Collana "Ricerche e studi territorialisti"

Building the Urban Bioregion

Governance scenarios for urban and territorial planning

Edited by
Anna Maria Colavitti and Sergio Serra

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RST

RICERCHE E STUDI TERRITORIALISTI

COLLANA DIRETTA DA
Filippo Schilleci

La Collana *Ricerche e Studi Territorialisti*, pubblicata dalla SdT Edizioni, nasce da una precisa volontà della Società dei territorialisti e delle territorialiste. Le ragioni che hanno portato a questa scelta sono molteplici.

In primo luogo poter pubblicizzare, attraverso una corretta diffusione, i lavori della SdT. Anche se di recente costituzione, la Società ha già avviato molti studi e prodotto materiali che nella maggioranza dei casi non hanno avuto, ancora, una adeguata divulgazione nonostante gli incontri, locali e nazionali, abbiano richiamato studiosi che, con le loro testimonianze, hanno dato un valido contributo al dibattito scientifico.

Un secondo punto è strettamente legato alla struttura stessa della SdT che ha un'anima composta da studiosi di molte discipline che lavorano congiuntamente per sviluppare un sistema complesso e integrato di scienze del territorio (urbanisti, architetti, designer, ecologi, geografi, antropologi, sociologi, storici, economisti, scienziati della terra, geofilosofi, agronomi, archeologi). Questo aspetto, come è chiaramente espresso nel Manifesto della Società, è un punto di forza su cui puntare per dare valore ai lavori che si portano avanti.

La collana non vuole essere una collana di settore, non vuole rappresentare il mezzo di espressione di un pensiero monodisciplinare. Al contrario, riprendendo un altro dei principi della Società, pone le sue basi sui molteplici approcci presenti nelle scienze del territorio, considerando il territorio stesso come bene comune nella sua identità storica, culturale, sociale, ambientale, produttiva.

I prodotti della collana saranno espressione, quindi, del progetto territorialista che, come più volte testimoniato, si occupa, in una società contemporanea fortemente deterritorializzante, di produrre valore aggiunto territoriale, attraverso forme di governo sociale per la produzione di territorio con la finalità di aumentare il benessere individuale e sociale di coloro che lo abitano, vi lavorano o lo percorrono. I contributi saranno, inoltre, testimonianza dei diversi ambiti di ricerca-azione che attraversano il vasto campo delle arti e delle scienze del territorio.

La collana, anche attraverso la composizione del suo Comitato Scientifico, farà dell'internazionalizzazione un altro dei suoi punti di forza. Ciò, non solo per dare respiro internazionale alla collana, ma anche per poter contare su apporti che non si limitino ad esperienze e a punti di vista nazionali - come del resto sta già avvenendo per la rivista - così da incrementare il dibattito transdisciplinare e transnazionale.

La collana, inoltre, utilizza una procedura di referaggio in double blind peer review avvalendosi di revisori scelti in base a specifiche competenze.

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Introduction

Anna Maria Colavitti, Sergio Serra

The urban bioregion is an alternative way of reading and planning local contexts, based on the recovery of the coevolutionary relationship between human settlements and territories in order to realise a self-sustainable and non-hierarchical system of urban and rural centers in balance with each other, according to Alberto Magnaghi's vision. Discussing the ways through which coevolution can be achieved helps us to reconstruct the historical relationships of balance between city and territory that have characterised in the past the existing regional and metropolitan contexts.

This idea, or rather this vision, starts from the workshop on "The Urban Bioregion. The idea, the project and future perspectives" which took place in Cagliari in 2017. It aimed at reasoning about the territorial and ecosystem relationships that have been established over time and have defined the local context of the City of Cagliari and its metropolitan area.

The reflections that emerged on that meeting allowed us to reflect on these relations and made proposals for the definition of development models for the Metropolitan City of Cagliari.

The workshop had involved researchers and students from the Department of Civil and Environmental Engineering and Architecture (DICAAR) of the University of Cagliari interacting with researchers and students from the Institut d'Aménagement de Tourisme et Urbanisme (IATU) of the Université Bordeaux-Montaigne, who had been conducting a research project on the urban bioregion of the Bordeaux metropolis since 2012.

Based on that initiative, which constituted the seminal framework for Sardinian bioregionalist discourse, our work culminated in a more extensive discussion among researchers from different European backgrounds who reasoned about the ways in which processes related to bioregionalism, looked at in a transdisciplinary way, can lead to interesting applications and analytical insights, not obvious, useful for reviewing and strengthening community self-organization and reflecting on the constitutive foundations of the relationship between communities and their territories.

The book is structured in the following parts:

- Section I. Theories, ideas, and forerunning experiences. Bioregional fundamentals as territorial development models;
- Section II. Projects. Bioregional good practices in Europe;
- Section III. New local approaches bioregional experiences in Sardinia region.

The cooperation between the French school of Bordeaux, the Tuscany school and the Cagliari school focuses on the balance relationships among city and territory and the conflicts resulting from the definition of several development models. The main idea that local project can be strengthened by the verification and inclusion, in the rational planning scheme, of the bioregion idea, has been the red line through the different contributions.

In the first section, the fundamentals theories and ideas on the concept of bioregion are explored and discussed, following the line firstly drawn by the Tuscany school. Different approaches and experimentations of the model in several regional contexts are also investigated, such as the Bordeaux and Sardinia regions. The section includes theoretical contributions from heterogeneous disciplinary fields, from urbanism to geography, from spatial planning to restoration and landscape design. This reflects the multidisciplinary nature of the bioregionalist approach.

The second section analyses some good practices concerning the application of the bioregionalist model in different European regions (Romania, France and Poland) and in the Italian context (for example Palermo in Sicily and the Central Tuscany).

The third section investigates the possible applications of the bioregionalist principles in the Sardinia region, focusing on a range of local contexts that extends from the metropolitan area of Cagliari to the low density population territories of Ogliastra and to small islands, such as San Pietro island.

This diversified framework of materials and references constitutes the common field of debate for the possible application of the bioregionalist model. The contributions discuss many issues related to the governance of metropolitan areas and the management of the urban-rural relationship with suggestions for the interpretation and project in a bioregionalist perspective, focusing on the themes of urban green, land vulnerability, agricultural supply chains in rural and peri-urban spaces, and new food economies in metropolitan areas. Particular attention is given to the integrated vision of protected areas as infrastructures of excellence for the ecological and environmental quality of metropolitan areas. Another important element concerns biospaces in consolidated historic contexts that manifest many critical issues in relation to the requalification project, with a specific focus on bio-microinterventions in historic built-up areas.

Several contributors reflect on possible governance scenarios in response to future strategic spatial decision-making, especially in the fringe areas between city and country, sometimes forgotten, where the bioregionalist model could provide revenge impulses and new planning visions.

The reported experiences, in some cases yet under implementation, are exemplificative of possible evolutionary frameworks for a new way of understanding the territory through the lens of the bioregion, with local development projects and innovative tools for the enhancement of the ideas of landscape and place.

Such experiments and reflections could result in a clear enrichment of the bioregionalist fields, while highlighting the discontinuities in current research and the different ways of work by local research groups.

The book allows an assessment of the cognitive and communicative possibilities of the descriptive categories and modes of representation that are used and, overall, it is able to give back some figures of the change taking place in bioregionalist practices extended to inter and multidisciplinary fields. The critical reflections, that emerge from the wide range of different approaches featured in the book, highlight "the good and the bad" of the bioregionalist model and its potential for innovating planning tools in the perspective of ecological transition.

SECTION I – THEORIES, IDEAS AND FORERUNNING EXPERIENCES

BIOREGIONAL FUNDAMENTALS AS TERRITORIAL DEVELOPMENT MODELS

The roots of the urban bioregion in the thinking of Patrick Geddes: from knowledge to citizens' involvement to build a new living[1]

Maria Rita Gisotti

Abstract

The urban bioregion model is deeply anchored in the Geddesian thought. In this contribution I will define those elements of Geddes thought that I consider fundamental for the definition of the bioregional approach: the (contextual) critique of a model of settlement and development, the personality of place as the foundation of self-sustainable development, an inter-connected and multi-disciplinary vision of the science of territory, real "eutopias" and the proactive role of the inhabitants in their construction. I will illustrate these four points and argue their links with bioregional approaches following the red thread mainly represented by Geddes' essays, referring in particular to "Cities in Evolution" and to the reports from India.

In the light of this reading, I will conclude this contribution through the identification of some possible progress to be made in the urban bioregionalism approach, in order to proceed on the path of action-research outlined by Geddes: a renewed consideration of the role of historical territorial heritages which "self-sustainability" should be read not only in environmental terms but also in economic and social ones; a new glance on the city, with particular reference to the built fabric of the entire city and, moreover, of that affected by marginalization process.

KEYWORDS: co-evolution, territorial belonging, personally of place, visual thinking

[1] I am very grateful to Ada Macchiarini Paba for giving me access to some of the volumes of the "Fondo Giancarlo Paba", even before its official opening within the Library of Scienze Tecnologiche of the University of Florence, which now hosts it. These texts have been essential to me in writing this contribution.

1. Introduction

The term bioregion appears in the American context in some texts produced by exponents of the ecological movement between the 1960' and 1970', such as Peter Berg, Judy Goldhaft, Gary Snyder (BERG, 2016, 10-11). For these authors, the bioregion is a geographic sphere endowed with specific physiographic features on which the anthropic component has grafted itself and developed a specific "consciousness" (*ivi*, 27) to inhabit it. In the 80', the bioregion is further specified by authors like Nancy Jack e John Todd and Kirkpatrick Sale as a "region governed by nature", while Murray Bookchin emphasises above all the character of self-governed community area.

However, the urban bioregion has its roots in a much older tradition that can find a particularly complete synthesis in the work of Patrick Geddes. His influence on the territorialist approach has been highlighted, among others[2], by Mike Small in an essay from 2007 dedicated to the legacy of Geddes in Cyprus, in Catalonia, Japan and Italy (SMALL, 2007). In Italy, Small writes, in the fields of architecture and urbanism, Alberto Magnaghi[3]embodies the figure in which this influence is most evident. The aspects of the territorialist approach which match better the Geddesian one are (SMALL, 2007, 50-51): the tension towards a planning theory based on the identity of places and on a model of "self-sustainable local development"; the individualization of social players to be mobilized (through interactive planning) as energies for the realisation of the above-mentioned model; the dialectic between local and global and between identity and differences in a rapidly evolving context. Mike Small references are mainly "The Urban Village" (MAGNAGHI, 2005) and the New Municipality Network (Rete del Nuovo Municipio), respectively a book and a collection of experiences in which the bioregionalist evolution of the territorialist approach is present *in nuce*.

Actually, the urban bioregion model is deeply anchored in the Geddesian thought (MAGNAGHI, 2020, 147, 151). In this contribution I will define those elementsof Geddes thought that I consider fundamental for the born of bioregional approach. They are:

- the (contextual) critique of a model of settlement and development;
- the personality of place as the foundation of self-sustainable development;
- an inter-connected and multi-disciplinary vision of the science of territory;

[2] On the topic of the Geddesian influence on the patrimonial and bioregional approach, please see PABA 2010, SARAGOSA 2005 and 2011, PAQUOT 2017, FANFANI, PERRONE 2019.

[3] The other two figures cited by Mike Small are Giancarlo De Carlo and Gian Carlo Magnoli (SMALL 2007, p.48).

- real "eutopias" and the proactive role of the inhabitants in their construction.

I will illustrate these four points and argue their links with bioregional approaches following the red thread mainly represented by Geddes' essays, referring in particular to "Cities in Evolution" and to the reports from India. In the light of this reading, I will conclude this contribution through the identification of some possible progress to be made in the urban bioregionalism approach, in order to proceed on the path of action-research outlined by Geddes.

2. The (contextual) critique of a model of settlement and development

The urban bioregion was born as an alternative model to the "eco-catastrophic planetary urbanism" one (MAGNAGHI, 2014, 40), based on the diffusion of disproportionated settlements compared to the corresponding agroforestry territory, products, and at the same time producers of delocalized economies, harmful to both the environment and the inhabitants. The bioregional spatial model assumes a radical change, not limited only to the spatial component but also involving economic and social change. This circularity between change in the settlement, production and social model is the first element of the urban bioregionalist approach that we can closely relate to the Geddesian vision.

Geddes' starting point for criticizing the settlement model of his time is, in fact, a contestation of its productive model: "we make it our prime endeavour to dig up coals, to run machinery, to produce cheap cotton, to clothe cheap people, to get up more coals, to run more machinery, and so on; and all this essentially towards 'extending markets'. The whole has been essentially organised upon a basis of 'primary poverty' and of 'secondary poverty'(GEDDES, 1915, 74). But these mechanisms, Geddes continues, do not bring with them the development of a "real wealth" (*ibid.*), which is reflected in appropriate cities and places. This is the model of the "Cacotopy", devoid of aesthetic quality due to its environmental and social malfunctioning, a typical product of the "Paleotechnic" era. Geddes calls for the transition to a new "Neotechnic" order firmly anchored in a progressive vision (which technological advances themselves will contribute to create). This new order will allow the preservation of resources, instead of their dissipation, and the construction of a better living environment.

Geddes' posture is therefore highly political as it cannot disregard structural factors underlying a specific spatial model. To some extent, he could also be

considered as belonging to that "urbanism without a model" codified by Francoise Choay (CHOAY, 1965) and which included radically political figures such as Marx ed Engels"[4]: it was useless and impossible for them to propose a model for the physical re-organization of the city since only the proletarian revolution could lay new foundations for the construction of a new city. However, Patrick Geddes' political approach clearly shows the influence of other important exponents of the anarchist current of his time: Peter Kropotkin, closer to Geddes in his libertarian spirit compared to the authoritarian Marx (as per Lewis Mumford's observation, 1947, p. 12), amongst the first, and Elisée Reclus, who both took part in the Edinburgh Summer Schools (MACLEAN, 2004, 93; MACDONALD, 2004, 76).

Which settlement scenario arises from such a strong contestation of the industrial (for Geddes) and neoliberal (for the urban bioregionalist approach) models of development? A new city capable of re-establishing that condition of "contact and co-operation" (GEDDES, 1947, 28) with the rural world around which has constituted, since its origins, a founding element of the urban condition: this was the case in the Greek city as "cultural centre of the rural life of the City State" (*ibid.*); this was also the case in the Roman city which included the *Pagus*. In the city re-founded according to the principles of a new neo-technical era, it is therefore necessary to re-create such "reunion of town and country" (*ibid.*) (a reunion that the garden village model only dimly manages to imitate), within a city region articulated in a polycentric way.

For Geddes, decentralization is a crucial issue, because it makes it possible not to go beyond the dimensional threshold appropriate to the proper functioning of the territorial system. Large cities concentrate population, food, and power at the expense of their provincial areas, which are increasingly impoverished by this continuous drainage. One of the objectives of the regional survey will be to re-compose this complexity and complementarity between urban settlements and territory of reference. The bioregional scenario is also clearly polycentric, since it is a territorial system characterized by the presence of urban and rural centres organized in a reticular manner in dynamic balance with the territorial context (MAGNAGHI, 2014, 82). The polycentric settlement system and the network of non-artificialized spaces thus constitute the organizational pivots of the urban bioregion.

[4] However, Choay positions Geddes within that humanist current (called "Anthropopolis") which represents an evolution of the culturalist current.

3. The personality of place as the basis of self-sustainable local development

Project-based valorisation of territorial assets is the basis of the bioregional scenario. Indeed, the rules of environmental wisdom are implicit in every place shaped by the co-evolutionary interaction between man and nature and can act as the "cognitive foundations" of the bioregion (MAGNAGHI, 2014, 91). These rules are particularly evident on the regional scale where hydrographic and geo-morphological features play a crucial role through the conditioning of the territory structure. Without running into deterministic interpretations, we can frequently observe how, in Tuscany for instance, the most stable soils host the villages that have structured the settlement system throughout history (except for exceptions such as settlements founded in relation to strategic needs as the peri-fluvial or coastal ones); the soils more suited to agriculture experience the development of intense and stratified works of modelling of the slopes, while those more sloping and difficult to work are left to natural vegetation. Territorial structures produced through the co-evolution between anthropic choice and initial environment conditions vary first and foremost in relation to the variation of the latter, as well as in relation to the historical and political events of that particular environment.

The second fundamental element of the bioregional approach inherited from Geddes lies therefore in the recognition of this correlation between anthropic and natural component, which gives rise to specific identities, creating the deep structure of territory. As per Geddes' quote: "settlements of men, from small to great, as initially determined by their immediate environment; and though thence extending into larger and larger towns and cities, yet retaining profoundly, even if obscurely, much of their initial regional character" (GEDDES, 1915, 280). In bioregional terms, such uniqueness can be understood as the territorial heritage of each built environment, a heritage composed of the structures sedimented by co-evolution and that gives birth to a true and proper "personality" of the place (MAGNAGHI, 2000). In this regard, when continuing the parallelism with Geddes' thinking, we cannot fail to recall how for these "each place has a true personality; and with this shows some unique elements a personality too much asleep it may be, but which it is the task of the planner, as masterartist, to awaken" (GEDDES, 1915, 397)[5].

[5] Hence, the criticism of any attempt of standardized planningaimed at proposing valid settlement models independently from considering the context and its specificities (and that seems primarily addressed to the functionalist/progressist current of urbanism).

Which operational consequences can be drawn from this conceptualization? This is how the idea of planning is expressed: "on pain of economicwaste, of practical failure no less than of artisticfutility, and even worse, each true design, each validscheme should and must embody the full utilisationof its local and regional conditions and be the expressionof local and of regional personality" (GEDDES, 1915, 396-397). Only in this way it will become possible to escape from the perversely recursive mechanisms of the paleothechnics era and enter the neo-technical one in which "each leaves the land better than he found it; and so, in every way helps to make the nation's fortune, and this at its best, place and people together" (GEDDES, 1915, 384). Geddes expresses with great foreshadowing ability an approach that we could define as proto-ecological, in which the city is "like a living being, in constant relation to itsenvironment, and with the advantages of this, itslimitations too. Like the living being it is, a cityreacts upon its environment, and in ever-wideningcircles" (GEDDES, 1915, 264). The personality of the place is therefore not an abstract concept but the matrix of a development that today we would call self-sustainable, i.e., able to regulate itself on a local basis.

The description and understanding of such personality, territorial heritage (in the bioregional sense) must therefore be the first task to be carried out in a planning process. To this end, Geddes mobilizes a series of investigative devices. One of the best known, because of its ability to capture the complex relationship between physical, anthropic, and social components (summarized in the triad place/work/folk), is the valley section. The valley section can be fully considered "an evolutionary diagram, a visual *longue durée*" (MACLEAN, 2004, 90). In fact, following the course of a river – a geographical entity that Geddes regards as "the essential unit for the student of cities and civilisations" (Geddes cit. in WELTER, 2002, 61)[6] – it is possible to fully grasp the co-evolution between the three components represented by the physical environment, anthropic occupations, and settlements. It is no coincidence that, under the stain glass panel depicting the valley section of Edinburgh Outlook Tower, Geddes has the following engraving written: "*Microcosmos Naturae. Sedes Hominum. Theatrum Historiae. Eutopia Futuris*" (MACDONALD, 2004, 74), demonstrating that it is in the personality of the place (given precisely by the relationship between nature and culture mediated by history) that the real utopia of the future can be found.

Through the valley section, Geddes profoundly renews regionalism, until then "an archaic and backward-looking movement, following the patter of nationalism, and paying more attention to a static and isolationist conception of

[6] In this aspect we can see the clear influence on Geddes by Elisée Reclus with his *Histoire d'un ruisseau* (1869).

the local community" (MUMFORD, 1947, 8). With the valley section, regional studies take on a dynamic meaning, aimed at investigating the constant interaction between man and the environment and the physical signs deposited by it (FERRETTI, 2010, 192; LEONARD, 2000, 80). Similarly, in the urban bioregion, administrative boundaries are overstepped by a reading that crosses physiography and anthropization in a co-evolutionary key. The identification of these boundaries is a fundamental part of the bioregional investigative work as it relates to the closing of water, waste, food, and energy cycles. In this area, too, the legacy of Geddesian research is particularly significant, as we will see in the next section.

4. An interconnected vision of "territorial sciences"

The concept of urban bioregion as a complex territorial system in which physiographic, settlement, economic, social aspects are intertwined, brings with it the need to recompose this wide range of knowledge inside the "territorial sciences". The aim is to produce an integrated approach both in the analytical-interpretative phase and in the planning phase, as has been done in the maps and the atlases of heritage produced in many action-research experiences of the territorialist school. We come then to a third key point in which Patrick Geddes' influence on the urban bioregionalist approach is clear: the projection of a synoptic vision able to "recognise and utilise all points of view" (GEDDES, 1915, 320) recomposing "scientifics" and "artistics" (*ibid.*) aspects in the reading of the evolutionary trajectory of the city, including both its history and its "futures possibilities" (*ibid.*).

To explain this principle, not only on the academic level but making it an integral part of the educational experience of citizens, Geddes elaborates a device that is at the same time analytical, heuristic, and didactic: The Outlook Tower. This ancient building located in the historic centre of Edinburgh is re-worked by Geddes to make it the materialization of a pedagogical and interactive itinerary, accessible from its highest floor (PABA, 2013): the *camera obscura*, which was meant to offer the opportunity to grasp with the naked eye the unity of the city and of its territorial surroundings. The visit of the five floors below was downhill, proceeding from the local (Edinburgh) to the global ("the world"), encountering very heterogeneous materials: as Kenneth Maclean observed, "maps, photographs, paintings, diagrams and panoramas – all were grist to his mill of visual thinking that blended art and science and formed an integral part of his educational approach to regional survey" (MACLEAN, 2004, 89). The

Outlook Tower, like the valley section, can be considered as a genuine "visual teaching tool" (*ibid.*), part of the "gaze education" project (FERRARO, 2002) in which Geddes' entire action-research is included.

This centrality of the "glance", of visual understanding and communication through diagrams, schemes, maps, makes it possible to synthesize something that until then had been the prerogative of single disciplines, of compartmentalized knowledges. It opens a holistic and generalistic (MACDONALD, 2000, 58) perspective that Geddes himself explains, many times, in various writings, as in this passage of a letter to Lewis Mumford of 1930: "my squares are not to confine the world into my categories as some think; they are so many windowpanes for looking out into the world movement (or sometimes like spectrum analysis of complex radiations)" (GEDDES, MUMFORD, 1995, 301). There is another aspect to underline in the centrality of the Geddesian aesthetic dimension: the fact that this is not only a heuristic and didactic instrument, but it is also an opportunity to verify the good "functioning" of things. A certain aesthetic adequacy is also the expression of good evolution and development of places, as of every living organism, as the biologist Geddes well knows. In this perspective, the failure of a certain type of planning is also an "aesthetic failure" (GEDDES, 1947, 26): it is due to the "lack of harmony between the advancing phases of western science" (*ibid.*), which fir this reason, does not produce integrated knowledge and action. The good plan, in order not to flatter itself on a merely technical operation (GEDDES, 1915, 34), must therefore start from the production of knowledge, from a survey that includes all the fields of analysis of the city, in the past and in the present ("situation, topography, and natural advantages", "means of communication", "industries, manufactures, and commerce", "population", "town conditions", GEDDES, 1915, 356) in order to get to the possible city of the future. To all these specialized fields shall be added an indispensable dimension of investigation, that of "civics" and sociology, in order to obtain the city's "veritable epic" (GEDDES, 1915, 359).

5. Real eutopias and the role of the inhabitants in their construction

The urban bioregion is a collective construction. Expert knowledge and contextual knowledge cooperate and intertwine to establish a new model of knowledge and planning. At the same time, it works for a re-appropriation of the dimension of self-government by local societies because the empowerment of the inhabitants-producers of the territory is considered one of the pre-conditions for the local project. The participation of the inhabitants in founding

the bioregion is therefore implemented on two intersection levels of competence regarding the management of places and their political legitimacy. It is no coincidence that, since the 90', many research experiences which developed within the territorialist schoolhave involved the development of urban planning tools and a strong participatory character. This is the last point we want to highlight in our reading path of Geddesian urban bioregionalist approach: the development of the "consciousness of place" (MAGNAGHI, 2000) which is a basic condition for the local project.

For Geddes, the starting point is once again, the conception of the city as an evolutionary organism in which two components converge, the physical and the social, with specific characteristics that depend on the personality of the place. Therefore, "such regeneration is not merely nor ultimately geographic alone: it is human and social also" (GEDDES, 1915, 400). The understanding and appreciation of this link between the physical and the social body of the city is the source of some of Patrick Geddes' most effective design solutions, such as those for Indian cities. Take, for example, the Garden Village in Indore: here, instead of building a western-type sewage, Geddes had a central spine of gardens and vegetable gardens of shared management, fertilized according to the "everything to the soil" (FERRARO, 1998, 188), which is culturally and historically part of the Indian tradition. The inhabitants of the houses facing the central spine will, on the one hand, ensure the management of the gardens and, on the other hand, will be able to use their produce.

Something similar is done for the recovery of the sacred pools of Balrampur, potential malarial hotbeds to be drained, for conventional planning. Geddes, on the other hand, grasps their multi-functional value (regulation of the level of the hydrographic network, irrigation, air cooling). He proposes, therefore, that the inhabitants should carry out active maintenance of the pools, including the breeding of ducks and fish (which feed on malarial mosquitoes) which they can partially use, and the use of muds to fertilize the gardens. In one of the reports on the Indian towns, Geddes writes that "town planning is not mere place-planning, nor even work-planning. If it is to be successful it must be folk planning" (GEDDES, 1947, 22).

How to reach the construction of this "Eutopia" that "lies in the city around us; and it must be planned and realised, here or nowhere, by us as its citizens each a citizen of both the actual and the ideal city seen increasingly as one"? (GEDDES, 1915, vii). Starting with knowledge. It is through a profound understanding of the evolving organism that is the city that a sense of authentic citizenship can be founded. It is by means of the regional survey that true geographical citizenship can be constructed, where the term citizenship is

referred not only to the urban dimension but, once again, also to the regional one. To understand this concept, we must go back to the idea of the region as a polycentric organism, in which the urban and rural dimension play complementary and subsidiary roles. In this perspective, as David Matless has observed "the region should be understood as a scale of citizenship devised with a particular scheme of civilisation in mind, with the rural and urban upheld as distinct ways of life and poles of thought whose distinctive virtues might be allied" (MATLESS, 2000, 92). Knowledge and belonging thus develop of equals in a transcalar dimension.

6. Pursuing Geddes' path further

At the end of this reading, in which we have highlighted four links between the urban bioregionalist approach and Geddesian thought, I would like to propose a concluding reflexion on two further aspects on Patrick Geddes' work that should be enhanced. The first regards the relationship with history. Even though for Geddes, as we have seen, the lesson of History plays a predominant role in orienting the planning options for the city or region, his approach remains always strongly progressive, also supported by a profound faith in the possibilities of technology. He has a dynamic conception of history (deriving first and foremost from his training as a biologist and scholar of evolution) which does not produce idealized visions of the past. As Lewis Mumford observed, the interest and the "respect" of Geddes for the roots of regional culture, meant that he didn't limited its expression to some historical moment: "if the roots were alive, they would keep on putting forth new shoots, and it was in the new shoots that he was interested" (MUMFORD, 1947, 8). I believe that even inthe bioregionalist approach it is essential not to run into visions that crystallize heritage (and with it the communities that produce it) to a given point in history. We may keep in mind, above all, that the "self-sustainability" of certain historical territorial heritages should be read not only in environmental terms but also in economic and social terms, with a particular focus on issues such as spatial justice and gender perspective. Once again, we borrow Geddes' beautiful words on the role of town planning, that "is to find the right places for each sort of people; places where they will really flourish" (GEDDES, 1947, 22).

The second point that I would like to emphasize may represent an axis of action-research to be increased in the bioregional approach: the intervention on an urban scale. Geddes, well before others, promoted an approach to urban regeneration that was opposed to the conventional Western one of his time. As

it is well-known, especially in India, he was able to intervene with the method of the conservative surgery, working with tactical actions, without upsetting the pre-existing tissues but supporting the re-generation project on the enhancement of their public places, their collective values (including symbolic ones), increasing, in this way, the participation and protagonism of citizens into the project. Geddes uses, in this regard, the metaphor of the city plan "as a great chessboard on which the manifold game of life is an active progress" (GEDDES, 1947, 27): this means that, in planning, as in chess, a strategy that faced with difficulties, makes a *tabula rasa* is less economical and less interesting than, even aesthetically, than one that turn existing difficulties into opportunities. I believe that the approach to re-building the city that is part of the model of the urban bioregion must incorporate a leap in scale as well as an analytical and design consideration of the existing built fabric of the entire city, especially of those marginalized in various ways (whether in the suburbs or in the historic centres). As Geddes wrote from India: "we must constantly keep in view the whole city, old and new alike in all its aspects and at all its levels" (GEDDES, 1947, 26) because the city – and the Indian city proves it par excellence – "form an inseparably interwoven structure" (*ivi*, 27).

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Biomimicry as a tool for territorial planning

Matteo Trincas

Abstract

Looking at Nature and seek for inspiration and mimicking behaviors to solve practical problems has a quite long tradition in human history of technology. But such approach has been formally decrypted and found itself as a theoretical based field of study in late 1990s and named biomimicry.

It relieson analytical, multidisciplinary observation and reproduction of natural processes to bring out new solutions whose applications are already widely in use in various fields of manufacturing. But the higher challenge is based on the implementation of this approach in territorial governance.

Last decades showed dramatically how our way of settle and exploit land is quickly pushing our communities, cities and territories to disruption while irreparably compromising the environment. There's perhaps a chance to treat our built landscape and our communities as human ecosystems and try to embed some techniques borrowed by biomimicry trying to apply them to planning issues. Since at least two decades scholars, especially in Europe, already defined an environmental space functional to a specific settled human community as bioregion.

Biomimicry, so, seems to be the best way to find and establish a set of good practices and protocols to develop new tools and policies suitable for bioregion planning approach. But to test this possible and innovative planning process it is firstly needed to define what human ecosystems are, considering that they are driven not only by material constraints. Cultural and social resources, relationships and assets are fundamental features of human ecosystems.

Sardinia is an island large enough, environmentally varied enough and obviously a quite closed system limited by the sea. Its Regional Plan pioneered the concept that landscape is a "product" made by environmental constraints and community embedded in a mutual balance.

Geographical, social, demographical and cultural features make it a good experimental field for bimomicry approach on planning issues.

KEYWORDS: biomimicry, planning, bioregion, Sardinia

1. Fit in the place we belong to: biomimicry techniques and the behavior of human ecosystems

The last few decades have dramatically highlighted how fragile and unjustified was our illusion of a full control over the environment we live in.

Damages and degradation we have caused to the natural systems we dwell have finally shown how much we depend on them to support our basic needs and have made it clear that anthropic space is unequivocally not just an external user of the land where it is settled but instead an active component of an ecosystem.

The illusion of control is very strong, especially in urban environment. That's because it is the man-made space in which the adaptability of the human species within a given environment is most exhibited, achieved thanks to the deployment of multiple and complex technologies, something we may refer to as 'prosthesis' (MAGNAGHI, 1998).

Yet this adaptation and prosperity entail the almost total extraneousness to the real physical space in which the community flourishes. Human communities create an ecosystem that is largely artificial and whose control and homeostasis require a waste of energy and resources which, according to current conditions, is clearly unsustainable.

The built environment that we consider our safe space of artificial comforts is now increasingly endangered by the deterioration of the cycles related to the consumption and regeneration of water, energy, air quality as well as by disastrous events that show up most and most frequently.

This awareness has resulted in numerous new studies and policies that tend to incorporate the knowledge of the natural sciences, ecology and biology into the most consolidated and still largely functionalist planning practices (KELLERT ET AL., 2011; NDUBISI, 2014).

The hope is that this commitment is not already irremediably late.

These last years have sanctioned a sudden realization of how much even remote events may affect our lives at a global scale and how every single territory is closely and widely interconnected in spite of all appearances: there's not a vulnerability remote enough not to involveglobal consequences.

So, finally if the evidence of facts has proved the well-known aphorism of Edward Lorenz about the fluttering of a butterfly's wings capable to cause a hurricane on the other side of the world, planning science and techniques that are to come will require an unprecedented breadth of skills and extraordinary agility of movement on multiple and different scales.

Among the possible strategies to be used biomimicry is under the spotlight and it rises the attention of the scientific community. If we have to define it shortly, biomimicry consists of borrowing behaviors observed in the wildlife and nature and convert them in protocols to be applied to optimize human activities.

Conceptualized in the late 1990s and at that time already widely used in the study of industrial products and processes, it is now maturing its theoretical ground and ready to be applied at the highest level of its potential: the management of complex systems.

The research of biomimetic techniques can obviate the dependence of the stability of human communities and activities on those we already named as "technological prostheses".

Biomimicry introduces planning operated through networks (ZARI, 2007), mutual exchange and mutual utility between anthropic space and natural environment, almost making true a visionary premonition stated by Ebenezer Howard who, at the beginning of the twentieth century, proclaimed the city as product of the earth and a natural fact (TAYLOR BUCK, 2017).

Times are ready to accept as valid the thesis that territory, settlement, environment and human ecosystem all together form a single and articulated entity that requires integrated government actions.

It is now necessary to define which are the most suitable tools to be used to develop these actions.

Biomimicry can be one of them, passing from being just a metaphor to become a methodologically accomplished technical protocol and probably a tool capable of designing a totally new concept of anthropic space.

The theory that describes the evolution of ecosystems and their demographic dynamics is based on two strategies called "r" and "K" by MacArthur and Wilson who proposed it in the 1960s.

The "r" strategy is essentially based on the reproductive capacity of the species: population development has a high degree of adherence to the environmental bearing capacity, or essentially the ability of the environment to provide ready resources.

The species adopting the "r" strategy take possession of the ecosystem very quickly but in an ephemeral way. The multiplication of individuals very quickly reach the threshold of bearing capacity mentioned above, opening crises that lead to a rapid substitution of the dominant species with a new antagonist who has not yet reached the tipping point.

The species that adopt this strategy are characteristic of ecosystems that have just formed in a "virgin" territory, for example after a disastrous event such as a fire.

By the other hand there are species that apply the so-called "K" strategy characterized by a much slower demographic growth and which are not subject to those sudden crises typical of the species that prefer the "r" strategy.

When the environmental bearing capacity is reached the population parameters stabilize.

The species that adopt this strategy are the most evolved, with a longer lifespan, at the top of the food chains and are a symptom of a balanced ecosystem that has reached maturity (BARRETT, ODUM, 1987). Great forests are an example of this. The human species represents an anomaly: while obviously applying the "K" strategy, it has behaviors regarding the voracity of resources very similar to the "r" strategy species and in addition to these it is extremely aggressive and unscrupulous in obtaining them from other ecosystems even up to their complete destruction.

But considering that we populate a finite physical environment, we are facing a crisis very similar to those that bring the ephemeral species of "r" strategy to an end. Biomimicry can be a way forward to identify methods and policies valuable to correct our behaviors, as well at a global scale and at a local level.

Janine Benyus (1997) has the merit of giving a formal definition of a design approach that in some way has always been a resource since remote ages. But only the help of powerful computers has made it possible to explore analytically: learn from processes and behaviors observed in nature and essentially copy them. The relationship of human beings with natural resources has therefore evolved through three phases of technical capacity: bio-use which involves the collection of the resource exactly as found available in nature; bioassistance, which for example involves the domestication of some animals to derive a specific resource, and finally the most advanced phase, which is precisely defined as biomimicry, a holistic approach that allows not to design with nature but rather to design like nature (BAUMEISTER, 2013).

If her first book at the end of the nineties was largely focused on industrial design, just over ten years later Jeanine Benyus states that the technique is ready to aspire to an upgrade in scale and that "the built environment is the most fertile ground for biomimicry" (quoted in KLEIN, 2009).

2. A new set of planning tools

There's not yet a research protocol about biomicry, especially in its applications to territorial policies, as it is still an emerging sector. Even if, in these last years, International Organization for Standardization started a formal

definition process releasing ISO 18458 (on the terminology, concepts, and methodology) and ISO 18459 (biomimetic optimization).

Very often the most common approach is the simply scan of the bioscience literature to find out functional analogies that might be useful to designers. This kept the field of biomimicry exclusively in the realm of empirical observation and searching for design inspiration as an exercise of "bioprospecting".

Talking about territorial policies this approach is a wonderful start but it's still only the beginning of a most articulated theoretical revolution. The problem is that we still look for solutions to mitigate the effects of environmental constraints where we should start using those constraints to our benefit.

In fact, there are very few examples of urban biomimicry found in the literature and all of them give answers to individual concrete problems related to making a certain use of resources "sustainable" (such as water recycling, or soil erosion). No one has yet dealt with issues of integral governance of a territory, also considering it as a product of the cultural interaction between the settled community and the environment.

There are different scales of biomimicry: surface, background and ecosystem.

Surface biomimicry consists in reproducing the shape, aesthetics or behaviors and gestures of observed organisms.

It is a precise observation with purposes related to individual material and structural characteristics of an object, such as the reproduction of the cells of the hives to create resistant and light materials or the aero and fluid dynamic shapes of some vehicles.

Background biomimicry focuses on the processes, mechanisms and functioning of organisms. Quite often surface and background biomimicry are closely related as one is the direct phenotype of the other.

The most obvious application of biomimicry lies in the optimization of very expensive traditional industrial processes trying to implement them with similar high efficiency processes developed in nature.

But the most complex degree, and of course the most interesting and significant to our field of application, is ecosystemic biomimicry.

Ecosystems are made up of interactions of all kinds, such as symbiosis or the sharing of a territory by several species. They are relationships essentially based on flows of energy, information or matter between the components of the system allowing everyone to be dynamically stable (resilience) and to persist in the environment.

Applied to community functioning, these flow and exchange models are widely profitable because they do not require the application of special technologies but mainly concern an organizational and non-technological level.

According to the OECD[1], this is the potentially most important level of intervention to reduce the ecological impact of human activities on the territory.

The "technologies of biology" (BAUMEISTER, 2013), or natural processes, are based on the transformation of energy by minimizing its qualitative decay, on the internal containment of excesses, on the reuse of each offshoot and on self-repair (QUINN, GAUGHRAN, 2010).

Biosphere privileges short and very rapid circuits of transformation of matter: a similar principle, applied to human needs implies, for example, the study of production and consumption chains in which for each waste generated there is a candidate sub-process to usefully exploit it or to use degraded energy coming from any other use.

This does not apply purely to material goods but also to services, just like in many cases of symbiosis in nature.

For this purpose, obviously, a great diversity of species is useful or in the case of application to an anthropized territory we will talk about economic or social actors.

This diversity entails a multiplication of capacities and needs that favors a full exploit of all the products and sub-products.

Precisely for this reason an ecosystem is closely linked to a specific region (or "bioregion" as we refer to in territorial science) (MAGNAGHI, 2014); the local supply of resources offers multiple environmental, economic and social advantages and the ability to close production-consumption-reuse cycles within a well-defined area is a symptom of balance and health of the territory itself.

As we already said pioneer ecosystems, which generally correspond to the early stage of mature ecosystems, are those that consume large quantities of resources to settle rapidly. In nature, pioneer ecosystems spend a lot of energy on growth regardless of the effectiveness of their functioning. In the same way they produce a lot of waste, preferring quantity to quality.

The species associated with type I ecosystems do not reside in the territory for long times because they are rapidly replaced by new transient colonies.

With each wave of colonization, some species remain; that's because they have begun to optimize their stay on that site and the new species that arrive adapt to an already partially modified environment. At each colonization cycle,

[1] The Organisation for Economic Co-operation and Development is an intergovernmental economic organisation with 37 member countries founded in 1961 to stimulate economic progress and world trade. It is a forum of countries describing themselves as committed to democracy and the market economy, providing a platform to compare policy experiences, seek answers to common problems, identify good practices and coordinate domestic and international policies of its members. The OECD is an official United Nations observer.

the chain will continue until stabilization in terms of quantity and quality of the species, promoting relations of symbiosis and mutuality.

The diversification of trophic networks is maximum and the ability to regulate environmental fluctuations is greater than that of all the other species previously appeared.

In the mature phase, population growth has slowed down, the systems are highly effective and with a high recycling rate of each resource.

A mature ecosystem, so, will be the theoretical model that best responds to the stresses and requests related to the development, functioning and quality of life in management at a territorial scale, ensuring that the anthropic environment not only imitates the biology of the ecosystem that contains it but makes it participating in its homeostasis.

Biomimicry offers an innovative perspective addressing issues related to sustainability and involves a deep change of view from the most established paradigms.

"Traditional" sustainable planning provides for the mitigation of the negative implications of human activity. Biomimicry, instead, points to ensure that these implications may have an active role in the ecosystem activity chain.

So the territory assumed as experimental field for biomimicry inspired planning policies must behave as a potential mature ecosystem: it must have a quite large variety of landscape, resources, human activities and good chances of contact, permeability and exchange within and outside the ecosystem.

In natural ecosystems there are three major classes of actors: Producers (usually green plants capable of producing oxygen and basic nutrition as they are the only ones able to transform solar energy into products accessible to the rest of the food chain that follows them); consumers (e.g. animals, including humans); the reducers (which reduce the material to make it useful again for producers and start the cycle again).

It is important to note that there is always a contribution from the outside that only a class of actors is ableto capture and process to make it available to others and then a recirculation of matter.

The characteristic and distinctive element of human ecosystems is that they contain not only flows of matter but also relations and technical / cultural flows (GELLER, GLUCKLICH, 2012).

An indication of the degree of "maturity" of the ecosystemis the ability to close the circles of consumption by producing the least amount of waste possible, working on opportunity of transformation of resources and introducing new possible symbionts as well.

For instance, the ability to use energy in all its form as it decays in quality (from solar energy to low-temperature heat) is another significant maturity index of biological ecosystems.

That's why for human ecosystems maturity does not lie in the flow but instead in the ability to create a structure, a network and to transform the incoming resources, be they material or cultural resources

3. Sardinia as a laboratory

Sardinia, considered its geographical circumscription and the great variety of landscape, is a very appropriate candidate for the trial of biomimetic and eco-systemic approach to the study of its critical issues and possible identification of future planning solutions and innovative strategies.

The great diversity of biotypes follows a very articulated configuration of the territory that spans from the alluvial plain to the mountains, from the lagoon to the dense and compact forest. Human footprint and the so called "anthropogenic pressure", by other hand, are mainly concentrated on the south and north cape and the most densely populated areas coincide with the corridor of the wide plain that crosses the island while mountain massifs occupy the entire eastern part of the island.

The distribution of the population is essentially tripolar oriented towards the areas of Sassari to the northwest, Olbia to the northeast and, with a large concentration gathering about one third of the inhabitants of the island, Cagliari to the south.

Even among these three areas, however, there are functional differences and inequalitiesdue to the nature of the territory and the vocation assumed over time.

Campidano, which is for instance the wide plain mentioned above, is the most intensely man-made area in which is settled most of the population with the higher density (122.74 inhabitants/km2 against 69 of the island average). It is also combined with the greatest number of economic activities.

The anthropogenic pressure drops drastically even in the other two major poles. In Olbia area, despite the density featuring the town itself, human footprint it's quite lower than in areas with a much smaller population and it's mostly oriented to the coastline.

The area of Olbia and Gallura, owe their development especially to tourism and port and airport activities, while other industrial activities are negligible, and agriculture is also a limited sector.

It has configured itself mostly as an infrastructural pole that serve as gateway for the inner part of Sardinia but doesn't really mutually cooperate with the background land. That's why the apparent contained anthropogenic pressure observed on the northeast sector of the island, therefore, is contrasted by data showing substantial higher goods import index and waste production of the whole island.

Even biological systems have such kind of exchange and contact points with the outer and neighboring ecosystems, that's because external outputs are obviously and always needed, especially energy.

But unlike our infrastructural poles, that in most cases become just pass-through points, those we may call "boundary ecosystems" are actively employed in life cycle.

Sun energy, for example, coming from outside is caught and transformed (mainly through plants) and made available for the internal cycles of the ecosystem and then partially returned to the biosphere.

So, consider infrastructural nodes and borders as biological exchange surfaces may represent interesting comparative parallel.

Back to our territorial functional analysis we can observe that for Sardinia the exchange area with the outer world coincides generically with the coast and more precisely with the infrastructural nodes mentioned above. But unlike biological systems this external area and its infrastructure lack of permeability to the inner land.

Coast and urban poles drain resources and refer themselves to the external world in a self-referential way. A balanced ecosystems model, instead, would consider hinterland in a symbiotic process to complete and sustain the coast role, working actively to close the loop of transformation of resources coming from outside, both material and immaterial resources.

It is important on this purpose to point out how in human ecosystemexchanges are not only made of material goods but even of information and cultural streams.

Infrastructural poles donot only have the function of exchanging, goods and consumer products of agriculture and industry, but above all they are the main spots capable of regulating the techno/cultural flowswith other neighboring or even far human ecosystems.

Nowadays, through the internet, it is quite simple for everyone to access information, entertainment or even the most advanced research products. But not to reduce this opportunity to a mere passive consumption, physical places are needed in which to develop inputs into refined cultural productsand exchange with the outside generates.

Let's say that we may consider the island like a cell whose membrane is generically permeable to exchanges with the outside, but in order to allow access to some large molecules needed for its functioning they must necessarily pass through some gates controlled by specialized proteins placed punctually on the surface.

In the same way, the information network makes us all permeable to a certain class of cultural and technical-scientific intangible assets, but some privileged access points are needed, such as universities, in which the synthesis of intangible assets makes a qualitative upgrade.

Insularity has always been an obvious problem for Sardinia, but we are facing what we may call the 'age of immaterial', we need less and less goods but we are great consumers of information, science, technology and culture.

But his could lead to the strong temptation to turn their backs to the territory and concentrate totally on exchanges with the outer world. Which is exactly the problem Sardinia faces, with high rates of dependency from imported goods and even food.

It is quite strange that such a small population in such a big and fertile land needs to import such a big amount of its needs. That's because of the centripetal action of urban poles (which, actually, is a common problem quite all over Europe) attract resources, high rank services and leave the outback deprived of every possible function. This dangerous drift condemned both inland and coast and cities respectively to abandon and external dependence with subsequent fragility to economic and climate shocks.

It doesn't really mean that inland areas must necessary be configured as rural areas; but for sure it means that we have lost the network of communities that kept territory under control, whose life was balanced and adherent to their embedding environment.

Refunctionalize the whole network of settled communities should be a priority because they are the closest example of mature ecosystems we may claim. About this subject we may say that the greatest record achieved in last decades on planning policies has been, no doubts, the introduction of territorial and landscape planning as referring tool. The fundamental statement about this planning approach is that landscape is not actually a given environment but, instead, a product of mutual interaction between nature and human community. The ultimate goal is "to preserve, protect, enhance and transmit to future generations the environmental, historical, cultural and built identity of the Sardinian territory; protect the cultural and natural landscape and its biodiversity; promote forms of sustainable development, in order to preserve and improve its qualities".

This kind of statements in some way underlay that the opportunities for a community to prosper are really tightly related to the land in which the community itself is embedded. So, it is what we previously called an 'human ecosystem'. And more: there's a teaching in the historical way people settled in that land (PAZZAGLI, 2021).

Sardinia still have a strong link between community and territory, almost merged in a single entity, as some still existing customs testify, like 'common lands' publicly owned. There are quite interesting experiences and attempts to plan such a network, even thanks to the visionary and brave contribution of Adriano Olivetti and his Movimento di Comunità (COLAVITTI, TRINCAS 2014).

The Piano Paesaggistico Regionale, or the superordinateand main tool to every local plan is still incomplete and, once again, does not apply to the inland (not yet at least).

Up to now conservation and development criteria were established considering landscape elements and settled community as reciprocally shaped, defining what we commonly refer to as "identity factors".

So actually, we recognize interdependence between land and community but perhaps the time has come to consider the even network as design constraint; to plan a single large program that attributes a specific role and drive skills expressed by each single territory into a common framework of mutual benefit and value. To treat it as an effective human ecosystem.

4. Summarizing issues and potentials

According to the Biomimicry Institute definition, biomimicry is"an approach to innovation that seeks sustainable solutions to human challenges by emulating nature's time-tested patterns and strategies. The goal is to create products, processes, and policies - new ways of living - that are well-adapted to life on earth over the long haul."

The concept of biomimicry, so, is based on a key idea: nature always operates on the principles of economy and efficiency. Biomimetic vision is part of a global strategy of responsible and sustainable development that aims to balance the way the planet's resources are used and human communities settle into a territory, making biomimicry a perfect, powerful tool in regional studies and planning.

Bioregionalism as conceived in the last decades is exactly the field of studies fitting for developing biomimetic approaches.

It's focus on enabling human communities to live, produce and interact sustainably within a dynamic web of life involve a fundamental scientific assumption: humanbeings aresocial animals, and they participate in an ecosystem.

There's not yet any organic and organized approach trying to embed these principles into an urban or regional plan, but Sardinia, whose Regional Plan pioneered the concept that landscape is a "product" made by environmental constraints and community embedded in a mutual balance, has a special chance to experiment these brand-new tools. Since this Regional plan is limited, up to now, to coastal areas, next years will be crucial to complete, and eventually mend, its inner lands to the most populated and developed boundary parts. It's an important chance as never before, and probably the most effective policy to face a quick changing climate, a more and more difficult resources supply chain and, mainly, the way to cope with these uncertain and aggressive times.

Steps to set a complete design biomimetic process are not far from those driving contemporary preservation planning about landscape and heritage; they can be easily merged since all of them cares about the long-haul permanence of human culture sprung out by environmental opportunities.

Traditional forms of settlements obviously adhere to local resources and environmental conditions.

Stepsfor biomimetic design starts from recognition of local ecological dynamics, mimic form of these dynamics to make suitable planning policies and create objective metrics to evaluate processes.

Implement into current planning methods this kind of analysis wouldn't, actually, upset most established practices, as demonstrated, since there's a strong parallelism between these approaches; but outcomes may set new, effective, reliable standards for regional planning to be applied widely.

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Exploitation of resources and human complexity: bioregional visions of territory as tools for overcoming the 'long century'

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Abstract

The scope of this essay is essentially twofold. On one hand, it intends to outline the characteristic features of bioregionalism in relation to pre-modern settled communities, 'structurally coupled' to their living environments, while looking at the historical transformations that determined the eradication of communities from their environments. The study is developed by considering the changes that took place in the 'long century', or over the last two centuries, in the relations between European human groups and local territories, and in the forms of using and activating natural resources. On the other hand, taking into consideration these processes shall allow to focus on the economic, ecological, and social features of territorial action in human societies, and on the opportunities for transforming conventional socio-spatial models by means of 'eco-friendly' productions of territoriality. Because of its methodological orientations and applicative values, I believe that bioregionalist and eco-territorialist perspectives can contribute to constructively addressing the difficulties we are facing in present time.

KEYWORDS: human complexity, eco-friendly productions, bioregionalism, eco-territorialism

> Nous sommes au cœur d'une insondable tragédie. Partout, on combat en aveugle contre des enemies partiels, des enemies anciens, des enemies morts, de nouveaux amis. [...] Nous n'avons pas encore compris l'aventureque nous vivons. La science, au lieu d'être le foyer de la nouvelle conscience, contribue au nouvel obscurantisme. La pensée réductrice/disjonctive d'une part, la pensée mythologique/fabulatrice de l'autre, concourent à nousmasquer la complexité omniprésente. Nous ne pouvons désormais plus rien attendre, nous devons désormais tout craindre d'une pensée incapable

de concevoir la complexité des réalités vivantes, sociales, humaines, et la complexité des problèmes posés par la crise contemporaine de l'humanité. Nous allons rêver de ne pas comprendre la complexité.

Edgar Morin, *La Methode II, La vie de la vie,* Seuil, Paris, 1985 (quotation fromID., *La complexité humaine, Champsessais*, 2012, pp. 339-340).

1. An interminable 'long century'

The anthropologist Franco La Cecla, in his introduction to the Italian edition of a classic text on bioregionalism, dwelled on the lack of relevance of ethnic and local-regional issues among Italian progressive forces. When the book was published, the bulk of Italian left-wing culture was 'workerist', at that time certainly much more than today. Above all, it was convincedly industrialist (and has remained so, eventually). The author also underlined how the tradition of Italian left-wing thinking was somewhat averse to the notion of homeland, and especially to the idea that all of Italy was historically made up of many 'small homelands' or, still better, *smallmotherlands* (for a literary example: BUGLIANI, 2015). The left considered giving attention to the local dimension a deterrent attitude, good only for the 'leagues' (and indeed La Cecla's remarks were published when the neo-nationalist phenomenon of the Lombard League was beginning to reap votes on the right). La Cecla also mentioned how difficult it was to conceive a bioregion without the belief that mountains and rivers are somehow people, "other forces of society", beings endowed with rights, "*au pair* with a housewife in Treviso or a worker in Mirafiori[1], adding: "Yes, I know this is an animist, spiritualist vision [...] but it is the only indigenous vision that 'works'" (LA CECLA, 1991, 11, our translation from Italian).

La Cecla deplored the inability of politicians aligned with an anthropocentric idea of progress –measurable only by quantitative indicators– to take on more 'identity' issues such as respect for and protection of natural places. Instead, he found these orientations in the *new animism* widespread in the bioregionalist movement, then in its infancy in Italy. Insinuating furthermore a heretical doubt about the appropriateness of modern dominant obviousness, he added (*ivi*, 12, our translation from Italian):

[1] FIAT factory in Turin.

The bioregion is first and foremost a relativistic revolution. There is no interest in survival except locally, of this region, this people, and this country. No one can do the ecological good of others, no one can pass off Gaia as a global motive. It seems a paradox. And yet is it not the case, finally, to stop believing in the General Solution, in the Universality of Good, in the United Nations, in the New International Order as in the Common Progress, even if it is an Eco-development? (LA CECLA, 1991, 12)

Mutatis mutandis, these issues are still very relevant to us today, and are becoming increasingly pressing, forcing us either to accept as 'natural' and unquestionable the development paradigm, or to radically rethink it, and reject the very idea of a consumerist prosperity based on the *exploitation of resources* (SHIVA, 2010). The point is that, however outdated, the notion of sustainable development still acts as a general techno-scientific guarantor of settlement, economic and welfare planning models. For example, it is well known that irrespective of its place in the scale of economic development levels, every population from any country on the planet would be required to comply with the Sustainable Developments Goals of the UN2030 Agenda. This means that –despite the severe warnings that we are receiving from the growing environmental, climate, pandemic and humanitarian emergencies– the 'Single Thought' of our times does not want (or cannot) escape from the *long century* mentality.

To outline his cultural model of a long century, Mauro CERUTI (2018, 29-49) indirectly refers to the notion of *short century* coined by Eric Hobsbawm for the twentieth century between 1914 and 1989; but he proposes, contrarywise, to link the twentieth century to the preceding one. Similar in duration to the *Long Cinqcent* of the Braudelianschool (BENASSAR, JACQUART, 1980), the *long century* of contemporary history would have begun during the consolidation phase of the modern nation-state, between 1789 and 1815. The period between the French Revolution and the Congress of Vienna in fact constituted a decisive turning point for the emergence of a new political paradigm that in many ways is still working today:

Many of the characteristics of the institutional form of the nation-state that would dominate the continental and, through mediation, the world stage were fixed, [and] an idea of popular sovereignty was outlined that entailed the involvement of everlarger masses (indeed, ideally, of all the inhabitants of a state) in identity-building processes [characterized by] mono-ethnic nation-states. *[States based on]* exclusive citizenship, *[…] fundamental rights granted to individuals of the dominant nationality, [… and on] territories separated from each other by* rigid borders. *[...]* Ultimately, there was a tendency to abolish

traditional historical identities, in favour of the centralised authority of the nation-state, which would no longer have to come to terms with authorities of lesser generality (CERUTI, 2018, 34-35, 38; our translation from Italian, Roman type by author).

Seen as a whole, the *long century* also has become the era of commercial, social, and ecological homologation of the entire planet. This colossal process of change was made possible by the technical consequences of mechanistic philosophy, by the thermo-industrial revolution since the end of the eighteenth century (GRINEWALD, 2007), by western imperialism, and finally by the deployment of the postcolonial globalized modernity in the second half of the twentieth century (*Modernité-monde*: CHESNEAUX, 1989).

What Ceruti concisely calls "traditional historical identities" were, and potentially still are, the societal modes of self-representation and self-governance practiced by the inhabitants of settled communities in the late Middle Ages and later, up to the time when the aristocratic-feudal *ancien régime* was still in force, and to some extent even later, in contemporary times. In Europe, these forms of sociality included self-governing models for the use of natural goods and were based on local statutes and customs. The legal pluralism of pre-modern times was based on a multiverse of types of access to sources of livelihood by subjects belonging to self-organized human groups and on a changing and complex dialectic between local social arrangements and jurisdictional powers (kingdoms, fiefdoms, communes, etc.) (DANI, 2013). Pre-modern settled communities used and re-used natural goods cyclically and exchanged only productive surpluses in market circuits. But this happened without formal institutions and state powers deciding what they needed to live on, what consumer goods to produce, how to produce them, and at what prices to exchange them on markets[2]. According to Paul DUMOUCHEL (1979, 248)

Les champs ouverts et les communaux formaient une respublica, une chose publique, à laquelle tous les villageois étaient d'office interessés. […] Avant que les terres soient encloses, et que chacun s'enferme sur sa propriété privée, elles ne formaient même pas un ensemble d'objets […] mais le monde, la terre nourricière, le lieu des hommes, le lieu des ancêtres, la nature et la vie, où tous avaient une place, bonne ou mauvaise.

The 'other' forms of possession and use of natural goods, not recognized and not codified by modern positive law, were attacked as 'unproductive

[2] Many of the arguments presented from this point on have been reworked and translated from PARASCANDOLO (2016).

archaisms', and were gradually dismantled by the expansionist bourgeoisies – starting with the English and Dutch, and then the French, etc.– who had taken command of the institutional apparatus in their respective states. Accompanied by radical technical, legal, economic, social, and environmental transformations, a '*nouveau régime*' thus historically imposed itself, first in northwestern Europe, and gradually elsewhere, continuously developing on a global scale in the form of an *urban-industrial system of life*, governed by bourgeois elites and functional to their "general strategies of power" (FOUCAULT, 2017, 13).

2. 'Tacit bioregionalism': mutual interactions between populations and landscapes

A fundamental aspect of the still currentlong century consists in the systematic trend toward the integral disarticulation of those *structural couplings*, organically connecting each settlement system (urban or rural) to the surrounding environmental system (SARAGOSA, 2005, 213-265, also for Italian examples). Processes of redefinition and elongation (even by thousands of km) of socio-territorial metabolisms through commodities flows have been made possible by the intensive application of industrial technologies, with consumption from non-renewable energy sources. The multiplication of wide-ranging transport of raw materials, semi-finished products, finished products, and finally waste, began in the second half of the 19th century with steamships and railways, and was completed during the 20th century with airplanes, motor vehicles and other mobile and high entropy machinery, and therefore with an ecologically unsustainable organization of supplies, particularly urban ones. Countless disintegrations of local economies and the parallel intensification of wide-ranging trade have therefore worn down and almost annihilated over time the factors of rootedness or at least of material and energetic 'anchorage' of local communities to the surrounding territories. When food and other basic resources for subsistence no longer reach households from the neighboring territories, or they only do to a small extent, it means that the *ecologic allocation* of the resource flows absorbed by the settled populations no longer coincides with their *geographic allocation* (WACKERNAGEL, REES, 1996, 23; SARAGOSA, 2001, 74). The development of industry and trade has thus corresponded to a break in ecological cycles (metabolic rift). And the environmental damage accumulated unceasingly.

Traditional economies (ancient, primitive, rural, pre-industrial) were structured according to other patterns. The local European populations –what

Adriano OLIVETTI (1946) called "concrete communities"– were once configured *as social cells*, culturally homogeneous and economically independent. Intensely connected to their respective territorial ecosystems, vernacular societies also activated flows of energy and material goods. But at the origin of these flows there wasn't a principle of *trade exchange* but rather one of *reciprocity*, which can be traced back to the

> *spirit immanent in the gift that commits the recipient to reciprocate. [...] The spirit of the archaic gift referred to a plurality of cosmologies, all radically different from each other, but all unanimous in considering the things donated as imbued with the spirit of the donor, and therefore capable of exerting a moral influence on the done* (CALLARI GALLI, 2017).

In pre-modern settled communities, the relations between sensible and supersensible elements and between human, non-human and supernatural worlds were constantly intermingling. Non-modernized societies were (and sometimes still are) able to establish rules and procedures for their dealings with natural goods, but only in *ethno-scientific*, i.e., narrative, mythological, magical-religious, 'superstitious' ways; in other words: based on irrational (technologically naive and scientifically discredited), *and yet ontologically significant* schemes (cf. BERQUE, 1987; PELLUCHON, 2015). These patterns of social action could also be found to some extent among urban dwellers, but they applied especially to those 'autotrophic' socio-ecological systems that used to be rural villages, especially when their inhabitants had little (or even no) access to sources of monetary income. Even in Europe, the inhabitants of traditional rural centres transformed the natural goods they could access into food, clothing, building materials and various other supplies by means of agro-pastoral labour. Much, and sometimes everything, of what was used in daily life came from the natural environment in which each local community was immersed. The subsistence orientation –that is*, the determination to maintain and reproduce life*– was the main axis around which economical activities turned (MIES, BENHOLDT THOMSEN, 1999).

As we have seen, these 'backward' social practices, incapable of generating efficient forms of capitalization, were bitterly opposed by the bourgeois powers. European nation-state societies and territories thus went through various phases of urban-industrial transformation that, in the long run, made them to conform to market-oriented organizational schemes imposed by urban centers, drivers of modernity. Throughout the long century, the organizational bases of social modernization relied on market exchanges, and when the latter became decisive for the life of human groups, it transformed them into *market societies* (POLANYI, 1944). At the end of a vast process of social and territorial modernizations, the

settled communities of inhabitants – changedat last into aggregates of residents-users and clients-consumers with the relative needs to be managed – are taken over by the institutional agencies of the encompassing socio-economic system. Populations therefore have become*needy* of standardized endowments of *products* to be 'imported', and of *services* provided by business entities and/or by publicly controlled bodies The mainstream narrative of this process is that during the 19th century or possibly later, industrializing national societies evolved according to a pattern of increasing 'hijacking': from a condition of predominantly peasantry to a far preferable one of civilized life. In the second half of the twentieth century (in the post-colonial era) this *civilization path* was intensified by the 'race for development' (SACHS, 1991; ILLICH, 2005, 2010; ESTEVA, 2010).

I believe that this historical process can also reveal, retrospectively, a decidedly 'broad' meaning of bioregionalism. *As a movement of opinion and awareness*, bioregionalism developed in the sixties of the twentieth century in North America, along with other currents of *deep ecology*, and spread to Europe, conveying instances of contestation of the productivist-consumerist lifestyle. But it is essential to note that *as non-modern life systems, many forms of 'tacit bioregionalism' have existed everywhere on Earth for more than 10,000 years.* In fact, countless ancient/traditional societies that were nurtured through peasant and agro-pastoral economies achieved it. And European state-national societies themselves lost their original bioeconomic and bioregional traits throughout the long century, or the contemporary historical phase of industrial and commercial 'enthusiasm' (widespread in all political parties, and coinciding with western social rationality, eventually overflowed into the whole world).

Finally, it is necessary to underline an increasingly problematic aspect of the geo-ecological history of modernity. The socio-ecological particularities of many local territories have been replaced with "interchangeable parts" of technically homologated monocultures. In this way, instead of producing goods for use *with* the Earth and its commons (that is, together with the *living planet*), the agro-industrial technologies and methods (that have replaced the previous agricultural and agrarian models) have produced goods of exchange *against* the Earth. In other words, they produced commodities and consumption products to the detriment of the global biosphere and its biological and cultural diversity. This historical process has been a key strategy of the capitalist and colonial production mode for many centuries (MOORE, 2015), while the accumulation of adverse ecological impacts on ecosystems has endangered and destroyed various types of common goods.

3. From mechanistic ecocracy to bioregionalist ecology. For a return to vital goods and territorial systems of nourishment

As not only material but also *relational* entities, the commons should be understood as civic networks, "a repertoire of active citizenship practices" (CACCIARI ET AL., 2012, 10). In non-modernized (and therefore non-privatized) times and spaces, commons constitute the ecological wealth that human communities know they can count on to meet their basic needs (OSTROM, 1990; RICOVERI, 2010; OLWIG, 2015). But decades and sometimes centuries of productive monocultures, of specialized supply chains, of social divisions of waged work, of urban zoning, and finally the irruption of a consumerist society dominated by the services and financial sectors, led to the downfall into oblivion, amongst Europeans, of self-governed territorial practices and of the sense of responsibility for local places and nature. Even though they are considered 'backward' by the standards of global technological civilization, the commoners who still exist around the world can afford the 'luxury' of prioritizing their reasons *for their own living* over those of increasing trade. And their systems of self-governed use of natural goods constitute the hard core of their independence.

In our days, the return to the political and social protection of renewable natural goods is increasingly an inescapable aspect of the construction of another alternative world to the ordo globalist 'megamachine'. But this objective is struggling to assert itself because it clashes with the techno-legal rules and with the socio-economic practices of the current world. What to do? The adoption of a metabolic approach to geographic space (PARASCANDOLO, TANCA, 2015), the search for eco-territorial compatibilities (MAGNAGHI, 2020), for independent micro-territorial productions (AGOSTINI, 2019), for 'concrete landscapes' (QUAINI, 2006; POLI, 2013) are indispensable. It is no coincidence that in metropolitan areas institutions caring about citizens' quality of life strive to green urban and peri-urban public spaces, encouraging environmentally friendly forms of agro-forestry. A precise assumption of responsibility on the use and consumption of soils, aquifers and biodiversity is crucial, because the protection of the common goods water, air, and soil, and of natural biodiversity must be promoted and organized locally, following a circular and not linear approach (NAVDANYA INTERNATIONAL, 2015, 5-7).

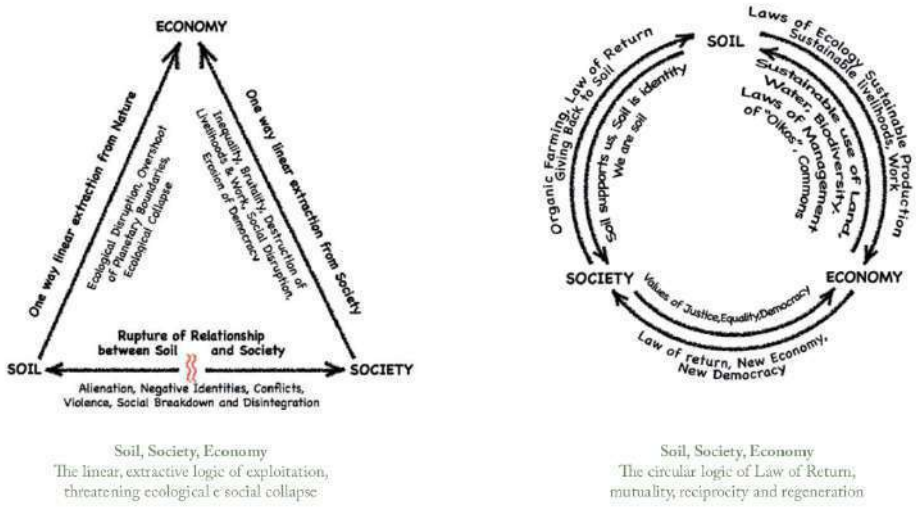

Fig. 1 – Linear (to the left) and circular (to the right) approaches to economy, soil, and society (from NAVDANYA INTERNATIONAL, 2015, pages 6-7)

I come to the conclusions: is there perhaps a 'mythical time' to return? Certainly not. History never recurs identically (fortunately). However, the reconstruction and knowledge of the past, even of the European past, are precious and indeed indispensable *for relativizing the present*. Treasuring past experiences enables constructively re-founding the ways of using biological and cultural heritages. The prospect of convergences and alliances between popular interests and expert knowledge for a good living (*buenvivir*, cf. for example SARTORELLO ET AL., 2012) is related today to bioregional issues for an appropriate construction of future. In times of systemic crises and biopolitical turns (see for example LEONARDI, 2015) it may still be possible to set a new course for human affairs on Earth, but only if we grasp the epochal scope of the necessary changes. It would be necessary to deeply question the ontological constitution of today's hegemonic ecocracy, with its Cartesian dualism oppressing human and non-human nature, with its managerial and monitoring postures, with the imposition of extractive states of exception (ZIBECHI, 2016), of 'immune' and discriminating biopolitical paradigms (ESPOSITO, 2004). The affirmation of models of participatory governance of social life is essential to effectively address the multidimensional crisis underway. On the horizon we can see a fundamental objective: to agree democratically among human communities, associations, and parts of republican institutions for putting in

place self-sustainable systems for the satisfaction of the needs of all, also pursuing security and healthiness of ecosystems. According to James B. QUILLIGAN (2012, p. 79)

When group of people recognize that the capacity of their commons to support life and development is in decline, this may spur them to claim long-term authority over resources, governance, and social value as their planetary birthrights, both at a community and global level. […] The human need for sustenance and livelihood vests these local groups with a new moral and social responsibility: to engage resources' users directly in the preservation, access, and production of their own commons. Rather than seek individual or civil rights from the state, commoners declare their sovereign rights as global citizens to protect, access, produce, manage and use these shared resources.

Effective readmission of the commons to the attention of late industrial populations and decision-makers will require public recognition that human communities are nourished by renewable natural assets (and not mere resources to exploit), and that they therefore require special legal protections (CARDUCCI, 2017). What is needed is the effective preservation of natural goods essential to life, rather than their subjugation for the sake of competitive economic growth. The risk is high: climate justice and the loss of substantial 'pieces of the ecumene' for present and future generations are at stake. A corporeal approach to citizenship, able to counter the hegemony of private interests and post-democratic joint ventures (CROUCH, 2004), could lead to the recognition of self-governed, equitable, and accountable access to vital goods. Claiming decentralized access rights to nature and putting them at the center of public debate would foster appropriate actions of socio-ecological regeneration (PELLUCHON, 2015; FERRANDO, 2018; FIORAVANTI, 2013), and the deconstruction of ongoing social rationalizations, such as economy 4.0, Artificial Intelligence and algorithmic capitalism in general (STIEGLER, 2015).

Fresh and clean water, free of polluting and climate-altering gases air, fertile and uncontaminated soil, seeds, and the spontaneous diversity of planetary living must be recognized as common goods that cannot be genetically manipulated and patented, and must be made available according to regenerative modes of activation and community mutualism (DE LA PIERRE, 2020). Thus, we could perhaps stand up to the *challenge of Gaia* (LATOUR, 2020), and preserve a living world capable of sustaining human survival (CERUTI, 2018, 189; MORIN, 2016). While it is true that the current century will decide the fate of the conflict between "global heterodirection of the ends of commodity production and consumption and local self-government of the means of reproduction of

material and relational life" (MAGNAGHI, 2010, 312, our translation from Italian), it is also true that the protection of ecosystems is unfeasible in the absence of an adequate context of settlement planning, as Tomás MALDONADO (1970) already warned us half a century ago. Furthermore, the time has come to ask: when the powerful processes of hierarchization and trivialization of the living set in motion at the dawn of the technoscientific revolution (MERCHANT, 1980; CAPRA, LUISI, 2014, 17-59) are fully deployed, will we humans still be provided with the free will necessary *to desire* other ways of life?

Integrated with other important elements of research and action, such as agroecology (ALTIERI, NICHOLLS, PONTI, 2015), bioregionalism and eco-territorialism should be considered as resistance tools to counter dystopias that clutter our immediate future. I would therefore include them within the *new humanism* advocated by Morin and Ceruti, and would certainly put them in the toolbox necessary to 'stay human'.

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D'un SCoT prescriptif à un SCoT animateur: un retour aux sources de la proposition territorialiste biorégionale

Emmanuelle Bonneau

Abstract

Territorial planning is now in charge of implementing an urban and agro-environmental project. In France, the Schémas de Cohérence Territoriale (SCoT) are the tools of this evolution. In Italy, the territorialist school proposes concepts and an approach inspired by bioregionalism that have been successfully tested in the context of territorial planning at the regional and local levels. In Bordeaux, the Sysdau, which implements the SCoT, tested the Italian territorialist approach to activate its ring of agricultural, forestry and natural project sites. This experimentation took place within the framework of the BIOREGION research contract financed by the Aquitaine Region and in partnership with local institutions in urban planning and development. Our paper describes this experimentation and highlights the reactivation of the Italian territorialist approach in terms of animation of territorial projects between research and action.

KEYWORDS: territorial planning, bioregionalism, research-action, France

En France, la planification territoriale participe depuis 2010 à l'organisation des continuités écologiques entre villes et campagnes. Ce nouvel objectif implique une évolution méthodologique conséquente pour passer d'une démarche centrée sur l'organisation urbaineà une planification territoriale où la structure écologique et l'accroissement de la biodiversité conditionnent ce développement. En Italie, les plans paysagers régionaux réformés en 2004, sont les instruments de cette planification. Dans les Pouilles et en Toscane, les deux premiers plans paysagers approuvés en 2015 selon les termes de la réforme, empruntent la méthodologie développée à l'Université de Florence dans le sillage des propositions culturalistes d'inspiration biorégionale portées à la suite de l'architecte et urbanisted'Alberto Magnaghi par l'école territorialiste italienne (Magnaghi 2000, 2021, Fanfani et Matarán 2020).Dans le sud-ouest de la France, cette méthodequi réalise le croisement des objectifs agro-environnementaux,

écologique et de cadre de vie, a suscité l'intérêt des universitaires comme des institutions et des praticiens qui s'associent en 2012 dans le cadre du projet de recherche BIOREGION (Berland-Berthon 2012) financé par la Région Aquitaine. Le Sysdau, structure porteuse du Schéma de Cohérence Territoriale (SCoT) qui s'applique sur les quatre-vingt-quatorze communes de l'aire métropolitaine de Bordeaux, a rejoint le projet BIOREGIONen 2014 dans l'objectif d'accompagner par la recherche la mise en œuvre de la «stratégie nature» du SCoT nouvellement approuvé.

En quoi la boîte à outil conceptuelle et les expériences biorégionales développées par les enseignant-chercheurs de l'Université de Florence servent-elles le renouvellement des pratiques de planification territoriale en France? Et inversement, en quoi l'expérience de recherche-action initiée dans le cadre du SCoT bordelais ré-actualise-t-ellela proposition italienne? Nous montrerons que la dimension prospective attachée à la notion de biorégion nécessite non seulement un renouvellement des méthodes et des concepts mobilisés par la planification territoriale mais également une structure humaine et organisationnelle capable d'animer et de conduire la mise en œuvre de ce projet dans le temps.

Notre contribution reviendra sur notre contexte d'action français et régional en évolution puis sur les concepts d'inspiration biorégionale proposés par l'école territorialiste et mobilisés par le Sysdau pour accompagner le changement. Nous présenterons alorsl'évolution méthodologique engagéepar cette structure qui se positionne en animatrice de projet urbain et agro-environnemental en contre-point des approches antérieures. Ce positionnement nous conduira à éclairer en conclusion le « retour au source » dont témoigne ce positionnement qui réactive des propositionssous-jacentes à l'approche territorialiste italienne en matière d'animation de projet de territoire et d'articulation entre recherche et action.

1. Le contexte d'action français: vers une planification urbaine et agro-environnementale

En France, les démarches de planification territoriale qui orientent et réglementent le développement urbain et l'organisation des activités économiques et sociales interviennent au niveau régional à travers le Schéma Régional d'Aménagement et de Développement Durable et d'Egalité des Territoires (SRADDET) et au niveau communal ou intercommunal avec les Plans Locaux d'Urbanisme (PLU). Le Schéma de Cohérence Territoriale (SCoT) constitue un niveau de planification intermédiaire visant à coordonner les

démarches de planification locale et à fixer des orientations communes en matière d'organisation du développement urbain, de déplacement et de mise en valeur environnementale. Il précise notamment la localisation et les conditions de mise en valeur et/ou de restauration des continuités écologiques (Trames vertes et bleues) définies par le Schéma Régional de Cohérence Ecologique (SRCE) et intégrées au SRADDET.

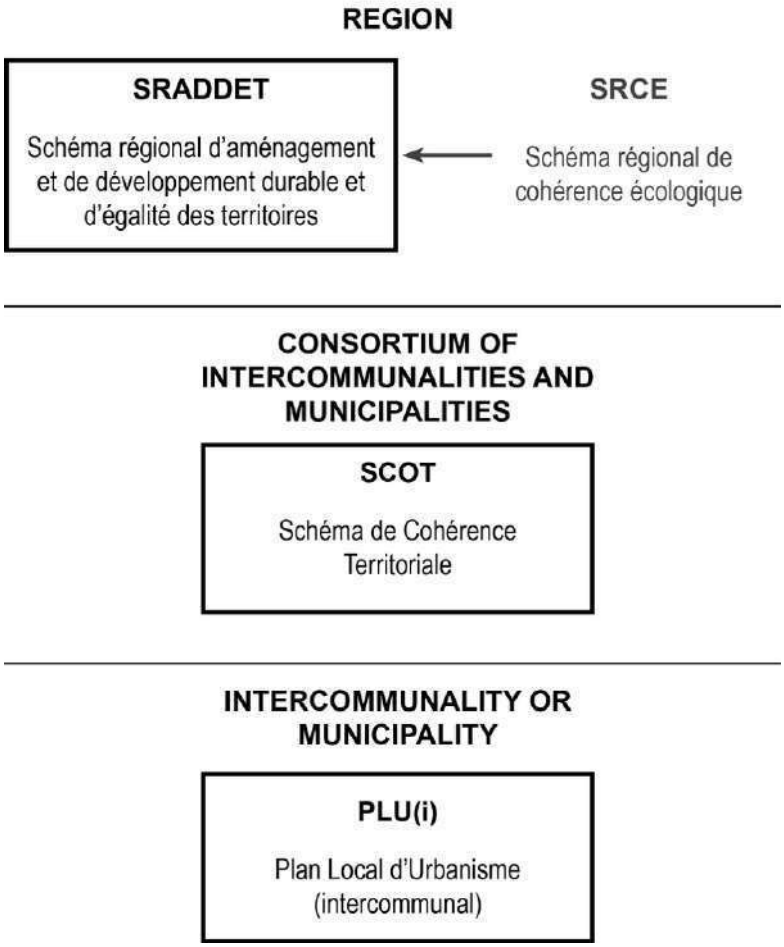
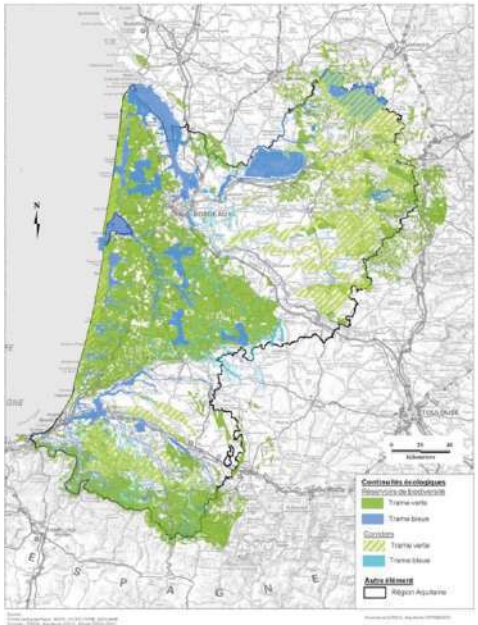


Fig. 1 - l'organisation des documents d'urbanisme et de la planification territoriale en France

Cette conception systémique du développement urbain et de l'environnement s'est affirmée progressivement. Au début des années 2000, l'intégration des principes du développement durable puis de transition

écologique a déplacé l'objet des démarches de conception spatiale en engageant le passage d'une planification urbaine experte organisant le développement de l'urbanisation à une planification territoriale impliquant dans une démarche concertée, l'organisation des rapports entre ville et nature et ville et campagne. Ce changement s'est traduit par la réforme des documents d'urbanisme (LoiSolidarité et Renouvellement Urbain 2000). Cette réforme prévoit la création des Schémas de Cohérence Territoriale (SCoT) et des Plans Locaux d'Urbanisme (PLU) qui remplacent (les documents antérieurs (Schémas Directeurs et Plans d'Occupation des Sols). Au cœur de l'élaboration des SCoT et des PLU, le Projet d'Aménagement et de Développement Durable (PADD) exprime un projet politique et constitue un document d'action stratégique en termes d'équipement, de développement et de renouvellement urbain comme de protection environnementale, la planification de l'urbanisation devant désormais tenir compte de ses incidences sur l'environnement. En 2006, la ratification par la France de la Convention Européenne du Paysage (adoptée à Florence en 2000) engage dans les démarches de planification la reconnaissance et la valorisation des paysages tels que perçus par les populations. Les lois Grenelle portant engagement national sur l'environnement (2007, 2010) introduisent le principe d'une Trame verte et bleue (TVB) dont la planification s'impose aux niveaux régional comme local à travers les PLU et les SCoT pour participer à terme à la constitution d'une « infrastructure verte » européenne (UE, 2013). Dans un temps concomitant, les collectivités territoriales sont montées en compétences dans des domaines qui relevaient jusque là strictement de l'Europe et de l'Etat. L'agriculture et l'environnement sont investis localement à travers la mise en place de politiques alimentaires territoriales s'appuyant sur une agriculture biologique et de proximité (loi Grenelle II 2010) et par la prise en charge au niveau intercommunal de la gestion des milieux aquatiques et de la prévention des risques (GEMAPI, 2017).

En vingt ans, au delà de leur compétence en urbanisme qui se traduit depuis 1983 par la planification des sols et *in fine* par l'octroi de permis de construire, les communes et les intercommunalités ont gagné une capacité nouvelle à gérer et valoriser leur environnement y compris à travers l'activité agricole. D'un point de vue méthodologique, cette évolution implique une remise en question conséquente des savoir-faire de l'urbanisme.



Ecological continuities - SRCE - Région Aquitaine - 2012

Intercommunalities and municipalities in the area of the SCOT of Bordeaux

Fig. 2 - Les périmètres d'action de la planification territoriale en Aquitaine

2. L'Aquitaine et le contexte urbain et environnemental autour de Bordeaux: l'enjeu d'un SCoT innovant

En Aquitaine et particulièrement en Gironde, les tendances actuelles de la métropolisation et la concentration des populations dans les grandes agglomérations régionales, en particulier Bordeaux, et sur le littoral s'inscrivent en concurrence avec la préservation et la valorisation d'une diversité de milieux entretenus par les activités agricoles, forestières, de pêche et d'aquaculture.

Dans ce contexte, en 2000, le Schéma Directeur (SD) de Bordeaux proposaitdéjà une innovation remarquée par les observateurs scientifiques et techniques en matière d'intégration des espaces agricoles, forestiers et naturels au projet d'urbanisme (Masboungi, Mangin 2009). La proposition d'un schéma d'orientation intitulé «charpente paysagère» permettait d'articuler dans un même dessin les prescriptions en matière de développement urbain et de mise en valeur des espaces périurbains.

Fig. 3 - Le développement urbain contemporain en concurrence avec l'agriculture et la forêt des coteaux de Gironde et les établissements vernaculaires de cabanes du littoral atlantique

Dix ans plus tard, la révision de ce document en Schéma de Cohérence Territoriale (SCoT) s'inscrit dans un nouveau contexte institutionnel lié à l'entrée en vigueur des lois Grenelle pour l'Environnement et marqué par une injonction nouvelle d'identification et de mise en valeur des continuités écologiques (TVB) dans la planification territoriale. La procédure de révision participe à la démarche «SCoT Grenelle» qui se veut pilote au niveau national, visant à favoriser l'émergence de démarches innovantes avec le soutien technique des services de l'Etat et du ministère chargé de l'urbanisme. Dans le SCoT de l'Aire Métropolitaine Bordelaise approuvé en février 2014,

l'aboutissement de la démarche de «SCoT Grenelle», se traduit par une carte d'orientation pour une «Métropole nature» identifiant une «couronne de sites de projets agricoles, sylvicoles et naturels» autour de Bordeaux.

La mise en œuvre de la «Métropole nature» renvoie à quatre objectifs d'action: «*protéger le socle agricole, naturel et forestier, structurer le territoire à partir de la trame bleue, affirmer les qualités et fonctionnalités des paysages de l'aire métropolitaine bordelaise et soutenir des agricultures de projets de nature au service des territoires*» (SYSDAU, 2014). La finalité de cette démarche: «faire des espaces agricoles et sylvicoles périphériques des lieux de projets afin d'en garantir la pérennité» est explicitement affirméepar le SCoT. La couronne de sites de projets agricoles, sylvicoles et naturels localisés sur des espaces partagés entre la Métropole bordelaise (28 communes dont la ville centre) et les intercommunalités périphériques intégrées au SCoT doit permettre d'en assurer la réalisation. Le portage de cette ambition et la volonté de sa traduction opérationnelle conduit le Sysdau à se constituer en partenaire du Contrat de Recherche BIOREGION.

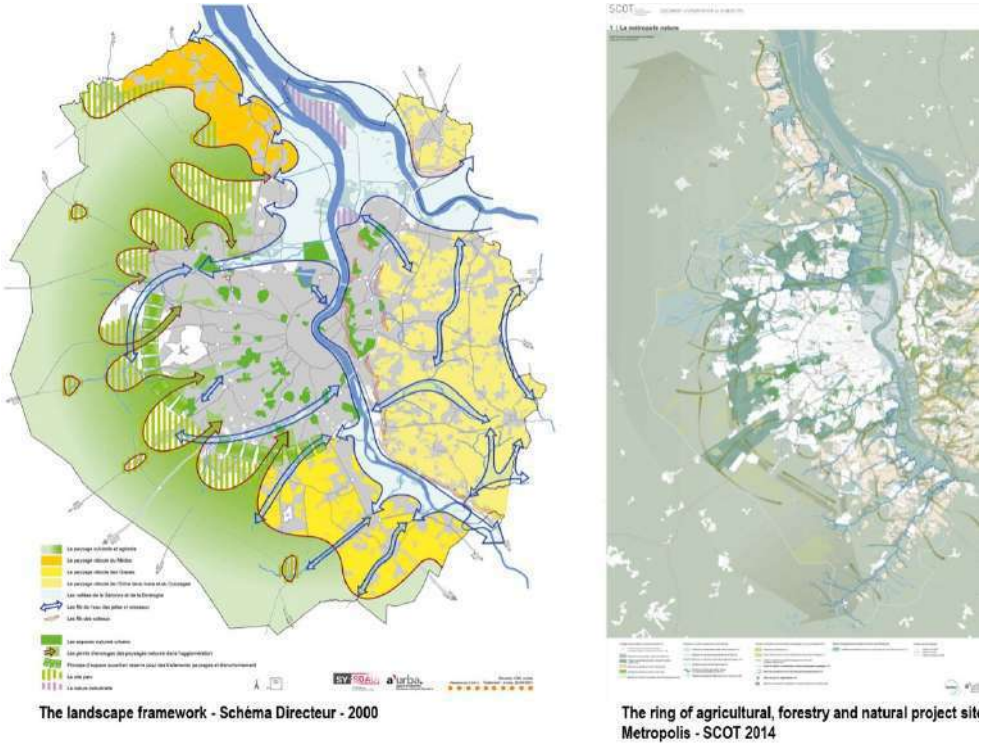


Fig. 4 - Du Schéma directeur de Bordeaux au SCoT, une innovation recherchée en matière d'intégration de l'environnement à la planification territoriale, sources : SYSDAU

Initié en 2012, le Contrat de Recherche BIOREGION est porté par Agnès Berland-Berthon au sein du laboratoire Ade[1] et financé par la Région Aquitaine[2]. Il a fait le choix d'expérimenter de façon concrète avec les institutions concernées par le SRCE la méthodologie territorialiste de construction de projets de territoire dans une optique biorégionale. Parmi ces institutions, le Sysdau s'est saisi de la méthodologie territorialiste dès l'approbation du SCoT en 2014 et poursuit sa mise en œuvre au delà du terme du contrat de recherche en 2016, en s'appuyant sur l'université et une démarche de construction de connaissance pour accompagner un changement de vision sur son territoire et la mise en projet de sa couronne de sites agricoles, forestiers et de nature.

[1] Laboratoire du Centre National de la Recherche Scientifique (CNRS) identifié aujourd'hui sous le nom de Passages, UMR CNRS 5319.
[2] Devenue Région Nouvelle Aquitaine

3. Biorégion urbaine et parc agricole: les concepts retenus pour accompagner le changement

Deux concepts issus de la pensée territorialiste, retiennent l'attention de l'équipe du Sysdau: la «biorégion» et les «parcs agricoles» pour leur capacité à accompagner le renouvellement de l'action pratique. Si leur mobilisation sémantique fait débat avec les élus qui préfèrent leur substituer des expressions plus consensuelles telle que «charte» plutôt que «parc», ils trouvent une valeur directement opératoire dans la production des représentations graphiques qui accompagnent l'animation de la démarche partenariale. La mobilisation du concept de «biorégion» permet d'acter un premier changement dans la représentation du territoire du SCoT, figuré non plus par son périmètre de compétence légal, mais selon les logiques hydro-morphologiques des bassins versants. Une vision fidèle au concept clef de la proposition territorialiste: la «*biorégion urbaine*» est définie par

[...] un ensemble de systèmes territoriaux locaux fortement transformés par l'homme, caractérisés par la présence d'une pluralité de centres urbains et ruraux organisés en systèmes réticulaires et non hiérarchisés, en équilibre dynamique avec leur milieu ambiant. Ces systèmes sont reliés entre eux par des rapports environnementaux qui tendent à réaliser un bouclage des cycles de l'eau, des déchets, de l'alimentation et de l'énergie. Ils sont caractéristiques des équilibres écosystémiques d'un bassin hydrographique, d'un nœud orographique, d'un système de vallées ou d'un système collinaire ou côtier, y compris de son arrière-pays, etc [...] (MAGNAGHI, 2014).

Cette vision conduit à décentrer le regard de la ville-centre pour la comprendre dans ses interrelations à son socle naturel et à un espace plus large, proche du périmètre de la Gironde et correspondant à son aire urbaine d'influence. Dans cette figure, le rapport entre ville et campagne est inversé. La Métropole n'est plus conçue comme un centre vers lequel convergent les flux issus des espaces péri-urbains. Elle apparaît au contraire comme un espace résultant, à la convergence de territoires ruraux caractérisés par des modes d'établissements humains et des terroirs spécifiques (Médoc, Entre-deux-Mers, Haute-Gironde), organisés en SCoT et susceptibles de porter des projets de « parc agricole » afin d'alimenter Bordeaux et ses habitants par la diversité de leurs productions.

Dans cette perspective, l'exemple du *Piano Territoriale di Coordinamento* de Prato (PTC) et de son parc agricole, présentée en 2015 à Bordeaux par David Fanfani (Université de Florence) lors d'un séminaire organisé dans le cadre du contrat

de recherche BIOREGION, a nourri la réflexion du Sysdau. L'élaboration du PTC, document d'urbanisme équivalent à un SCoT en termes de périmètre d'action, a été portée par les enseignants-chercheurs territorialistes de l'université de Florence au début des années 2000.L'idée d'un parc agricole est née dans ce cadre institutionnel par les échanges croisés entre urbanistes, agronomes et agriculteurs. Elle est entrée en action dix ans plus tard portée par une initiative citoyenne et à nouveau accompagnée par l'université qui a apporté ses ressources en matière de construction de connaissances pour l'action aux acteurs sociaux organisés en association. Cette démarchea conduit à la reconstitution d'une filière de production de blé ancien et de transformation locale avec l'association d'un meunier qui contribue aujourd'hui à l'alimentation des cantines scolaires et à la distribution de pains, de pâtes et de gâteaux estampillés «kilomètre 0» par les artisans et notamment par les boulangers locaux.

4. La mise en œuvre d'un SCoT animateur : produire des connaissances dans une démarche d'apprentissage collectif

Dans la démarche territorialiste, la reconstruction d'un «récit de territorialisation» qui décrit le processus de co-évolution établi entre société et nature dans le temps long, a directement vocation à constituer un socle commun pour les acteurs du territoire. En faisant référence à l'histoire locale et à la structure des paysages, il permet de donner la parole à celles et ceux qui participent à son élaboration (élus, techniciens et acteurs socio-économiques de l'agriculture et de la forêt en particulier) et les constituent ainsi comme personnes ressources, tenantes d'un savoir dans la perspective d'un projet urbain et agro-environnemental. Ce repositionnement permet de faire évoluer des acteurs traditionnellement installés dans une posture défensive vis à vis de l'élaboration de documents d'urbanisme traditionnellement conçus comme des outils de développement urbain, tel que le Conseil Interprofessionnel du Vin.

Dans ce récit, l'espace naturel, agricole et forestier est envisagé comme un espace construit, produit de pratiques anthropiques. L'élaboration d'une cartographie inédite a révélé du caractère évolutif du couvert végétal et en particulier du vignoble qui tend à la monoculture depuis cinquante ans. Son objectif était double: d'une part, identifier une structure : des grands ensembles agricoles, forestiers, invariants dans l'histoire et d'autre part, ouvrir des possibles, notamment en matière de diversification culturale, certains espaces (Entre-deux-Mers) aujourd'hui dominés par la vigne, apparaissant comme historiquement dédiés à la polyculture. Le rappel de l'histoire a ici une valeur suggestive pour

envisager l'avenir sur la base d'une «rétro-innovation» (Stuiver 2006), le terme emprunté par l'école territorialiste à une scientifique néerlandaise, faisant référence à une ré-activation de pratiques agricoles historiques à l'appui de technologies contemporaines et au service d'un développement économique et social conscient de l'environnement.

En parallèle, un second corpus de connaissances est constitué, dérivant de l'identification des «systèmes territoriaux locaux» promus par l'école territorialiste et visant à révéler la dimension, non plus morphologique mais fonctionnelle des espaces agro-forestiers: c'est à dire, leurs logiques d'usage et de mise en valeur socio-économique. La cartographie est là encore mobilisée pour traduire en une connaissance partagée, les entretiens avec les acteurs institutionnels de l'agriculture, de la forêt et de la gestion des milieux naturels (Office National des Forêts, Centre Régional de la Propriété Forestière, Chambre d'Agriculture, etc) déjà connus et constitués en partenaires du Sysdau. Elle conduit d'une part, à identifier des espaces à enjeux différenciés sur le territoire du SCoT et à ses marges et d'autre part, les initiatives locales allant dans le sens d'un changement des pratiques, réactivant pour certaines des pratiques anciennes (gemmage dans le massif landais) ou empruntées dans d'autres contextes (pâturage par des vaches marines pour l'entretien des milieux humides) favorables à l'entretien des écosystèmes et potentiellement reproductible.

L'exploration de ces «bonnes pratiques», potentiellement reproductibles a conduit à identifier des acteurs associatifs ou privés encore inconnus du Sysdau. La documentation de leurs expériences et leur «mise en carte» a été le levier d'agrégation d'un collège d'acteurs complexe (institutions, associations, porteurs de projet privés) dont la participation active aux réunions thématiques organisées par le Sysdau (trois forums techniques et une commission avec les élus organisés entre novembre 2014 et mai 2015 auxquels succèdent des réunions thématiques courant 2016 et 2017) a permis la prise en charge collective de questions ou de problèmes émanant de porteurs isolés, telle que la création d'un parc agro-paysager sur un terrain inondable convoité par un supermarché. Ce temps d'expérimentation et d'interprétation de l'approche territorialiste a donné lieu à un document contractuel validé par l'ensemble des partenaires la «Chartes des agricultures et des paysages». Ce document de référence au niveau local a permis au Sysdau de voir la démarche expérimentale engagée dans le cadre du contrat de recherche BIOREGION, reconnue au niveau national et développée depuis 2017 à l'appui du dispositif «Plan de paysage[3]».

[3] https://objectif-paysages.developpement-durable.gouv.fr/appel-projet-plan-de-paysage-plus-quun-mois-pour-candidater-686

Cette agence a notamment pour vocation de coordonner les projets de recherche finalisés vers la construction d'une connaissance nouvelle en matière environnementale, l'élaboration de projets sectoriels et l'information et la consultation des acteurs sociaux. Instance technique, elle est conçue en lien étroit avec un «comité de surveillance» qui rassemble l'ensemble des représentants institutionnels concernés par la démarche de planification. C'est ce repositionnement en tant qu'agence animatrice de projet qu'a opéré le Sysdau depuis l'élaboration du SCoT en 2014 en cherchant à mettre en œuvre son projet urbain et agro-environnemental avec les acteurs sociaux bien loin des démarches antérieures qui se limitaient à la prescription et à l'approbation ou non des projets locaux.

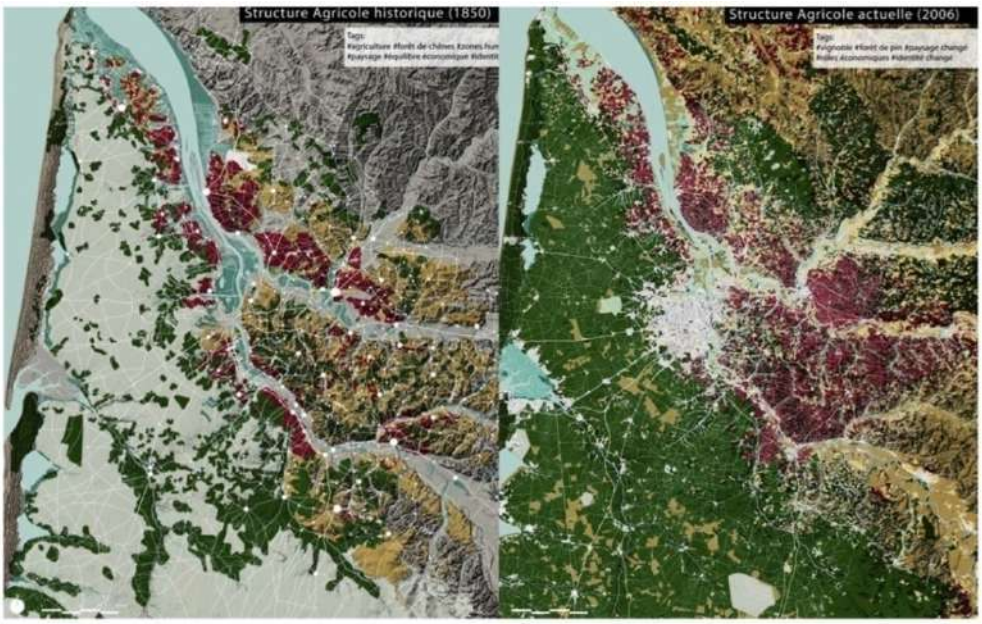


Fig. 5 - L'occupation du sol autour de Bordeaux au XIXème siècle et au XXIème siècle : une uniformisation des cultures, la vigne (violet) s'imposant sur la polyculture, source : Contrat BIOREGION/SYSDAU

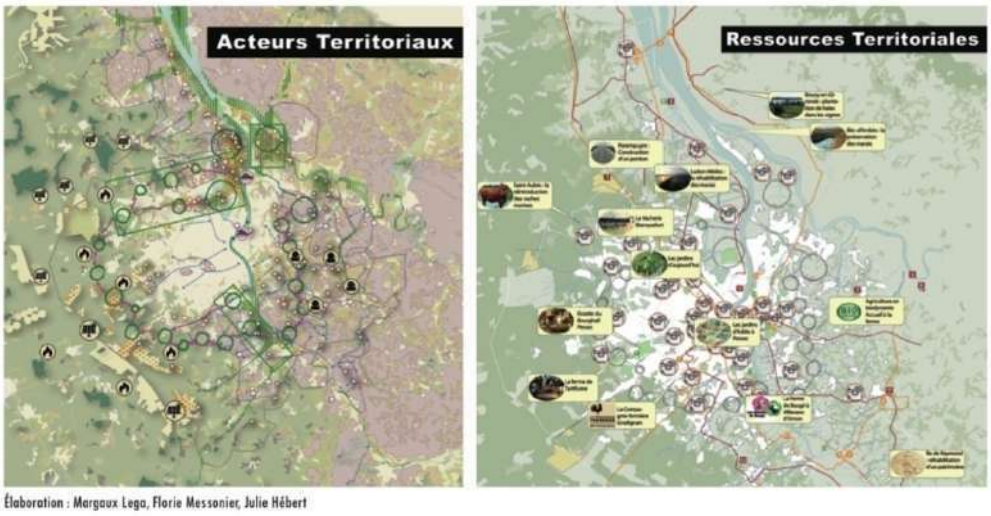


Fig. 6 - L'identification des acteurs agro-environnementaux et de leurs bonnes pratiques, source : Contrat BIOREGION/SYSDAU

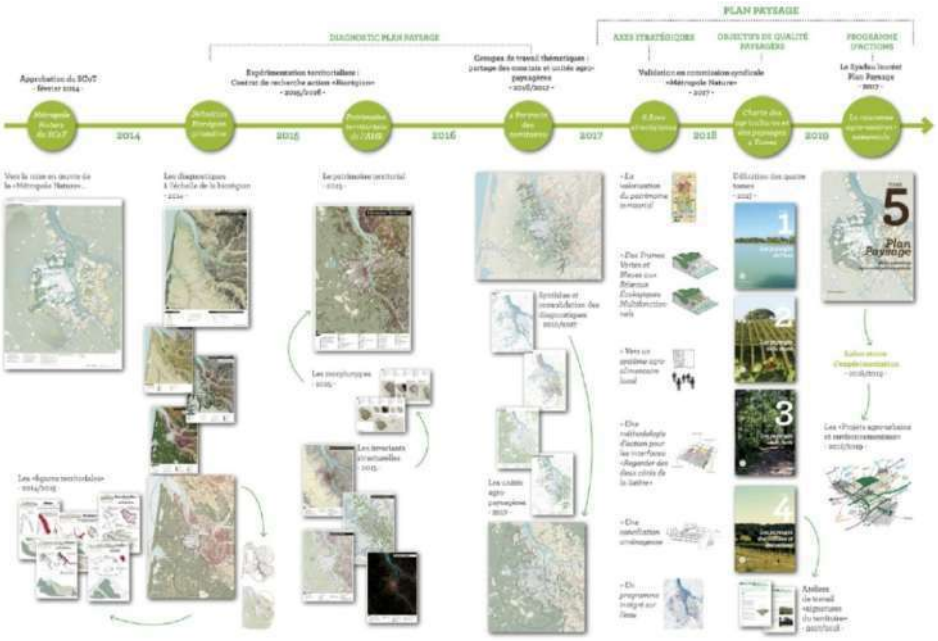


Fig. 7 - La chronologie de la démarche du SYSDAU en ancrage dans le contrat de recherche BIOREGION, sources : SYSDAU

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Sardinia in hard changing times. Reflections on territory and new development models

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Abstract

"*Sardinia is another thing. Much wider, much more ordinary, not up and down at all, but running away into the distance. Unremarkable ridges of moor -like hills, running away perhaps to a bunch of dramatic peaks on the southwest. This give a sense of space, which is so lacking in Italy. Lovely space about one, and traveling distances-nothing finished, nothing final. It's like liberty its...*"(DAVID HERBERT LAWRENCE, Sea and Sardinia, 1921)

This paper evaluates on what basis and with reference, to what previous situations of a historical anthropological and sociological cultural type in general, Sardinia today is facing a whole series of weighty problems at the level of political and territorial choices. This situation is also related to the consequences of a more generalized situation at a European level. The problems are also connected to the insularity. In recent years, a development model has been proposed that no longer meets the territory's needs, both in terms of infrastructures and services, and in terms of the partial diffusion of certain valuable urban functions that are scattered throughout the territory. Historical vocations with a higher potential quality, the opportunities available, even those that have not yet been realised and which today could instead be an important opportunity for the territorial renaissance of our island, if accompanied by appropriate structures for innovation have been lost. It would be necessary to build a far-reaching project framework by gathering the remaining cultural and intellectual ensembles to decide what kind of Sardinia we want and on the basis of what kind of possible future. In this direction, the work proposes some initial seminal reflections that are a prelude to a more articulated construction of a 'future' project to be shared.

KEYWORDS: Rebirth Plan, bioregional model, local development, local communities

1. A troubled region... different policies over time and history

In the 1950s, the modernisation process in Sardinia had a specific focus and matched specific ambitions. It focused on given conditions that were peculiar to those of Italian society to which Sardinia should also adapt from an economic point of view. Also related to these aspects is the use of the term 'modernity'. It comes with the concept of modernity related progress that has to be taken into account if one does not want to pursue a fake agenda that does not comply with the reality. This interpretation should be taken into account if we want to avoid misunderstandings when interpreting and considering the historical processes and important phenomena that followed in recent years. The process of industrialisation and consequently of urbanisation that has developed in Sardinia must be seen in its historical origin. This process refers to a well-known series of problems in which the only partly successful experiment of industrialising a number of areas was characterised by a hetero-directed political action with limited use of local resources. Here, the predominantly petrochemical industry, also due to the regional community and industry-specific, not only failed to establish a strong industry, but also did not survive the oncoming crisis. The landscape planning tools following the introduction of the Cultural Heritage and Landscape Code in 2004, have also resulted substantially divided into two parts: the coastal part and the inner part, producing important differences between the different communities. This contrast, which was also a historical contrast, still influences the definition of policies that structure both development processes and necessary resilience processes with respect to specific economies that could be re-proposed and could also find their cultural background in relation to the past. Understanding these aspects is important because the following considerations are based precisely on the observation of the ways in which the Sardinian territory has developed and experienced resilience dynamics by adapting more traditional ways of life to the different local patterns. Industrialisation has been characterised precisely for being heterodirected and using non-local resources. Tourism development has been positive, but its characteristics must be evaluated a little differently because its monothematic connotation centred on the use of coast-sea-beach resources has led to a spatial concentration along the coast, cutting off an important part of the territory and leading to the development of so-called second homes, albeit in line with what happened in the rest of Italy.

The endowment of infrastructures has remained inadequate. Especially in relation to accessibility, they have conditioned the development perspectives also for tourism in inner areas, by avoiding a stronger diffusion of local growth

networks in areas that are not easily accessible. At present, we are facing a situation of abandonment of inner-city areas that creates major obstacles to economic and regeneration processes as it greatly weakens human capital and prevents its valorisation. These negative aspects resulting from such a development process are basically an early difficulty in identifying opportunities for local production that are still very inadequate, even though there has been a qualitative improvement in terms of food and wine products, an improvement in economic cooperation between enterprises, but with a low vocation for technological innovation due to the inability of enterprises even to access the most advanced technologies

On this aspect, there has been an improvement especially with regard to the creation of specific brands (labels) but much still needs to be done. In addition, another important aspect concerns the limited supply of business services due to an unexpressed demand for services as well as a lack of entrepreneurial creativity.

In this situation, one must consider the structural weakness of the implemented policies that also limits the institutional support with the participation of the public administration despite the numerous articulated interventions fostered in the territory. Therefore, the policies appear highly weak in being able to affect the critical trends of the ongoing development processes that, for better or worse, are in the making because development cannot be stopped. Attempts to pursue growth and follow specific development dynamics give rise to an economic development characterised by partial development with an insufficient diffusion of social welfare and some problems related to the consumption of non-renewable resources, the crisis of traditional economic structures with a limited valorisation of them that could, however, be identified (if appropriately identified and studied) and allow the introduction of innovations (BRANCATI, 2022). Past experience teaches us that in order to design a possible future, it is necessary to reactivate a traditional economic system by innovating with respect to the traditional economic model, but at the same time maintaining specific structural conditions of both context and organisation. Also from a demographic point of view, Sardinia has historically been characterised by a limited population with very low territorial densities, and the same characteristics of the economy have never created conditions for a significant demographic development. We have to consider an agricultural production generally at the limit of self-sufficiency, a moderate presence of manufacturing activities linked to local markets that are exclusively urban and structurally weak, with the addition of particularly heavy fiscal systems and the endemic diseases present in lowland areas (malaria, etc.) that are today fortunately eradicated.

Even in more recent years, the characteristics of the demographic processes seem to have maintained their inertia, however, with a further widespread demographic weakening, especially in the marginal areas of the territory, and a resilience, albeit partial, in the bigger centres. This is generally the growth trend.

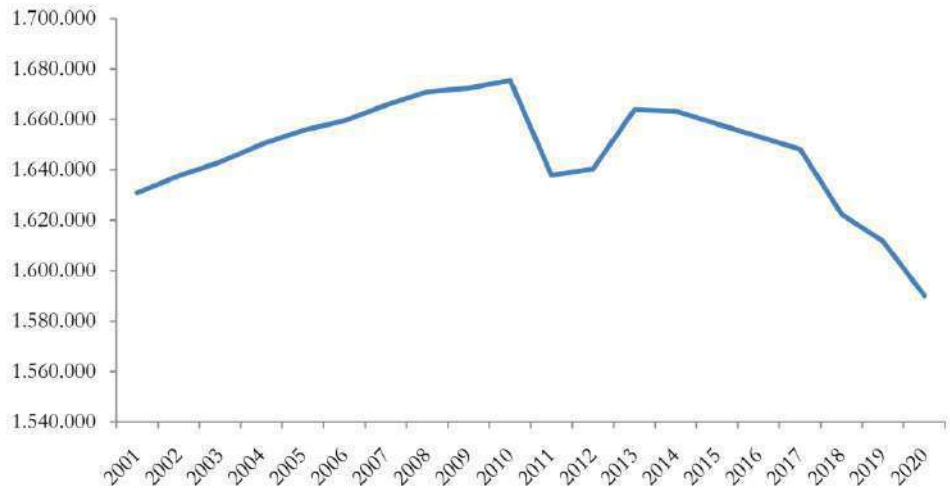

Fig.1 - Sardinia Region demographic trend. Author's elaboration based on ISTAT data

Examination of the spatial situation requires reducing spatial imbalances and paying attention to the formulation of active policies that also contain the (somewhat fluctuating) processes of urban polarization. And it is necessary to avoid sprawl processes that can induce land consumption with the consequent increase in costs in services supply and the infrastructure provision with a decrease in their efficiency

Industrial activities represent a great field of intervention even if obviously the objectives, actors and practices have changed, as well as political action in the production sector. The profound crisis of the traditional sectors of public intervention in industry has had its most typical historical manifestations in the large chemical settlements of Porto Torres and Ottana, or in the mining system in the south of the island has shown all its ability and weakness in inducing local and regional economic development, remaining essentially an exogenous element with little incidence in the system of local economic relations, although its ability to produce a general improvement in income conditions, at least in some social areas of the island's reality, should not be denied. Thus, in the face of the crisis of large-scale public industry and despite the presence of important infrastructures and services, the local production system has not been able to

find ways to revitalize itself, transform itself and become autonomous, promoting new paths of economic development. In this sense, the choice of leftist parties to side with tradition should also be recorded. As a dominant symbolic motif, for example, we can remember the Pratobello revolt as a strong response to the social and territorial modernization too (LUPO, 2020).

Fig. 2 - Porto Torres Chemical Industry. Photo by M.M. Minderhoud (2009) from Wikimedia Commons

Even the development of tourism in some privileged coastal areas such as the Emerald Coast, although triggered by substantial outside investment, has not granted a sigh of relief to the area. The importance of some supply chains such as dairy or the cork sector where they have not been in short supply in terms of entrepreneurship and ability to organize and implement have failed to create local economic development that has not been exclusively assisted. These sectors have always needed to be modernized and adapted to the new needs that the market has manifested, while the construction of a solid local economic system proposes and suggests that they be joined by others that are able to borrow industrial creativity, dynamism, and the ability to place themselves on

the market both nationally and internationally, organizing themselves in networks and interdependent integrated systems capable of creating, after an early phase of receiving from the outside technique and products, also technological innovation and information for export, thus a resource for intensifying relations and interactions with other productive realities with other national and international district systems.

Fig. 3 - Porto Cervo, Yacht Club Costa Smeralda (1976) from yccs.it

The Sardinian territory is a vast territory in which the relationship between the inner areas and the coast is an unbalanced. Great distances, unhomogeneous elements of connection, a conception that already in the Sardinian literature between 1800 and 1900 some geographers and foreign travelers who had been in charge of describing the Sardinian territory had previously emphasized. So what appears to be an element of monotony is in reality a strongly characterising element of the landscape, the territory, the environment. In this environment, there is a spatial experience that is quite particular in which this uninhabited space acquires a dominant function. However, despite its insularity and also the considerable distances that separate our island from the rest of the continent, Sardinia has traditionally entrusted its identity to the strong sense of homogeneity with which its territory is perceived and to the great presence of areas that it exhibits, above all by virtue of its low average population density

Even today despite the process of urbanization has gone quite far this situation has not changed. The territorial environmental dimension of Sardinia still remains as dominant dimension, widespread pervasive to such an extent that despite the fact that the urban fact has aligned itself with the other urban facts spread in the Western Mediterranean from a very old idea, this dominant environmental dimension has a large scale value.

The case of Cagliari, the main city of Sardinia, is a typical case in which the environmental dominant dimension prevails. It characterizes the site where the city was built, and it is prevalent with respect to other conditions that are irrelevant, despite the compactness of some manifestations that have assimilated Cagliari with the contemporary urban manifestations of the other cities. This characteristic of the territory and this substantial environmental integrity, with environmental invariants that are always and in any case permanent, remains the fundamental reference condition of the environmental project. This condition has been emphasized several times by some scholars: in particular by the Cagliari school that was directed by Fernando Clemente and Giovanni Macciocco, and it represents for us a fundamental starting point with all the informational potential it brings with it. The ability to observe the environmental construct and to grasp the unique ways sometimes in which this construct first entered land use planning has characterized some other members again of the Cagliari school, such as Giancarlo Deplano.

The study of this environment that is connoted in such a specific way has been made the subject of a great process of global experimentation that has transformed it into a laboratory of the history of social and even local development from 62 to 74 in correspondence with the to the period of implementation of Law 58 by which the State provided funding for an extraordinary plan for the economic and social growth of Sardinia. An attempt was made to transplant to the island the typical patterns of high development areas and to bring out and accept the rationality that was theirs. The objective was to bridge the gap between the urbanism of the North and the South left aside with the countryside in a degraded condition, overcoming the gap of modernization and industrialization in which space basically meant urbanization. To this end, an effort was urged from all Sardinians to activate an overall programme of growth for the entire territory supported and encouraged by the solidarity of the State, by the application of programming, by the development of industrialisation and above all by a new autonomist conscience aimed at achieving certain levels of life, employment, income, civil structures and well-being. The pre-eminent objective was to respond to material needs, satisfy the demand for development, break the stagnation, and the idea that these

interventions, at the structural level, would bring about, at the superstructural level, a cultural upheaval capable of defeating resignation and fatalism.

In this perspective, traditional culture, lifestyle, habits and behaviors related to it were seen as the fundamental causes of regional underdevelopment and as an obstacle to be overcome. This gave raise, in perhaps unexpressed form, to the idea that pre-existences understood as an immobile past were to be overcome. In many cases this impetus spread as far as involving natural rights, such as the use of language, and did not stop in the face of ecological habitat and territory. The situation was to be balanced by other factors developed by industrialization: employment, income equalization with other parts of the country, the spread of multiple factors related to modernity, development, the growth and spread of a self-sufficient entrepreneurial class and the formation of an endogenous capitalist structure. During the first period (1963-1970) everything seemed to be going well and Sardinia, after Friuli-Venezia Giulia, was one of the Italian regions with the fastest speed of economic development. However, this did not happen and the island was not adequately prepared to welcome the innovation conceived by a new ruling class that was perhaps ahead of the territory and its community. The training process that was able to welcome that kind of innovation did not seem to be able to achieve specific results. Despite numerous attempts to strengthen the productive and even the social fabric through appropriate empowerment actions such as the creation from the start of new agricultural and production assistance institutes, to promote and realize effective aggregations between cognitive systems and research centers on the one hand and economic activities on the other, the conditions for continuity were not created. In the 1960s and 1970s, however, such awareness had not yet emerged. The emergence of large industrial clusters, both around major cities and around more backward areas brought about a traumatic impact. The basic elements, in structural terms, of development (companies, income, employment) became available, but these elements could not be integrated into a new culture, alternative to the traditional one. The result was a hybrid environment, indeed hostile to development, which carried with it all the rhetoric of failed development because it was the result of an incorrect vision of the territory's potential and the relations between urban and rural. The images of the shepherds of Ottana (ZEDDA, 2021) leading their flocks a stone's throw from the factories are emblematic of the rootedness with the past. The relationship between agglomerations and territory in Sardinia is the story of a continuity between town and country, in which the centres in inner areas traditionally arose as an extension of agricultural work and transferred the urban to the countryside. In the history of detachment and proud isolation, in the deep

sense of local autonomy, in the solid connection with the activities of the countryside and in the permanence of the latter's cultural hegemony over the urban, the peculiarity of Sardinia's urbanization process can be distinguished. A feature that distinguishes the city-countryside relationship and that in the case of Sardinia is always counterbalanced by a composite space in which urban and rural landscapes coexist and are contrasted, failing to synthesize into a harmonious picture. The combined action of all these factors disrupted the traditional model, which continued to persist, but was affected by an increasingly acute disorientation caused by its forced coexistence with an alternative model that in fact failed to impose itself. The most relevant consequence was the rupture of territorial balances induced by the creation of industrial poles (CLEMENTE, 1964). This gave rise to a dualism that broke the continuity of the social environment, without achieving the overall growth of the system. Territorial imbalances were recorded and intensified due not only to the polarisation of effects to restricted areas in the north and south of the island, but also to changes in the social environment that did not correspond to the island's reality. This led in the early seventies to an increasingly radical and widespread criticism of the development model adopted, which led to the second phase of the Rebirth Plan (1974-1986), in an attempt to correct the distortions created and focusing attention on the pastoralism and mining sectors, considered the most significant nodes of the Sardinian issue. This second phase is characterised by the emergence of a strong call for local culture, no longer seen as an obstacle to development, but as a recovery and valorisation of that complex of material and immaterial values, not organised and structured in social demand, but important with respect to the permanence or disappearance of that convinced support to the choices and strategies of economic and social growth. The critical rethinking and questioning of the nodal points of the previous experience thus led to the re-emergence of the conditions for safeguarding specificities, indeed to their placement in a different perspective, useful for new development. But even this was not enough...there was a cultural deficiency determined by the inability to consider the phenomenon of identity (FOLLESA, 2021) in the light of the new conditions of production systems, services, innovation chains and also to understand the new problems posed by the urban question, with the needs determined by generalised urbanisation, with the increase in mobility and interpersonal relations (PARASCANDOLO, 2019).

The reading of the past must lead toward a correct diagnosis of what has happened. It has become trendy now to make industrialization and modernization, development in general, and forced processes of urbanization,

the most immediate cause of the ills of present-day Sardinian society. This approach is incorrect and forgets the ways in which such models have been established in the sphere of culture and political activity in general. We must finally have the courage to make aseptic assessments with respect to the idea that modernization and industrialization in reality did not serve and also ask ourselves how much of Sardinian society has, instead, willingly seen the spread of the "new," aspiring to change their beliefs and lifestyles, without, however, denying their specific identity and attachment to traditions, whether agricultural-pastoral or otherwise. Modernisation must take into account a margin of possible transformation beyond which is not possible to go (CASSANO, 2001). In the case of Sardinia, the conditions were not able to have a process capable of transforming the constant inflow of external capital into an expansion and strengthening of the local productive structure, rather than a simple increase in income and domestic demand.

Today, the problem to be addressed cannot be reduced to the mere rediscovery of the myth of the 'mother earth' and the consequent appreciation of the landscape and the importance of non-renewable resources. All this belongs to the egoistic mantras that consider the aesthetic experience as prevailing over the community coexistence. If it is true that the perception of space is influenced by the aspirations, hopes, and desires of the communities that live in that space, and if is true that the environmental context is the result of a perceptive activity oriented by a shared background, it is illusory to try to preserve the quality of the territory without taking care of the quality of perception of those who, with ever-renewing settlement behaviour, should nourish it with ever deeper meanings and values.

Values gaps are the inevitable result of modernization, and it is difficult to govern change by encouraging the progressive adaptation of communities to the different historical context in which they live. The impetus for such restructuring of the ideal world should come from a policy that not only looks at material processes, but is also concerned in the right measure with the disorientation of consciences caused by the breakdown of production systems and their diversification and the discontinuity between the new goals imposed and the material and cultural means available. It is clear that such a task can only be taken on by a policy that knows how to throw itself into the risk of the game of renewal, aware of the fact that it also and above all requires new knowledge and is therefore oriented towards individual and collective subjects with the aim of fostering the harmonious integration and mutual enrichment of thought and will of the new styles of rationality and of the widespread and deep-rooted values. A qualifying objective of this subject policy must be to foster the emergence of a

language of change that promotes, rather than passive adaptation, a drive for innovation in which the old and the new converge.

Policies so far have not the capacity to elaborate such language in which the elements of tradition and innovation could communicate with each other in a concrete and effective way. The lack of a wide-ranging project is being addressed, and the consequences are clearly visible. In recent years, policies have replaced exogenous development with endogenous development, that is, they have involved local forces in that phase which is precisely called "local development" on which the literature has contributed different evaluations. The policy experience has been implemented by the various territorial pacts, multifaceted and dependent on the capacities of the area communities to come together and work as a system.

For the most part, negotiated programming has been dispersed in its fragmentation. An overall organic vision of the regional reality has been lacking. But above all, an assessment of social capital has been lacking and is still lacking, on the basis of which even to hypothesize processes for the recovery of territorial systems, whether they are traditional local productive systems or better traditional integrated ones, would be misleading at least. Then there is the problem of the 'market', i.e. small and medium-sized production activities in Sardinia have so far operated in traditional sectors and have mainly been aimed at the local market; therefore, they can only be a credible alternative for the growth of the regional economy if the overall strategy of the Sardinia project is redefined. Something that is currently not understood and not considered. Suffering radicalizes gaps, such as that between coastal and inner areas, or metropolitan areas (Cagliari, in particular) and neighbouring areas, which in our case are extremely significant.

The decline of agro-pastoral Sardinia is counterbalanced by a Sardinia with a deficit of planning capacity and culture. For example, an analysis of the trends in the 1980s in the various production sectors into which the Sardinian economy is divided shows how the decline in the share represented by industrial activities is accompanied by the constant weight of agriculture and the increase in the incidence of the tertiary sector.

This last element does not, however, constitute an index of modernisation of the regional economic structure. In fact, the tertiarization process has taken place almost exclusively within the more traditional activities protected from external competition and linked to consumer demand and the employment reservoir function performed by the public administration. Advanced services, which presuppose an established production structure that expresses demand for advanced services for tertiary production, are still lacking. To complete the

framework there is the lack of infrastructure to contain the growing deprivation, i.e., transportation, telecommunications and widespread IT networks (CAMBA, CHIRI, PICCOLO, 2000).

2. Place is important...restarting from place. The premises for a bioregional construction in Sardinia

If we talk about the modernization achieved, all the contradictions of an imperfect society emerge, in which it does not seem to paid to leave agro-pastoral Sardinia for an alternative Sardinia that, in fact, has not been successful, or at least not too much. We need to change from a deterministic vision centred on the idea that cultural growth, and growth in general terms, can be a variable dependent on economic expansion and the employment of external resources. This has led to the emergence and entrenchment of a strong sense of subalternity and fostered the consolidation of an attitude of passivity. Nor should we fall into the error of considering the landscape-environmental perspective the only way out. It would be more interesting and more qualifying to assume the global value of the territory understood in a systemic sense, i.e. as a context traversed and supported by a network of services and infrastructures, to be considered as added values capable of enhancing it beyond its aesthetic value.

Then there are the people, the communities, precisely the variously understood social capital on which the compactness and stability of policy choices are based, based on the histories of places and inhabitants, but steeped in contradictions and fears.

Starting from the new conception of the local project (MAGNAGHI, 2000), up to the territorial principle (MAGNAGHI, 2021), important transformations are developing within the territorial sciences (PATASSINI, 2022; VIDALI 2022). The debate on development models recalls the need to propose some options that reflect on new indicators of well-being not only linked to the measurement of GDP and quantitative wealth, but to substantial parameters of well-being such as social equity, self-governance, justice, relational quality (BANERJEE, DUFLO, 2019; SHIVA, 2022).

In this sense, the bioregionalist paradigm not only constitutes a disciplinary advancement in the spatial sciences, but also an advancement within the existing dichotomy between the development paradigm and the sustainability paradigm. The territorialist approach seeks 'neo-ecosystems' within a co-evolutionary relationship. The recipient of actions aimed at sustainability becomes not the

environment but the 'territory', the concrete fruit of this interaction relationship. laying the foundations for basic needs, self-reliance and eco-development. Self-sustainable local development becomes an analytical-planning key capable of renewing traditional methods. In this direction, it is possible to find a path that is at least reassuring regarding the concept of self-sustainability. "Self-sustainable" is a development based on the construction of virtuous relations between the settled community and its milieu, understood as an identity heritage and at the same time as capital to be invested in development processes (PERELLI, 2020).

Fig. 4 - Marmilla landscape (2009) by author.

Social capital shapes the bioregion and enhances the ability to plan for the future. In this sense, bioregionalist experiences succeed in intercepting the innovative ferments that place people in communities at the centre of the regional space and interpreters of their destiny. This is a precise 'policy' that welcomes constructive mediation and rejects the sterile sophistry of welfarism. The spread of landscape thinking (more significantly since 2004, with the institutionalisation of new landscape planning through the Urbani Code) and

landscape protection has also contributed to stabilising a conception of the territory linked to places and the immanent conditions of places themselves, without giving way to unrealisable utopias. We are therefore witnessing a significant reversal, from a cultural point of view, that can make a significant contribution to the repositioning of territorial systems considered disadvantaged or peripheral.

A first relevant point is to keep the population in its place of residence and increase its employability. How to act? There is relevant literature on these issues that cannot be addressed here, but from which we start for the following observations.

The development of entrepreneurship is an important requirement for achieving the goal of smart, sustainable and inclusive growth set out in European strategies. It is also a means to respond to new economic challenges, to create jobs and to combat social and financial exclusion. The impact of the global economic and financial crisis makes it necessary to give entrepreneurship and self-employment a stronger role in economic and social development policies. This is particularly important for young people, who face higher unemployment rates than the adult population and greater difficulties entering the labour market. However, the effectiveness of national, regional and local measures and actions to promote the development of inclusive entrepreneurship in Europe can be hampered by fragmented responsibilities, resources and strategies and a lack of understanding of the goals of inclusive entrepreneurship (EYENN, FAJFER, 2021). Entrepreneurship is somehow linked to the concept of the bioregion and the use of local systems and production, in a socio-economic dimension that is acceptable according to regional and local rhythms.

One of the most relevant aspects in bioregionalist construction concerns the issue of boundaries. This theme is also linked to the choice of cultural patterns that have generated the environment and form of human space. the delimitation of landscape-environmental units is a complex matter. As early as the 1980s, Fernando Clemente reasoned about landscape-environmental units as instruments of regional planning, wondering what the specific contents and relational methods with which references could be established might be. Hence, the recognition of macro and small regions, differentiated at different scales, he emphasized, became a fundamental operation of spatial planning activities (CLEMENTE, 1987). Even more recently, the theme that is certainly central in the thoughts of town planners and scholars, deserves to be defined and studied in depth by following a line of investigation that includes planning references that give concrete answers and set real actions (DEZIO, 2020). This issue is more present than ever in the Sardinian case, where land use and landscape

compatibility have undergone significant cultural and conceptual transformations over time, having consequences on the contents of planning at different scales. Reasoning that is more attentive to pointing out the co-evolutionary forms of land and landscape that have marked the history of the most important traceable agro-ecosystems can also lead to renewing the concept of the multifunctional agricultural district, which is so fashionable today, but not very practicable, in terms of innovation of practices and products.

These operations must be conducted under a broad problematic framework, with the involvement of local governments, the participation of resident communities, but, in particular, with the promotion of a parallel regional-scale economy. Contracting the dynamics of a global market, which for so many decades was the driving force behind economic growth, to promote economic regionalism, as a hypothesis of evolution, may be perplexing. Bioregional dynamics orienting and integrating towards innovative, profitable and flexible small-scale entrepreneurship have a greater capacity to exploit the opportunities of physical and virtual connectivity in a rapidly changing market and, in particular, to bind to the territory with sustainable production, promote ecosystem management policies in an integrated manner with an economic development model that bases the possibility of growth on the recovery of local material and cultural resources.

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Conservation and bioregionalism. A methodological contribution for trans-disciplinary transitions

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Abstract

The paper investigates the possible role of the restoration discipline in the construction of urban bioregions, starting from the trans-disciplinary approach that both territorialism and conservation practice are increasingly maturing. From the comparison between the conservation approach and the territorialist one, a profile of two rather close sciences emerges.

In particular, they both consider the centrality of knowledge; the trans-disciplinary management of information; the stratigraphic approach; the importance of identity values; the principle of conservation as a key factor for the sustainable reactivation of the heritage. For pursuing these goals, the restoration team of the University of Cagliari - in cooperation with a panel of other academic experts - has developed a trans-disciplinary protocol of investigation able to store and cross-check the heterogeneous multilayered information coming from the cooperation of several disciplines. This way of collecting and managing information, directly connected to the assessment step and the design phase, can ensure the maintenance of historical values and drive towards sustainable interventions, avoiding transformations, facilitating transitions. Even if both processes are irreversible, while a transformation generally denies and cancels the values of the past, a transition updates them, making them useful for contemporary society, leaving them available for future generations. For the restoration discipline bioregions are cultural associative landscapes and territories in transition, never to be treated as experimental fields of transformation, especially in historical context. Even if developed for the restoration of architectural assets, this methodology could be extended to cultural anthropized landscapes, for the conservation and valorisation process of urban bioregions.

KEY-WORDS: Cultural landscapes, sustainable transition, assessment of cultural values, restoration of landscapes

1. A common perspective of knowledge and protection

Is there any possible relationship between conservation and bioregionalism? What are the reasons and possible common areas of work? Are there methodologies and tools for mutual interdisciplinary collaboration?

This paper intends to investigate the possible role of the restoration discipline in the construction of urban bioregions. From the point of view of the restorer, the bioregion can be identified as a cultural associative landscape; in fact, recognizing the indissoluble unity of territory and environment in the landscape (GAMBINO 2003) means, in the eyes of the restorer, conceiving the territory as that extension of the earth's surface which is the unique and unrepeatable result of the skilful modelling produced over time by the natural and historical-cultural environment. Even if landscape, environment and territory are often wrongly intented as indistinct, they otherwise embody different concepts, mutually inclusive and fully integrated: an urban bioregion summarizes them in a complete and, indeed, truly trans-disciplinary dimension.

Over the course of the twentieth century, the evolution of the concept of cultural heritage, which matured primarily within the theories of restoration, laid the progressive extension of the quality and quantity of the heritage to be transmitted to future generations. We have thus moved from the landscape as an unchangeable 'beauty' to a palimpsest of elements and conditions in constant change. The Amsterdam Declaration of 1975 and its definition of the 'integrated conservation' has placed cultural heritage at the centre of 'issues' and 'tensions' extrinsic to the discipline, generated by being part of a broader urban, economic, socio-anthropological context and landscape. In terms of methodologies, the strategic role assumed by heritage in this wide and dynamic context and the 'multiscale' experiences carried out at the territorial scale both in theoretical investigation and in design applications have led to firmly recognizing the methodological unity and the same goals pursued by architectural restoration, urban restoration and landscape protection (GUERRIERI, 2001; RUSSO, 2014). Following Brandi's principle of "uniqueness of the method" (BRANDI, 1977), it is possible to operate on the landscape according to conceptual and methodological extensions of the discipline developed in other fields of applications, such as that of art and architecture.

Different disciplines have developed their own definitions of landscape, identifying relationships and hierarchies, with very different outcomes.

One of the most important common points between territorialism and conservation practice is the trans-disciplinary approach that both the disciplinesare increasingly maturing. It is particularly evident in the similar

methodological process of identification, interpretation, protection and governance of the identity features that make a territory a complex cultural landscape.

Alberto Magnaghi in his "analytical methodology for the identity planning of the territory" states that in the territorialist approach the research of the specific qualities of the place and the representation of identity features require a complex analytical apparatus, but also a continuous "displacement of the point of view", a "trans-disciplinary nomadism" in the observation and reading of places, the incorporation of the interpretative gaze in the "structure of feelings" of places and territories (MAGNAGHI, 2001, 5).

This approach leads to transcending physical boundaries and privilege all those relational aspects particularly dear to the conservation approach. It is in this inclusive dimension of the landscape - which absorbs the territorial patrimony with its cognitive and material sediments - that the tradition of the restoration discipline has always moved.

From the comparison between the conservation approach and the territorialist one, a profile of two rather close sciences emerges. In particular, the following aspects immediately appear to be shared: the centrality of knowledge; the trans-disciplinary management of information; the sedimentary/stratigraphic approach; the identification of identity values and interpretation of meanings; the principle of conservation as a key factor for the sustainable reactivation of the heritage. Furthermore, considering the territory as the outcome of a long-lasting coevolutive process featuring peculiar 'historical deep', territorialism shows a high sensitivity towards the roles that have determined changes and to the understanding and conservation of the consequent material permanences: this attitude is obviously in line with conservation objectives.

These principles were only partially considered by the legislator in Part Three of Italian Legislative Decree 42/2004, which systematically excludes the word - and concept - of restoration in the field of landscape, rather preferring the terms "recovery" and "redevelopment".

The Italian Cultural Heritage and Landscape Code assigns to the Landscape Plan the role of a unique reference tool for all the institutions involved in the protection and management of the landscape. In this way, it attributes a new centrality to landscape planning, which is supposed to integrate and coordinate the different levels of protection. However, the landscape plan needs the integrated cooperation of a wide range of disciplinary skills to generate the widespread improvement of the landscapes quality, the production of new identities, the redevelopment or recovery of compromised parts of the territory,

strongly advocated by the law. Conservative actions need to be planned and developed within this general framework of protection, considering the restoration of the built heritage strictly connected with its territorial and environmental context, fostering effective synergies between all the involved disciplines (restoration, urban design, environmental engineering, etc.). The discipline of restoration is asked to re-calibrate its role and offer itself as a collaborative contribution in the contemporary challenge of facing the future while preserving the signs of the past. The most significant contribution comes from the consolidated protocols of investigation and the effective methodologies for the identification of the values, the critical assessment and the protection of the identity features of the considered landscape at the territorial as well as the architectural scale. This is an essential step for developing sustainable restorative and transformative interventions to be undertaken on all scales.

2. Sharing methodologies: trans-disciplinary approach and multilevel investigation

In the field of restoration many studies have been developed about the 'multi', 'inter' or 'trans' disciplinary dimension of the discipline, depending on the way of conceiving and composing the framework of knowledge. Recent studies - both in urban planning and in the conservation field - has also already demonstrated the positive contribution of the trans-disciplinary approach to make the knowledge phase an integral and 'determining' part of the design choices.

The concept of trans-disciplinarity derives from Jean Piaget's studies of genetic epistemology on the mechanisms through which knowledge is formed (PIAGET, 1970). Its fundamental principles on the objectives and modalities of the relationships between the disciplines can be found, also in terms of lexical specifications, in the contemporary literature (MONTUORI, 2012; MARZOCCA, 2014) which, taking up the general principles, has further explained the applicative potential of those theories on contemporary scientific research.

In the field of architecture, interesting perspectives of trans-disciplinary study applied to urban peripheries are those proposed by Marc Augè and Stefano Boeri and those on the more general theme of memory as a trans-disciplinary process (AGAZZI, FORTUNATI, 2007).

Considered outdated - at least in the field of research - the "assembly-line Taylorism" which for decades has determined 'self-referenced' projects, in a

trans-disciplinary approach the group of experts is called to redesign in a participatory way the 'grid' within which each problem has traditionally been divided into individual disciplines, without any of these assuming a hegemonic role over the others, finding new metaphors for sharing and coding updated lexicons for mutual understanding. The professionals involved in the project are transformed into a 'team' that reciprocally increases their domain of knowledge.

The restoration process is intrinsically trans-disciplinary. The metaphor of the orchestra used by Marzocca (MARZOCCA, 2014, 22) for trans-disciplinary research brings to mind the one that assimilates the restorer to a doctor (TRECCANI, 1996), a coordinator, a symphonic director (NIGLIO, 2000, 6), capable of controlling all the activities connected to the conservation project in an "almost priestly level role" (MARCONI, 1993, 28). This trans-disciplinary approach of restoration derives from the traditional aptitude - particularly in the Italian context - to operate through the "art of deciphering the signs and investigating changes", overcoming the mere freezing of historicized reality, to identify new keys to interpret the landscape and manage its dynamic transformations, in synergy with the different approach that the various disciplines - from urban planning to landscape architecture - have developed on the subject, reaching sophisticated theoretical and instrumental apparatuses.

Specifically, the stratigraphic approach, already widely experimented in individual areas - geological, archaeological, architectural and urban -, can represent an inspiring principle for the restoration of the landscape, conceived in terms of conservation of historical material, management of transformations and functional integrations, with particular attention not only to the treatment of the single element but also to the interfaces, intended as a spatial and temporal entity of interaction between history, environment and society.

The management of a trans-disciplinary process by the restorer does not imply an exhaustive knowledge of all disciplines, but the governance of 'how' knowledge is created. The investigation process is a creative process in defining the work path: it is a process of knowledge creation where the different sciences represent the tools, individually known, but not in the reciprocal relationships that are defined and clarified case by case, as well as the skills that from time to time become necessary in an interpenetration of disciplinary fields. The disciplines involved in the restoration process are not simply supportive but, on the contrary, they are an integral part of the process itself.

The restoration team of the University of Cagliari, School of Architecture - in cooperation with a panel of academic experts in survey and drawing, history of architecture, urbanism, geomaterials, physics, structures and diagnostics - has developed a trans-disciplinary protocol of investigation with the overall aim of

contributing to the definition of a methodology for the respectful restoration and sustainable reuse of multilayered historical assets included in stratified cultural landscapes.

Starting from the awareness that the deep knowledge of every single artefact that composes a cultural landscape is a crucial step for the development of a sustainable rehabilitation and regeneration project, the trans-disciplinary protocol of investigation is based on the indirect and on-site analysis and it has already been tested on selected typologies of historic buildings.

The planning, schedule and management of multidisciplinary scientific contribution have always appeared as a critical juncture in the research, even for small artefacts. This complexity, as it is well known, seriously increases considering wide architectural complexes in stratified urban areas and requires to think more deeply on the complex relationships between the different branches of sciences in the field of restoration and to define efficient protocols for the planning and the management of the single multidisciplinary contribution inside a coherent overview of the multifaceted preservation and reuse design project. In building cross-linked knowledge, brainstorming meetings and a co-working attitude are very useful measures for activating a successful and constructive technical and strategic dialogue. But, most of all, what is required is an effective protocol of investigation able to stimulate and support the comparison and the cross-check of the heterogeneous disciplines collected.

Another aspect refers to the interpretation of the investigation results and identification of historic and artistic values. This is traditionally the end of the knowledge plan and the beginning of the planning stage. What usually happens is that a lack of connection between the two phases of the project causes the undermining of the investigative efforts.

At this point, the question is: how is it possible that even accurate knowledge plans give rise to underwhelming projects? The answer is to be found in a specific step of the decisional process: the moment in which the designer decides the fate of every single element described in the investigation phase. It has already become widely accepted that the restoration act is a cultural, personal and even creative intellectual product. Nevertheless, it is also true that what throws the design choices into crisis is the failure to recognise and manage different levels of historic and artistic values with an operational consequence on conservation modalities. The critical synthesis that makes restoration an ethical act should be supported by methodological and procedural tools to support action plans and to shift the main project goals from 'what to preserve' to 'how to preserve'.

To face and solve this problem, the protocol of investigation has been based on a stratigraphic approach and a multilayered analysis, considered as a series of thematic investigations, following a generally held methodological process. This process consists of two main phases, carried out in parallel, one indirect and the other direct.

The indirect phase is based: 1. on the consultation of bibliographic sources and archival documents; 2. on the transcription of documents considered more significant for the reconstruction of the history of the site; 3. on the analysis of historical city maps and iconography useful for the reconstruction of long term urban transformations; on the analysis of project designs, views and historical pictures for the definition of the limits ante quem and post quem when absolute dates are unavailable; 4. on the elaboration of chronological schemes of synthesis, both in plan and in elevation which facilitates the understanding of the various phases of construction; 5. on the comparison of the relative chronology with archival information to date and define every single element of the building.

The direct phase includes: 1. the architectural survey or the updating and revising of the available ones. This step also considers innovative technologies such as 3D models and photomap of architectural surfaces; 2. the survey of construction techniques; 3. the thematic mapping of materials and relative mineralogical-petrographic analysis of samples; 4. the assessment of the state of conservation of materials and structures; 5. the analysis of the urban and architectural interfaces related to urban and architectural stratigraphy; 6. specific panel of diagnostics for the investigation of further aspects (thermographs, ground-penetrating radar, etc.).

The original scientific contribution to the generally held methodological process is to consider the multi-layered analysis as a single step of the wider investigation process, not the final one. The innovative point is the stratigraphic approach to the investigation phase, applied simultaneously to the urban and the architectural scale. The already well codified stratigraphic and archaeometric analysis has amply demonstrated the efficiency of the interdisciplinary comparison that comes from different field of sciences, making stratigraphy a sort of hub of knowledge, intended as a knowledge belonging from a dense contribution of several sciences, specifically oriented to the definition of chronologies. If we consider that every stratigraphic analysis ends with the chronological interpretation within the Harris matrix, it's a natural thought that also a multi-layered analysis requires an interpretation tool, usually not included in the process, leaving the information unconnected and less effective for the restoration process. But then, which are the other multidisciplinary hubs?

Beyond chronology, the methodology considers the following additional hubs: the state of conservation, the identification of values and the degree of possible transformation. A conceptual framework is in figure 1.

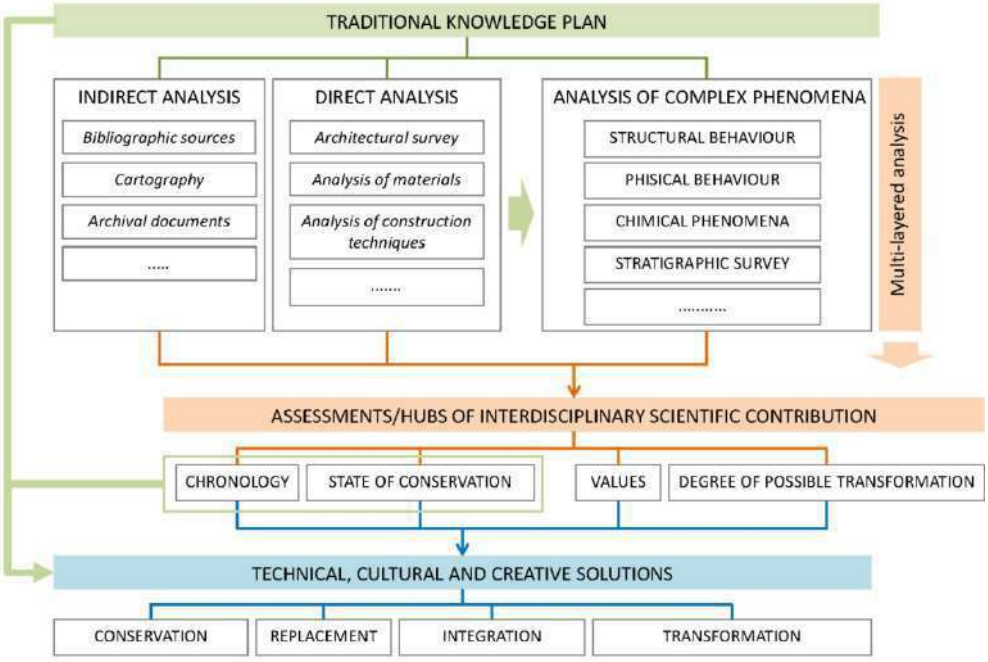

Fig. 1 - The flow chart illustrates the role of the 'hub criteria' in the traditional restoration process, acting as an intermediary element for the cross-check of the multidisciplinary contribution and the management of the additional parameters (value and degree of possible transformation)

The cross-check of the information in the knowledge hubs can't be random. The most suitable way of managing this kind of information is the use of a specific assessment form, properly designed for the application of this methodology, consisting of a sequence of data-sheet arranged as a hierarchical system. The conceptual framework is in figure 2. Every element is described through a form where it is analyzed and assessed according to some parameters and indicators. Each of them can change into a codified range of values.

This way of collecting and managing information, directly connected to the assessment step and the design phase, can ensure the maintenance of historical values and drive towards sustainable interventions, avoiding transformations, facilitating transitions. Even if developed for the restoration of architectural assets, this methodology - that preferrers a "cooperative" trans-disciplinary approach to a more "addictional" inter-disciplinary one - could be easily

extended to the different elements that make up a complex landscape, contributing to the understanding and enhancement of cultural anthropized landscapes, also useful in the conservation and valorisation process of urban bioregions.

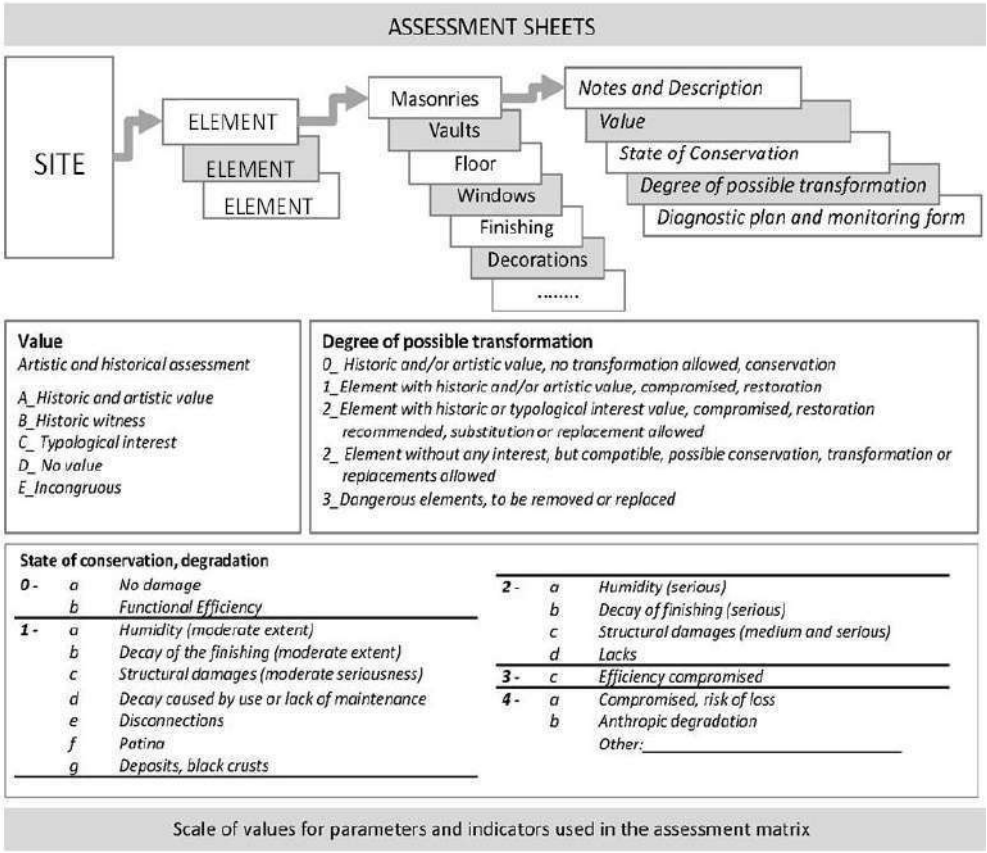

Fig. 2 - The flow chart illustrates the data-sheet framework and the scale adopted for the interdisciplinary assessments (value, state of conservation, degree of eligible transformation)

3. From transformation to transition

Territorialisation is a complex process by which space incorporates anthropological value, which remodels physical properties generating new cultural forms and functions. For this reason, territorialism requires upgraded methodologies and tools of knowledge in order to monitor anche guide changes

toward - financial, social and cultural - sustainable changes. Consequently, considering bioregion as associative cultural landscape implies the validity of the restoration and conservative principles and methodologies on both the fields of application. It follows that the trans-disciplinary acknowledge protocol deeply described in the previous paragraph can be easily adopted in planning, monitoring and managing vulnerable bioregions, characterized by natural and cultural values.

In the past, the 'interdisciplinarity' approach applied to the analysis and understanding of anthropized cultural territories has highlighted critical aspects where, to the great amount of information, the study of the interrelations between the investigated aspects has not followed, making the cognitive efforts in some way ineffective for the protection of the local values. The direct consequence of a design project, as well as a territorial planning based on the interdisciplinary approach is very often that of a deep transformation. As everyone knows, the word "transformation" literally referrers to a complete change, that can even make an object - but at the same time a monument, a place, a landscape, a territory - deeply different.

Otherwise, the adoption of a trans-disciplinary approach in the acknowledge plan has already shown in the past to stimulate 'transition' processes, where the word "transition" referrers to a process of gradual changes from one state or condition to another without necessarily involving a radical transformation. Both processes – transformation and transition - are irreversible, but while a transformation generally denies and cancels the values of the past, a transition takes on the values of the past and updates them, making them useful for the contemporary society and leaving them available for future generations.

For this reason, we have the duty to consider urban bioregions like territories in transition, never experimental fields of transformation, especially in historical context. Evolutions in culture, standard and style of living, and social requirements take necessary controlled modifications, possibly bearing new and more sustainable meanings. A trans-disciplinary approach to bioregions, with the adoption of the investigation protocols tested in the restoration field, seems to guarantee this transition, in a controlled balance between conservation and sustainable modification.

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HORTUS CONCLUSUS. The Garden at the heart of Bio-region.
Interpretations of idea of 'microclimate garden' into the city and landscape construction

Adriano Dessì

Abstract

In the contemporary age, in what Pierre Donadieu calls "the economy of itinerancy", it is necessary to mach the productive and ecological connections between the city and the rural, typical of the Bioregional idea, with strategies that enforce the needs of the 'man of the city' to 'taste' the Landscape in many ways, in particular through loisir and direct practice.

According to french geographer, that is true not only because the presence of 'pieces of nature' or 'pieces of countryside' near of housing places, is becoming the status symbol of the bourgeois way of living, but mostly, because the contemporary man's idea about the urban public space is increasingly linked to the place of 'renewed interaction between man and nature' and less and less to 'the space of civil representations'.

In that vision, the Garden regains a strong "centre" role in defining of contemporary human habitat, because of its double meaning of useful – but also aesthetic - practices place, it is the space of the domestic dimension but also of the 'Eco-symbolic' of the rural one, to quote Berque.

The present paper tries to discuss this new "central role" in a new - but also historical – interpretation of the human habitat into the Bio-regional future scenario and planning idea, that increasily seems one of the most important in the contemporary big-scale research.

The paper is going to try to highlight how this centrality is more evident and a special feature of the Mediterranean landscape, in which a particular type of European garden, the Hortus Conclusus, is costantly revealed in the human habitat construction and may also be a new necessary start point of landscape construction in the future, mainly based on principles of sustainability.

KEYWORDS: Landscape, Garden, Microclimate

1. Introduction: No bio-region without the garden

In a vision of an 'economy of itinerancy', according to Pierre Donadieu[1], it is necessary to mach the productive and ecological connections between the city and the rural, typical of the Bio regional idea, with strategies that enforce the needs of the 'man of the city' to 'taste' the Landscape in many ways, in particular through *loisir* and direct practice. According to french geographer, that is true not only because the presence of 'pieces of nature' or 'pieces of countryside' near of housing places, is becoming the *status symbol* of the bourgeois way of living, but mostly, because the contemporary man's idea about the urban public space is increasingly linked to the place of 'renewed interaction between man and nature' and less and less to 'the space of civil representations'. In that vision, the Garden regains a strong "centre" role in defining of contemporary human habitat, because of its double meaning of useful – but also aesthetic - practices place, it is the space of the domestic dimension but also of the 'Eco-symbolic' of the rural one, to quote Berque.

The present paper tries to discuss this new "central role" in a new - but also historical – interpretation of the human habitat into the Bio-regional future scenario and planning idea, that increasily seems one of the most important in the contemporary big-scale research. If, in fact, it is mainly based, according to Magnaghi,

[...] on a multiplicity of urban and rural centers, organized in reticular and non-hierarchical systems of main urban nodes and in clusters of small and medium-sized cities (…) and addressed towards the production of wealth through the valorisation and insertion in a network of "peripheral" and "marginal" nodes, each one in balance with their reference environment

it seems clear that the minimal spatial unit, productive and ecological, located in the inside and in the outside of this networks and costant factor of environmental balance between city and countryside, it is really the garden.

The paper is going to try to highlight how this centrality is more evident and a special feature of the Mediterranean landscape, in which a particular type of European garden, the Hortus Conclusus, is costantly revealed in the human habitat construction and may also be a new necessary start point of landscape construction in the future, mainly based on principles of sustainability.

[1] Cfr. Donadieu P., *Campagne Urbane*, Donzelli, Roma, 2006.

2. The Garden as a historical response to the crisis

In '*Breve Storia del Giardino*', published in Italy in 2012, Gilles Clément wrote:

The first garden was when the man has decided to interrupt his wanderings. During human and society life, there's no right time for this stage. The first garden was for food. The orchard was the first garden. It is temporal because it has not only been the base of the History of gardens, but it has crossed and marked it in its each period. The first garden was an enclosure. It agrees to safe the precious asset of garden; vegetables, fruits and then flowers, animals, the art of living and everything, as time goes, will seem to us the "best" (CLÉMENT, 2012).

The human dual purpose, through the garden, of selecting the place to inhabit and – enclosing it – of saving his better goods, providing us with more than a man's surviving way on earth, but with the time of the first construction of human habitat and landscape.

In the opera '*Topographia Paradisi Terrestris*' of Athanasius Kircher[2], a green giant enclosure crops a square of land, at the confluence of the Tigri and the Eufrate on the Mesopotamian valley. In the inside, we observe the same vegetation - which in the outside is thin and wild – in a dense and geometrical form; it becomes more 'human', rows along the rivers and orchard on the other surfaces; in the middle we find a range of monumental plants including the Evil Tree: the ambiguity behind this illustration, of a religious and proselytising nature, it is in opposition between the enclosure shape and the natural space, between the geometry as a rational tool and the local shapes as result of the natural processes. They continue flowing inside the garden without losing their natural flow's energy into their local millenary geography.

The human work, really closed to Divine and transcendent, but also of a original form so concrete and efficient, is not a physical and ecological barrier to natural elements but selects a specific portion of territory saving the best parts to be inhabited. In this giant enclosure the gates are at the intersections of the rivers. The other important – and probably more decisive - assertion of Clément is that the enclose garden is a continuous and necessary fact in the construction of human landscape.

[2] Ref. to the inked illustration of author kept at Harvard University – Hughton Library and present in different texts in which it may be quoted the monography edited by Godwyn, J. *Athanasius Kircker e il Teatro del Mondo*, Istituto Poligrafo dello Stato ed., 2010, and the recent Gunther Vogt'sexpositionopened with a giant image of the artwork (February, 2021).

Fig. 1 - *Topographia Paradisi Terrestris,* Athanasius Kircher, 1675

Nowadays, the same concept of continuity is particularly relevant, mostly even if we try to reintroduce some pre-pandemic *habitus* of Western societies, as the material and cultural detachment between the basic and exhaustible resources of their territories and the irreversible changes of human habitat for pre-eminent economic reasons. From this point of view, the idea of continuity probably seems that more needs to be putted into crisis as a result of decisive and all-encompassing break with the past. Recently, at the opening of the 'Festival del Verde e del Paesaggio' of 2020 in Rome, Franco Zagari has questioned: «what does it mean, today - 'during the pandemic time', as would have said Marquez - talking about gardens? The fact is that it has always occurred: during the more dramatic events of human history, the garden has been evoked as a place of catharsis, a selected place of natural and artistic heritage awareness, it is like a laboratory of experimentation where we could have an anticipation of the future, as well as place of extraordinary moral

usefulness»[3]. In this passage, Zagari cites another issue linked to the idea of garden, that of 'experimental place', the same expressed by Tomàs Maldonado, in a Zagari's collection, when he said:

[…] the garden – and through the garden, the landscape – has ever been an experimental place, created to meet the deeper religious, social and economic needs, in addition to being a specific expression of human thought about nature (ZAGARI, 2006, 31).

We can think how the garden has been central into architectural design of specific buildings for social and health control of the city and so much important in the city developing, mostly during crisis periods, like prison, penal settlements, psychiatric hospitals, orphanages, college students and in the typo-logical evolution of hospitals: in the more ancient Mediterranean garden, and probably the more ancient of Europe, the Patio of 98 Orange Trees of Mezquita of Cordoba, «that isle of shadows, silence and scents», as it was defined by Ricardo Molina[4], during the Christian epoch, the two levels porched space was used as a little Hospital and temporary house for abandoned children[5]. In that garden, the presence of fountains, of orchards, of shaded benches, of playgrounds and learning spaces, allows both to facilitate the cares, to relieve the pain and to achieve psychological and physical well-being and also to ensure the social control against the insalubriousness and insecurity of the urban space. Just in the Mediterranean, the idea of the garden as a space of social sanitation and redemption has involved, but also the idea of a measure and reference space during the most critical times of society. Already Emilio Sereni pointed how

[…] the landscape of suburban orchards and gardens, with its little and irregular plots of land, with its dense plantations and shrubs, with its border walls […] in which the small streets run between the white of enclosures, covered by the bright green of the orange trees foliage, was just a little evidence of order and organisation of landscape of the Southern Italy, in its traditional backwardness and low competitiveness and during its deeper crisis of contemporary period (SERENI, 1961, 268-269)[6].

[3] Zagari, F., "dal giardino alla città", Festival del Verde opening video in Auditorium Parco della Musica of Rome.

[4] Ref. to *Elegias de Sandua*, Ricardo Molina, 1948.

[5] Cfr. Nieto Cumplido, M., *Historia de la Iglesia en Córdoba: Reconquista y Restauración* (1146-1326). Publicaciones del Monte de Piedad y Caja de Ahorros de Córdoba, Córdoba,1991.

[6] Sereni, E., *Storia del paesaggio agrario italiano*, referring to Landscape of Mediterranean Garden of farm houses in chapeters "giardino mediterraneo" and "le origini del paesaggio contemporaneo: il paesaggio meridionale del giardino contemporaneo", Laterza, Bari, 1961, pp. 228, 268-269.


Figg. 2-3 – Garden of 98 OrangesofCordoba Mezquitaand the main courtyard with fountain and wines Pergolain the House-Museum "Max Moreau"in Granada (images of Dessì, 2015)

It is therefore following this interpretation of continuity we must view this text, in other words and from a different point of view about the human living, going ahead an idea of crisis that allows to select more accurately and reasonably the experiences of the past, into a renewable meaning of 'operative history'[7], based on the radical changing of our relationship to the space and to the same concept of nature.

[7] Muratori, S., *Studi per una Storia operante di Venezia,* Istituto Poligrafico dello Stato, Libreria dello Stato, 1960.

Fig. 4 - The wisteria's courtyard in Seville Cartuja (image of Dessì, 2018)

Fig. 5 - Cloisters and housing-courtyards at Albaicìn, in Granada, shooted from the terraces of Alhambra (image of Dessì, 2015)

3. The Garden as a micro-climate tool for the Mediterranean Bioregion

Although the idea of Garden is deeply linked to the rural dimension, as the landscape historiography has expressed several times – it has been, moreover, since the Roman Age, a real process of 'importation' of parts of countryside into the city – it is clear and evident, into the Mediterranean landscape construction process, that the role and the development of the garden are really linked to the shape and to the development of the city. Regarding this suggestion, John Dixon Hunt reminds us:

[…] the idea of introducing into the urban fabric a specific zone that takes configuration, role and sense from the countryside, goes back to the time of Ancient Romans. […] The creation of open areas into the Roman city is nothing but the reintegration of figurative experiences of the past, really familiar to its inhabitants, but refined and mediated by their country mental associations (DIXON HUNT, 1993, 70).

Finally, the garden is the place where city and countryside penetrate one other, materially and figuratively; it is an integral part of the urban structure and of architectural typology – at least until the modern city decided to do without its rural territory, in the industrial age advent.

But it is in the 19th century, as states Giorgio Grassi, that occurs the posting between city and countryside – and, with them, between urban built and voids - that has never been healed: «before the 19th century, the city shall allows the void into its fabric made of gardens and blocks. In the centuries that followed it has become "all built", it has been just the expression of legal order and mathematics relations in the space using»[8]. The progressive eating of the "hollow space"[9]of the historical city, especially of the Mediterranean one, due to the fully built or, also, due to the modern 'terrain vague' in which individual buildings float, has produced strong imbalances and the more blurred distinction between city and countryside. In this process, the role of the garden - on the other hand, historically space of balance – has gradually been lost and especially that spatial unity of Mediterranean landscape made of «irregular enclosures in order to protect the herbaceous and shrubs crops from the bite of flocks»[10]has been replaced by open surfaces, by residual, by the uncultivated fragments, by empty spaces without physical limitations.

[8] Grassi, G., Lecture at Doctoral School of Department of Architecture of University of Cagliari, Cagliari, June 2012.

[9] Pezza, V., Introduction to Discussion 2.3 atProArchForum, *Il progetto di architettura come intersezionedeiSaperi (The Architectural Design as knowledge intersection)*, Naples, 23rdNovember, 2019.

[10] Sereni, E., *Storia del paesaggio agrario italiano*, Laterza, Bari, 1st ed. 1961, quoted in XV, 2008, p. 39.

As it always happens into the city history, the main social and economic changes are inevitably reflected on a more general field, mostly on the environmental and ecosystem-based one. The loss of the *hortus conclusus* of being that extraordinary tool for giving shape to the human micro climate - in which the interaction between the enclosure, the house and the internal green space, has been the main way to achieve the balance between housing and producing in the hostile and arid climates of Southern Europe – has limited and gradually but considerably eroded the effects of micro climates of urban heat islands, with important effects also into the macro-regional - and finally global – scale: thinking about our own domestic garden always means thinking, in the contemporary, about the «planetary garden»[11], as Clément always says.

From a different point of view, the issue of the garden as the micro climate heart of the city is not only linked the large-scale challenges of an increasingly broad horizon, but also to the daily human wellness. If the idea changing of Bio-region demands an "anthropological mutation"[12]of the concept itself of living, not yet linked to the functionalism of the 'smart' urban models, and also not to return to the rural and pre-modern hamlets ideas, it appears clear that we need to regain the physical dimension of living, the "tactile empathy" between people and their housing places, and also considering them as a part of a greater micro-climate system – and the Bio-region as the organization model of that system – in which it is a priority the relationship between the man and the nature, especially between the man and the different forms of vegetation.

In additional to the well-known benefits of the relationship between the vegetation and the ground permeability, due to the trees evapotranspiration and the water retention in the soil, that allows the absorption of heat, and also the restitution of the latent heat[13], – of the solar radiations, into the hortus conclusus this process is enforced by the walls, mostly between day and night. In fact, the wall provides a great thermal mass in winter and generates dense shadows in summer, but mostly interacts with the internal vegetation – trees, brushes or

[11] «Whether we like it or not, the garden always refers to the planet. If, in its initial configuration, it has never ceased to welcome species from all over the world - and to constitute a planetary index in this world -, here it is now ecologically connected to nearby space, which is in turn connected to a other farther, and so on, until it goes around the Earth», transl. from Clément, G., *Giardini, paesaggio e genionaturale*, Quodlibet, Macerata 2013.

[12] « (…) These questions, in particular the second and third one, which involve an anthropological mutation in the relationship between human settlement and environment, between functional geographies and places, lead me to conclude that the 'return to the city' cannot be a return to the historic city, nor to the rural village» transl. fromMagnaghi, A., *La regola e il progetto. Un approccio bioregionalista alla pianificazione territoriale.* Presentation, p. XIII, University Press, Firenze, 2014.

[13] Cfr. Beretta, S., *Gli effetti del microclima urbano sulla mitigazione dell'isola di calore urbana*, Politecnico di Milano, 2012.

fruit vegetables – releasing, during night, the absorbed heat of the day, aiding the evaporation of water held in the ground and keeping the garden temperatures mild in terms of micro-climate effects (in other word, measured up to two meters from the ground[14]); through the evapotranspiration, the tree ensures the same effect during the day, reducing the temperature over the ground through the production of water vapor.

In addition, the closeness between walls and trees, if we don't take account of species and dimensions even if very important, generates a shaded and half-lighted areas continuous sequence, in which the evaporation is not produced by direct radiation but mostly by thermal differential, in such a way that the water is kept for a very long time in the low air between the walls and in the hand-held, maintaining constant the hygrometric conditions.

This mutual cyclical action also generates, at the small scale, little but important air movements, created by thermal differential between the ground, the over-ground and the foliage of the trees[15], but mostly between the inside and the outside of garden, generating effects of gentle breeze that, mostly during the summertime, contribute to the urban comfort and the physical well-health's improvement – dissipating more quickly the body's heat. In the Iberian Patio, for example, the functioning has been implemented with the placement of low seating, close to fountains and along the little open canals flow – the well-known 'Acequias' - used for the fruit trees irrigation. The closeness between the people, the water and shadows on that seating, allow both the slowing down evaporation of water and to keep constant the body temperature.

Thus, the principle of the 'scale control' introduced with the same concept of Bioregion may be transferred to that of 'climate control' which if putted into practice from a low degree through the combined action of a multitude of 'passive internal areas' rather than central and big energy production systems, allows to renew the same concept of housing and to extend its meanings. In addition, the combination of many differing micro climates that is generated by the interior gardens system and the renewed view of empty space colonized by urban vegetation, at the urban and regional scale, may allow to divide and fragment the heat island effect caused by the density of building and urban surfaces in their territories, and to produce diffuse thermal exchanges between the inside and outside of the city in which we have, at the time, at about

[14] It is defined as «The complex of climatic conditions existing in the immediate proximity to the ground (up to a height of 2 meters), which are decisive for the development of vegetation» by Oxford Dictionary; about this definitioncfr. Unwin, D.M., *Simple techniques for microclimate measurement* in JoED, p.179-189, 2010.
[15] The top layer of a plant or group of plants also called "vault", "upper layer" or "canopy".

temperatures of 3°C and 5°C; according to recent investigations on Italian cities, the increasing of about 10 % of empty urban spaces for vegetation, may lower the urban temperature by approximately 2°C,significantly mitigating the heat-island effect. Obviously, reducing the thermal differential between the inside and the outside of the city – and, in a more little scale – the inside and the outside of buildings, may lead to significant benefits in terms of energy consumption (calculated about 8% to 12%[16]).

The multi-functional character of the Mediterranean Garden is based on this system, derived by Roman Hortus Conclusus: Garden for food, for society, therapeutic, for *loisir*… Due to the proximity between the agriculture and the enclosures system, the water cycle and the daily and seasonal temperature changes monitoring mechanisms, the ease and capillarity of that monitoring, the different forms of enclosed Garden, - the Île de France *murs à pêches*, the sub-Saharan and mid-East palm-orchards and also the olivetate gardens of the Peloponneso and Andalusian citrus-groves, the bocages of Normandy and also the terraced gardens of the Douro valley, have survived in time and represents, at the moment, a very achieved model through which is possible orienting the urban development and regeneration.

Fig. 6 - Alcobaça Monastery cloister – recovery project by G. Byrne (image of Dessì, 2015-18)

[16] Unwin, D.M., *op. cit.*

Fig. 7 - Garden of Oranges inCaja de Granada designed A. C. Baeza (image of Dessì, 2015-18)

4. Thinking the Garden as Hortus-Conclusus. Some "micro-scale" elements design for an Urban Bioregion idea

These last considerations have been moved on a double point of view that sees, on one hand, the human habitat construction in its continuous relationship with the garden as the most important element of ecosystem balance, on the other the garden as a new "center" of the Bioregional strategy. That position goes beyond practices and ideas which have been demonstrated obsolete and inefficacy to face the complexities of contemporary age, mostly based on progressive loss of multiple relationships between city and the environmental systems that sustain it.

In conclusion – in these two points of view and into this more general Bioregional idea, it is possible to propose some design strategies in which the concept of Hortus Conclusus, even if differing in programs, places and

dimensions, may seems an useful solution of the architectural problem into the interpretation of micro-climate construction.

In those brief strategies proposal, the urban space could be precisely designed to form an Hortus Conclusus and, for this reason, it starts from the internal urban empty spaces, from the internal gardens of houses, from the public space between the housing fabric end the main streets, from parks and from all the connection elements more than the physical elements of the city: in respect of this strategy it is possible thinking some formal strategies into the micro-climate construction which is possible to categorize as follows:

- A construction of urban open-space strategy based on the 'impluvium' through the identification of a system of meeting spaces in which the collection and the provision of the wastewater become the main issues of design and constitute the very core of the urban regeneration. This strategy is based, similarly to historically was ever happened in the Iberian and Andalusian courtyard, on this central space, recognizable into all the scales - that of neighborhood, of the block and of the house also – in which the water of urban surfaces and roofs are drained and slowed down towards the center, establishing free routes for pedestrians along the perimeter and guarantying shaded and close to the entrances paths. That draining 'impluvium', in the center of urban or domestic open space, organizes the same space distinguishing the passing from the dallying sides, the dry from the humid pathways through the material surface definition. Usually sporadic tree species are used to colonize that space through which it is possible to generate shaded areas and to reduce the direct irradiation exposure time of walking surfaces and also being protected by the walls.

- A construction of urban open-space strategy based on the 'island of shadow' produced by the closeness between the walls, dense vegetation and small architectures (like pergolas) that defines protected and well-being spaces in which the use of spaces under the trees or under light roofs is favored by the urban temperature mitigation and by the dense, luxuriant and productive vegetation. That strategy is therefore based on the activation of micro-climate conditions through the intensification vegetable dense mass concentrated in a very defined area, a sort of "green tank". In this case, the courtyard, interpreted as a 'urban interior', it is seen as a 'room without roof', would have said Carlos Martì Aris speaking about the house, an open space, with comparable dimensions with other ones like squares, illuminated from above by the natural light filtering to the vegetation, a space in which the combination between the architectural and the green mass allows to protect from the main winds and produces constant and moving shadows;

- A construction of urban open-space strategy based on the 'humid buffers' that surrounds the central space which must be free for different public and collective uses, and are made of a dense border vegetation and of the presence of water on the ground; that interaction allows to preserve the central areas from the direct solar radiation and from the heat transition of the closer urban blocks. It may be obtained by a succession of 'linear vegetation tanks' that encloses the space, colonized by permanent species of trees - similar to rural hedgerows like the pastoral 'bocage' – and protects the enclosed space. In that succession, the presence of water tanks and fountains aims to variate the organization of the space but also to mitigate the heat produced by the mass of walls - and reflected by urban surfaces – through the humidity produced by the flowing water. It is a sort of exchanging boundary and thermal breakage between the inside and the outside of the public space and favors the micro-breeze effects due to the thermal differential produced between the urban buildings and the internal gardens of blocks.

That interpretation of Bioregion founded on the system of private and urban gardens and on ecological relationship between urban gardens and countryside, is possible only if we change some points of view and theoretical positions based just on a functional and positional idea of its elements. In that vision, in fact, the polycentric system of settlements, the anti-hierarchic relation between different scales, the social and productive relationship between different communities, the construction of a net of capillary connections which is at the base of the same concept of Bioregion, are characters strictly linked to a system of gardens in a certain territory. The garden represents the place in which the Urban Bioregion rediscovers the space of nature as the main development tool and it might be applied as one of the most significant and perspectival way to reach a new sense of "being humans on earth".

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SECTION II – PROJECTS

BIOREGIONAL GOOD PRACTICES IN EUROPE

Sustainable Urban-Rural Relationships in Romania within the Paradigm of Urban Bioregionalism

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Abstract

The main goal of the current study was to determine the level of openness of Romanian society to the practices that can be framed in the paradigm of urban bioregionalism. The following objectives structured our research: first, creating an overview of the international literature on urban bioregions; secondly, realizing an overview of the academic approaches on the topic by Romanian scientists; thirdly, identifying case studies in Romania which fit into the paradigm of urban bioregions and briefly presenting and discussing them. We achieved our aim by analysing and interpreting the following research material: (a) available online data on urban bioregional discourses and practices at the international and national level, (b) the authors' previous research data on urban regeneration in Romania and (c) the results of field research. Results are presented in the form of an exploratory and qualitative study on Romania on urban bioregional practices. One of the most significant findings to emerge from this study is that practical approaches to the theme of urban bioregions are more and more part of the everyday reality of urban-rural relationships in Romania, various initiatives featuring citizens, entrepreneurs, civil society, and local administration as stakeholders, and yet, very little accounted for by academics so far. Considering the regional level of this country, most of the case studies are located in Transylvania and Western Romania. These examples point at the focus on sustainable and innovative production and consumption patterns. In Romania, advocacy and practice concerning urban and peri-urban sustainable development innovative initiatives, framing bioregionalism as a choice of some people and communities in their present and future trial of reclaiming resilience for the respective settlements, are foregrounded by examples of the last two decades.

KEYWORDS**:** metropolitan areas, urban gardens, peri-urban agriculture, urban and rural regeneration

1. Introduction

Bioregionalism is nested in environmental theory and it is a cultural and social movement advocating for the creation of resilient communities at local and regional levels (FANFANI, DUZI, 2019). Based on participative processes in governance and fair resource management, bottom-up and place-based development is the strategy encouraged within this paradigm (FANFANI, DUZI, 2019, 6). Reciprocal enhancement of urban-rural supportive relationships and societal democratic practices ensure the complex processes of sustainable development. The urban bioregion is highly relevant as an alternative approach to classical development also due to the global concerns about the sustainability of our lifestyles (IUCN, 1980; WCED, 1988).

Bioregionalism, as a development paradigm, proposes a different lifestyle than the consumerist one (i.e. triggered by commercial purposes), that is one based on attunement to the "carrying capacity" of the territory (ATKINSON, 1992, 338). More specifically, the political and cultural project of bioregionalism is not a conventional approach to development, but an ecocentric one, advocating for "an ecological and cultural symbiosis," for a new ethics towards the progress of the human society (ATKINSON, 1992, 338-339).

In the context of the unsustainability of contemporary cities and swift changes characteristic of the rural areas in their proximity, there is a stringent need to overcome social, economic, cultural, and environmental dysfunctions. The use of the bioregional model proposes certain answers in the framework of the territorialist approach to development, that is development based on local resources and culture and a search for roots (ATKINSON, 1992, 330; BANINI, 2017; BANINI, ILOVAN, 2021a; 2021b).

This subject of urban bioregions is emerging in Romanian research and scientific literature (ILOVAN ET AL., 2021; ILOVAN, CIUPE, 2021) and *this chapter aims* to assess whether there is evidence concerning societal openness to urban bioregional practices in Romania.

One of the place-based approaches within this paradigm is that of sustainable food practices and systems and that will be the focus that we shall offer for Romania in this material; other related approaches, such as sustainability of transport infrastructure, sustainable urban regeneration for recreation and well-being, biodiversity, will be discussed in detail in another contribution to the theme of urban bioregions in Romania (ILOVAN, CIUPE, 2021).

To reach the aim of the chapter, *the following objectives structured our research*: first, creating an overview of the international literature on urban bioregions; secondly, realizing an overview of the academic approaches on the topic by

Romanian scientists; thirdly, identifying case studies in Romania which fit into the paradigm of urban bioregions and briefly presenting and discussing them.

2. Methodology

A first study on urban bioregions in Romania was realized from the perspective of geography university education (ILOVAN ET AL., 2021). The lack of any scientific literature explicitly documenting urban bioregional discourses and practices, having Romania as a case study, proved to be very challenging for researchers interested in the topic (ILOVAN ET AL., 2021).

We achieved the aim of this chapter analysing and interpreting *the research material including* (a) available online data on urban bioregional discourses and practices at the international and national level, (b) the authors' previous research data on urban regeneration (ILOVAN ET AL., 2020a, 2020b) and (c) the results of field research. Therefore, collecting the data involved a mix of online documentation (which started in March and ended in December 2020), observational fieldwork and face-to-face interviews with representatives of certain initiatives (from 2018 to 2020).

Results are presented in the form of an exploratory and qualitative study on Romania on urban bioregional practices.

3. An overview of the international literature on urban bioregions

Starting with the 1960s, a change in beliefs and practices addressing the environmental problematic in a sustainable manner has developed (ATKINSON, 1992, 327-328). Bioregionalism, as an ethics of loyalty to place (TAYLOR, 2000), advocates for using efficiently and in an innovative and sustainable way the potential of the territory. More recently, researchers have argued that: "the definition of innovative thresholds and qualitative standards referring to human well-being, shared at the European and international level, can help prevent the speculation and exploitation of the common goods, the trampling of the rights of the people and the consequent decrease of the community welfare. At the same time, the necessary flexibility and adaptability to the specific territorial situations can be guaranteed" (COLAVITTI ET AL., 2020, 15).

Active citizenship helps at creating and promoting urban commons (i.e. for their role in creating edible cities, cf. SCHARF ET AL., 2019), while the latter reinforce such active participation for solving community problems: "urban

commons bear the potential towards participatory, democratic, community-building, and bottom-up processes that re-situate citizens as key actors of future cities" (SCHARF ET AL., 2019, 11). Considering this, the city is conceptualised as a living system, formed at the intersection of civic ecology and local economic development, and continuous cooperation among formal and informal stakeholders (THACKARA, 2018, 14), "fostering active citizen participation through stewardship and community engagement" (CHURCH, 2015, 1).

In addition, community identity is supported by these urban bioregional practices, perceived as both innovative and sustainable, as these foster community and place attachment. Thus, bioregionalism, also as a people-centred approach (CHURCH, 2015, 3), enables processes of individual and community empowerment.

Against this theoretical background, among the first contributions that we considered were those belonging to the Italian academia, which helped create the theoretical basis and provided us with relevant examples (POLI, 2015; FANFANI, 2018; FANFANI, DUZI, 2019; COLAVITTI ET AL., 2019, 2020). Besides these, the scientific literature of Australia, the USA, Canada, the UK, and Germany points out where it is concentrated the highest public and scientific interest on the topic of urban bioregions (ILOVAN ET AL., 2021).

Although the interdependence or complementarity between the rural and urban areas is not a new topic (NICOLAE, 2002; HIRT, KOVACHEV, 2015), the urban bioregional approach foregrounds the practices and implicit education that aim at a sustainable territorial reconnection and functional structuring of the two environments, based on common objectives, inclusiveness, shared heritage, social capital, and territorial identity (BANINI, 2017; BANINI, ILOVAN, 2021a, 2021b). In addition, it proposes protection from development, regulating relationships between cities, their hinterlands, and regions within a movement towards sustainability, where nature, the state and governance are brought together (MACDONALD, KEIL, 2012).

Taking into account *sustainable food practices*, a series of recent papers follow on the topic of urban bioregions, considering farmland preservation from urbanization, underlining dedicated programmes and their social benefits (MACHADO ET AL., 2006). Moreover, preservation of native species diversity through environmental management strategies, by re-imagining and co-opting the humans in restoration and gardening activities, by shifting their representation from threats to stewardship of land and species was another line of enquiry (HEAD, MUIR, 2006). In the same vein, sustainable food systems or bioregion food systems and food system design and planning were explored in the trial of certain stakeholders to better align communities and their economy

with their living environment (HARRIS ET AL., 2016). In such a context, farmers' markets and community supported agriculture are instances of "the realities of the local food movement" (DUNNE ET AL., 2011, 46).

Moreover, in the framework of the new bioregionalism of the 21st century, researchers argue that healthy and just bioregions are objectives that should focus on disadvantaged communities and favour place-based approaches (i.e. territorially rooted ones) (PEZZOLI, LEITER, 2016). However, pursuing ecological sustainability and addressing social exclusion and economic inequality of the region at the same time is a difficult task. Therefore, Menser (2014) debates bioregionalism with "its virtue ethics-oriented communitarianism as well as its spatial understanding of the just human polity [which] render it unable to adequately address the on-the-ground reality of environmental degradation and political injustice as they occur in urban regions" (439).

4. An overview of the academic approaches on urban bioregions by Romanian scientists

In Romania, the academia studies the present situation and informs on future territorial development usually warning against the potential dangers of urban development in relation to the rural area. Considering the relation between the two areas within the framework of sustainable development, there is relevant research about the decentralization of urban roles (STOICA ET AL., 2010), urban-rural economic and social disparities (ANTONESCU, POPA, 2014), and urbanization, suburbanization and counter urbanization processes and their causes (NICOLAE, 2002; SĂGEATĂ, 2008; GRIGORESCU ET AL., 2012). As a key idea concerning the connectivity of the two areas and their social-economic relationships, Romanian researchers underline the necessity to restructure these in the framework of sustainable development (FURDUI ET AL., 2011; GHIUCĂ ET AL., 2012; UNGUREANU ET AL., 2013; DELCEA, 2014).

The Romanian academia discusses the lack of interest and the degrading of the idea of community, the incapacity of many to cooperate, high individualism and ethnic fragmentation as highly relevant when creating communities at the local and regional levels (HARTEL ET AL., 2014). In the same vein, they point at the necessity to regenerate the rural area depending on the local and regional historical, economic, and social factors at the basis of the appearance of Romanian village, suggesting actions either from the public administration or from relevant social actors in rural life, such as the Church (SURD, 2010).

The main concerns are the high pressure from both urban and rural inhabitants on agricultural land and the present chaotic initiatives (GRIGORESCU ET AL., 2012). Most economic initiatives from the rural area focus on the main resource – agricultural land (SURD, 2010; FURDUI ET AL., 2011), and, at the same time, the urban population looks for cheaper resources and puts pressure on the same land for residential purposes (GRIGORESCU ET AL., 2012; GURAN-NICA ET AL., 2016).

Notwithstanding all this research, the syntagm of "urban bioregion," in Romanian "bioregiune urbană," is not used in the Romanian scientific literature; it is only indirectly touched upon (i.e. no definitions or examples, whatsoever) (cf. ILOVAN ET AL., 2021). The same situation is true also for the Romanian mass-media or resources created for the online environment.

In the present post-socialist Romanian society, the bioregional paradigm may offer the necessary context for a "back-to-the-land" approach, ensuring community resilience and capitalizing local resources and territorial identities in the process (ILOVAN ET AL., 2020a, 2020b, 2020c; for a discussion in the Italian context, cf. also COLAVITTI ET AL., 2020, 13-14). In the *National Strategy for the Sustainable Development of Romania*, such a sustainable and participatory approach to development is presented within the smart city framework, and, by extension, although not specified, one could envision this to be functional also in the rural neighbouring area: "the smart city maximizes the synergy between the city and its inhabitants, encouraging these citizens to be more active and participative in the life of their community" (CELAC, VĂDINEANU, 2018, 73).

5. Sustainable practices foregrounding the urban-rural relationships in Romania

This part includes the research results, that is case studies on good practices in Romania which fit into the paradigm of urban bioregions and the bioregional philosophy, as explained by Sarah Church: "bioregional philosophy propounds that people should live in balance with the environment, other people, and non-human life, within the carrying capacity of naturally or culturally bounded regions (bioregions)" (CHURCH, 2015, 3).

The topic of sustainable relations between rural and urban environments showcased relevant subtopics for Romanian urban bioregions, which we identified, based on examples from this country: metropolitan areas, peri-urban agriculture, agricultural/agro-industrial parks, urban agriculture and reducing pressure on the rural environment, gastronomy, food products and crafts.

5.1. Metropolitan areas and development that supports the rural settlements

According to POLI (2017), creating networks between the rural and urban areas is a key issue in creating an urban bioregion: "Such networks may become the backbone of a rururban public space defined for flood risk prevention, easy mobility, preservation of historical buildings, proximity to farming, and presence of agroforestry" (965).

In Romania, in many cases of development through cooperation between the urban and rural areas, it is used the syntagm of "metropolitan area" or the project for the development of this area, for enabling the relationships between the two in all sectors aiming at synergic development (SĂGEATĂ, 2008). This trend of reconnection for sustainable development is discussed in Romanian scientific literature, relating it both to the national context and the European one (STOICA ET AL., 2010; PINTILII ET AL., 2012; ANTONESCU, POPA, 2014). The symbiosis between the large urban centres and the rural area is pointed out. However, the more prosperous the urban centre and its extension is not regulated the more it urbanises the neighbouring rural settlements. The intention to modernise and increase the living standard, but without any development strategy to protect the rural area, leads to the destruction of the latter, of its resources that were initially attractive for the city dwellers and the appearance of other deficiencies of the suburbanization process. Although the connectivity trend is good, the present development is a chaotic one and the urban area consumes step by step the rural one in its proximity, such as in the documented, but not unique, cases of the settlements nearby Bucharest (GRIGORESCU ET AL., 2012; PINTILII ET AL., 2012), Piatra Neamţ (GHIURCĂ ET AL., 2012), and Constanţa (GURAN-NICA ET AL., 2016).

Romanian researchers studying the rural area underline the problems generated by rudimentary economic practices such as subsistence agriculture (SURD, 2010; HARTEL ET AL., 2014) and the necessity of a strategy for reviving the rural area (SURD, 2010; GRIGORESCU ET AL., 2012), where many initiatives are financed by E.U. funded projects (UNGUREANU ET AL., 2013). Solutions are implemented by private stakeholders and by the public administration.

Within metropolitan areas, large projects are implemented having as beneficiaries both the urban and the rural area, aiming at creating a self-sustaining regional entity, developed in a sustainable way. The Romanian public administration, under European legislative guidance, but also encouraged through E.U. non-refundable funds, implements infrastructure investment projects that stimulate the connections among settlements (SĂGEATĂ, 2008). This enables the appearance of metropolitan areas defined through complementarity and collaboration (e.g. the economic, social and cultural

relation between Piatra Neamț Municipium and Gârcina Commune, cf. GHIURCĂ ET AL., 2012).

The end of the 2000s showcases the development of initiatives for collaboration between the urban and rural areas in the official administrative framework of the newly created metropolitan areas, such as those of Oradea, Cluj-Napoca and Constanţa (Tab. 1). Examples are provided on the official websites of the metropolitan areas, where there is information concerning all the implemented development plans or undergoing implementation, as well as about educational projects on environmental protection and preservation of the natural heritage within the metropolitan area. Besides these, informative programmes and conferences take place on themes appropriate to the characteristics of the respective settlements.

Tab. 1 - Metropolitan areas – Good practice examples from Romania within the paradigm of urban bioregions

a. Oradea Metropolitan Area; b. "CityRegion.Net The role of cities in integrated urban development" project; c. Exchange experiences with other cities / metropolitan areas, develop a Local Action Plan with the implementation of the new strategies; d. January 2008-January 2011; e. Aiming to develop work plans and public policy recommendations to improve cooperation between cities and other local communities / peripheral communes (ZONA METROPOLITANĂ ORADEA [ORADEA METROPOLITAN AREA], 2020).
a. Asociaţia de dezvoltare intercomunitară (ADI) [Intercommunity Development Association (IDA)] with the founders: Cluj-Napoca City Hall, Cluj County Council and 17 communes in the periurban area of Cluj County; b. Use of the growth pole strategy for the Cluj-Napoca Metropolitan Area; c. Through voluntary partnership between urban and rural settlements; d. From 2008 onwards; e. Reducing regional economic and social disparities (DRANCA, 2013).
a. The public administrations of six cities and eight communes; b. Development Strategy of Constanţa Metropolitan Area; c. "taking into account the sustainable development of the entire area and reducing current development disparities among the 14 localities that make up the growth pole"; d. From 2010 onwards; e. "The development direction envisages the development of Constanţa Metropolitan Area as a competitive multifunctional centre of Romania and the main economic polarizer in the Black Sea region" (ZONA METROPOLITANĂ CONSTANȚA [CONSTANȚA METROPOLITAN AREA], 2010).

Meaning of the classification used in the table: a. stakeholder(s); b. official/unofficial title of the project/action/initiative (according to available online information); c. objectives of the project / action / initiative; d. project starting year/implementation period; e. utility of the project / action / initiative.

5.2. Peri-urban agriculture and reducing pressure on the rural area

Considering Poli's perspective (2015), who underlines how the rural area is defined in the urban bioregional context – "A countryside which remains countryside, but which now carries out innovative, multifunctional and multidimensional services for the city while still keeping its rural role and functions" (84) – we remarked that in Romania, peri-urban agriculture is hosted mainly by small farms, because of the high degree of agricultural land

fragmentation. Under such circumstances, we identified the trend of realising partnerships between such small producers and families or groups of families from cities and towns. In exchange for an annual or monthly allowance (based on subscription), the rural producer delivers weekly, during the respective year, baskets of vegetables, fruit and other food products.

Peri-urban agriculture initiatives supported by city dwellers are present starting with the late 2000s, foregrounding the role of the civil society and entrepreneurs, and less of public administration, in supporting small agricultural producers and local products, with such stakeholders especially from the area of Cluj-Napoca, Timişoara, Iaşi, Arad, Oradea and Odorheiul Secuiesc (Tab. 2). Results show endeavours to recover traditional supply chains, while enabling awareness about the re-appropriation of local resources in the community (cf. also COLAVITTI ET AL., 2019).

Local food systems reflect bioregional practices contributing to the protection of peri-urban local cultural landscapes, to maintaining a countryside which preserves its features and functions and also provides the city with a multitude of services (cf. POLI, 2015, 84). As such, the agri-urban cooperative relationship enhances bioregional justice (FANFANI, 2018, 6). Advocating for regional food systems and environmental stewardship, the urban bioregion paradigm aims to advance sustainability (KISSINGER ET AL., 2019).

Tab. 2 - Peri-urban agriculture – Good practice examples from Romania within the paradigm of urban bioregions

a. World Vision Romania Foundation; b. The "Merindar" concept - intermediary for selling honey; c. Beekeeping consulting, "AgroVision buys honey from beekeepers in the fields where World Vision operates and offers 25% more on the purchase of honey, to encourage and support them [i.e. local producers in rural areas]"; d. From 2008 onwards - the establishment of the Agrovision farm, and from 2018 onwards - the creation of the "Merindar" concept; e. "to give needy families in rural areas a chance to escape poverty and earn a decent living" (MERINDAR, 2020a, 2020b).
a. Non-governmental organization - The initiative group from Timişoara sessions supported by the Romanian Permaculture Association; b. "The creation of a vegetable garden in the courtyard of the Waldorf Kindergarten"; c. "The garden is a source of fresh vegetables for the morning snack of children and space for them to learn about gardening and plants"; d. 2014; e. "Expected impacts: Green space, habitats and biodiversity, Health and well-being, Regeneration, land-use and urban development, Sustainable consumption and production" (URBAN NATURE ATLAS, 2017b).
a. Asociaţia pentru Susţinerea Agriculturii Ţărăneşti [The Association for Supporting Peasant Agriculture]; b. It promotes alternative short food supply chains which connect the urban with the rural; c. In exchange for an annual or monthly amount (based on subscription), the proximity producer delivers weekly baskets of vegetables, fruit or other food products to consumers in Timişoara, Cluj, Arad, Oradea and Odorheiul Secuiesc; d. From 2014 onwards; e. Capitalization of small-scale local producers (IDEI DE AFACERI, 2014).
a. Civitas Food Hub S.R.L. (Limited Liability Company) in collaboration with Foundations: Romanian-American Foundation and Fundaţia Civitas pentru Societatea Civilă– Filiala Cluj-Napoca [Civitas Foundation for Civil Society - Cluj-Napoca Branch]; b. On-line platform - Nod Verde ("Food Hub");

c. "acting as a connecting point between small producers and consumers" through delivering services - DIY box concept; d. From 2017 onwards; e. Supporting local producers; Increasing access to healthy food for urban population; Connecting rural and urban areas to improving living standards; Growing less capitalized areas; Promoting small producers and local resources (NOD VERDE, 2020).
a. Nord Natural Hub S.R.L. (Limited Liability Company) in collaboration with Open Fields Foundation; b. On-line store - Food hub; c. Food farm distribution - "Our suppliers are small local and family businesses in the agri-food sector that use local ingredients and ancient recipes putting a lot of passion into everything they do."; d. From 2017 onwards; e. It is an "alternative to conventional and bulky foods promoted by large companies," they propose to support producers and "act as a bridge between farmer and customer, in the hope that the welfare of one also means the welfare of the other" (NORD NATURAL, 2020a, 2020b).
a. S.C. Local Hub S.R.L. (Limited Liability Company) in collaboration with Community Safety and Mediation Center (CMSC); b. "Roade şi Merinde" [Fruits and Victuals] initiative – Food hub; c. They "distribute products directly from small producers with natural ingredients (fresh or processed) from 90 farms and local producers in Iaşi County and neighbouring counties."; d. From 2017 onwards; e. "Our mission is to stimulate the community around the Municipality of Iaşi and the North-East region and to build a sustainable and equitable regional food system" (ROADE ŞI MERINDE, 2020).
a. Helyénvaló Helyi! created by the Civitas Foundation and funded by the Romanian-American Foundation; b. The Helyénvaló Foodhub project; c. The products sold are manufactured by local producers within a maximum radius of 70 km from the city of Odorheiu Secuiesc; d. From 2017 onwards; e. "We want to make producers aware of their products, to make them aware that the circle of conscious consumers who want to use the right local products is growing" (HELYÉNVALÓ HELYI, 2018).
a. Colina Farms (Cluj County); b. Farm – On-line delivery; c. It is a local brand that produces organic vegetables and sells them online, through a subscription-based system; d. From 2018 onwards; e. It ensures the possibility of delivering eco-products by means of personalized Green Boxes to the citizens of the city (COLINA FARMS, 2020).
a. Two young people from Cluj-Napoca; b. Strategy for distributing products from rural communities to urban areas; c. They took products from neighbouring rural areas and sold them in urban areas through a mobile store; d. From 2019 onwards; e. Capitalization of small-scale local producers (DASCĂLU, 2020).
a. Ciugud Mayor's Office (Ciugud Commune); b. Ciugud Virtual Grocery; c. "A virtual platform where all local producers and their products can be found. You need to select what products you want to buy and contact the local producer to discuss the quantity and price"; d. From 2020 onwards; e. "Created to promote local products as well as local producers, and to develop local economy. This idea came as an alternative to closing agro-markets caused by the COVID-19 pandemic" (PRIMĂRIA COMUNEI CIUGUD [CIUGUD COMMUNE MAYOR'S OFFICE], 2020)

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5.3. Agricultural and agro-industrial parks

In the context of the co-evolution of urban and rural areas and of good practices, Fanfani (2018) presents an agricultural park where the communities of the metropolitan area of Florence, Italy, sell their products, and thus support the local consumption and economy. In addition, the creation of agricultural parks contributes to the rehabilitation and naturalization of the urban area (COLAVITTI ET AL., 2020, 10) and, moreover, the functioning of an agricultural park involving local communities could be interpreted as a response to the food

revolution and its translation into the agro-urban public space and to the creation of new identities in these "intermediate territories" (POLI, 2017, 965).

Agricultural parks start to be present in the Romanian society at the beginning of the 2010s, underlining the incipient cooperation in this field between local public administration, commercial societies, and the academia in the regions of Bucovina, Transylvania and Moldova (Tab. 3).

There are just a few agro-industrial parks, either finalised or under construction and an initiative is in the project stage. Such a finalised project is the agro-industrial park in Leţcani (Iaşi County), aiming at developing a market for agricultural producers in the area. This park offers commercial space for over 300 agricultural producers from Iaşi, and also for dozens of SMEs (Tab. 3). Another example is the project for an agricultural park that aims to take over a disaffected farm near Suceava city, from the property of the Academy of Agricultural Sciences into the property of the County Council. Later, through private investors interested in such projects, the public administration will start the arrangement of the park. Since local agricultural production is renown in the region, this initiative proposes that products, and not raw materials, should be sold for local consumption and to other areas (Tab. 3).

Tab. 3 - Agricultural / agro-industrial parks – Good practice examples from Romania within the paradigm of urban bioregions

a. Academy of Agricultural Sciences and Suceava County Council; b. Bioeconomic Integrated Agricultural Park; c. Creation of an agricultural park by taking over a disused farm near the city of Suceava, both for local consumption and in other areas; d. From 2013 onwards; e. The project aims to improve living conditions in rural areas (AGRICULTURA ROMÂNEASCĂ, 2011; NEWSBUCOVINA, 2013).
a. Câmpia Turzii City Hall (Cluj County); b. Arranging two agri-food markets inside the municipality and an animal fair on the outskirts of the town; c. The markets are equipped both inside (with special areas for vegetables-fruits and dairy products) and outside to facilitate the supply and flow of people; d. 2015; e. To promote local producers (FLOREA, 2015).
a. The County Council and the company S.C. Conest S.A.; b. The agro-industrial park of Leţcani (Iaşi County); c. The park offers selling points for over 300 agricultural producers in Iaşi and for dozens of companies and agricultural companies in the Republic of Moldova and Ukraine; d. From 2015 onwards; e. It aims to develop an outlet market for local and regional agricultural producers (ADEVĂRUL, 2012; CONSILIUL JUDEŢEAN IAŞI [IAŞI COUNTY COUNCIL], 2014, 2016).

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5.4. Urban agriculture and greening the cities for inclusive and sustainable urban areas

These measures are very much in connection with the endeavour of greening urban areas, of reusing and upgrading derelict and neglected parts of the city, improving the environment, making the city more liveable. Urban gardening

addresses not only social aspects, but bears also environmental advantages, reconnects urban dwellers with nature, and contributes to food security.

Under good practices of decreasing the pressure on the rural and urban environment, we included examples concerning the capitalization of the disused spaces through urban agriculture and urban regeneration for recreation and well-being. In the last 15 years, a variety of stakeholders (public institutions, either administration or academia, associations and NGOs, local based organisations, regular citizens, and private investors) from Cluj-Napoca, Bucharest, Timişoara and Hunedoara engaged in reducing the pressure of a consumerist lifestyle and of economically-driven initiatives on the urban environment (Tab. 4).

Taking over production concepts from the rural area, urban community gardens, as a popular land use (EGERER ET AL., 2019), led to a movement of transforming roofs and unused spaces into green areas cultivated with vegetables. The use of agricultural lots for urban gardening is either individual or collective. Many such urban initiatives focus on the reuse of derelict areas for multiple functionalities urban gardens (Tab. 4).

Tab. 4 - Urban agriculture and sustainability practices in the Romanian cities, within the paradigm of urban bioregions

a. Asociaţia ColectivA [CollectiveA Association]; b. "La terenuri – Spaţiu comun în Mănăştur [At the Playgrounds - Common space in Mănăştur]" c. "Thanks to the 'At the Playgrounds' initiative, the green space was brought back to life, one of the central elements being the urban community garden created by the team that deals with the project with the help of children and gardeners in the neighbourhood"; d. From 2012 onwards; e. It promotes collective participation to maintain and protect a green area in the Mănăştur neighbourhood of Cluj-Napoca (LA TERENURI - SPAŢIU COMUN ÎN MĂNĂŞTUR [AT THE PLAYGROUNDS - COMMON SPACE IN MĂNĂŞTUR], 2020)
a. Asociaţia Efectul Fluture [The Butterfly Effect Association]; b. It proposes the redevelopment of disused industrial parks into urban gardens with multiple functionalities; c. This idea was inspired by the project "Grădinescu," developed by Kaufland in cooperation with Asociaţia şi Institutul de Cercetare în Permacultură din România [Association and Research Institute in Permaculture of Romania] for community urban gardens, transforming the roofs, outdoor parking lots and warehouses of the supermarket chain into cultivated green spaces with vegetables; d. From 2013 onwards; e. Reducing the pressure on rural areas (WALL-STREET, 2017; ŢUGUI, DIACONU, 2015).
a. Corporate investment; b. The Park Apartments in the city of Bucharest; c. "The Park Apartments is a complex of block buildings which incorporates a green concept, such as an interior garden and balcony gardens, erected to create a space where architectural norms combine with environmental regulations and together deliver an oasis of peace in a crowded city, using holistic measures"; d. 2014-2016; e. Expected impacts: "green space, habitats and biodiversity, environmental quality, including air quality and waste management regeneration" (URBAN NATURE ATLAS, 2017c).
a. Financing source(s): Crowdsourcing; b. "Ferdinand" School Vegetable Garden in the city of Bucharest; c. Among the project's objectives were: "to increase knowledge of nature and plant growth, positive social interactions around the garden, promotion of healthy development, to increase consumption of fresh fruits and vegetables, to increase the role of agriculture in children's lives (food chain)"; d. 2015; e. "A vegetable garden located on the property of an elementary school, enabling children to grow their own vegetables, minimizing the lunch costs for the school's management and

bringing together parents, children and volunteers in creating a space for learning, relaxation and community all under the umbrella of environmental protection" (URBAN NATURE ATLAS, 2017d).
a. Non-governmental organization - Fundația '89, Timișoara; b. Inclusive Vegetable Garden; c. Among the objectives of the project were: "offering a community space for the disadvantageous groups," "creating a place in which occupational therapy can be implemented," "planting vegetables," and "maintaining a green area"; d. 2015; e. "Expected impacts: regeneration, land-use and urban development, social justice, cohesion and equity, health and well-being, sustainable consumption and production" (URBAN NATURE ATLAS, 2017a).
a. Hunedoara City Hall; b. "The Household from the Apartment house Contest"; c. "This is more like a contest between citizens and who has the most beautiful 'urban garden'"; d. April and May 2017; e. "Encourages citizens from the urban parts of Hunedoara to take care of the green space near their residential unit" (ZIARUL PRIMĂRIEI HUNEDOARA, 2017).
a. Institutul de Cercetare în Permacultură din România [Romanian Permaculture Research Institute] and Kaufland Romania; b. A network of community urban gardens; "10 urban gardens, of which 3 located on the roofs of Kaufland stores, 4 in parking lots or behind shops and 2 in schools in the city of Bucharest, and the most recently implemented in the Citadel of Alba Iulia. […] The gardens are designed to be cared for by the inhabitants - through participation and the Grădinescu team - through expertise, facilitation and research; d. From 2017 onwards; e. "The Grădinescu network brings innovation in the field of urban regeneration projects through an integrative approach" (NINE O'CLOCK, 2017; GRĂDINESCU, 2020).
a. Urban Garden Cluj initiative; b. Facebook page; c. Promoting and encouraging through media photographs and videos the activities of planting of plants on windows, balconies, or roofs; d. From 2018 onwards; e. It represents "an initiative to bring back the green environment to Cluj-Napoca [...] for "a greener, healthier, liveable city. Let's try it out ourselves." (URBAN GARDEN CLUJ, 2020).
a. Cluj-Napoca City Hall; b. Public park with urban gardens; c. "In the project, there is also a proposal to preserve an area of urban gardens, pedestrian steps to water, on water, a bridge"; d. From 2019 onwards; e. "to generate a public space by capitalizing on and completing the existing natural resources" (ACTUAL DE CLUJ, 2019a, 2019b).
a. Cluj-Napoca City Hall; b. The development of the forest-park "Parcul Tineretului – Pădurea Clujenilor"; c. In this project, among others, a closed urban garden will be arranged, d. From 2020 onwards; e. "The urban garden will help schools and NGOs that promote knowledge of nature and the environment, being a space for exploration and experimentation" (PRIMĂRIA ȘI CONSILIUL LOCAL CLUJ-NAPOCA [CLUJ-NAPOCA CITY HALL AND LOCAL COUNCIL], 2020).

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5.5. Crafts, gastronomy, and food products enabling the reconnection of the urban to the rural area

Ungureanu et al. (2013) advocate for the necessity of preserving a society's cultural identity through the rural area, as well as its huge potential for regional development. These arguments are supposed to generate feelings of necessity and responsibility that the urban areas should hold and thus invest resources for stimulating the regional economic development, especially of the rural area.

Considering the development of the urban area, the initiatives (a) to rekindle the interest in crafts in towns and cities (thus enhancing dwellers' attachment to places, as well as personal, collective, and territorial identity) and (b) to encourage the mobility of crafts from the rural to the urban (which these are

depends on each area) stimulate the relationships between urban and rural settlements and could lead to regional development. This link is not only due to providing services and raw materials, but also due to exchanging information with a cultural and educational role, and thus perpetuating them at the regional level. Researchers underline the necessity to consider the characteristic features of each area, for supporting inhabitants' sense of belonging through traditions and customs, culture, history, and symbols (BARFOROUSH, SHEMIRANI, 2015; COLAVITTI, 2013, 2017).

There are many examples of practices in Romania that promote crafts from the rural to the urban, the first providing specialists who educate the urban dwellers. Most of the time, there are projects to promote and support small producers from the rural area, including, besides crafts, also gastronomy and foods products. Such products are advertised also online and sold to city dwellers both in cities and neighbouring villages.

Like previous categories of activities highlighting the relationship between the rural and urban areas of Romania, the last ten years are relevant for initiatives promoting crafts together with local gastronomy and food products, especially in Transylvania and Western Romania (Tab. 5).

Tab. 5 - Crafts, gastronomy, and food products – Good practice examples from Romania within the paradigm of urban bioregions

a. Administraţia Rezervaţiei Biosferei Delta Dunării [Danube Delta Biosphere Reserve Administration]; b. Calendar of events from 2020 in the Danube Delta and North Dobrogea; c. March, 27 - Maslenita „Săptămâna Albă" [Maslenita "The White Week"] (Jurilovca), May, 01 – 03 - Serbările Scrumbiei [The Feasts of the Mackerel] (Maliuc); July, 30– 02 August – Soundrise Festival (Sulina); August 10 -16 - Festivalul International de Film Anonimul – Editia a 17-a [International Film Festival Anonymous - 17th Edition] (Sfantu Gheorghe); August, 15– Mănâncă Peşte Lipoveneşte [Eat Fish in Lipovan Style](Sageata Apei – hotar Jurilovca – Lunca); August, 29 – 30 -Festivalul Borşului Lipovenesc de Jurilovca, ediţia a III-a [Jurilovca Lipovan Fish Soup Festival, 3rd edition] (tourist harbour Jurilovca); September, 05 – 06– Sărbătoarea Borşului de Peşte din Delta Dunării [Fish Soup Feast in the Danube Delta] (Crişan); d. yearly; e. It promotes numerous gastronomic and cultural events (INFO DELTA, 2020).
a. The general government of the city of Timişoara; b. A new market for producers; c. Creation of marketplaces and covered market halls in the outskirts of Timişoara; d. 2018; e. Improving the marketing conditions of local producers (DICHIŞ, 2016).
a. Asociaţia „Produs în Bistriţa-Năsăud" ["Produced in Bistriţa-Năsăud" Association]; b. The fair "Produced in Bistriţa-Năsăud"; c. The products are promoted online and sold in the centre of Bistriţa; d. From 2015 onwards - every Saturday; e. to promote producers in Bistriţa-Năsăud County with various areas of activity, ranging from food products to crafts and encouraging small rural producers to sell their products "in town" (FARCAŞIU, 2020).
a. Braşov Metropolitan Area Project, in collaboration with Asociaţia Creatorilor de Artă Tradiţională şi Contemporană Braşov [Braşov Association of Traditional and Contemporary Art Creators], Inspectoratul Şcolar Judeţean Braşov [Braşov County School Inspectorate], and Muzeul Judeţean Braşov [Braşov County Museum]"; b. "Summer camp - small handicraftsmen from the country of Ţara Bârsei"; c. Cultural education sessions aimed at pupils, craft creative workshops, educational trips, handcrafted products created by children, etc.; d. February-October 2017; e. "Increasing the visibility

of authentic folk crafts by creating authentic cultural promotion products, representative for Romanian cultural creation" (BRAŞOV METROPOLITAN AGENCY, 2017).
a. Asociaţia pentru Dezvoltarea Rurală Sătmăreană [Sătmărean Rural Development Association]; b. Târgul Produselor Sătmărene [Fair of Products Made in Satu Mare]; c. "Over 25 local producers and craftsmen are waiting for you with good autumn harvest and traditional meat dishes, but also with handmade objects, glass objects, various textiles and leather products, as well as dolls or lavender essential oils!"; d. From 2017 onwards; e. Supporting local producers and their products (OPINIE DE CAREI, 2020).
a. Satu Mare City Hall and Satu Mare County Council in partnership with Asociaţia pentru Dezvoltarea Rurală Sătmăreană [Sătmărean Rural Development Association]; b. Traditional Christmas fair; c. "The producers and craftsmen will wait for the people of Satu Mare with traditional products and goodies for the Christmas table, as well as with personalized decorations, hand-made ceramic and leather products, textiles, which can become unique gifts for their loved ones"; d. 2020, December 7-24; e. Supporting local producers and the need for healthy food with a traditional taste (PRESA SM, 2020).

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6. Final remarks

The main goal of the current study was to determine the level of openness of the Romanian society to the practices that can be framed in the *paradigm of urban bioregionalism*.One of the most significant findings to emerge from this study is that practical approaches to the theme of urban bioregions are more and more part of the everyday reality of urban-rural relationships in Romania, various initiatives featuring citizens, entrepreneurs, civil society, and local administration as stakeholders, and yet, very little accounted for by academics so far.

However, in mass-media, there are mostly presented initiatives from civil society, public administration, or individuals. For this reason, the community is becoming increasingly aware of the potential opportunities and benefits, and thus builds bridges between rural and urban areas.

The rural milieu usually focuses on the problem of connectivity with the urban environment, in order to increase the flow of information, matter and technology from it. It envisages strategies for creating new markets, but also the diversification of services provided to citizens. In this case, examples of good practice can be found mainly in the mass-media (e.g. the strategy of promoting products from rural communities in urban areas).

Even so, in terms of mass-media articles, we may be not able to find theoretical concepts or solutions, but examples of good practices among citizens or local public administration, all in order to encourage such initiatives. In the same vein, mass-media tends to promote a much information that keeps society

up to date regarding the major projects launched by the administrations and puts pressure for their implementation.

Considering the regional level of Romania, most of the case studies are located in Transylvania and Western Romania. Furthermore, most of the initiators are young, with previous life experience in similar projects abroad and more rarely, as part of the local administration, and sometimes, also the latter having the expertise of people from abroad. In general, it seems that at national level, a perception of the relationship of rural structures with urban centres has been set off, but especially with regard to the importance of the rural environment and its tremendous untapped potential so far.

In Romania, advocacy and practice concerning urban and peri-urban sustainable development innovative initiatives, framing bioregionalism as a choice of some people and communities in their present and future trial of reclaiming resilience for the respective settlements, are foregrounded by examples of the last two decades. These examples point at the focus on sustainable and innovative production and consumption patterns.

Moreover, in post-socialist Romania, where much of the investment has been directed towards city centres and urban peripheries or hinterland, affecting urban-rural relationships and sustainable development, urban bioregional discourses and practices take a variety of activism forms. Many of the examples are proof of the creative adaptations to the fast changes of the Romanian transition period.

On the one hand, the urban population is aware of the importance, the qualities of the rural environment and its resources, thus becoming a consumer. On the other hand, those in rural areas notice the potential of the retail market provided by the urban environment, creating a situation in which the two milieus build reciprocal meaningful connections both individually and through pressures on the public administration matters. Administration supports the actualization of their potential also due to the European Union funded projects. As such, there are provided strategies or solutions for protecting the rural environment, and new methods of urban-rural connection based on European development strategies that reduce social exclusion and increase the level of cohesion within and among communities.

Regarding the lack of academic literature, considering the adaptability of the Romanian scientific milieu to new information, new discoveries, it is possible that in the near future this field shall gradually improve.In the first instance, the mass media remains the environment through which the academic milieu, general government and society can express their views and reach a consensus, in order to create a strategy based on cooperation and conservation of both the

natural and the anthropic environment.Each party has become aware of the importance of such a complementary development, but the trend seems to be chaotic, considering the still relatively small number of initiatives at the national level.

In conclusion, we identify the stakeholders' increasing awareness of socio-economic problems at local and regional levels and a movement towards solving them, but the concept of urban bioregion is missing from the vocabulary of Romanian society and it is feebly reflected by various initiatives within the paradigm of urban bioregionalism. However, importance is given to the topics of *reconnection* and *capitalization* in a sustainable context, which establishes a common ground. Overall, it is particularly important to observe both through the mass-media and academic milieu as society has become aware of the need for connection at regional level, from all perspectives of a more sustainable life.

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Impacts territoriaux de la congestion urbaine et trajectoires d'évolution des différents sous-espaces de l'aire métropolitaine bordelaise

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Abstract

This analysis is part of the compact city versus diffuse city debate instituted since the 1990s around the interactions between the evolution of the transport system and the dynamics of the land markets which, since the advent of the automobile, have led to urban sprawl, the lengthening of the daily distances traveled per person and, consequently, the dependence of cars and the growth of polluting emissions and energy consumption.

However, this contribution renews the debate insofar as it questions the spatial scale of these interactions and their effects at the level of different types of urban territories, thus departing from the classic approach of the monocentric model (ALONSO, MUTH, MILLS, 1969) which remains the essential reference to shed light on the dynamics and their challenges. In addition, beyond the classic reference to automobile dependence, the study focuses on the localized effects of road congestion and its impact on mobility within different territories.

It also fully integrates the social dimension of these interactions, while the compact / diffuse debate remains too strongly focused on the environmental impacts of urban dynamics. Finally, on a methodological level, this contribution proposes original indicators combining the measurement of congestion and a typology of urban territories based on the socioeconomic characteristics of their inhabitants.

The understanding of the combined effects of the increase in land and property prices and of urban congestion on the level of vulnerability of households and territories is enabled by the development of a territorialized approach to the impact of urban congestion integrating the characteristics socio-economic populations and different territories.

KEYWORDS: vulnerability of households and territories, housing prices, urban congestion

Résumé

Nombreuses sont les publications qui démontrent la difficulté de plus en plus forte des ménages de catégories moyennes et modestes d'accéder au logement dans les zones les plus centrales des grandes agglomérations. L'une des raisons principales relève de l'accroissement considérable des prix fonciers et de l'immobilier observé dans la plupart des grandes métropoles mondiales depuis plus d'une décennie. Partout, les ménages les plus modestes et les classes moyennes sont amenés à s'éloigner largement des centres urbains pour se loger et, en particulier, pour accéder à la propriété. Ce phénomène de relégation entraîne des effets négatifs sur les mobilités des ménages concernés qui se matérialisent, notamment, par un allongement des distances et des temps de trajet et donc, par une augmentation des coûts induits par la mobilité quotidienne, d'autant que les territoires périurbains et éloignés des centres engendrent une plus grande dépendance automobile (DUPUY, 2011). Les ménages se trouvent ainsi confrontés à une vulnérabilité accrue face aux coûts du logement et de la mobilité (VERRY, 2009; SAUJOT, 2012,;NICOLAS ET AL. 2012). Cette vulnérabilité se définit au regard d'une part du risque d'isolement social – limitation de l'accès aux aménités et diminution possible des déplacements de loisirs ou de visite – et d'autre part du risque de pauvreté directement liés aux coûts cumulés de logement et de déplacement.

Ce phénomène fait, notamment, écho au «mouvement des gilets jaunes» qui a émergé à l'automne 2018 en France suite à la volonté du gouvernement d'augmenter la taxe Carbone. Ce mouvement a mis en lumière l'ampleur d'un phénomène que de nombreuses recherches en sociologie et économie urbaine pointaient déjà sans, toutefois, parvenir à saisir complètement le malaise profond induit par ces nouvelles fractures territoriales liées au phénomène de métropolisation et à l'accentuation des formes de ségrégation socio-spatiales (GASCHET, LACOUR, 2007). Jacques Donzelot décrivait pourtant déjà il y a quinze ans l'émergence d'une «ville à trois vitesses», rythmée par la relégation, la périurbanisation et la gentrification (DONZELOT, 2004). Ces tendances ont d'ailleurs été renforcées, en France, par l'acte III de la décentralisation mis en œuvre dans les années 2010 organisant une forme «d'injonction métropolitaine» suite à la loi portant sur la Nouvelle Organisation Territoriale de la République (NOTRe) du 7 août 2015 et la loi du 27 janvier 2014 de modernisation de l'action publique et d'affirmation des métropoles (MAPTAM). Le processus de métropolisation politico-administratif ainsi mis en œuvre a, de ce fait, pu accentuer les inégalités territoriales d'accès au logement et à l'emploi, renforçant la dépendance à l'automobile de certaines catégories de ménages.

Ces mouvements soulignent ainsi la nécessité, pour penser les conditions de la transition énergétique des territoires urbains, de mieux articuler, dans l'analyse de la durabilité urbaine, la dimension environnementale et la dimension socio-économique. Trop souvent focalisées sur la seule empreinte écologique de la croissance urbaine, les approches en termes de durabilité urbaine négligent le plus souvent les enjeux de soutenabilité sociale des modes d'habitat et de transport liés aux formes d'urbanisation. La question du logement revêt pourtant une importance fondamentale dans l'appréhension des inégalités spatiales. Certains dysfonctionnements des marchés du logement ont pris une ampleur singulière, ces dernières années, tant par un accroissement conséquent du taux d'effort des ménages (*Cf. Fig.1.*) par rapport à son niveau de longue période que par le freinage des mobilités résidentielles, ou encore de l'incapacité à orienter la production neuve vers les zones de forte tension. Ces tensions sur l'accès au logement viennent parfois contrarier les politiques de compacité urbaine, en encourageant des comportements de localisation et des formes d'urbanisation à rebours des objectifs poursuivis. Les approches en termes de formes urbaines doivent ainsi mieux intégrer la formation des inégalités socio-spatiales.

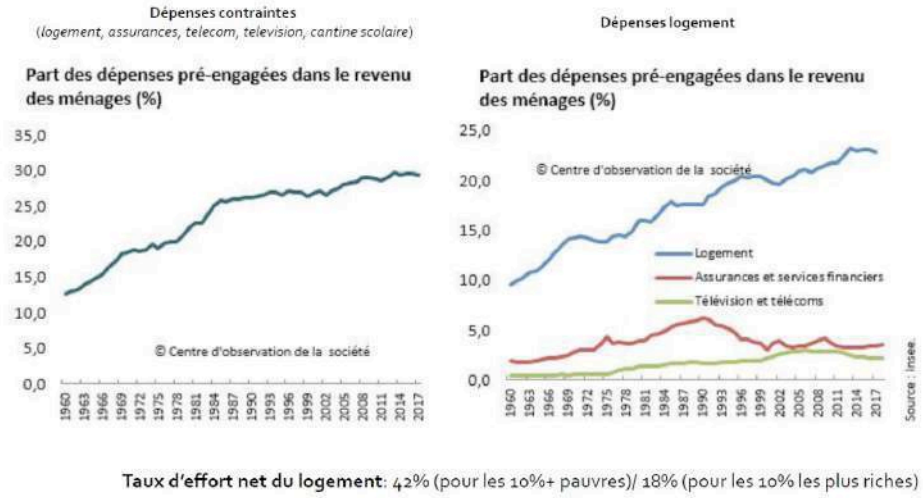


Fig. 1 - Evolution des dépenses contraintes des ménages en France entre 1960 et 2017 Source: INSEE, 2018

Il convient également de mieux comprendre comment s'articulentles contraintes d'accès au logement et à la mobilité quotidienne, notamment pour les ménages les plus vulnérables. La mobilité quotidienne est notamment au cœur des préoccupations des territoires peu denses situés en périphérie des

métropoles car elle soulève un certain nombre d'enjeux tant sur le plan environnemental, économique et social que sur l'organisation spatiale de ces territoires. Là encore, les approches existantes intègrent rarement la complexité des interactions à l'œuvre. Les analyses en termes de prix hédoniques permettent de comprendre la formation des prix du logement et leur lien avec les formes urbaines mais peinent à intégrer le rôle de l'accès à la mobilité autrement que par la prise en compte de la distance aux infrastructures et aux centralités. Inversement, la littérature sur les comportements de mobilité permet de relier les choix modaux aux formes urbaines sans pouvoir restituer pleinement les arbitrages que rendent les ménages pour gérer conjointement leurs contraintes d'accès à l'emploi, au logement et à la mobilité.

L'enjeu est donc de contribuer à une meilleure compréhension des interactions complexes entre les formes urbaines, le fonctionnement des marchés du logement et les comportements de mobilité quotidienne et à en évaluer les conséquences sur les formes et le degré de vulnérabilité des ménages.

L'organisation spatiale des métropoles accentue les inégalités d'accès à la ville que l'on se situe dans les pays du Nord ou dans les pays en développement. Des différences importantes apparaissent, toutefois, dans les processus de relégation à l'œuvre dans les différentes études menées sur les métropoles, en raison de la complexité des choix de localisation des différents ménages localisés en périphérie des villes. Il serait, en effet, hâtif, de considérer un processus unique de relégation des catégories moyennes et modestes, en effet, la complexité des processus de localisation des ménages, ne relèvent pas uniquement des arbitrages entre accessibilité, coût du logement et aménités spatiales, mis en exergue par la théorie économique urbaine, mais d'un ensemble de facteurs complexes inhérents aux caractéristiques intrinsèques des individus.

L'effet des principaux instruments des politiques de transition urbaine doit être apprécié en fonction des contextes territoriaux et des politiques sociales menées à différentes échelles sur ces territoires.

L'évaluation des effets combinés et cumulatifs des conditions de mobilité et d'accès au logement dans les espaces péri-urbains des grandes métropoles constitue ainsi un enjeu central pour apprécier la durabilité à la fois sociale et environnementale de ces formes de développement urbain.

Cette analyse s'inscrit donc dans le débat ville compacte *versus* ville diffuse institué depuis les années 1990 autour des interactions entre l'évolution du système de transport et la dynamique des marchés fonciers qui, depuis l'avènement de l'automobile, poussent à l'étalement urbain, à l'allongement des distances quotidiennes parcourues par personne et, par conséquent, à la

dépendance automobile et à la croissance des émissions polluantes et des consommations d'énergie.

Toutefois, cette contribution renouvelle le débat dans la mesure où elle interroge l'échelle spatiale de ces interactions et leurs effets au niveau de différents types de territoires urbains, sortant ainsi de l'approche classique du modèle monocentrique (ALONSO, MUTH, MILLS, 1969) qui demeure la référence incontournable pour éclairer les dynamiques et leurs enjeux. De plus, au-delà de la référence classique à la dépendance automobile, l'étude se focalise sur les effets localisés de la congestion routière et son impact sur les mobilités au sein des différents territoires.

Elle intègre, en outre, pleinement la dimension sociale de ces interactions, alors que le débat compact/diffus reste trop fortement centré sur les impacts environnementaux des dynamiques urbaines. Enfin, sur un plan méthodologique cette contribution propose des indicateurs originaux croisant la mesure de la congestion et une typologie des territoires urbains assise sur les caractéristiques socioéconomiques de leurs habitants.

La compréhension des effets combinés de l'accroissement des prix fonciers et immobiliers et de la congestion urbaine sur le niveau de vulnérabilité des ménages et des territoires est permise par le développement d'une approche territorialisée de l'impact de la congestion urbaine intégrant les caractéristiques socio-économiques des populations et des différents territoires.

1. Congestion et formes urbaines

Les travaux académiques ont, depuis plusieurs décennies, cherché à relier le niveau de congestion des systèmes de transport urbains à deux caractéristiques clefs des formes urbaines : le niveau de compacité et le degré de décentralisation des emplois.

La compacité des formes urbaines est considérée comme un déterminant majeur du degré de congestion urbaine, les fortes densités étant supposées réduire les distances de déplacement tout en favorisant le report modal et en limitant en conséquence la dépendance automobile (EWING, 1997). Le sujet reste néanmoins fortement débattu, depuis la controverse nouée en 1997 dans le Journal of the American Planning Association. GORDON ET RICHARDSON (1997) défendent dans cette contribution classique l'idée que l'étalement urbain a constitué le principal mécanisme d'ajustement à la congestion urbaine, en déplaçant la demande automobile vers des zones dont les réseaux de transport sont moins soumis à congestion et plus adaptables à l'évolution de la demande.

La contribution de LEVINSON ET KUMAR (1997) portant sur l'impact de la densité sur divers indicateurs mesurant les caractéristiques des trajets domicile-travail confirme d'ailleurs cette ambiguïté : si la densité a des effets significatifs sur les distances moyennes de déplacements, en revanche, elle n'en a pas sur la durée de ces derniers, l'ajustement se faisant par une réduction de la vitesse moyenne de déplacements. Les ménages suburbains utilisent les vitesses plus importantes offertes en périphérie par les infrastructures routières pour augmenter leurs distances de déplacements tout en maintenant stable la durée de ces derniers. KAHN (2007) montre ainsi sur un échantillon de villes américaines que les ménages vivant dans des villes étalées ont des déplacements plus longs de 1,8 miles mais plus courts de 4,8 minutes en moyenne, du fait de vitesses de déplacements plus élevées. Ces travaux ont toutefois le défaut d'utiliser systématiquement les durées de déplacement comme une approximation de la congestion.

EWING ET AL. (2002) ont développé un indice d'étalement urbain permettant de tester de manière plus robuste le lien étalement-congestion. Après contrôle des effets de taille de caractéristiques sociodémographiques ils n'identifient aucun impact significatif de l'étalement ni sur les durées de déplacements ni sur le niveau de congestion directement mesuré. Ce résultat est confirmé à partir d'un modèle structurel permettant d'intégrer l'ensemble des effets indirects de l'usage du sol sur la congestion (EWING ET AL., 2018).

Face à cette indétermination, la littérature a intégré un deuxième facteur structurant, le degré de décentralisation des emplois. Les effets positifs attendus de l'étalement urbain sur les temps de déplacement des ménages périurbains dépendent par exemple du degré de dispersion des générateurs de déplacement. En cas de centralisation forte de ces derniers dans les cœurs d'agglomération, les déplacements des ménages périurbains, fortement marqués par une géographie centripète, exposent à des coûts de congestion importants aux abords de la ville «agglomérée». GORDON ET LEE (2013) montrent ainsi que l'étalement urbain, lorsqu'il est combiné à une forte dispersion des emplois, est source de réduction des temps de déplacement des ménages suburbains, même si les distances de déplacement sont plus importantes. CRANE AND CHATMAN (2003) concluent également à un effet négatif de la suburbanisation des emplois sur les durées de déplacement.

La formation de centres secondaires d'emplois apparaît en particulier comme un moyen de limiter le niveau de congestion subi dans les déplacements domicile-travail. Sur la base d'un modèle de simulation avec prise en compte des comportements de déplacements domicile-travail et des phénomènes de congestion, WHITE (1990) montre que l'augmentation du nombre de sous-

centres urbains est susceptible de réduire de 15% à 50% le volume total de ces déplacements. Le modèle de ANAS ET KIM (1996) prédit également que le degré de polycentrisme des villes augmente en réaction au niveau de congestion urbaine.

L'impact des structures polycentriques sur les distances/temps de trajets intraurbains et le niveau de congestion est toutefois ambigu. Ewing et al. (2018) montrent ainsi que le niveau de congestion est positivement affecté par deux facteurs : le nombre de km par véhicule et la concentration spatiale des couples origines-destinations des déplacements. La concentration des emplois au sein du centre principal et des centres secondaires d'emplois a ainsi un impact positif sur la congestion au niveau local en densifiant les couples origines-destinations, mais peut avoir un effet négatif sur les distances parcourues et donc sur la congestion à plus large échelle.

Les études empiriques tentant de lier polycentrisme et niveau global de congestion sont d'ailleurs peu concluantes. Si certaines études identifient un impact négatif du polycentrisme sur les distances et temps de déplacement (MODARRES, 2011; SUNE ET AL., 2016) d'autres recherches, plus nombreuses, montrent que le développement de structures polycentriques ne réduit pas nécessairement les distances ou temps de trajet (GIULIANO ET SMALL, 1993; CERVERO, WU, 1997; SCHAWEN ET AL., 2003; VENERI, 2010).

En dépit des progrès dans la mesure des formes urbaines et le développement de mesures directes de la congestion, les travaux cherchant à relier à l'échelle des aires urbaines les morphologies au niveau de congestion restent ainsi peu concluants.

2. L'impact spatial de la congestion au sein des villes

A l'inverse du lien entre formes urbaines et congestion, peu de contributions ont cherché à identifier l'impact local de la congestion sur les différents sous-espaces d'une aire urbaine.

Le modèle monocentrique canonique utilisé en économie urbaine depuis les années 60 prédit que dans une ville monocentrique (où les emplois sont localisés et concentrés dans la partie centrale de l'agglomération) la congestion doit décroître rapidement à mesure que l'on s'éloigne du centre. En raison de la structure centripète du réseau de transport innervant ce type de structure urbaine, c'est dans les parties centrales que les vitesses de circulation sont les plus affectées par la densité du trafic (ANAS, ARNOTT, SMALL, 2000). Une extension naturelle de ce modèle consiste à supposer que la congestion est

particulièrement importante autour des principaux pôles générateurs de déplacements urbains au sein des structures urbaines contemporaines polycentriques.

Des travaux récents suggèrent néanmoins que les ménages périurbains peuvent être exposés à d'importants coûts de congestion, pour deux raisons principalement. En premier lieu, l'augmentation des prix du logement dans les agglomérations coïncide à la fois avec une dynamique de concentration des emplois dans les cœurs métropolitains (dynamique de métropolisation) et une relégation croissante de catégories de ménages aux revenus moyens ou modestes dans des zones périurbaines de plus en plus lointaines (DONZELOT, 2004), contribuant ainsi à accroître les distances de déplacement tout en concentrant les flux de déplacement vers les cœurs d'agglomération, dont les réseaux de transport sont de plus en plus saturés. Les ménages ainsi relégués dans le périurbain lointain subissent à la fois des distances de déplacement importantes et une réduction des vitesses de circulation aux abords des agglomérations (LE NECHET, NESSI, AGUILERA, 2016; CAS, 2012). Dans ces espaces, les distances de déplacement vers l'emploi continuent d'ailleurs d'augmenter (ORFEUIL, RIPOLL, 2015). Les opportunités plus nombreuses expliquent des budgets temps de transport plus importants avec une diversité des comportements à l'intérieur de chaque type résidentiel (CROZET, 2016).

Le deuxième facteur d'exposition des ménages périurbains à la congestion réside dans le poids croissant de la recherche d'aménités dans les choix de localisation. La prise en compte des aménités urbaines complexifie considérablement les schémas de localisation résidentielle. BRUECKNER, THISSE ET ZENOU (1999) introduisent par exemple un niveau d'aménités exogènes dans les préférences résidentielles des ménages pour expliquer dans quelle mesure la relation entre la localisation des ménages et leur niveau de revenu dépend de caractéristiques spécifiques d'une ville. Parmi les aménités exogènes, on trouve des aménités patrimoniales centrales liées à la présence de bâtiments, parcs, monuments historiques mais aussi des aménités naturelles et paysagères surtout présentes en périphérie. Les choix de localisation résidentielle vont être fortement influencés par la dotation relative des différentes zones en aménités, mais également par la valorisation relative, par les différentes catégories de ménages, de l'accès aux aménités par rapport à la demande de logement ou au coût de transport. Ainsi, une forte demande en aménités paysagères et récréatives surtout accessibles en zone périurbaine peut conduire à des choix de localisation se traduisant par d'importants surcoûts de transport et de logement (CAVAILHES ET AL., 2003). D'une manière plus générale, l'accès aux aménités urbaines, caractéristique des villes considérées comme des espaces de

consommation, peut modifier considérablement les schémas de déplacement des habitants par rapport à la seule prise en compte de l'accessibilité à l'emploi (GLAESER, KOLKO, SAIZ, 2001).

Au terme de ce rapide survol de la littérature, trois types de territoires urbains apparaissent potentiellement impactés par la congestion:

- Les pôles d'emplois et de générateurs de déplacements, par un effet de concentration des trafics induisant une réduction locale des vitesses de déplacement
- Les territoires périurbains à fort niveau d'aménités, pour lesquels la congestion subie peut être la contrepartie de l'accès aux aménités naturelles recherchées
- Les territoires de « relégation » périurbains, définis comme des territoires très éloignés des lieux d'emplois et recherchés essentiellement en raison du faible coût du logement et du foncier.

L'estimation d'indicateurs territorialisés de congestion doit permettre de tester l'impact des principaux facteurs identifiés par la théorie économique urbaine concernant l'impact spatial de la congestion.

Les indicateurs de congestion territorialisés seront confrontés à une typologie de territoires elle-même construite à partir des résultats théoriques précédents. Trois facteurs d'exposition sont particulièrement retenus : la polarisation intra urbaine des générateurs de déplacements, le phénomène de relégation périurbaine et le rôle des aménités dans les choix de localisation résidentielle. Pour cette raison, la typologie de territoires urbains proposée in fine ne se limite pas aux distinctions usuelles (distance au centre, densité, morphologies urbaines ou péri-urbaines) mais cherche à intégrer les différents facteurs potentiels de surexposition à la congestion, afin d'en tester la portée explicative dans le contexte girondin. La dimension sociale du peuplement des différents territoires est ainsi pleinement prise en compte. Une analyse de variance est utilisée pour tester le pouvoir explicatif de ces différents facteurs sur l'exposition à la congestion.

Cette démarche est appliquée aux déplacements réalisés au sein de l'agglomération bordelaise à la fin des années 2000 (2008-2009). Cet espace métropolitain est, en effet, marqué par trois caractéristiques favorables à l'investigation proposée: d'une part, la congestion des réseaux de transport routiers urbains et péri-urbains a fortement progressé durant les années 2000 et 2010, faisant de Bordeaux la troisième ville française la plus embouteillée selon la 9e édition du « Traffic Index » publié par TOM-TOM pour l'année 2018. En outre, cet accroissement de la congestion s'est accompagné d'une très forte

progression des prix immobiliers, faisant de Bordeaux la deuxième ville la plus «chère» de France en 2018. Enfin, l'agglomération bordelaise se caractérise par un très fort niveau d'étalement urbain, en raison notamment d'une très forte disponibilité foncière péri-urbaine, et de disparités importantes en termes d'aménités territoriales, liées à la proximité du littoral à l'ouest de l'agglomération et la présence d'un massif forestier source d'aménités récréatives et paysagères.

3. Définition des indicateurs territorialisés de congestion et appariement des bases de données

La construction des indicateurs réseaux de congestion urbaine s'appuie sur les bases de données de temps de parcours issues des GPS TomTom en 2009 et 2013 fournis par Bordeaux Métropole. Ces données sont compilées en cinq itinéraires allers-retours couvrant les grands axes de circulation du réseau structurant de la métropole ainsi que sa périphérie proche. Les indicateurs de congestion du réseau obtenus à partir des données GPS peuvent être territorialisés, c'est-à-dire calculés pour chaque territoire d'origine des flux de mobilité en fonction des profils spécifiques des zones résidentielles et les caractéristiques locales des ménages telles que leur revenu, leur lieu d'emploi, leur distance de trajets, etc. Par conséquent, nous croisons ici les données GPS avec l'Enquête Ménage Déplacements de la Métropole Bordelaise qui date de 2008 (EMD, 2008) et recueille les comportements de déplacements d'un échantillon d'environ 6000 ménages ainsi que l'enquête Grand Territoire réalisée en 2009 (EGT, 2009) auprès des ménages localisés dans les autres communes de Gironde. Ces bases de données fournissent des informations sur les comportements de mobilité des ménages (nombre de déplacements, mode et destination des trajets quotidiens) selon leur niveau de revenu, leur statut socio-économique et leur lieu d'emploi. La combinaison des informations relevant des matrices origine-destination des déplacements de chaque zone et des données relevant du niveau de congestion sur chaque segment de route du réseau de transport permet de quantifier l'impact de la congestion sur les différents territoires. Un ensemble d'indicateurs d'exposition des ménages et des territoires à la congestion peut ainsi être établi afin d'identifier les territoires les plus impactés.

La définition d'indicateurs territorialisés de congestion suppose de calculer, pour chaque territoire d'origine des flux i, le temps de trajet total cumulé –avec

et sans congestion- de l'ensemble des ménages ayant effectué un déplacement à partir de la zone étudiée[1].

Le temps de déplacement cumulé sans congestion du territoire i (T_i^{UC}) se définit ainsi :

$$T_i^{UC} = \sum_{j=1}^{D} t^{SC}{}_{ij}\, n_{ij}$$

Où $[t^{sc}{}_{ij}]$ est la matrice des temps de déplacement théoriques (sans congestion) pour chaque paire origine i –destination j et $[n_{ij}]$ est la matrice des flux de déplacement observés pour chaque paire origine i –destination j.

Le temps de déplacement cumulé avec congestion du territoire i (T_i^{C}) se définit ainsi :

$$T_i^{C} = \sum_{j=1}^{D} t^{C}{}_{ij}\, n_{ij}$$

Où $[t^{C}{}_{ij}]$ est la matrice des temps de déplacement observés pour chaque paire origine i –destination j et $[n_{ij}]$ est la matrice des flux de déplacement observés pour chaque paire origine I –destination j.

A partir de ces données, deux types d'indicateurs de congestion territorialisés peuvent être calculés :

a) Le ratio de congestion d'un territoire i ($\boldsymbol{RC_i}$), exprime le rapport entre temps de déplacement cumulé observé et théorique pour chaque territoire:

$$\boldsymbol{RC_i = \frac{T_i^C}{T_i^{SC}}}$$

b) La perte de temps moyenne par déplacement ($\boldsymbol{PTD_i}$) se calcule comme l'accroissement des temps de déplacements observés liés à la congestion ($\boldsymbol{T_i^C - T_i^{UC}}$) rapportés au nombre de déplacements effectués à partir du territoire i ($\boldsymbol{N_i}$) :

$$\boldsymbol{PTD_i = \frac{T_i^C - T_i^{UC}}{N_i}}$$

Les matrices de temps de déplacement avec et sans congestion$[t^{C}{}_{ij}]$ et $[t^{UC}{}_{ij}]$ ont été produites à partir des données GPS en utilisant l'algorithme

[1] Il peut s'agir de ménages dont la résidence principale est située sur le territoire considéré mais aussi de ménages non-résidents effectuant un déplacement à partir de de territoire.

d'optimisation des itinéraires pour chaque paire origine i –destination j (OD cost matrix solver) proposé par l'extension «network analyst» d'ArcGis. Cet algorithme permet en effet de simuler les déplacements optimaux qui peuvent être réalisés entre une origine et une destination en fonction de la structure du réseau de transport et des vitesses observées sur les différents segments.

Les données mobilisables pour calculer les temps de déplacements (données GPS) et les flux de déplacements (enquêtes ménages) sur le territoire de la Gironde imposent toutefois deux contraintes fortes dans la mise en œuvre de la méthode proposée.

D'une part, en raison de la taille limitée des échantillons utilisés pour documenter les flux de déplacement par origine/destination dans les enquêtes ménages, les territoires choisis pour identifier les origines et les destinations analysées des déplacements girondins doivent permettre de maintenir la représentativité de la distribution géographique des déplacements. Ainsi, dans les parties du territoire girondin couvertes par les EGT (pour lesquelles les échantillons interrogés sont plus faibles), le maillage retenu dans l'étude reste plus large. Dans la partie du territoire couverte par l'EMD, une plus grande finesse du découpage en zones d'origine/destination a pu être préservée.

D'autre part, la structure du réseau sur laquelle ont été collectées les données GPS impose de limiter le nombre des territoires d'origine et de destination pour lesquels l'appariement entre données GPS et données d'enquêtes ménages peut être raisonnablement mis en œuvre. Le réseau documenté est effet de structure centripète et ne permet de simuler correctement que les déplacements effectués vers la partie la plus densément peuplée du département girondin. Le nombre de territoires d'origine des flux a ainsi été restreint à 31 territoires parmi les 39 pour lesquels les enquêtes ménages étaient mobilisables.

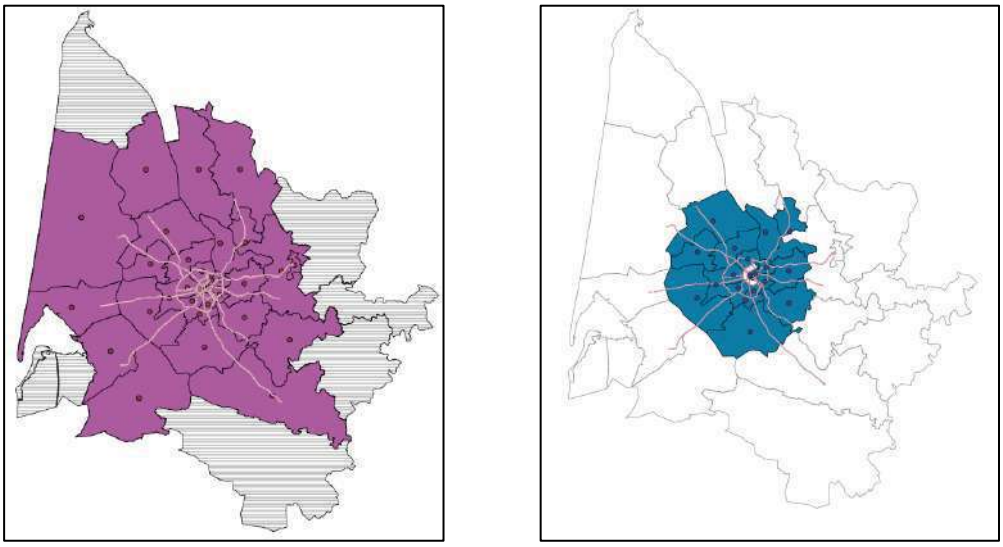
Huit territoires d'origine ont été exclus de l'étude en raison de leur trop grand éloignement par rapport à la couverture du réseau de transport documenté (Cf. Fig. 2). Parmi ces huit territoires, les cinq localisés au nord ou à l'est de l'agglomération correspondent plutôt à des territoires péricentraux à revenus modestes. Les trois territoires localisés au sud-ouest de l'agglomération correspondent au Bassin d'Arcachon, zone marquée par des revenus élevés et un fort niveau d'aménités forestières et littorales.

Les territoires de destination des flux de déplacement ont été sélectionnés de manière encore plus restrictive, en raison de la forme centripète du réseau. La simulation des déplacements non centripètes («de périphérie à périphérie») produirait en effet des erreurs trop importantes compte tenu de la non-prise en compte de dessertes plus directes dans la base de données GPS. Le nombre de

destinations prises en compte est ainsi limité à 20 territoires « centraux » (cf. figure 5).

Seuls les déplacements originaires de l'un des 31 territoires d'origine et à destination de l'un des 20 territoires de destination ont été pris en compte dans la production d'indicateurs territorialisés de congestion. Pour les 20 territoires «centraux», ces choix conduisent à prendre en compte 98% de l'ensemble des déplacements. Pour les 11 territoires seulement considérés comme origines, 77% des déplacements se font à destination des zones centrales et sont donc pris en compte. L'appariement entre données GPS et enquêtes ménages a été effectué selon les modalités suivantes :

- L'ensemble des déplacements à destination de l'une des 20 destinations sélectionnées ont été retenus, quel que soit le motif du déplacement.
- L'appariement entre temps observé de déplacement sur le réseau et origine-destination des déplacements dans les enquêtes ménages tient compte de l'heure de départ et d'arrivée renseignée dans l'enquête ménage, de façon à appliquer aux déplacements considérés les temps de déplacements observés à différentes heures de la journée dans la base de données GPS.



a) Les 31 territoires d'origine b) Les 20 territoires de destination

Fig. 2 - Les territoires d'origine et de destination des déplacements sélectionnés. Source: EMD (2008), EGT (2009), IGN. Réalisation : Auteurs

4. L'impact de la congestion sur les différents territoires girondins

La figure 3 permet de visualiser les disparités de ratio de congestion en Gironde. Conformément aux prédictions théoriques du modèle monocentrique, la congestion ainsi mesurée suit très largement un schéma radiocentrique. Le ratio de congestion atteint son maximum dans l'hypercentre de l'agglomération bordelaise, où les temps de déplacements réels sont trois fois plus élevés que les temps de déplacements théoriques (fondés sur les vitesses maximales autorisées). Ce ratio décroit dans les communes de première et deuxième couronne de l'agglomération bordelaise, mais demeure à un niveau élevé, notamment, dans les territoires dans lesquels sont implantés des pôles d'emplois structurants. L'implantation d'un nombre important d'activités économiques sur ces territoires renforce les effets de congestion en multipliant des pôles générateurs de déplacements et en superposant les déplacements à origine et à destination de ces zones.

Le ratio de congestion décroît plus nettement au-delà des limites de l'agglomération bordelaise. Pour ces territoires, les temps de déplacements observés n'excèdent jamais le double du temps théorique. Des disparités apparaissent toutefois entre ces territoires non métropolitains. Le ratio de congestion est ainsi particulièrement faible dans l'entre-deux-mers et le territoire sud Gironde, où les temps de déplacement constatés n'excèdent que de 50% les durées minimales.

La mesure territorialisée de la congestion par le ratio de congestion présente toutefois une limite importante : elle ne tient pas compte de la longueur plus importante des déplacements dans les territoires éloignés de l'agglomération bordelaise, pour lesquels la congestion induit mécaniquement davantage de temps consacré au transport en raison de l'encombrement du réseau. Il importe donc, pour mieux appréhender l'impact de la congestion dans ces territoires, de mesurer le supplément de temps que doivent consacrer les ménages à leurs déplacements du fait de la congestion.

L'indicateur de perte moyenne de temps par déplacement présenté plus haut permet d'appréhender cette dimension. Ainsi que l'indique la figure 4, il met en évidence une géographie très différente des impacts territorialisés de la congestion. Au regard de cet indicateur, les territoires les plus éloignés de l'agglomération bordelaise subissent des pertes de temps nettement plus marquées. Alors que la perte de temps liée en moyenne à un déplacement dans l'hypercentre de l'agglomération reste limitée à 10 à 15 minutes, elle atteint plus de 20 minutes dans les territoires littoraux du Médoc, du nord du bassin

d'Arcachon et du Val de l'Eyre. La perte de temps atteint même 30 à 35 minutes dans l'est du département (Libournais).

Il existe en outre d'importantes disparités entre territoires non métropolitains. L'Entre-Deux-Mers et le Sud Gironde connaissent des pertes de temps beaucoup plus limitées que les autres territoires situés à des distances comparables de l'agglomération bordelaise.

Afin de mieux appréhender les facteurs explicatifs de ces disparités, il est possible de décomposer l'indicateur de perte moyenne de temps par déplacement en deux composantes : la perte de temps par kilomètre parcouru et la distance moyenne de déplacement au sein de chaque territoire. L'indicateur se décompose en effet de la manière suivante :

$$PTD_i = \frac{T_i^C - T_i^{SC}}{N_i} = \underbrace{\frac{T_i^C - T_i^{SC}}{L_i}}_{\text{Perte de temps par km parcouru}} \times \underbrace{\frac{L_i}{N_i}}_{\text{Nombre moyen de km par}}$$

Les figures 5 et 6 présentent séparément la cartographie des ces deux composantes sur le territoire étudié. Les pertes de temps par kilomètre parcouru suivent logiquement un gradient monocentrique marqué. En raison de la saturation plus forte du réseau de transport dans ses parties centrales, les pertes de temps par km y sont beaucoup plus importantes que dans les autres territoires girondins. La carte 10 souligne à l'inverse la forte augmentation des distances de déplacement dans ces territoires, qui excède souvent 35 km. L'importance de pertes de temps enregistrées dans le Libournais s'explique ainsi par la combinaison de distances parcourues très élevées et de pertes de vitesse de circulation importantes (entre 0.78 et 0.87 minutes/km) au regard de l'éloignement de ce territoire. La même explication prévaut sur les territoires littoraux. A l'inverse, le Sud Gironde parvient à contenir les pertes de temps par déplacement grâce à la relative fluidité du trafic sur les axes empruntés à partir de ce territoire. Les déplacements sont aussi longs que pour d'autres territoires comparables, mais les pertes de vitesse sont nettement plus faibles (de 0.3 à 0.5 minutes/km).

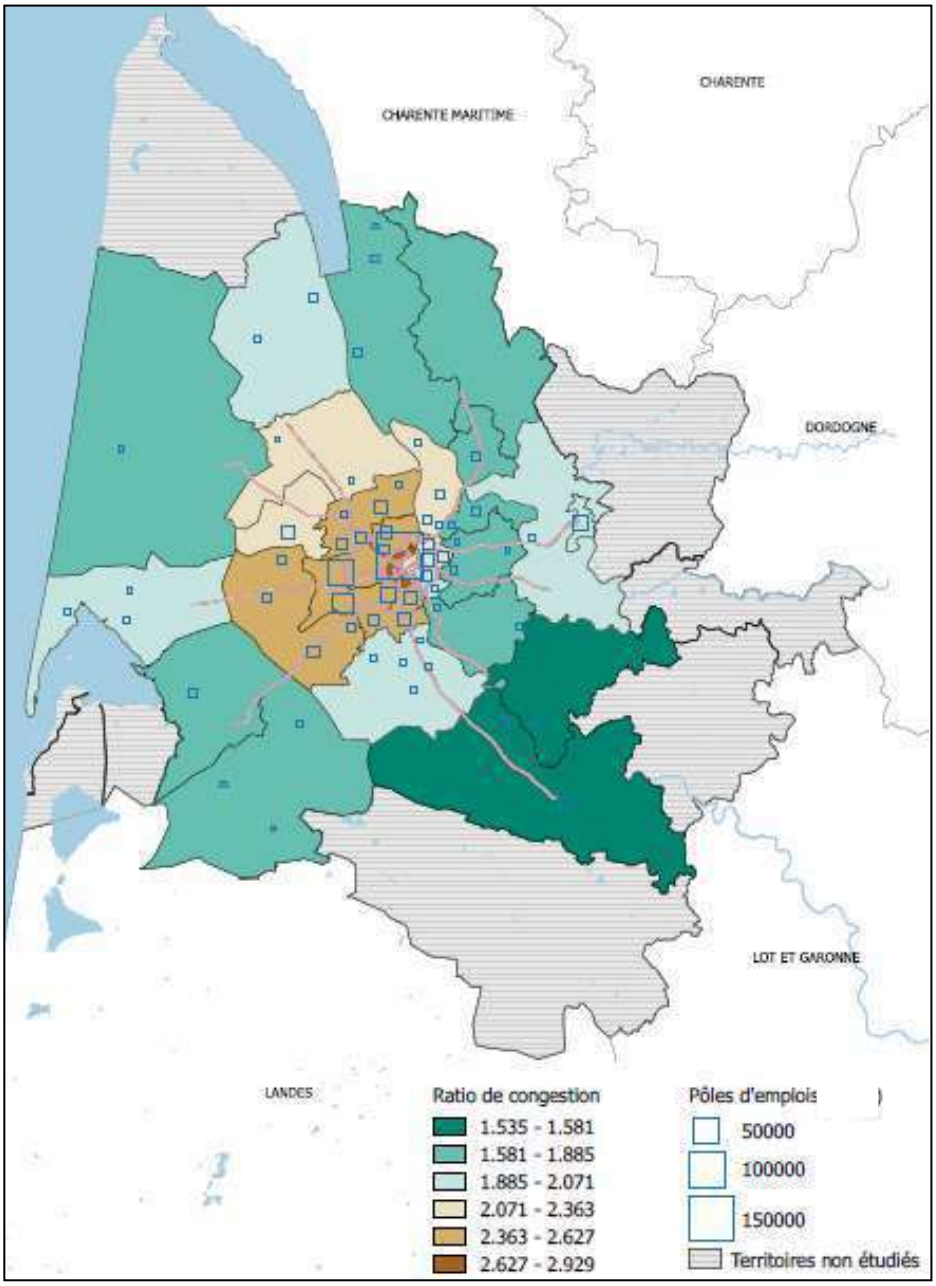


Fig. 3 - Mesure du ratio de congestion sur les territoires girondins en 2009
Sources : EMD (2008), EGT (2009), IGN, Base TOM TOM Réalisation : Passages-GREThA

Fig. 4 - Mesure de la perte de temps moyenne par déplacement en 2009
Sources : EMD (2008), EGT (2009), IGN, Base TOM TOM Réalisation : Passages-GREThA

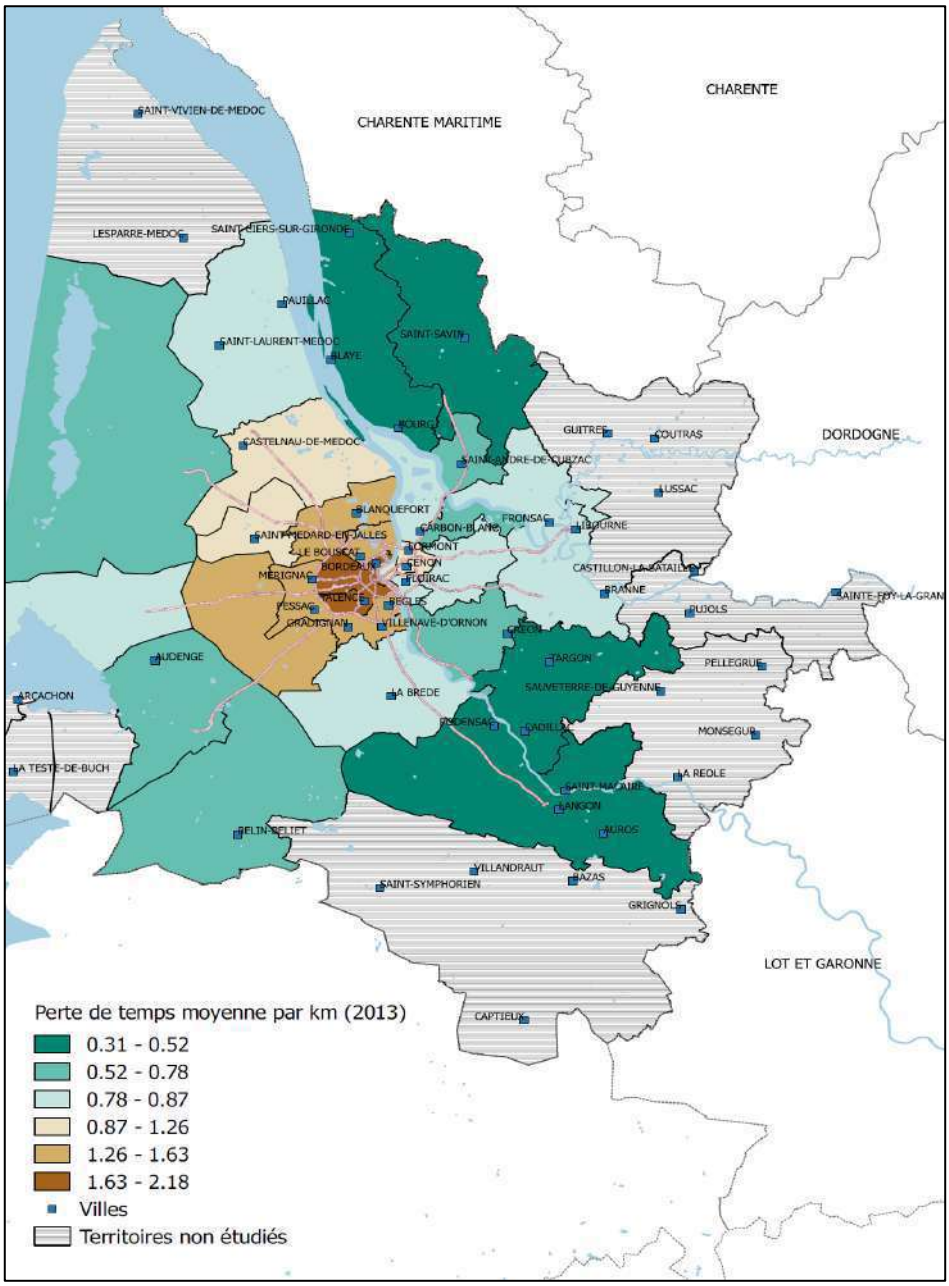


Fig. 5 - Perte de temps moyenne par km parcouru en 2009
Sources : EMD (2008), EGT (2009), IGN, Base TOM TOM; Réalisation : Passages-GREThA

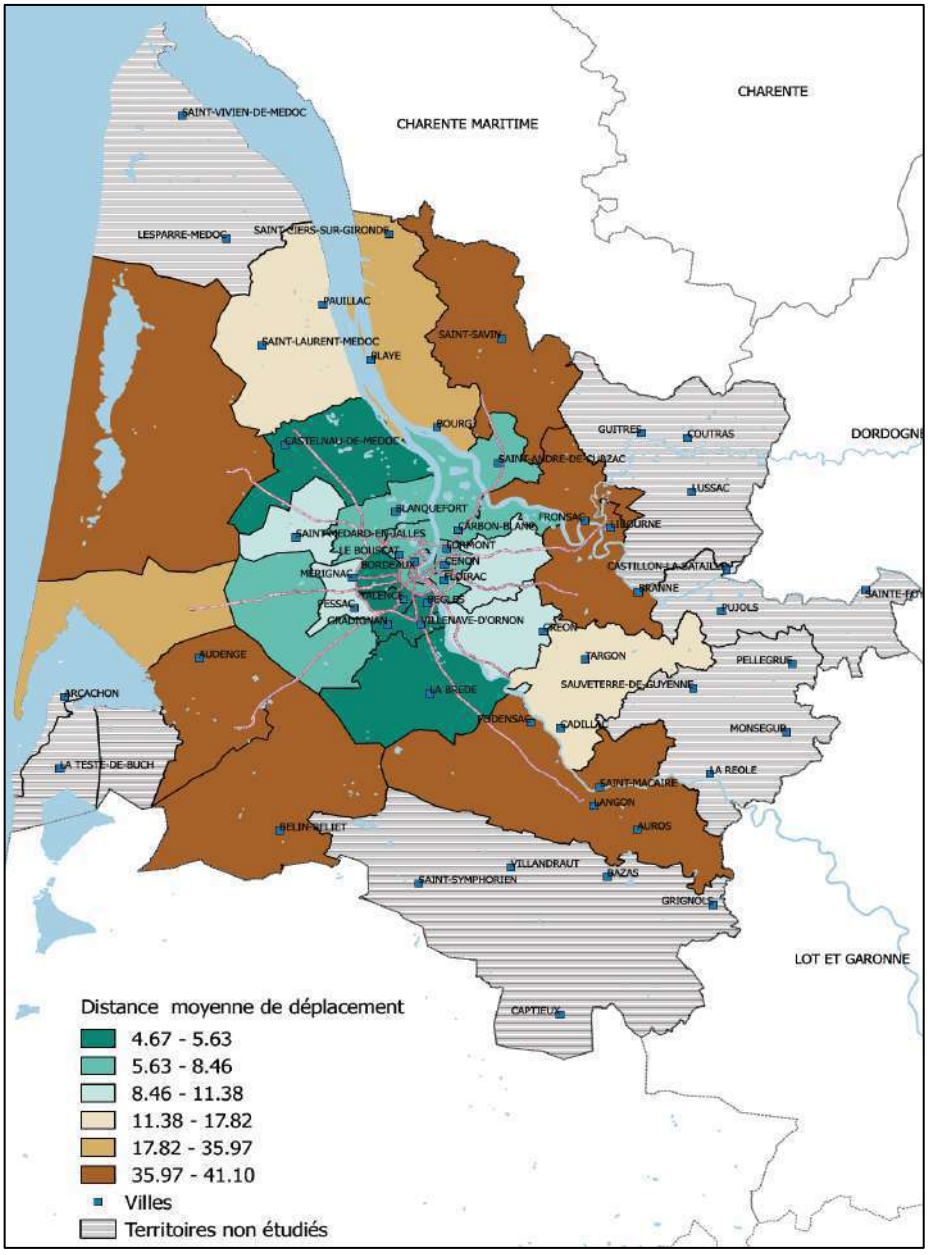


Fig. 6 - Distance moyenne de déplacement en 2009
Sources : EMD (2008), EGT (2009), IGN, Base TOM TOM; Réalisation : Passages-GREThA

5. Les impacts territoriaux de la congestion urbaine

Cette partie vise à évaluer l'impact de la congestion sur les différents territoires en testant les différents facteurs identifiés par la théorie et discutés plus haut. Trois facteurs sont particulièrement retenus : la polarisation intraurbaine des générateurs de déplacements, l'arbitrage entre prix du foncier et coût de transport généralisé et le phénomène de relégation périurbaine et le rôle de plus en plus structurant des aménités dans les choix de localisation résidentielle. Compte tenu du nombre limité de territoires observés et de l'absence de données individuelles sur l'exposition à la congestion, le corpus de données ne permet pas de tester l'impact de ces différents facteurs à travers une modélisation économétrique adéquate. Nous proposons donc ici un dispositif d'analyse différent, fondé sur la construction d'une typologie des territoires d'étude combinant les facteurs théoriques mentionnés (5.1) que nous confrontons ensuite à l'indicateur territorialisé de congestion construit précédemment (5.2). Une analyse des évolutions combinées de la congestion, du peuplement et des prix des logements est enfin discutée (5.3).

5.1. Une typologie des territoires girondins

La typologie des territoires girondins est fondée sur la combinaison de trois facteurs d'exposition à la congestion identifiés par la théorie : la localisation au sein de l'espace urbain, les dotations en aménités et en activités génératrices de déplacements des différents territoires et enfin le profil socio-économique de ces derniers.

La localisation au sein de l'espace métropolitain est appréhendée à travers deux indicateurs traduisant le niveau d'accessibilité des territoires : la distance au centre principal mais aussi la distance aux infrastructures de transport. L'orientation fonctionnelle des territoires est appréhendée à travers deux aspects principaux : le niveau de polarisation des activités économiques sur les différents territoires et la présence d'aménités naturelles et paysagères. La polarisation de l'emploi traduit la présence de générateurs de déplacements, notamment domicile-travail, en plus des fonctions résidentielles des territoires. Elle est mesurée à travers le ratio du nombre d'emplois au lieu de travail par actif résident sur le territoire. La recherche d'aménités paysagères est également susceptible d'induire des stratégies de localisation résidentielle éloignées des lieux d'emploi, allongeant en conséquence les distances de déplacement et les niveaux de congestion subis par les habitants de ces territoires. Dans le cas de la métropole bordelaise, deux types d'aménités bien documentées influent sur les choix de localisation résidentielle : les aménités littorales (POUYANNE ET AL., 2016) et la

présence de la forêt (TU ET AL., 2016). L'accès à ces aménités est mesuré d'une part par la distance au trait de côte, d'autre part par la proportion de la surface de la forêt dans l'usage du sol communal (cf. tableau 1). Enfin, le profil socio-économique des territoires est appréhendé, de manière classique à travers deux dimensions complémentaires : le niveau de revenu médian par unité de consommation et la présence des différentes catégories socio-professionnelles sur le territoire. Ici le rapport entre le nombre de « cadres et PIS » et le nombre « d'ouvriers » est utilisé comme indicateur synthétique du profil socio-économique de chaque territoire.

Tab. 1 - La construction de la typologie : dimensions et indicateurs mobilisés

Dimension	Variables utilisées
Localisation	1) Distance au centre de la métropole 2) Distance à la rocade périphérique
Orientation fonctionnelle des territoires	1) Polarisation de l'emploi : Nombre d'emplois par actif (source : INSEE 2009) 2) Aménités naturelles : - Distance au littoral (source : trait de côte IGN 2010) - Part de la forêt dans l'occupation du sol (source: BD carto IGN 2010)
Profil socio-économique des territoires	1) Catégories socio-professionnelles : ratio cadres et professions intellectuelles supérieures/ouvriers (source : INSEE RGP 2009) 2) Revenu médian par UC (source : INSEE 2009)

Ces sept indicateurs sont utilisés pour construire une typologie des territoires à partir d'une approche hiérarchique descendante décrite à la figure 7. Cette méthode a été préférée aux méthodes plus classiques de classification telles que les nuées dynamiques ou la classification ascendante hiérarchique en raison, d'une part, du faible nombre de territoires (31) et d'autre part de la non linéarité de l'effet des principaux indicateurs utilisés.

Les indicateurs de localisation permettent de distinguer dans un premier temps les espaces centraux (moins de 3 km du centre) les espaces péricentraux (entre 3 et 5 km du centre et à moins de 5 km de la rocade) et les espaces périurbains, situés à plus de 10km du centre et plus de 5km de la rocade.

L'orientation fonctionnelle des territoires permet ensuite de regrouper les territoires centraux et certains territoires péricentraux ayant un fort niveau de

polarisation de l'emploi (pôles secondaires d'emplois) sous la catégorie de «centres d'emplois». Ces territoires affichent tous un nombre d'emplois par actif supérieur à 1. Les autres territoires péricentraux ont une vocation plus résidentielle. Les deux indicateurs d'aménités sont largement corrélés et permettent de scinder les territoires périurbains en deux catégories : les territoires périurbains à fortes aménités sont situés à moins de 30km du trait de côte et ont une couverture forestière représentant plus 50% de leur territoire.

L'analyse du profil socio-économique permet d'affiner cette typologie en distinguant:

- Les territoires péricentraux aisés (rapport cadres/ouvriers supérieur à 1 et revenu médian par UC supérieur à 20000 euros) et modestes (le rapport cadres/ouvriers est inférieur à 0,6 et revenu médian par UC inférieur à 19000 euros).
- Les territoires périurbains à fortes aménités aisés (rapport cadres/ouvriers supérieur à 0,8 et revenu médian par UC supérieur à 21000 euros) et à revenu moyen (le rapport cadres/ouvriers est inférieur à 0,4 et revenu médian par UC compris entre 19000 et 21000 euros).

Les territoires périurbains à faibles aménités sont homogènes d'un point de vue socio-économique avec une faible proportion de cadres et un niveau de revenu nettement plus faible que les autres territoires (revenu par UC inférieur à 18000 euros)

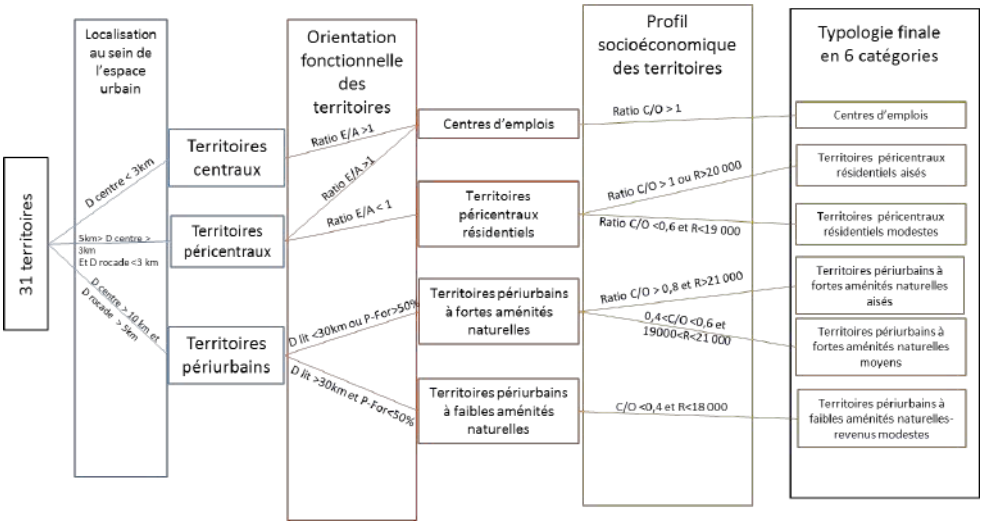


Fig. 7 - Construction de la typologie territoriale : hiérarchie des dimensions et seuils retenus*

* D centre : distance au centre ; D rocade : distance à la rocade ; ratio E/A : Nombre d'emplois par actif ; D lit : distance au trait de côte ; P-For : part de la surface communale forestière ; ratio C/O : nombre de cadres et PIS/nombre d'ouvriers ; R : revenu médian par unité de consommation

La typologie finale permet de distinguer 6 grands types de territoires. La robustesse de cette typologie peut être éprouvée de deux manières. D'une part, le tableau 2 permet de tester, par une analyse de variance, la significativité des différences de moyennes pour chacun des sept indicateurs entre les territoires obtenus. L'ensemble des différences de moyennes apparaissent significatives au seuil de 1%. Une analyse de variance multiple (MANOVA) permet de prendre en compte les corrélations entre les sept variables et confirme la forte différenciation des six catégories de territoires (tableau 3). Enfin, nous avons soumis Les différents territoires à une analyse discriminante linéaire incluant les sept variables utilisées précédemment. L'analyse discriminante permet de classer correctement 90.3% des territoires.

Tab. 2 - La robustesse de typologie-analyse de variance à un facteur

typologie	Distance Centre	Distance rocade	Nombre d'emploi par actif	Part de l'emprise forestière	Distance au littoral	Revenu médian par UC	Ratio Cadres-PIS/Ouvriers
centres d'emplois	3,86	-2,54	1,58	0,08	37,51	19456	1,55
T Péricentraux résidentiels aisés	4,14	-1,09	0,74	0,07	37,88	21111	1,41
T Péricentraux résidentiels modestes	6,91	1,73	0,84	0,09	44,47	16999	0,39
T Périurbains à fortes aménités aisés	13,07	7,31	0,56	0,43	37,01	22317	1,08
T périurbains à fortes aménités-revenu moyen	29,54	22,67	0,42	0,66	22,78	19712	0,50
T Périurbains	33,49	27,36	0,53	0,25	53,87	17119	0,29

revenus modestes							
valeur moyenne	**14,46**	**8,55**	**0,80**	**0,30**	**39,20**	**19623**	**0,95**
F test	**25,64*** **	**31,25** **	**4,96*** **	**6,58*** **	**4,14*** **	**10,19*** **	**18,53*** **

* : indique une significativité à 10% ; * *: indique une significativité à 5% ; *** : indique une significativité à 1%

Tab. 3 - La robustesse de typologie-analyse de variance multiple

Statistique MANOVA (7 variables)	Valeur	F test
W = Wilks' lambda	0,0033	6,8***
P = Pillai's trace	2,817	4,24***
L = Lawley-Hotelling trace	19,0402	9,47***
R = Roy's largest root	13,0163	42,77***

* : indique une significativité à 10% ; * *: indique une significativité à 5% ; *** : indique une significativité à 1%

6. Les trajectoires d'évolution des différents territoires

A titre exploratoire, nous proposons ici une analyse synthétique des trajectoires d'évolution des différents types de territoires après 2009, de façon à éclairer les mécanismes d'ajustement possibles des différentes configurations territoriales. Cette analyse reste exploratoire dans la mesure où le corpus de données et le dispositif d'analyse ne permettent pas d'isoler un effet causal du niveau de congestion sur les évolutions constatées, mais seulement d'identifier des tendances permettant de suggérer des hypothèses d'analyse. Le tableau 4 indique, pour chaque catégorie de territoire, l'évolution de la congestion entre 2009 et 2013, leur évolution démographique ainsi que la dynamique des prix médians des maisons individuelles. Ces données permettent d'appréhender les évolutions combinées de la mobilité, des choix de localisation résidentielle et des prix du logement sur le territoire d'étude. L'évolution de la congestion est mesurée, entre 2009 et 2013, par l'évolution absolue des pertes de temps par déplacement entre 2009 et 2013 ($\Delta\, PTC_i$), exprimée en minutes :

$$\Delta\, PTC_i = \frac{PTC^{2013}}{N_i} - \frac{PTC^{2009}}{N_i}$$

Les flux de déplacements utilisés pour la simulation en 2009 et 2013 sont toutefois identiques (EMD, 2008 et EGT, 2009), ces enquêtes n'étant pas

reproduites dans un délai aussi court. Cet indicateur estime donc l'évolution locale de la congestion *à structure constante de la géographie des déplacements*.

Trois tendances apparaissent à la lecture de ces résultats. Tout d'abord, on constate un net ralentissement de l'attractivité démographique du périurbain modeste, dont le taux annuel moyen décline fortement après 2009 (cf. figure 8). Ce ralentissement est pourtant assorti d'un maintien de prix du logement beaucoup plus faible que dans le reste du territoire, puisque les taux d'évolution des prix restent très en dessous des valeurs moyennes. Sur ces territoires, on constate en même temps une quasi-stagnation du niveau de congestion entre 2009 et 2013. Une interprétation possible de ces données est que le niveau très élevé de congestion subi notamment par les actifs occupés sur ces territoires remet en cause les stratégies de localisation en quête de foncier accessible. Cette hypothèse est d'autant plus crédible qu'elle coïncide avec une tendance à la prise démographique des espaces centraux et des quartiers péricentraux, notamment les plus modestes, dont la croissance démographique accélère fortement sur la période 2013-2015, en dépit d'une croissance soutenue des prix du logement. Une recentralisation de la croissance démographique bordelaise semble donc s'esquisser, notamment en direction des communes de première couronne modestes, qui pourrait constituer l'un des ajustements à l'augmentation de la congestion subie en périurbain éloigné, d'ailleurs recherché par les politiques d'aménagement urbain locales.

En revanche, les territoires périurbains à fortes aménités conservent un haut niveau d'attractivité démographique en dépit d'une congestion élevée en 2009 et en progression entre 2009 et 2013 et d'une croissance soutenue des prix du logement, supérieure à 5% par an entre 2014 et 2018. La recherche d'aménités périurbaines semble ici contrebalancer les niveaux de congestion croissants de ces territoires.

Tab. 4 - Les trajectoires d'évolution des différents types de territoires

	Evolution de la perte de temps par km 2009-2013 (en min)	**TCAM population 2009-2013**	**TCAM population 2013-2015**	**TCAM prix médian des maisons 2009-2014**	**TCAM prix médian des maisons 2014-2018**
centres d'emplois	0,05	0,76%	1,50%	4,16%	9,96%
T Péricentraux résidentiels aisés	0,24	1,30%	1,10%	3,78%	7,44%
T Péricentraux résidentiels modestes	0,00	1,33%	2,52%	1,58%	6,05%

T Périurbains à fortes aménités aisés	0,15	1,59%	1,67%	2,14%	5,46%
T périurbains à fortes aménités-r moyen	0,08	2,09%	2,54%	1,56%	5,28%
T Périurbains revenus modestes	0,01	1,17%	0,58%	0,17%	2,73%
valeur moyenne	0,10	1,32%	1,51%	2,45%	6,39%
F test	**3,26****	**2,66****	**2,38***	**8,65*****	**9,74*****

* : indique une significativité à 10% ; * *: indique une significativité à 5% ; *** : indique une significativité à 1% TCAM : Taux de croissance annuel moyen

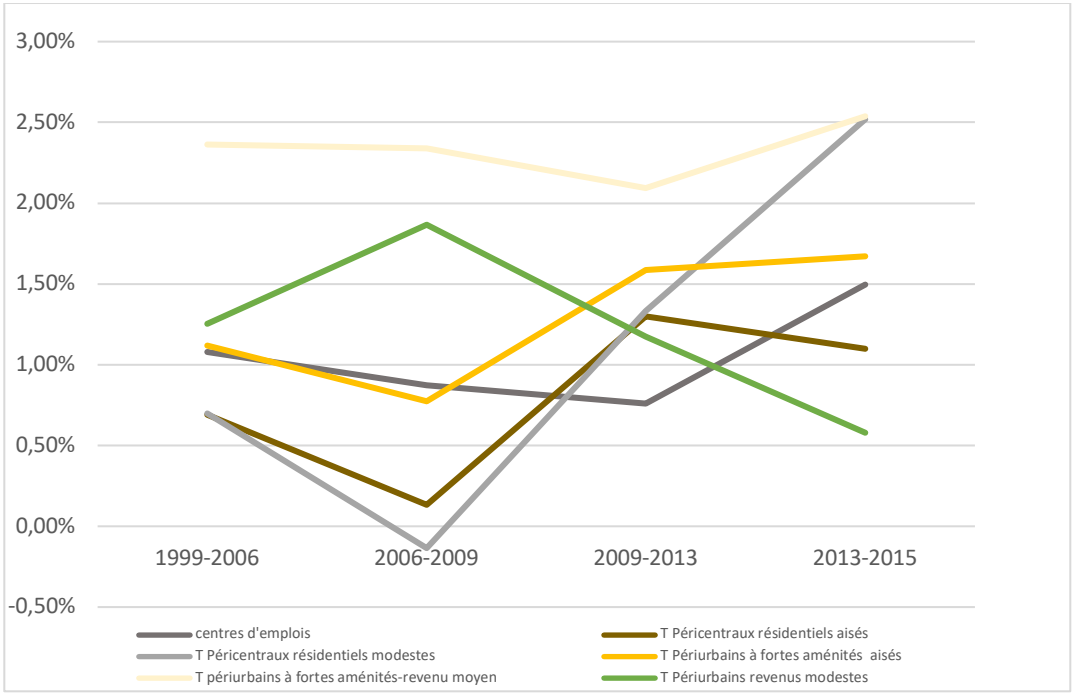


Fig.8 - Dynamiques démographiques des différents types de territoires

7. Conclusion

Cette contribution a permis de mieux comprendre l'impact local de la congestion sur les différents sous-espaces d'une aire urbaine alors que jusqu'ici les travaux académiques se sont plutôt attachés à relier les morphologies urbaines au niveau de congestion en apportant des résultats controversés.

La méthode d'analyse de l'impact de la congestion sur les différents types de territoires adoptée ici a permis d'identifier, dans un premier temps, trois types de territoires particulièrement affectés par la congestion : les territoires périurbains à revenu modeste, les territoires périurbains à fortes aménités et à revenu moyen et les centres d'emplois. Les résultats ont montré, dans un deuxième temps, que les actifs occupés subissent systématiquement un niveau de congestion plus élevé que les autres ménages, particulièrement, pour deux catégories de territoires : les territoires périurbains à fortes aménités et le périurbain modeste sans pour autant révéler de différenciation significative entre les CSP.

Enfin, cette analyse souligne que le niveau très élevé de congestion subi, notamment, par les actifs occupés du périurbain modeste (où l'on observe un net ralentissement de l'attractivité démographique ces dernières années) remet en cause les stratégies de localisation en quête de foncier accessible. A contrario, les territoires périurbains à fortes aménités conservent un haut niveau d'attractivité démographique en dépit d'une congestion élevée qui reflèterait le prix des aménités urbaines.

La coexistence de ces deux effets doit amener à s'interroger sur les capacités d'adaptation des ménages vulnérables et des territoires en termes de mobilité et de choix de localisation résidentielle dans les territoires périurbains hétérogènes. Afin d'y apporter une réponse efficiente, il ne faudra pas omettre que l'espace urbain se caractérise par des déplacements et des localisations qui se co-déterminent l'un l'autre, les formes urbaines peuvent, certes, générer des niveaux de congestion différenciés mais ce papier a montré que la congestion elle-même tendait à façonner les territoires. Par conséquent,

la ville est bien un système dynamique qui s'adapte en permanence aux interactions de ses occupants et non pas un système statique qui conduit les pouvoirs publics à formuler des politiques de déplacements indépendamment des politiques d'aménagement (WIEL, 2002).

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Metropolitan places for bioregional projects: hypothesis of federative strategies between metropolis and bioregion for French regional planning

Luana Giunta

Abstract

The phenomenon of French metropolisation has established in the political, social and economic life of the country through the definition of the "métropoles d'équilibre", a strategy that has allowed economic and demographic growth of metropolitan territories. Strong local disparities and urban-rural imbalances have fostered social protests, including the 2018 gilets jaunes movement, which manifested social malaise in the metropolitan areas.

The urgency of climate change and the global economic crisis of 2009-2013 have underlined a strong territorial vulnerability, including the social, food and energy domains. Public policies are moving toward a redefinition of public action through the 'aménagement du territoire', by developing strategies that can ensure the sustainability of territorial systems and their survival. The issue of the metropolitan form, which until now was an utopia, has become central to restructuring the relationships between the city-mother and the peri-urban territories. Energy and food insecurity has not only increased the instability of metropolises in the face of global changes but also emphasised its dependence on rural territories. The actualisation of the negotiated planning instruments could open the way for a shift in the paradigm of spatial planning, encouraging the relations between territories and the forms of organization and coordination of public action, in other words the 'interterritoriality,' according to the definition of geographer Martin Vanier. If planning can facilitate the design of new forms of spatial cooperation, and if the latter is an essential condition for succeeding in the ecological transition, how are spatial metabolisms structured within the system of relations between metropolis and peri-urban territories? The experience of the territories of the Bordeaux metropolitan area through the co-construction of an urban bioregion scenario has made it possible to reveal an intrinsic culture of territorial cooperation based on the specificities of the territory.

KEYWORDS: bioregion, metropolis, territorial cooperation, territorial metabolism

1. Introduction

For more than thirty years, the French State tried to implement territorial decentralisation. This political strategy was intended to solve the historical problem that was represented by the slogan: 'Paris et le désert français', launched by Jean-François Gravier in 1947. Indeed, the slogan had the purpose tostress the total absence of both public and economic actionsthroughout the Country apart from the city of Paris, since the Second World War. A strong regional disparity saw the disproportionate growth of the urban agglomeration of Paris to the detriment of the other French Regions, creating an instability of weights and flows across the nation. In order to deal with this problem, the French State proposed to create the 'métropoles d'équilibre', through an empowerment strategy of all those regional capital cities that were capable of remedying the failure of France's urban framework (ROCHEFORT, 2002). From this point onwards, the phenomenon of metropolisation spread throughout France, becoming an opportunity for territorial development of many Regions, and at the same time, the cause of local disparities and imbalances between the city and its countryside.

Today the phenomenon of metropolisation that characterise all French Regions, has been tested by territorial changes. Both climate changes and global economic crisis have demonstrated the territorial precariousness, such as the social, food and energy ones. This situation as induced public policies to take a new direction.

Regional planning and design are at the heart of these dynamics, and they could subvert the territorial trends to ensure the self-sustainability of territories, through the mobilisation of theoretical models, practices and accumulated experiences.

2. Searching for new territorial synergies: a paradigm shift for French regional planning?

The link between the territorial context[1], public policies and spatial planning is known for its laborious articulation. Questioning on paradigm shift in regional planning implies analysing the process in which public policies evolve in relation to the evolution of the territorial context (MULLER, SUREL, 1998, 139). In France, for several years, we have been witnessing a remodelling of public action that accompanies and redefines the rules of spatial planning. This dynamic is

[1] In the social, economic and cultural sense.

accelerated by global changes that are shaking the current territorial context. Repercussions of the global economic crisis of 2009-2013, environmental concerns linked to the climate changes, and transformative relations between city and its countryside are showing an alteration in the interdependencies and synergies between territories. Through more or less clear signals from populations, public policies are being structured with the aims to take into account these repercussions and ensure the sustainability of territorial systems and therefore their survival.

In the French context, one of the strongest signals that can be considered useful to stimulate a change in public policies and to promote their integration into spatial planning is the 2018 *gilets jaunes* movement. The protests made it possible to reveal the social malaise in relation to the economic unsustainability of monocentric territorial geographies, or the role that metropolises have imposed in the organisation of weights and hierarchies between different territorial systems.

For a long time, several experts have been considering the metropolitan issue as a contemporary scientific problem. In the field of economics, the notion of the "globalised city" introduced by S. Sassens in 1997, means that themother cities (metropolises) are within the logic of global markets, causing a loss of local ties in favour of a strong territorial competitiveness. The notions of metropolis and metropolisation are also studied by political scientists and sociologists. According to political ecology, metropolises are the cause of social segregation, environmental disasters, and migration between city and its countryside (PAQUOT, 2016, 4). From the perspective of urban planning, the metropolisation is qualified as a phenomenon of "ecocatastrophic planetary urbanisation" (MAGNAGHI, 2017, 24), the cause of the "death of the city" (CHOAY, 2008; *Ibid*, 27), whose mother city has become a "ville éclatée" (MAY ET AL., 1998, *Ibid*), a "diffuse city" (INDOVINA, 1990; LANZANI, 1993; SECCHI, 2005, *Ibid*), a "ville éparpillée" (BAUER, ROUX, 1976; *Ibid*).

The institutionalisation of the metropolises in France[2] has transformed the concept itself. Indeed, it is becoming not only an economic factor but also a social, political, and environmental one, positioning the metropolis at the highest level of the local territorial hierarchy. This fact has completely changed the social perception of the metropolis because it is transforming itself from a potential economic wealth into a suffered attractiveness.

This feeling of injustice in suburban cities and 'rurban' societies has induced city debates that have induced the constitution of political self-organisations.

[2] Through the approval of Law LOI n° 2014-58 of 27 January 2014 " modernisation de l'action publique territoriale et d'affirmation des métropoles ".

The magnitude of this phenomenon can be measured considering the French municipal elections of 2020, which were characterised by the subversion of the historical political classes of many French metropolises and their hinterlands through the entry of self-organised citizens into the palaces of power.
The demand for an economic balance between metropolises and suburban cities is accompanied by a socio-cultural revolution driven by the emergency related to climate changes and the need to implement the ecological transition of territories. To translate new public policies into regulatory provisions, policy makers must face the substantial evolution of the mechanism of regional planning. If the French regional planning has integrated the principle of balance between the knowledge of development and the preservation of resources through the SRU law[3] until now, today it must deal with the logic of negotiation between economic and natural resources because the latter do not belong to the same territorial geographies. Recently, the metropolis form has been disputed: observations on its structure, which was a scientific and political-militant utopia until now, have become the pivot for restructuring the relations between mother-city and suburbs through a mutual adjustment of the relations between territories. The precariousness of energy and food has not only accentuated the instability of metropolisesin relation to global change, but also has highlighted its strong dependence on rural territories whose virtuous relations can be observed historically. According to these observations, the actualization of devices related to the negotiated regional planning could offer new interaction between actors defining the trajectory a paradigm shift in regional planning. Indeed, regional planning could favour the proper relations between territories through forms of articulation, organisation, and coordination of public action by means of a socio-spatial compromise, based on guaranteeing and structuring 'inter-territoriality', according to what stated by the geographer Martin Vanier.

For example, the ecological transition could formalise the creation of new trajectories in the field of territorial cooperation, between the metropolis and the suburban area. The risk of this hypothesis is that the authority of all those territories that participate in the construction of inter-territoriality could fall into the trap of a game of strength in which "the territorialized democratic expression could weigh against the collective interests of cooperation" (VANIER, 2005, 335).

The role of territorial planning could consist in coordinating the logic of cooperation through the expression of a broad territorial design within which the forms of negotiation make sense if they are part of a co-constructed and shared territorial project.

[3] The SRU law of 13 December 2000 "solidarité et au renouvellement urbain" is a text that profoundly modifies the French urban planning code in order to integrate the principles of sustainable development.

Indeed, analysing the evolution of the concepts recently used to implement territorial planning, the passage from the notion of 'projet urbain' (SRU law) to the 'projet de territoire' testifies to the need for a new political responsibility that moves from a projective logic to a dynamic partnership of construction of the public action. The predetermination of the territorial action is replaced by the revelation of an implicit project through the contribution of the actors that participate in the planning process using a transversal and transcalar logic.

3. The scenario of the Bordeaux urban bioregion to reveal an intrinsic culture of territorial cooperation

If regional planning can be the instrument to facilitate the design of new forms of territorial cooperation, and if the latter is the sine qua non condition to succeed in the ecological transition, how are territorial metabolisms structured within the system of relations between metropolis and suburban territories?

Through the notion of 'urban bioregion' (MAGNAGHI, 2014, 78) territories of the former Aquitaine Region have chosen to reinterpret the relationships between cities and open spaces from a self-sustainability perspective, in which the reproducibility prerequisites are based on the intrinsic constitutive characters that guarantee the condition of existence of the territories (MAGNAGHI, FANFANI, 2010, 39).

This analysis was carried out within the "Biorégion" research programme (BERLAND-BERTHON, 2012, 8)[4], which involved different partners[5] in order to experience the notion of urban bioregion to renew the planning practices of territories of the Gironde Department. Through the analyses developed by applying the territorialist approach of the University of Florence, material flows and relations between metropolises and suburban territories were identified in a long-term analysis. Beyond the current metropolitan flows that show the dependence of suburban territories on the metropolis, the city-countryside relations that constituted the historical polycentrism of Gironde were identified.

[4] signed from 2013 to 2016 between the University of Bordeaux Montaigne (Institut d'Aménagement, de Tourisme et d'Urbanisme IATU and CNRS PASSAGES) and the University of Florence (Department of Architecture - DiDA)

[5] Other territories were also partners in the "Biorégion" research contract: the former Aquitaine Region, the Tuscany Region, the Gironde Department, the Landes de Gascogne Regional Natural Park, the Pays Médoc and the Sysdau.

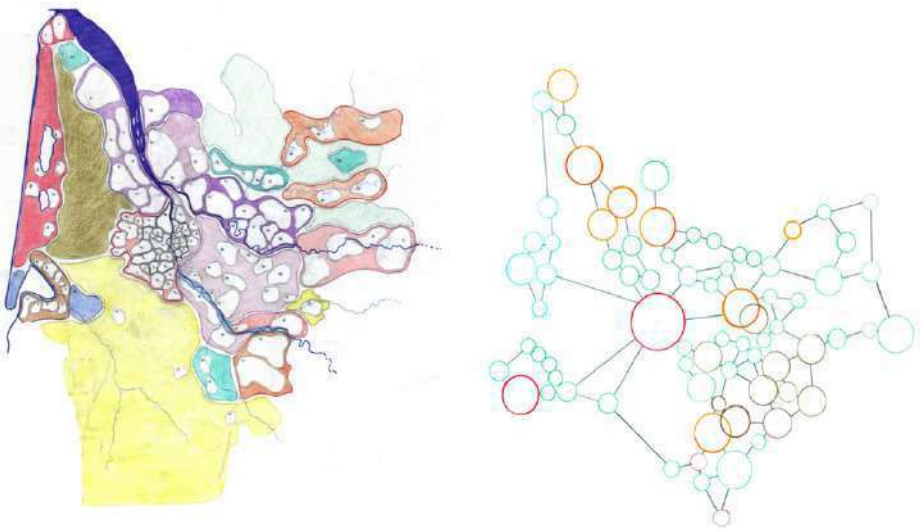

Fig. 1 - The historical polycentrism of the Gironde bioregion and the territorial morphotypes (source: General Council of Gironde 2014, BIOREGION contract, students of the laboratory coordinated by D. Fanfani and D. Poli)

Fig. 2 - Comparison between the historical (19th century) structure on the left and the current (2014) structure on the right (source: GIUNTA, 2016)

The analysis of the land use historical evolution in territories of the Gironde Department (between the 19th century and the current period) shows how the reservoir of resources that fed the Bordeaux metropolis had completely redesigned the productive vocations in order to enter global markets.

The historical structure (Fig. 2), which is highlighted by the Etat Major 1820 - 1866 mao, traces the considerable changes in territorial configuration. The reclamation made by Napoleon III's to rehabilitate the marshy area of the Landes definitely transformed the area of the Landes into a productive maritime pine forest, trough the 19 June 1857 law on 'l'assainissement et la mise en culture des Landes de Gascogne'. Before the 'enrésinement', this area was characterised by a flourishing pastoral activity organised at territorial level. The historical evolution of the agricultural structure also shows the abandonment of polyculture, which was the main agri-food supply in the Bordeaux Region, that was replaced by the monoculture of vines: the new emblem of the Bordeaux economy. All these changes are the evidence of a shift from a subsistence economy, based on the proximity of agricultural land, to a global economy, based on the exploitation of resources. The Bordeaux metropolis, which is now part of an international trade, exchanges its new territorial excellences (wood, resin and wine) to ensure its food, energy and industrial subsistence through imports.

Fig. 3 – Commercial traffic in the 18th century (source: GIUNTA, 2016).

The evolution of the historical territorial metabolism allows to decisively highlight the fragility of the metropolitan system in maintaining essential relations for local resource supply. The analyses, which are usually conducted to reveal the conditions for the existence of a Girondine bioregion, allowed to highlight, the existing or potential relationships between the metropolis and non-urbanized land using an analytical synthesis. Through the study of structural invariants the identity dynamics, phases and methods of territorial transformation and breaking points of territorial balances have been identified: it has meant the constitutive factors of the following processes of territorialisation and deterritorialisation. The synthesis of these analyses has led to the configuration of sub-regions ('territorial figures' according to the territorialist vocabulary) having a unitary character and representing the historical local identity of the Girondine bioregion (Figure 4). The image of the 'Girondine bioregion' (in the shape of a daisy) has demonstrated that the historical interrelationships between the metropolitan territory and its rural hinterland constituted the basis of a circular supply system based on the territorial cooperation between the mother-city and its surrounding territories.

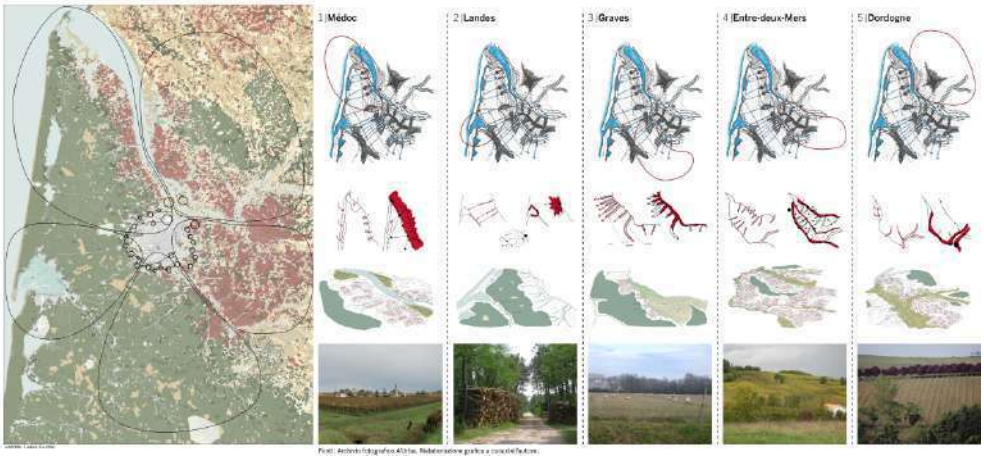

Fig. 4 - The interdependencies between the metropolis and its rural hinterland that is composed of five territorial figures (source: GIUNTA, 2016).

The evolution of the urban structure due to the process of metropolisation has influenced the territorial metabolism. As with other French metropolises, which historically played a key role in defening territorial flows, the virtuous relationship between city and countryside is evolving into bilateral and monofunctional relations between territories through the "fragmentation of the

hinterland, decentralisation and privatisation of governance" (BOGNON ET AL, 2018, 29).

The emergency of environmental concerns, energy and food insecurity, problems related both to mobility flows and access to the labour concentration zones force us to rethink territorial relations through a circular and self-sustainable perspective. We need to relate the production of materials, the organisation of flows and the economic and environmental system through a reorganisation of territorial metabolism towards a notion of balance with our own territorial system. These concerns are the focus of the new policies of the Bordeaux Métropole: through a strategy of territorial cooperation, it is starting to establish negotiation dynamics with the rural neighbouring territories, which today hold environmental and energy resources. To date, the cooperation has started withthe large conurbations of the Region[6] with a view to pactual territorial negotiation. However, these strategies do not include all those territories of the Bordeaux metropolitan area that are the most affected by Bordeaux metropolisation. These territories, which historically guaranteed a virtuous and propitious city-countryside relationship due to a mutual exchange between environmental and energy resources and workforce (HIGOUNET ET AL, 1963, 277), were based on spontaneous cooperation between territories for mutual subsistence.

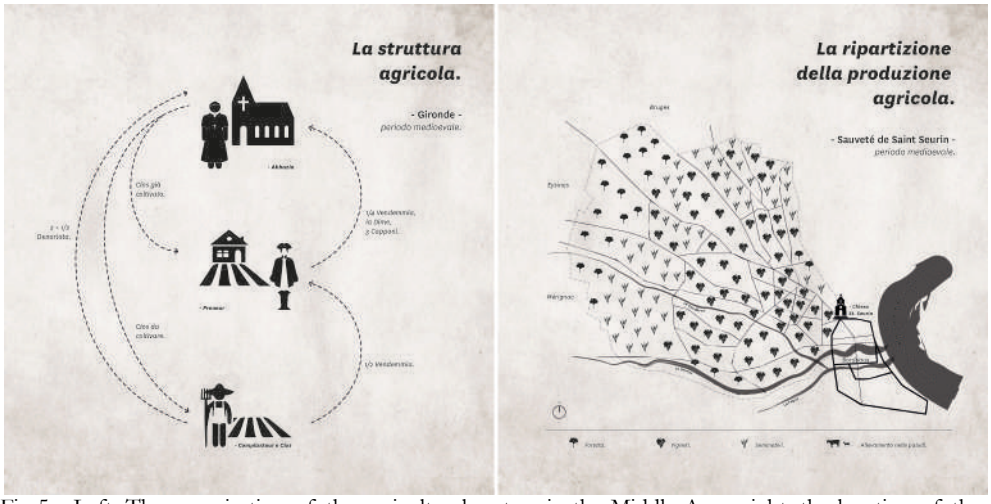

Fig 5 - Left: The organisation of the agricultural system in the Middle Ages, right: the location of the agricultural structure in the Saint-Seurin district of Bordeaux in the Middle Ages (source: GIUNTA, 2016)

[6] Such as the city of Angoulême, the agglomeration community of Libournais (CALI) and the agglomeration community of Val de Garonne (VGA), in order to guarantee the energy and food supply of the metropolis through 2050

If the new cooperation strategies were inspired by the historical relations between the Bordeaux metropolis and the Girondine bioregion, the role of the territories of the Bordeaux metropolitan area would become crucial. In order to ensure the supply of the Bordeaux metropolis, political strategies could allowto reverse the dynamics of metropolisation through regional planning to confirm the productive and sustainable vocation that characterised the historical identity of these territories. It would be a question of reconstructing, through a strategy of negotiation by agreement, the relationship between the enhancement of natural resources (biomass potential, for example) and territorial investments capable of optimising suburban territories in order to solve the imbalances caused by metropolisation. These pact agreements represent the basis for the creation of "territorial alliances" in relation strategic projects.

4. Places of transition between metropolis and bioregion: regional planning strategies in the Bordeaux metropolitan area

Through its inter-municipal planning tool, the SCoT (Schéma de coherence territoriale), the territory of the Bordeaux metropolitan area lays the groundwork to establish a balance between the metropolis and the 'metropolitan buffer zone'. The SCoT of the Bordeaux metropolitan area, approved in 2014, manages the attractiveness of the Bordeaux metropolis through the creation of a polycentric 'priority geography' in which the new suburban centralities can counterbalance the monocentric attractiveness of the Bordeaux metropolis.

The 'priority geography' makes it possible to identify two strategic metropolitan buffer zone (Fig. 6) in ensuring the organisation of territory in terms of its economic, urban and agri-environmental components.

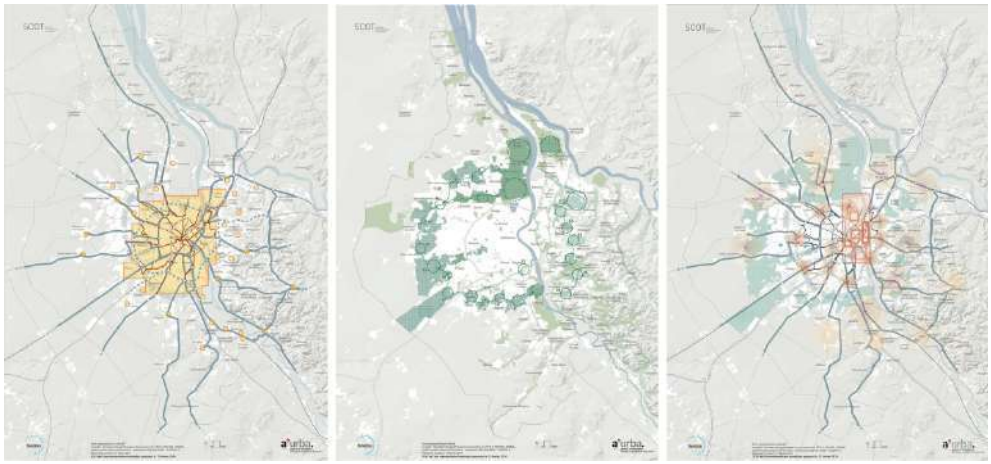

Fig. 6 - From the left: the map of the 'priority geography' of the urban and economic offer of the strategy 'métropole à haut niveau de service', the map of the agri-environmental buffer zone of the strategy 'métropole nature', the overlap of the agri-environmental buffer zone and the 'priority geography' (source: DOO, SCoT of the metropolitan area of Bordeaux, Sysdau).

With the concern of combine a responsible spatial development and the preservation of ecological resources, the Sysdau[7] needsto start a reflection that is capable to reversing metropolitan dynamics towards enhancement of the intrinsic resources of territory, towards the urban bioregion.

During the experimentation of the BIOREGION research contract, the agri-environmental buffer zone was the centre of territorial strategies to anchor the metropolis to the urban bioregion. Through the proposal of a "bioregional metropolis", the agri-environmental buffer zone allowed us to rethink the agri-environmental flows between the metropolis and non-urbanized land through a logic of exchange but also of self-sustainability. In fact, the idea of a bioregional metropolis (GIUNTA, 2016, 59) was based on the proposal to start a real transition of the metropolitan model towards the bioregion through bioregional prerequisites of transformation: the reconstitution of a polycentric network of cities, the revelation of local identities, its proximity agricultural belt and its of multifunctional ecological networks.

[7] Public structure that represents the metropolitan area of Bordeaux: 94 municipalities, 28 of which belong to the metropolis of Bordeaux (Bordeaux Métropole) and 66 belong to seven communities of municipalities that make up the metropolitan buffer zone (CdC Médoc Estuaire, CdC Jalle Eau Bourde, CdC Montesquieu, CdC Secteur Saint-Loubès, CdC Coteaux Bordelais, CdC Portes de l'Entre-deux-Mers and CdC du Créonnais). This territory is politically and administratively represented by the Sysdau, a mixed union that is in charge of drawing up and applying the SCoT (Schéma de cohérence territoriale) of the Bordeaux metropolitan area.

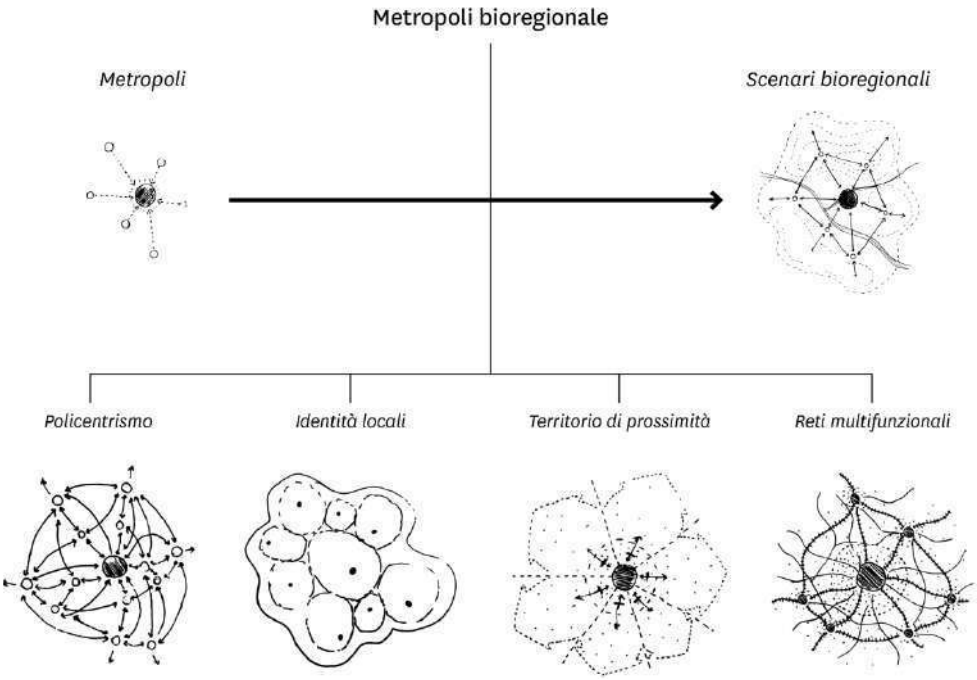

Fig. 7 - From metropolis to urban bioregion: prerequisites for a bioregional metropolis (source: GIUNTA, 2016).

In order to initiate the transition from the metropolis to the urban bioregion, these strategies were formulated on the territory of the metropolitan area of Bordeaux according to three project guidelines: the "proximity metropolis" (*Ibid.*, 61), the "ecological metropolis" (*Ibid.*), and the "polycentric metropolis" (*Ibid.*). The bioregional metropolis would be the result of the combination of these three strategic figures (Figure 8).

The proposal of the bioregional metropolis received the support of the Sysdau as an instrument of renewing the planning approach implemented through the SCOT of the Bordeaux metropolitan area. The new working methodology includes transdisciplinarity, participation/co-construction, and the revelation of local resources as prerequisites for any project to be undertaken.

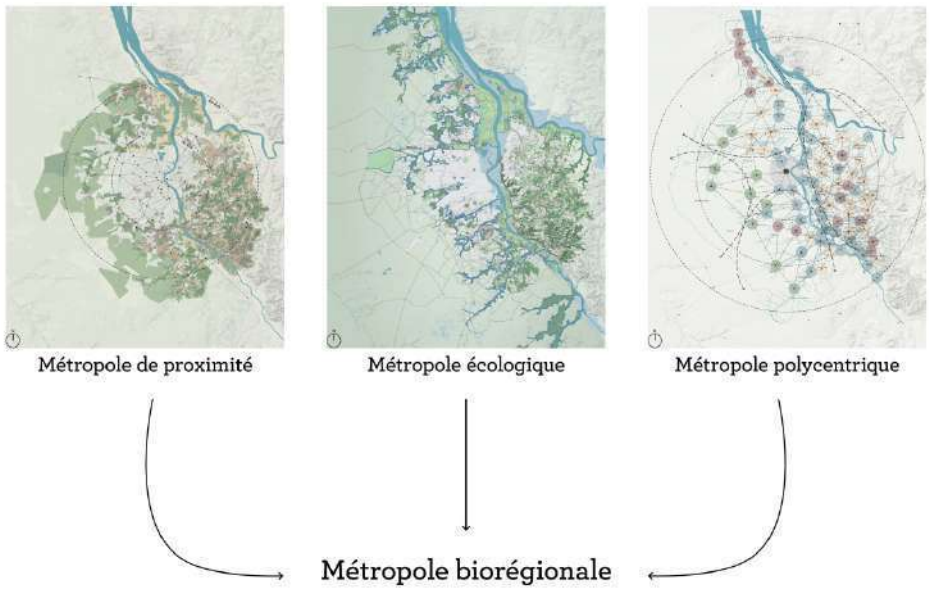

Fig. 8 - The proximity, ecological and polycentric metropolis, that are the guidelines of the bioregional metropolis (source: GIUNTA, 2016)

If the experimentation effects of the notion of urban bioregion applied to the metropolitan area of Bordeaux have encouraged a renewal of design practices within the Sysdau, this direction could open up the hypothesis of a certain intrinsic renewal of French urban action. This renewal, that was sought as a result of the change in planning goals (i.e. ecological transition, territorial cooperation, etc.) has to be accompanied by theoretical notions capable of renewing its epistemological aspects (such as the notion of urban bioregion) and project methodologies (i.e. the territorialist approach) capable of providing a design practice to reinterpret and readjust the urban planning practices.

The territorialist assumptions expressed in the notion of an urban bioregion have allowed Bordeaux planning actors to reflect on issues related to the integration of environmental, agricultural and landscape quality into current plans and projects. For example, the Direction de la Nature of Bordeaux Métropole has supported its agri-environmental strategy for the Parc des Jalles project, and the InterSCOT which is led by the Gironde Department and managed by the DDTM de la Gironde, has addressed landscape issues.

Now, the Sysdau is experimenting with new planning strategies, in order to promote territorial cooperation within the Bordeaux metropolitan area. These

new alliances are based on the creation of "bouquets of transactions" of environmental, energy and human resources that will be located in strategic project sites. Through the notion of "transactional places" (DUGUA, TROTTA BRAMBILLA, 2012, 116), the agri-environmental and centrality metropolitan buffer zone recombine themselves again to bring out all those areas interested by urban projects, based on urban transformation, ecological transition and localization of investments that are agreed upon between the metropolis and suburban territories.

5. Conclusions

The need to reverse the trend of territories, that are saturated by the dynamics of metropolisation has been the starting point for a renewal of regional planning. The experimentation with the notion of urban bioregions and the territorialist approach in the Bordeaux territories has opened up new fields of action and has tested new urban planning practices. Within the SCoT, the territorialist experience has allowed the integration and enrichment of project proposals and planning frameworks through the interaction between bioregional prerequisites and metropolitan dynamics, emphasizing the capacity of territorial models, urban planning practices and territorial notions to evolve, by a reflexive approach, with the purpose of developing a common and local culture of feasible project scenarios to increase territorial resilience.

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The broken bond: unveiling the contribution of farmers in planning the transition spaces

Mirko Greco, Luca Lazzarini

Abstract

This chapter aims at investigating the problems and challenges of the urban/rural interface by looking at a specific case-study area, the Metropolitan City of Turin, in Northern Italy, and focusing on the perspectives of farmers owning and/or working in periurban agricultural areas. It employs a mixed qualitative-quantitative methodology made of two surveys. The first one analyses the plans and planning documents at municipal and metropolitan level to understand how planning policies treat agricultural areas and frame them within a perspective of stronger urban/rural relationships and more sustainable food systems. The second survey is based on semi-structured interviews addressed to periurban farmers aimed at assessing their ability and willingness to undertake processes of transformation of their agricultural enterprises by introducing multifunctional practices.

KEYWORDS: urban/rural relationships, food system, multifunctional practices

1. Introduction

Almost 20 years ago, Patsy HEALEY (2002) noted that in Europe there was no common understanding of the concept of Urban-rural relationship and that policy makers and analysts tended to use different terms ('travel-to-work areas', 'labour market regions', 'functional places') for indicating the same aspects and dimensions. Reasons of this variety lie in the many ways to describe the linkages between urban and rural spaces, which depend on the specific material and imaginative contexts, on the political purposes and on the interaction between past concepts and new ideas. According to Healey, the main problem was the need to exploit the policy imaginations of this concept for improving the urban development practices:

How far does the concept of 'urban-rural relations', with its intention of overcoming the separation of the domains of agricultural and regional development policy, as well as the embedded cultural imagery of distinct 'urban' and 'rural' areas, has the metaphorical power to release policy imaginations to create locally meaningful policy frames which can shape territorial development in urban regions in enduring and positive ways? (HEALEY, 2002, 337).

Over the past two decades the concept has gained attention in the policy and scientific debate, both at EU and national levels (BENGS & ZONNEVELD, 2002; DAVOUDI & STEAD, 2002; CAFFYN & DAHLSTRÖM, 2005; LAZZARINI, 2019). Various strategic EU documents have highlighted the importance of urban/rural relationships for sustainable territorial development. One of the first documents addressing the issue is the European Spatial Development Perspective (ESDP), adopted in May 1999 at the informal Council of Ministers responsible for Spatial Planning in Potsdam (COMMITTEE ON SPATIAL DEVELOPMENT, 1999). The document gives considerable attention to the urban-rural nexus by adopting a governance approach which underlines the need for urban-rural partnerships. It also entails forms of spatial planning for achieving a balanced spatial development (ATKINSON, 2001; ATKINSON & PACCHI, 2020). After ten years, a report by OECD stresses the "Urban/rural partnership" model as a policytool and governance approach for translating the concept of urban/rural relationships to spatial development (OECD, 2013; FEDERAL OFFICE FOR BUILDING AND REGIONAL PLANNING, 2012). In 2011, the Territorial Agenda 2020 acknowledged the multiple ties that link together urban and rural areas throughout Europe and stresses the need to address urban-rural interdependence through integrated governance and planning devices based on broad partnership (EUROPEAN COMMISSION, 2011; AUGÈRE-GRANIER, 2016). More recently, the EU Cohesion Policy (2014-2020) put a strong emphasis on the importance of a balanced, sustainable and integrated territorial development, by taking into account the functional links in and between territories, notably rural and urban areas.

Building from these policy documents, a number of EU-funded projects have provided crucial steps for addressing the issues related to urban/rural spatial and functional interdependence, though not every member state has given the same policy attention to these aspects (EUROPEAN COMMISSION, 2011). For instance, the PURPLE (the acronym for "Peri Urban Regions PLatform Europe") Project had the aim to achieve a greater recognition of periurban regions in European policy and regulation by influencing regional, urban and rural policy-making, sharing knowledge and good practices, and

promoting trans-European initiatives in the field. One of the key achievements of the PURPLE network is its contribution to the Horizon 2020 ROBUST Project, approved by the European Commission in 2016, having the overall objective to advance the understanding of the interactions and dependencies between rural, peri-urban and urban areas and to identify and promote policies, governance models and practices that foster mutually beneficial relations. The Sustainable Urban Fringes (SURF) Project, part of the INTERREG IV B Northern Periphery Program Area, involves partners and experts from five Countries of the North Sea Region to develop a common approach on urban fringe development and raise knowledge on the specific potentials and problems of peri-urban areas. The aim is to review urban fringe policies, implementing guidelines to influence the contribution of regional, national and EU policies in tackling issues of governance and spatial planning (GERMAN FEDERAL OFFICE FOR BUILDING AND REGIONAL PLANNING, 2012). The URMA (Urban-Rural partnerships in Metropolitan Areas) Project was funded within the INTERREG IV C by the ERDF. The Project had a two-year duration (2012-2014) and involved nine partners from five EU member states, working together to "create new impulses for a concept of decentralized cohesion, enriching the European discussion on large-scale urban-rural partnerships and serving as a laboratory and testbed for innovations in supra-regional co-operation" (urma-project.eu). The main objective was to identify sectors in which urban and rural actors could benefit from cooperation. In the case of regional food and product cycles, the actors involved identified and developed tools to "promote regional productive chains and to better match food supply and demand" (JACUNIAK-SUDA ET AL., 2018).

Alongside these conceptual and policy advancements, the question raised by Healey remains still relevant today as the problem of spatial and functional interdependence between urban and rural areas became more pressing due to the ongoing global urban challenges affecting cities and metropolitan areas (FAO 2019; EUROPEAN COMMISSION, 2020). Most of these challenges (the impact of climate change on urban and rural settlements, the intensive management of natural and agricultural ecosystems, the scarcity and insecurity of major resources such as food, water, energy, and the growing socio-spatial inequalities) are not confined to the urban nor the rural realm, but rather extend across the two spatial dimensions and thus require a combined effort in terms of both policy and governance (DANSERO ET AL., 2017; REED ET AL., 2013). At the same time, linkages and interactions between urban and rural areas are increasing and they concern flows of people and materials/goods which can be unidirectional (e.g., waste) or bidirectional (e.g., recreation and tourism) (STEAD, 2002). As long as agricultural systems are considered, the factors having a key role in

urban/rural linkages range from geographical and demographic characteristics such as the nature of agricultural land, the population density and the income distribution patterns, to farming systems based on land tenure and access to farmland (TACOLI, 1998). Levels of infrastructural accessibility also have an important role as they allow farmers to access the food markets and consumers in the city for selling their products. The institutional and governance framework (notably the presence of a proactive and supportive local government) can also play an important role in identifying local needs (VANDERMEULEN ET AL., 2006), provide an adequate response to them and in regulating the conflicts for the use of land between farmers, developers and local residents (PASCARIU ET AL., 2012).

The objective of this chapter is to investigate the problems and challenges deriving from the relationship between urban and rural areas by looking at a specific case-study area, the Metropolitan City of Turin, in Northern Italy, and focusing on the perspectives of farmers owning and/or working in periurban agricultural areas. The choice to work on these areas is based on the willingness to observe, analyse and critically discuss the impacts on farmland of the land-use dynamics and transformations taking place in the fringe areas. Differently from the past when a sharp and fast expansion of the built-up area was occurring, today a number of Western cities – including Turin – are experiencing a slow-down of land consumption. In periurban spaces, the residual agricultural areas are gradually encompassed by a fabric which is subjected to much slower and incremental transformations, though these continue to produce significant impacts on farmland. The outcome is a long-lasting process of assimilation, in which peri-urban agricultural areas lose in a silent way their productive potential. These land-use transformations involve a range of different actors (farmers, businesses from industrial, logistics and service sectors, local administrations, local communities) that are involved in a conflictual battle of interests over the land, where the more vulnerable are the farmers cultivating the residual agricultural areas. For them, the relationship with the urban realm is often dichotomic. On the one hand, they are attracted by the opportunities that the proximity, especially to the core city, offers. On the other hand, they are exposed to the strong pressures to sell their land and convert it to urban uses and functions. Frequently, the institutional actors ignore the needs of agriculture and they consider the few in-between leftover areas as spatial reservoirs for logistics, leisure or technological facilities. Interpretations that are often the outcomes of municipal regulations and policies that are scarcely compatible with the needs of local agricultural economy and that, over the years, have distanced administrations, especially in large municipalities, from the agricultural

dimension. The agricultural is seen as a simplified space which contrasts with the *complexity* of the urban.

The chapter is organized in five sections. Section 2 describes the research objectives and the methodology. In section 3 a survey of municipal and metropolitan plans is presented for understanding if and how planning policies consider the contribution of agricultural areas in constructing stronger urban/rural relationships and promoting the transition towards more sustainable food systems. Section 4 discusses the outcomes of the survey on periurban farmers in the transition spaces of Turin. Section 5 analyses the relationships between the two surveys and describes some inherent weaknesses and untapped opportunities of periurban agricultural spaces. Final section highlights few reflections on how to unfold the contribution of periurban farmers in planning the transition spaces.

2. Methodology

This chapter lies its foundations from a survey on the territory of the Metropolitan City of Turin aimed at assessing the ability and willingness of farmers residing in the peri-urban areas of the core city to undertake processes of transformation of their agricultural enterprises by introducing multifunctional practices. The study, made alongside a Horizon-2020 Project called ProGIreg – productive Green Infrastructure for post-industrial urban regeneration (2018-2023), was oriented to investigate the agricultural practices in the first metropolitan belt of Turin (Fig. 1), and focused on the point of view of farmers who are directly affected by the "peri-urban" condition (ALLEN, 2003; BRUZZESE & LAPENNA, 2017; AGOSTINI, 2018). This study represents a reference case for understanding how the issues and dynamics above mentioned can occur – though in different forms and scales – in other similar contexts of the Metropolitan City as well as in other metropolitan areas in Italy. Although the focus of the research has been mainly on the perspective of periurban farmers and on the way in which planning can deal more effectively with their needs, it is important to highlight that the problems that periurban agricultural areas face go well beyond planning and belong to the realm of global economy, to which periurban farmers are exposed, independently of the planning documents, masterplans, and guidelines.

To understand the dynamics of peri-urban agriculture from a planning perspective, it was required to construct an accurate and comprehensive geographical database. The cartographic representations were the primary

output of this work. The data collection process provided the opportunity to study the current state of peri-urban agriculture in Turin from the point of view of farmers and agricultural entrepreneurs (BRYANT, 1995; ERBA ET AL., 2010). It also allowed to create an important source for strategies, policies and decisions in future planning, mostly regarding the successful integration of multifunctionality and new sustainable concepts and ecosystem services in agricultural practices (GRECO, 2019).

Fig. 1 – A portion of the northern peri-urban fringe of Turin. Source: Google Earth, 2018.

The work employed a mixed qualitative-quantitative approach in five steps. The first step was a survey on plans and planning documents at municipal and metropolitan level to understand how planning policies treat agricultural areas and investigate the extent to which they are framed within a perspective of construction of stronger spatial and functional ties between urban and rural spaces and creation of more sustainable food systems. The outcomes of this survey are presented in section 3. After that, cartographic data were collected and processed to elaborate a GIS map to associate farmlands and land owners. Then, a range of semi-structured interviews were carried out for collecting information on the state of the farms directly from the owners and farmers

(RUSSO ET AL., 2014). The fourth step saw the creation of a GIS database system for territorializing the results of the interviews using the regional land database and other cadastral maps (Fig. 2). The support of local farmers' unions (Coldiretti) was crucial, as they shared their knowledge to identify in an accurate way the land ownership and the land-use patterns where regional maps and databases were inconsistent or lacked up-to-date information. Lastly, all the areas which we could not explore during the field campaign were identified and described using the previously collected data and the GIS and historical satellite cartography. Section 4 presents the findings from the semi-structured interviews done to farmers and agricultural entrepreneurs working in the periurban area of Turin. The main aim of the survey was to get, through a questionnaire, specific information on the territory by the farmers; but also to test the viability of introducing agricultural multifunctional practices in the peri-urban area, recognizing in this mode of land-use and farm management an opportunity to revitalize declining or economically distressed rural areas and to shape stronger urban/rural ties. However, during the research campaign, the interviews were carried on with a flexible and open approach, leaving the farmers free to engage in the discussion on the issues of the questionnaire. This freedom of action was possible thanks to the databases that the Piedmont Regional Government made available to the researchers, which contained most of the quali-quantitative information (and on a much larger scale) included in the questionnaire.

The information collected through the interviews touched the following topics: Company size and localization; Type of Production; Direct product transformation; Cultivation methods; Employees and economic yield; Active Multifunctional activities; Future multifunctional project; Physical limitations and threats to the land; Need to acquire new land; Livestock food supply dynamics; Irrigation systems adopted; projects of business development; Need for new buildings or adaptation of existing ones; Opportunities and Disadvantages related to the proximity to the city.

Farmers were asked to provide points of view, ideas, and personal observations on the above-mentioned issues. The sample consisted of 45 farms active in the municipal territory, and the in-depth interviews covered 25 of them. The open approach allowed us to deeply analyse the economic state of the peri-urban agriculture in Turin by looking at the relationship between the farmer, the territory and his land, and to obtain important information about the quality of life that characterizes these contexts.

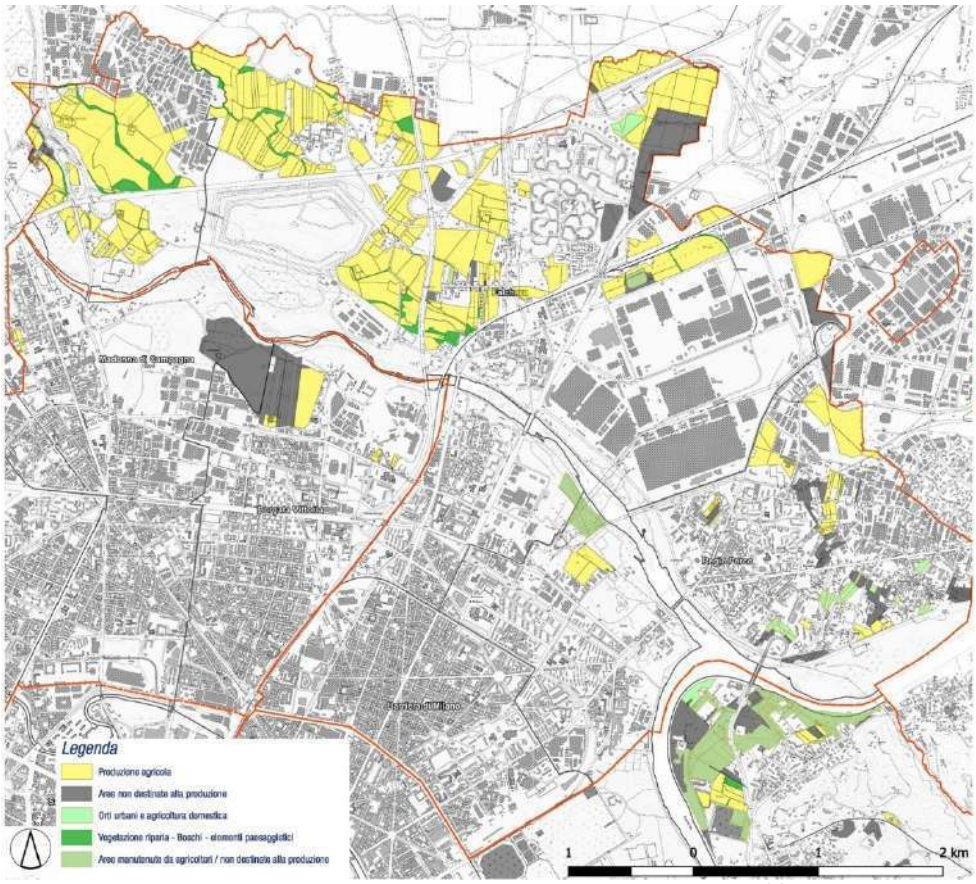

Fig. 2 - Final output and cartographic definition of peri-urban farmlands, north of Turin, 2018
Source: Elaboration by Mirko Greco on cadastral maps with data from SistemaPiemonte

3. The role of farmland in strengthening urban/rural relationships: a survey on planning policies in Turin metropolitan area

The preservation of farmland and its role to strengthen the relationship between urban and rural areas is one of the grounds where the tensions, gaps, and conflicts between different planning objectives – notably the need to preserve natural and productive land on one hand and the expansion of the city with new developments on the other – become more visible (ALLEN, 2003; GALLENT & SHAW, 2007). In the metropolitan area of Turin, this aspect is particularly evident not only for the high urbanization rates which characterise the municipal area and the rhythms with which the urban expansion has

occurred in the last half century, but also for the heterogeneous geomorphology that characterizes the metropolitan area, which also depends on its extension, being it the largest Metropolitan City in Italy in terms of surface (6.827 sqkm) and number of municipalities (312). Differently from the other metropolitan cities in Italy[1] in which the administrative area often matches with a central core city and several spatially and functionally dependent suburban towns, the Metropolitan City of Turin comprises also a wide rural territory which extends from the valley of the Po River to the alpine arch.

As far as the planning policies at metropolitan and municipal level are considered, the recent decade has seen an increasing attention towards the protection of farmland and the enhancement of its contribution in the sustainable development of the metropolitan area. This has guided local institutional actors to reformulate the metropolitan and municipal plans towards better addressing the environmental, landscape and productive qualities of open spaces as areas where stronger relationships between the core city and the rural hinterland can be created.

3.1. The Provincial Plan (Ptc2) of Turin

At the metropolitan level, the Provincial Territorial Coordination Plan (Ptc2) adopted in 2011 (still in force) by the former Province of Turin (today Metropolitan City) has contributed to slow down the expansion of the built-up areas and the loss of agricultural land (GIAIMO & FERLAINO, 2018). The Plan has interpreted the periurban area as a space where the transformations of the city occurred in recent decades – from a *Company-town* characterized by a relatively rigid social and economic structure (DAVICO ET AL., 2019) to a metropolis with uncertain borders increasingly connected with the rest of Europe – can be observed and investigated. In terms of planning regulations, the Plan introduces a perimeter of the peri-urban space, obtained from the analysis of the built-up transformations taking place since 1820, and the mapping of the most important infrastructural axes and the main urbanized surfaces (PROVINCIA DI TORINO, 2011a). Being a non-binding spatial figure subjected to future changes, the perimeter does not match with any specific regulations. Its objective is instead the creation of a backbone for the system of

[1] The Metropolitan City is an administrative tier introduced in Italy in 2014 after a territorial reorganization reform (Law 56/2014) by which in 10 large urban areas (including also Turin) the former Provinces were substituted with new metropolitan institutions. Despite their new status, Metropolitan Cities inherited some of problems of the former Provinces like the budget scarcity, an uncertain role in planning policies and decision-making processes and complex interaction patterns with other local institutions (Fedeli, 2016).

natural areas and ecological corridors distributed along the fringe areas of Turin, but fragmented into a mosaic of municipal boundaries, yet united by an implicit ecological-environmental continuity. This objective had already guided the emergence of several territorial projects, such as the Corona Verde project elaborated in the 1990s. The project represents an attempt to promote the conservation of the natural parks of the metropolitan area of Turin and to create a system of relations between the parks and green areas of the city for improving the functionality of green and blue infrastructures (TORINO STRATEGICA, 2016; CORRADO & GIAIMO, 2007).

Among the main goals of the Plan there is the reduction of land-take. This objective has been implemented through a quantitative model based on an algorithm which analyzes the levels and distribution of settlement density across the provincial territory. The model led to a distinction between "dense, free and transitional areas" according to the different levels of settlement density. Each area matches with a set of prescriptions included in the Plan and aimed at governing the new developments and the recovery of the existing urban fabric (PROVINCIA DI TORINO, 2011b). Despite the slowdown of soil consumption, the most important weakness of the model is the lack of consideration of the qualities of open spaces, both in terms of their ecological and environmental performances and of the fertility of agricultural land. This has not allowed to grasp the plural and complex dimension of the open space as a heterogeneous area where the productive values overlap and combine with ecological-environmental and landscape features (ERBA ET AL., 2010).

3.2 The Strategic Metropolitan Plan of Turin (2021-23)

The Law no. 56/2014 has given to Metropolitan Cities the functions and competences related both to territorial and strategic planning at metropolitan level. The Metropolitan City of Turin has been one of the first metropolitan cities in Italy to adopt a Strategic Metropolitan Plan (SMP). The process for developing the first SMP started in 2015 and ended in 2018 with the approval of the SMP 2018-2020 which has identified 5 project platforms, divided into over 60 actions, under the main goal of promoting the harmonious, inclusive and sustainable development of the metropolitan area. In 2020 the Metropolitan City began the process for developing its second SMP. The Plan "Turin, Augmented Metropolis" (2021-2023) has been approved in February 2021 and it is articulated in six axes corresponding to 6 programmatic objectives which refer to the Next Generation Europe program, and to the 6 missions of the National Recovery and Resilience Plan (NRRP). These are in turn articulated into 24 strategies and 111 specific actions. The main idea underlying the plan is to

develop a proposal for "Augmenting Turin", say for improving "the capacity of the city to systematize the public/private, institutional/entrepreneurial intelligence of all territories around a common project focused on the virtuous relationship between spatial quality and material infrastructure on the one hand, and digital information on the other" (CITTÀ METROPOLITANA DI TORINO, 2021a: 17). The Plan addresses the relationship between urban and rural areas in its conceptual framework, which is used to explain the diversity of the metropolitan territory: "[it] summarizes the variety of territories in two ideal-typical conditions: the full and empty spaces" (IBID.: 75). Full and empty spaces represent a range of complementary design conditions: urban and rural, dense and rare, large and small, continuous and discreet, gridded and off-grid. The Plan interprets the relationship between full and empty spaces not only as a way to describe two spatial conditions but more importantly as an opportunity to guarantee the same quality of material and immaterial connections all over the metropolitan territory. Alongside this framework, the issue of urban/rural relationship is addressed by a number of axes, strategies and actions. For instance, in the Axes n. 2 "Green revolution and ecological transition", it is mentioned the action of connecting the system of mountain, hill and river protected areas in a single metropolitan green infrastructure network, functionally interconnected, which crosses the dense urban areas through linear parks (action 2.1.1). Another significant action is the one of measuring the exchanges of Ecosystem Services (ES) between urbanized and non-urbanized areas, and creating a "metropolitan accounting" of ES for readdressing the current planning standards in quantitative and qualitative terms (action 2.5.5).

3.3 The new Territorial Metropolitan Plan of Turin: an analysis of the preliminary proposal

In April 2021, the Metropolitan Mayor of Turin has adopted the technical proposal for a new Territorial Plan of the Metropolitan City of Turin which should be finally approved in the upcoming months. The Plan is articulated in six macro-Goals (so called "metrogoals") and in 21 metropolitan Strategies. Each strategy matches with a set of Actions that are in turn translated in regulations, guidelines and specific projects. The problems and challenges of agricultural areas and the issue of urban/rural relationships are addressed specifically by the macro-goal n. 5 titled "Conscious use of resources" which highlights the objectives of "Land take containment and preservation of its productive and protective function" (Obo4c) and of "Limitation of urban developments in environmentally 'fragile' or 'critical' contexts" (Obo4c). As far as the first objective is considered, among the related strategies and actions, the "Containment of dispersed and fragmented urban fabric and the redesign of

urban edges" (STG3c) and the "Provision of settlement and infrastructural interventions in order to maintain the passages between built-up areas for guaranteeing the ecosystem and landscape continuity" (Azo3c1) are highlighted. The second objective refers to the strategy of "Planning settlements to meet the development needs while reducing urbanisation in green areas" (STG4b). Actions refer to: i) definition of dense, free and transition areas and related provisions for urban transformations (drawing a continuity with the former provincial plan), ii) adoption of criteria for land take containment; iii) protection of I and II classes of land use capacity and of the areas of significant agronomic value.

Alongside the goals, objective and strategies, the Plan introduces the category of the "Periurban Open Spaces" (POS). POS are defined as "areas of contact between cities and countryside characterized by tangible and intangible relationships between rural and urban areas of a functional, socio-economic, spatial, ecosystemic type and distinguished by medium-high population density, urbanization and fragmentation of the territory, the presence of infrastructures and facilities even with high impact, but also by agricultural and forestry land uses of extreme importance due to their conditions of scarcity, the supply of ecosystem services and their belonging to green and blue infrastructure" (CITTÀ METROPOLITAN DI TORINO, 2021b: 3). Challenges and problems of POS are addressed through a set of guidelines that require municipalities while drafting their local plans to develop a survey on POS comprising also a cartographic representation. The survey has the objective to identify the prevailing function of the periurban spaces (agricultural productive, ecological, visual perceptive, recreational, cultural) and indicate the ways in which municipalities should preserve or improve the multifunctional values of these areas in case of land-use transformations.

In the Guidelines of the POS, a spatial and functional classification of periurban open spaces is highlighted (CITTÀ METROPOLITANA DI TORINO, 2021c). The document provides a distinction between different periurban areas according to their prevailing function (productive and food potential, historical-cultural recognition, natural value, perceptual-visual value, recreational function). As far as the productive and food potential is considered, the most significant surfaces are located on the southern slope area of the Turin hinterland, in particular in the foothills between Moncalieri and Chieri, in the plain between La Loggia and Santena, Rivoli and Rivalta, as well as within the Stupinigi Natural Park. In these areas, the Plan highlights that there is the highest concentration of organic agricultural practices and most farms are oriented to the urban market. Less significant is the productive potential in the north-west

area, in which lawn and wooded areas prevail, and in the western boundary of the metropolitan area between Alpignano and Piossasco, due to the dispersion of settlements and the presence of many mobility infrastructures (IBID.: 19).

The interest of the document lies in the ways in which the guidelines orient the local plans and planning policies towards addressing the contribution of farmland to shape a certain idea of urban/rural relationship. This is not univocal but it is subjected to multiple interpretations, though not always consistent between themselves. For instance, in the first guideline ("limit the land-take") the objective of improving the compactness of settlements also through the creation of green belts coexists with the one of impeding the creation of welds between built-up areas, preserving the permeability and urban voids and creating green wedges. At the same time, an emphasis towards the creation of multi-actor agreements and other governance forms between local governments, managing bodies of natural parks, farmers and their associations is underlined in several guidelines for preserving and enhancing the agrarian landscape and providing services of proximity for local communities.

3.4 The Municipal Plan of Turin

In 2017, the Municipality of Turin started the revision process of its Municipal Plan (PRG). The Plan was elaborated between the late 1980s and early 1990s by the studio of Gregotti and Cagnardi and adopted in 1993. It conveyed a new vision for the city which during the 1970s and 1980s was experiencing a condition of socio-economic decline that generated a large amount of brownfields within the city in need of urban regeneration. As far as agricultural areas are considered, the Plan removed the agricultural land-use and classified farmland as parks and green areas due to the need to guarantee a higher amount of public spaces (the so-called Standard) according to the regional legislation (L.r. 56/1977). This land-use change further weakened the condition of agricultural areas as farmers could not access anymore the subsidies by the Rural Development Plan of Regional Government (CINÀ & SINI, 2016; GRECO, 2019). This problematic situation was partly solved in 2015 when the Municipality approved a Variant to the Plan (n. 331) through which it reintroduced the agricultural land-use for the cultivated areas, allowing farmers to modernize their farms also by enlarging the facilities via the submission to the Municipality of an agricultural development plan.

The "Technical Proposal of the Preliminary Project for revision of the Municipal Plan" adopted by the City Council in July 2020 represents one of the last steps before the final approval of the plan's revision (CITTÀ DI TORINO, 2020). It identifies two land-use designations for agricultural areas: the "Areas

of Urban, Ecological and Agricultural Parks" and the so-called "Agricultural Ecological Areas". The first designation indicates those areas along the river banks characterized by significant environmental, naturalistic and agricultural value and for which the Plan determines the protection from urban development (the zero-soil consumption is prescribed). The second category designates the agricultural or wooded areas used for agricultural aims and integrated with the system of urban and territorial parks. Only for the first land-use designation, the Plan proposes a range of guidelines for farmers that goes from orienting the farm towards social, recreational, pedagogical activities to the use of environmentally compatible production methods and the preservation of the historical paths along the fields.

4. The losing trust of farmers and the disadvantage of urban proximity: a survey on periurban agricultural practices

The survey highlighted that for farmers the biggest disadvantage of proximity to the city comes from the fragmentation and loss of land they experienced during major urban and infrastructural expansion happened in the last decades. The findings show a clear dualism between the owners/farmers/agricultural entrepreneurs having a large farm (more than 20 ha) and those having a small farm (less than 20 ha). Small farm owners were mostly negative about working in peri-urban locations. For them, the proximity to the city is not enough to compensate the disadvantages. The loss of land has made their living and working conditions increasingly precarious. On the other hand, for large landowners, the proximity to the city and the presence of an environmentally degraded landscape is less of a problem. They can compensate the deficiencies with complementary activities and productions in other, more favorable locations. These subjects are often livestock owners who need large pastures. Proximity for them means easier sells of their meat and dairy products. Moreover, large farmers can experiment with alternative modes of production due to the high productive turnover as well as the availability of more significant economic resources.

Both large and small farmers showed a general lack of trust in institutions and in the potential disclosed by the new dynamics and opportunities of the agricultural sector. Smallholders showed little interest in, and sometimes concern about, multifunctionality and the introduction of innovative agricultural practices, while larger farmers and livestock owners have the resources necessary for transformation but are less inclined to differentiate their activity.

An evidence of the inertia of the farmers' activity in periurban areas is provided by the labor dynamics. Farmers, both small and large, prefer to minimize the use of workforce outside their household as much as possible. This leads them to shelve projects of development or productive conversion. Farmers specialize in a limited variety of productive models while maintaining a constant commitment in terms of hours devoted to work. Interviewed owners in most cases underlined a negative opinion about the possibility to initiative new projects for differentiating their activity. 82% answered negatively to the opportunity of experimenting with new crops; 88% would not try to process their own products; 82% are not willing to build facilities for on-site sales (GRECO, 2019). This means that the farmers are gradually becoming more dependent on EU and governmental subsidies due to economic dynamics such as inflation and price volatility. At the same time, farmers remain somewhat trapped in *peri-urban third spaces* (FANFANI, 2006), even when these no longer provide adequate living conditions. A sort of broken bond of trust between farmers and the territory can be highlighted. The outcomes of their work are increasingly meager, eroding the quality of life of landowners and workers. This is having significant effects on the living conditions of a number of families involved in agriculture in the peri-urban area of Turin. On a longer period of time, these individual or familiar dynamics are likely to find a spatial translation in phenomena of land abandonment, crop diversity reduction and further soil degradation and consumption.

5. The untapped potential of farmers

The two surveys underline a sort of mismatch between the contents and objectives of the plans and planning policies on one hand, and the problems and disadvantages faced daily by farmers in periurban areas on the other. While the analysis has shown that planning policies are mostly oriented to identify constraints and limitations to the urban expansion and protect farmland via a land-use regulation, farmers do not gain specific advantages from this approach as if their problems were on a different level than those of the planning policies. As far as the planning syntax employed by local government is considered, transitional spaces (such as peri-urban rural landscapes) remain suspended until they are abandoned by farmers, slowing down processes of re-appropriation and negatively affecting the quality of life of individuals and families working in the food system. The peri-urban ends up to be interpreted mostly as the space of flows of commuters, goods and services (STEAD, 2002). To the point that local

administrations find it difficult to interpret peripheral territories in any other way. Citizens living in these areas risk to be downgraded to the rank of city-users and lose control over their relationship with the territory. They can only get re-integrated by taking part in this landscape of flows. Policy makers, in search for plausible solutions to these issues, tend to force functions, roles, and milieus for different areas of the metropolitan city that fall into the category of peri-urban landscapes via a vertical and top-down approach.

Alongside this framework, the research demonstrates that peri-urban agriculture presents a series of inherent weaknesses and untapped opportunities. A major weakness resides in the living conditions of farmers, owners and agricultural entrepreneurs who still work the land in the immediate proximity to the city. They have, in most cases, no intention of initiating projects to renew the farm and innovate the agricultural activity. The weakness of their position is exacerbated by the degraded quality of both the landscape and the land on which they live and work. This situation results in a *cul-de-sac*, as their property keeps a very low residual value, land has lost much of its productive utility, and productions have shrunk due to land consumption. With agricultural commodity prices largely determined by global trade, these farmers cannot, and will not, undertake major transformations without clear and achievable benefits. It is also true that in the case of the Turin area, few farmers own other land, often much larger, in other areas of the Metropolitan City, and use the proximity as a strategic asset for accessing the urban food markets. To all intents and purposes, the land still used by farmers in the immediate vicinity of the city represents an important asset for continuing to preserve and strengthen the relationship between the city and its rural hinterland, and to allow urban inhabitants to have access to food produced nearby. This means having guaranteed a certain degree of food security, and potentially introducing strategies and collaborations between actors and institutions to further improve this interaction.

5. Conclusion: leading the way to partnerships and multifunctionality

Research findings underline that the prevailing approach by planning policies at municipal and metropolitan level in dealing with agricultural areas is regulative and prescriptive. Emphasis is placed on protecting existing farmland, rather than exploring the potential of agricultural production to guide a transition towards stronger urban/rural relations and more sustainable food systems. What is needed is a clear strategy with actions and incentives for readdressing agricultural

activity towards multifunctional practices and enabling the access of local products in urban food markets. A range of indications can be identified when it comes to planning peri-urban agricultural areas in metropolitan contexts.

A first indication is methodological and concerns the added value of the field research for steering the action and the scope of planning in periurban contexts. As shown in the survey presented above, it helped to better understand why and how territorial planning policies which rely on institutional and corporate stakeholders risk missing their goals. One of the biggest problems, still unresolved in planning at all scales in Italy, is the lack of active involvement of the local actors who live and work in a territory, in this case the farmers. These actors are a *reservoir* of knowledge and skills that planning processes and, more in general local governments, sorely need. Without them parks, river areas and, in general, green and blue infrastructures crossing cities would be at risk of abandonment. Farmers and agricultural workers can be employed in several maintenance and public utility tasks and services: for instance, the maintenance of roadsides, natural and artificial forests, river banks, but also any green area that can serve as a buffer for climate mitigation and carbon sequestration (POWER, 2010). All these spaces need consistent and timely management which local institutions increasingly face difficulty to perform. The farmers who live in urban and peri-urban contexts could fill these roles. One of the problems here comes from the long-lasting processes of urbanization that – though slower than in the past – are still taking place in the peri-urban interface and are making agricultural activity even more marginal. Farmers often live in precarious conditions and are becoming old or retiring. These precariousness makes difficult to initiate the long-term investments that farms need to implement multifunctional practices, undermining their potential to shape stronger urban/rural linkages (LAZZARINI, 2019).

As widely demonstrated by past researches (PAÜL & MCKENZIE, 2013; ERBA ET AL., 2010), multifunctionality and the conversion to integrated production - if supported by an enabling institutional environment (VANDERMEULEN ET AL., 2006) - can provide a way to make agricultural practices more economically and environmentally sustainable. This would also have a potential to recover the ecosystem value of the farmland (PAN, 2010), raise the quality of food production near the city and therefore boost the viability and acceptance of more tightly integrated proximity relations between rural and urban areas.

Another issue is that planning policies often willingly gloss over the active role that citizens can have in preserving/maintaining the land and have often undermined their ability to do so. These, at all scales, should enable the reintegration of citizens into land management practices by for instance

allocating vacant peri-urban areas to citizens and farmers that live and work in their proximity. This would allow to reverse the dynamics of depopulation and abandonment of peri-urban lands, especially in those areas that are heavily degraded or insularized in the vicinity of major centers. Many of these activities are already carried out by these citizens and farmers, but often through land contracts that stimulate precariousness instead of mitigating it. These initiatives of land reallocation could be promoted by the already mentioned urban/rural partnerships, such as groups of citizens, farms and agricultural enterprises, institutions joining together under the common goal of preserving agricultural land and enhancing its use for multifunctional activities, with positive and long-term outcomes in terms of social integration, recreation and environmental qualification, as also shown by other similar contexts in Italy (CINÀ & LAZZARINI, 2018; 2019). These partnerships would also provide a way to create more links between civil society and statutory planning processes and improve the governance of food systems by setting up and strengthening new organisational and multistakeholder structures that can facilitate the involvement of different government departments and jurisdictions (local and metropolitan) of various stakeholders and those that link civil society activities and initiatives to more formal food policy and planning (DUBBELING, 2015).

Municipal and metropolitan administrators have the tough task of renewing the social contract with citizens in order for them to take an active role in the transformation process of the periurban interface. Without mutual trust and cooperation between institutions and citizens, it will be extremely difficult to reverse any process of depopulation, further abandonment, social and physical degradation. Planning must go beyond the recognition of the phenomenon of peri-urban fringes or its effects. The role attributed to these spaces by strategic or statutory urban planning instruments is not as important as a strategy that recognizes the role that the inhabitants of these areas can have in mending the broken link between citizenship and territory.

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Architectural Stenobionts. The importance of bio-micro-interventions in the urban structure of Poznań

Maciej Janowski

Abstract

Modern agglomerations are or are becoming *chaotic and dispersed*. Their dynamic growth transforms them into consumption centres: cities consume 75% of natural resources, generate 50% of global waste and emit from 60 to 80% of greenhouse gases in global terms. They underlie topographic and local transformations, climate change and biodiversity loss. In order to improve regional living conditions, it is vital to connect enclosed eco-urban systems (urbanocenosis) with one another and with the natural landscape (biocenosis) to create one bioregion. In the urban scale, biocenosis propagators may include: public space, transport lines and reclaimed buildings and areas. In the architectural scale, we can use bio-microinterventions in the form of dispersed points (residual spaces, end walls of the buildings, patios, backyards, roofs, balconies). Scale of impact of bio-microinterventions on urbanscape depends on their density network, inclusion of the local context, the use of existing forms and space, combined with the unconventional use of NBS.

KEYWORDS: wedge-ring green system, bio-microinterventions, urbanocenosis, biocenosis

1. Introduction

A modern city is often viewed as a structure featuring an echo system (M. A. Laugier and F. Milizia's idea of city as a forest) for the reason of its mutual, network interrelations between the components as well as for the reason of its organic, uncontrolled sprawl. The growth of a historical city was balanced, whereas, modern agglomerations are or are becoming *chaotic and dispersed*. Their dynamic growth transforms them into consumption centres: cities consume 75% of natural resources, generate 50% of global waste and emit from 60 to 80% of greenhouse gases in global terms. This adversely affects the landscape, at first at a regional and then, at the global scale. In consequence, urban space is

subjected to topographic and local transformations, climate change and biodiversity reduction or even total loss. Howard's idea of a garden city has been replaced with the modern concept of functional facilities set in *large lawn areas*. Green areas have been reduced to parks, squares and avenues, thus, to closed biological systems, that are not interconnected in any way and do not extend from the natural flora of the region. Urban greenery seems to feature "a Cabinet of Wonders" containing botanical curiosities, not found in the natural ecosystem. With such a label attached to greenery, the designer can freely introduce therein any, not matter how invasive, plants. Urban green areas are typically designed in the form of an island (parks and squares) or a line section (avenues and boulevards), at the same time, it shall be noted that these forms are non-continuous - they are separated from one another as well as from any natural forests, river valleys or water reservoirs.

In order to improve living conditions in the region, it is vital to connect these enclosed eco-urban systems (urbanocenosis) with one another and plan them as an integral extension of the natural landscape (biocenosis). This way, urban greenery and the surrounding nature can be combined into one bioregion that will positively influence the comfort of living in the city and will resist the gradual degradation of the natural environment. Such improvement will, however, require qualitative changes and revaluation of approach to individual buildings in an urban scale and to the natural resources.

2. Loss of continuity

The idea of blending natural assets and urban greenery into one system is nothing new. In Poznań, Josef Stübben's ring of parks was[1] later supplemented with greenery wedges designed by WładysławCzarnecki, which connected urban green areas with the natural valleys of the rivers: Warta, Cybina and Bogdanka[2]. Czarnecki also planned the third ring of greenery of the width of 1,000-1,300 m and the circumference of about 30 km, in the remains of the Prussian fortress belt. His design envisaged 4 main wedges and 6 additional ones dividing the city

[1] Stübben plans made in 1903 and 1914 envisaged two rings of greenery: the first encompassing the parks and promenades, which were to appear in place of the former fortifications around the city centre and the second one comprising promenades along the ring road around the western districts. The plan also included the conception of Solacki Park, which later became the starting point of the Western Wedge. [Grzeszczuk-Brendel, 2018, pp 77-82]

[2] The concept of green wedges and rings also appeared in designs of Theodor Fritsch (1896), Bruno Möhring (1912) and Paul Wolf (Sternstadt, 1919). Czarnecki himself referred to Ebenezer Howard's idea of a garden city. [Grzeszczuk-Brendel, 2018, pp 210-212]

into respective districts, each provided with access to daylight, greenery and air. From the 1920s until after the war, only 4 main wedges were actually made: the Northern Wedge (Naramowice district) and the Southern Wedge (Dębina district) run along the the Warta river valley, the Western Wedge spreads out along the Bogdanka river, and is then supplemented with the catchment area of Junikowski Stream, and the Eastern Wedge is shaped along the Cybina river. They are all connected with the Noteć Forest in the north and with large forest complexes of Wielkopolski National Park and Rogalin Landscape Park in the south.

Despite the fact that Czarnecki's plan was not fully implemented, its present wedge and ring system is a relatively good starting point for further activities aimed to transform Poznan into a core element of a bioregion. Yet, the so-defined future of the city is jeopardised with the colonialist supremacy the national and local governments enjoy over natural and cultural resources. Local governments fail to pursue any cohesive strategies aimed to prepare the city for short-term and long-term consequences of the climate crisis. What's more, no strategy has been developed to counteract the negative environmental impact of uncontrolled urbanisation in Poland. Moreover, local governments seem to ignore the fact that the cities can and should counteract the climate crisis on the basis of nature-based solutions (NBS). The more visible the adverse effects of the overharvesting economy and pathological construction, the more frequently can we hear the declarations concerning the environmental protection. Numbers, statistical data and socio-technology are being creatively used to hide the true and poor condition of urban planning and architecture in Poznań. As an example we can refer to the analysis made in 2019-2020 by the Institute of Poznan, which presented a breakdown of the number of parks and green areas in Poznan and attempted to prove that their increased number failed to truly represent their surface area or the factual number of trees cut down and compensatory planting[3].

The effects of cutting down the trees, followed by developing green areas with buildings, can be observed within the above described wedges. Semi-natural eco-systems of the Northern Wedge (Naramowice district) are reducedgiving way to industrial areas. The main, northern part of the Southern Wedge (Dębina district), which extends to the historical centre of Poznan, has been subject to gradual development since the 1930s. In the last decade this

[3] The number of parks has increased in Poznań from 40 to 47, however, their area has expanded only by 3%. The issue of the number of green squares is also peculiarly presented. Allegedly in 2010, there were about 119 green squares in Poznań, then the number dropped to 113 in 2013, only to rise to 123 in 2016. Three years later, there were 120 of them in Poznań but as per the analysis their surface area has decreased by 12.5%. [Osten-Sacken, 2019]

process has accelerated. The Western Wedge, which accommodates PoznańŁawica airport, is shrinking as a result of expanding residential development. The investment projects are also planned at the edges of Sołacki Park.[4] The Western Wedge naturally defends itself against the development attempts owing to its borderline extending along the Cybina river valley and a series of lakes: Maltańskie, Swarzędzkie and Uzarzewskie, yet, there are still some investment projects under consideration that pose a threat to the natural environment[5].

Critical elements of the wedge-ring green system in Poznań are in the eye of the housing communities and social organisations, however, the forests connected thereto are deprived of any such social protection and can easily fall prey to adverse development policy. Taking into account the social interest, they should play a protective role for the urban areas and serve as a natural extension of urban eco-systems. These forests are logged at the rate and on a scale typical of the overharvesting economy, which results in the reduction of forested areas and loss of biodiversity. Poland, as a periphery country, exports raw materials or only somewhat processed goods. Due to unprofitable mining and ineffective agriculture,[6] destructive overharvesting of forests has become a source of state budget income.

Changes in the architectural scale are equally adverse to those in the urban planning scale. The currently applicable law in Poland pertaining to the compensatory planting sets forth primitive and imprecise methods of calculations. Therefore, the compensatory biologically active surfaces only to a small degree make up for the green areas lost due to the actual development process. The legally required 25% share of biologically active surfaces is implemented through lawns (wild flower meadow have been deemed too expensive) and green roofs situated mostly over the underground car park halls. On average, they represent over 42.6% of green areas, though sometimes in the city centres, the underground car park halls extend under the entire surface area

[4] Nearby Wodziczko Park, a complex of multi-family buildings was erected (Green Solacz, designed by Studio Lisiak) and another project is under construction - Wodziczko Villas (designed byAdapticarchitekciNickiel). At present, works are pending on the local zoning plan for Solacz part B, which assumes the expansion of areas planned for development.

[5] Malta Ski company is planning to build a 150 metre high hotel at the southern bank of Maltańskie Lake, taking advantage of ambiguous wording of the local zoning plan of 2002. What's more, there are plans to build a controversial dormitory, which in fact shall serve as an apartment building, nearby Browarny Pond within the area of Maltańskie Lake.

[6] 17.4% of all the employed in Poland works in the agricultural sector, generating only 4% of GDP, which means that agriculture in Poland is three times less efficient than agriculture in Western Europe.

of the lot of land.[7] This, combined with impermeable for rainwater surfaces of roads and pavements, gives rise to the dessert effect, impedes water retention, underlies the degeneration of the micro-climate (no natural shade) and thus, adversely affects the quality of life in a city.

We can, furthermore, observe a rapid decline in the quality of greenery and its biodiversity caused with a narrow range of plants,[8] and a limited number of trees planted. Supporting the above stated with a particular example, there are only 36 trees per 1 square meter in the complexes of residential buildings in the newly designed district called Łacina, of which majority are the Norway maples (Acer platanoidesGlobosum). On top of that, they are planted along the streets and in small groups. The aforementioned ratio is even lower in the downtown quarters of the streets and the historical city centre and ranges from 4 to 15 trees per 1 m^2, whereas the trees are sometimes dozen years old.

This translates into the fact that both downtown quarters of the streets and newly erected housing estates are adversely affected with qualitative and quantitative scarcity of greenery, which fails to meet its basic functions: water retention, transpiration, phytoremediation, insulation and aesthetics. And above all, the so-created trends in designing the relations between man, architecture and nature will only reinforce bad practices in shaping the urbanscape. What's more, we can observe more and more interventions that gradually break the continuous line of cultural landscape naturally linked with the environment. It is very unfortunate that the interventions tend to introduce ill-suited elements of pop-cultural landscape that claim but fail to meet the principles of sustainable development, apparently hiding the unrestrained global expansion transforming our surroundings into the post-human landscape.

The accelerating adverse climate change enforces the undertaking of the "*Critical Care*" steps [FITZ, KRASNY, 2019, pp 10-22] in the city and for the benefit of its inhabitants demonstrated through respective activities in urban planning and architectural designing. The main purpose thereof is to create open

[7] The urban plans adopted by the Town Hall in Poznań require the developers to envisage 1,2-1.5 of a car park place per one flat but permit highly intensive development. Thus, car parks and underground car park halls are in high demand to the detriment of green areas and playgrounds. In Warsaw, a decision was made to grant the building permit for the erection of an 11 floor high tower block without any car park places but with an indoor bike storage hall and an electric car rental. Yet, some councilmen were of the opinion that the decision was right but premature.

[8] Areas of the majority of the analysed residential building complexes have been planted with Thunberg's barberry, boxwood, Siberian dogwood, creeping cedar, common cotoneaster, euonymus, thuja (mostly thujaoccidentalis), Norway maple, small-leaved lime and robiniapseudoacacia, sometimes with spruce. The decision why these plant species were selected was mainly dictated with their: low price, simple care and wide social acceptance of these non-invasive plants.

eco-systems positively affecting the quality of architecture and its comfortable use, and above all improving the quality of natural environment in cities.

3. Promoters of biocenosis in urbanscape

As already presented, Poznań has the advantage of prior designed and implemented wedge-ring green system, nevertheless, planning and implementing an overall program for the entire city seems infeasible. First, the municipal authorities fail to show any persistence in its pursuit, being short of funds, and second, the developers, who in fact enjoy the decisive voice in urban planning, are not interested in the changes that in the long-run will bring no profits to them. Social organisations and housing communities have failed to work up any long-term strategies of defensive coalitions that might effectively protect the interests of the inhabitants and valuable elements of the cultural landscape. Accounting for the above presented realities, it shall be assumed that future activities should concern selected green areas and the density of such areas will pre-determine their impact on a given area, and as a result, on a given region. This requires changes in the urban planning process that can effectively transform it into a stimulus of biocenosis in urbanscape, with no detriment to the basic functions of the process.

The key component of the structure of greenery is the ring of old fortifications, which, free of any human intervention, have transformed into unique urban eco-system. Owing to the protection of nature, the fortifications have overgrown with an urban forest of high biodiversity, which comprises those plant species that have best adapted to the urban conditions[9]. This wide range experiment is of significant importance because it is carried out in different locations and in different conditions, which makes it possible for the researchers to study the evolution of urban greenery and to identify the most resilient species of trees and bushes, suitable for urban planting. Connecting the fortifications with street greenery and green areas within the housing estates (in particular in the south-west section of the city) shall render the designed by Czarnecki second ring of straight-line network of greenery that will connect the four greenery wedges at the suburban zone. It could be then aptly supplemented, accounting for good urban planning practice, with new parks and wildflower meadows planted on wasteland areas and only slightly interfering with the

[9] A similar process takes place in Edmund Szyc Stadium, which, in just 20 years, has become an integral part of the Southern Wedge of greenery. See: Janowski, Janowska, Smulczyńska, 2020.

existing eco-system. Thus, a new approach is needed both to wildflowers and urbanscape design.

The biocenosis promoters in the dispersed structure of the suburban zone can be also the transport routes (streets, motorways, tram lines) and wasteland strips running along overhead power lines, as an example we can refer to Saint-Laurent district in Montreal[10]. As a result, they can become promoters of the network of "green corridors", linking new and existing green areas. They can be, further, supplemented with green roofs of the shopping malls located on the city outskirts and near the ring roads as well as with larger number of trees and bushes planted in the car parks, effectively serving the function of shading, insulating and phytoremediating.

The research has found that out of 20 multi-storey car parks, lawns (and just lawns) were designed only in six of them and trees were planted only in one such a car park. The simulations made have confirmed that the reduction of the car park space by 10% would allow for planting 17 trees per 1,000m^2 of surface area[11]. This network structure of greenery should be linked with the elements of local road infrastructure, transforming them into the biocenosis promoters with the use of green acoustic screens and adaptation of structural components for the purpose of green walls. As examples of the adaptation of such residual spaces, we can refer to among others Mexico City, where, following the initiative of Fernando Ortiz Monasterio, an architect, the Via Verde program founder, the urbanscapewill be enriched with about 60,000 m^2 of plants. A similar design of reclaiming the areas near a bridge in Warsawwas developed by Elżbieta Szymańska and Michał Dołbniak.

The development of the wedge-ring green system in Poznań shall simultaneously entail proper care taken of protection forests in the city itself and in its surroundings[12].

[10] Biodiversity Corridor Project worked up by Civiliti, LAND Italy, Table Architecture and BiodiversitéConseil envisages the creation of a corridor that will facilitate the transformation of a separated area into one diverse urbanscape underlying the restoration of habitat of animals, insects and plants. Source: https://worldlandscapearchitect.com/biodiversity-corridor-planned-for-montreal/, access: 30/06/2020.

[11] The *Car Parks 2.0* project by Studio NAB envisages the transformation of car parks by providing them with additional agricultural functions. Source: courtesy of Studio NAB.

[12] The surface area of forests of Poznańis 4,253 hectares, which represents 16.2% of the entire area of the city. Just to compare these numbers, forests in Berlin occupy 32.6% of the entire area of the city. This makes Berlin a city with the largest forest complex in Germany.

Fig. 1 - The wedge-ring green system in Poznań, supplemented with biocenosis promoters - urban scale. Drawing by M. Janowski, A. Janowska.

At present they are not classified as high conservation value forests, which allows for their uncontrolled exploitation, whereas, they deserve to be protected under a Moratorium on the Cutting and Harvesting of Timber in the Natural Forests and against any other man-made interventions. Protection of natural processes will gradually transform commercial forests into natural ones. Moreover, arable land around the aforementioned forests shall be reclassified from unreliable soils into plant nurseries to supply plants for specialised urban planting[13].

[13] Sustainable urban development will require at the minimum two types of trees and greenery. The first group will comprise trees adapted to difficult urban conditions, that can replace the trees affected with dieback. According to the research made by J. Tigges and T. Lakes in Berlin, annual mortality rate of trees ranges from 1 to 3%, however, the mortality of newly planted trees may be twice as high in reality, for that reason, in this case study, it has been assumed that maintenance of 2 million trees in a city may require planting of 1 million trees per 10 years. The second group will comprise trees specially dedicated to planting on buildings - on green roofs, terraces and balconies. The species of such trees have been selected among others for Bosco Verticale (arch. S. Boeri) by Peverelli firm in collaboration with botanists and ethologists. https://www.stefanoboeriarchitetti.net/en/project/vertical-forest/, Poznań, like other Polish towns, is

4. Bio-micro-interventions

Bio-micro-interventions can be easily designed in suburban areas and implemented at a large scale, however, maintenance of their continuity in dense downtown development, required for the preservation of continuity of eco-systems, seems impossible. In view of the foregoing, micro-scale activities may play an important role: biocenosis promoters may assume the attire of dispersed points in accordance with the general principle for the allocation of limited resources, which include: residual spaces, undeveloped lots, end walls of the buildings, patios, backyards, roofs and balconies. Such promoters of biocenosismay be called bio-micro-interventions defined by the author as tiny components of biocenosis introduced into the existing forms and resulting in the increase of green areas.

Fig. 2 - Examples of bio-microinterventions: street in the historical centre of Cagliari and Frau GeroldsGarten in the industrial district in Zurich. Their scale and form are pre-determined with local conditions and cultural context. Photo by the author.

The scale of impact of bio-microinterventions on humanscape depends on their density network, inclusion of the local context, the use of existing forms and space, combined with the unconventional use of NBS. As examples of such bio-micro-interventions we can refer to the adaptation of the Oerlikon factory building made by Burckhardt + Partner Architekten for the purpose of the MFO

not adequately prepared for growing trees at a large scale and continuously suffers from the shortage of trees, which most probably will be mitigated with nursery grown plants of poor quality. Such a status quo will be generating high costs, unmatched with positive effects rendered.

Park, overgrown with hundreds of blooming, aromatic climbers, and the Geveltuinen project in Rotterdam, the initiative of creating façade gardens by the residents. The Leefstraten (Living street) project also meets the criteria of the definition of bio-microinterventions. The project was initiated by the authorities of Ghent to reclaim and redefine public space by temporarily converting selected streets by their rearrangement into playgrounds, meeting places, parklets and plant boxes.

Simulations carried out on nine selected buildings located in downtown quarter of streets have proven that microinterventions consisting in replacement of impermeable surfaces into permeable ones (gravel and grass or mineral-resin) increase the Biotope Area Factor (BAF) from 0.24 to 0.36. Green walls and roofs can increase the factor up to the range from 0.39-0.49.

Because bio-micro-interventions are not required under the applicable urban planning law, their creation solely depends on initiatives of urban groups, housing communities and individual residents and their standing towards ecology, underpinned with their organisational experience, knowledge and the feeling of aesthetics. In other words, bio-micro-interventions may be perceived as natural elements corresponding to architectural stenobionts because their formation, use and development testify to the existence of a specific combination of cultural and social factors, including in particular, characteristics of the local community. Greenery is introduced to architectural forms under grassroots initiatives undertaken by individuals and local communities. Such initiatives stem from participatory model of introducing spatial changes and accountability. The model includes negotiations between sometimes contradictory needs of individuals and the community but above all, establishes the relations between various groups of stakeholders. Thus, any activities are only undertaken as a result of the consensus reached and based on the right knowledge on the relations between greenery and architecture, accounting for the local conditions.

5. Conclusions

Coupling urban planning activities and architectural designs might significantly contribute to the resolution of climate change problem and challenges of social and demographic issues. Adaptation of the planning and designing practices to new purposes and developing new methods of undertaking activities will render a multivalent urbanscape, created of *Places*, not spaces and buildings. The Places will be adapted to the changeable needs of

people but they must, at the same time, serve as a habitat of plants and animals. The symbiosis will mitigate adverse effects of environmental pollution and will make it feasible to resist the Urban Heat Island (UHI) phenomenon. If the proposed strategy of bio-micro-interventions can be combined with various forms of urban development designed with the use of Nature-Based-Solutions (NBS) and certain areas inside and outside the city left free to be overgrown with plants, the urban development will be directed towards high development intensity, yet, largely saturated with greenery. Greenery must be perceived as an architectural material on the same basis as other traditional materials. It will, further, underlie the continuity of eco-systems: from re-naturalised protection forests, via municipal forests, valleys of rivers and streaks to parks, street greenery, urban farms, green roofs and private gardens. Urban green networks, corridors and linkages will not only improve the quality of life in the cities but will make access to green areas much easier to various social and age groups. Greenery must be perceived as part of the urban infrastructure - an eco-system whose continuity shall counter-balance the development of respective districts. Such green infrastructure shall be planned at the scale of the entire city and linked to the surrounding areas to compose one bioregion.

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Protection of urban greenery as part of a Bioregion

Agnieszka Janowska

Abstract

Integration of planning activities and forms of nature protection plays an important role in mitigating adverse effects of global industrialisation and climate change that are in particular severe in urban areas. Rapid growth of towns often annexes areas of high biodiversity and reclaimed (re-naturalised) residual spaces. For that reason urban greenery requires new forms of protection and new approach of the civic society (from passive to pro-active) that would be more suitable in view of the local conditions and in view of a wider public access to greenery. Proper urban growth design by means of protective planning instruments can underlie a more efficient, pro-active and compliant with the local context preservation of local natural resources. Municipal authorities should use relevant tools of protection of urban greenery that can efficiently underlie its preservation as a link creating the overall structure of a bioregion. An eco-friendly city stands a chance to create urban environment that not only consumes but also effectively protects and recreates its natural resources.

KEYWORDS: biotope, urban reserves, urban re-naturisation, residual spaces

1. Introduction

Integration of planning activities and forms of nature protection plays an important role in mitigating adverse effects of global industrialisation and climate change that are in particular severe in urban areas. Rapid growth of towns often annexes areas of high biodiversity and reclaimed residual spaces.

For that reason urban greenery requires new forms of protection and new approach of the civic society (from passive to pro-active) that would be more suitable in view of the local conditions, pre-determined with the urban location, and in view of a wider public access to areas of high biodiversity.

This complies with the New Athenes Charter of 2003, which stated that towns should ensure "opportunity for all to live and work in proximity of [...]well-maintained elements of [...] natural heritage". Positive influence of

natural eco-systems upon the quality of life in urban areas has been recognised by theInternational Union for Conservation of Nature (IUCN) and the Council of Europe Conference of Ministers responsible for Spatial/Regional Planning (CEMAT) and respectively included in the *Guiding Principles for Sustainable Spatial development of the European Continent 2000*. Curitiba Declaration (2007) contains similar guidance that urban planning shall play an important role in the preservation of eco-systems, which shall mean the protection of natural bio-diversity[1] and the shaping of the living environment in the city by means of properly developed planning tools[2].

Assuming this statement as the right recommendation, it shall be, thus, unambiguously stated that proper planning instruments used in the shaping of spatial and functional urbanscape can contribute to more effective, pro-active and compliant with the local context preservation of the natural resources of protected areas.

At the same time, lack of relevant guidance on the instruments shaping urban space and its functions may result in maladjustment of the investment purpose and the scope of protection of particular local natural resources, and may give rise to conflicts of interests between the process of urbanisation and nature protection. Should this be the case, nature is bound to be on the losing side. Therefore, the following activities are becoming more and more important:

- ensuring public access to protected green areas,
- ensuring inter-connections between protected green areas and natural eco-systems,
- limiting development,
- limiting conflicts between man and nature,
- developing proper awareness and approach towards nature (WORBOYS ET AL., 2015).

[1] It must be emphasized that our priority today is the conservation of the biodiversity of endemic trees, formed as a result of natural processes and not as a result of e.g. forest management policy. Such conservation should ensure the continuity of growth of endemic trees and any interference into the tree stand caused by the forest management should be reduced to the minimum. As the research made by Steffen Boch team proved "richness of plant species indicates management-related disturbances rather than an indicator of the forest conservation status" Boch, 2013, p. 504.

[2] Adam Wodziczko, a co-designer of the wedge-ring green system in Poznań, was a pioneer of this approach in Poland. As early as in 1937 he wrote that proper planning was a condition precedent for the preservation of the natural balance (Wodziczko, 1937).

2. Parks and their important meaning for a bioregion

There are 685 types and kinds of protected green areas in Europe, which testifies to a large degree of regionalisation in the area of nature protection. Diversification of nature protection forms can be particularly seen in cities and large agglomerations as such forms derive from the contextual approach to the issue of preservation of various eco-systems and their specific environments. The criteria underlying nature protection shall include not only the urban location of green areas to be protected but also the specific laws and regulations that would allow us to distinguish types and kinds of greenery to assign to them appropriate means of protection. For example, *Geschützte Landschaftsbestandteile* GLB have been set up in Berlin as landscape protection zones, London has assigned selected areas with the status of *special areas of conservation* (SACs) and *sites of special scientific interest* (SSSIs). Vienna, where protected green areas represent as much as 34.5%, has distinguished areas of sustainable development (*Ökologische Entwicklungsflache*) and biosphere reserve parks (*Wienerwald Biosphärenpark*). The latter stems from an interesting concept of a national city park. One of the first of such parks is the one set up in 1995 in Stockholm - the Royal National City Park. The idea was to create one coherent system of protection of historical park arrangements (Ulriksdal baroque park), various forms of planted greenery and natural landscape forms ofthe Feather Islands (the Stockholm archipelago). The Park areas also accommodate residential complexes and buildings, in this the 17th century Ulriksdal Palace and the Stockholm University Campus. For this reason, the Swedish Environmental Code adopted in 1998 set forth that "new buildings and new facilities could be constructed and that any activities could be undertaken within the premises of a national park only if they did not interfere with the landscape of the park or its natural environment and did not adversely affect any natural and cultural values of the historical landscape in general"[3]. Pursuant to further provisions of the Code, detailed conditions of any interventions into the space of the park should be entered in the protection and development plan (in accordance with the Planning and Building Act), whose overall goal is to maintain the continuity of natural environment, cultural heritage and unique features of respective areas[4] and to ensure public access

[3] Chapter 4, section 7 of the Swedish Environmental Code. Source: *Miljöbalken, https://www.riksdagen.se/sv/dokument-lagar/dokument/svensk-forfattningssamling/miljobalk-1998808_sfs-1998-808,* accessed Feb 10 2021.

[4] The park premises include Koloniföreningen Söderbrunn – a complex of garden plots set up by Anna Lindhagen in 1905. Owing to the high ratio of greenery (any chalet or pergola size is limited to 6.5 m2), the park makes up a valuable green area that plays an important social and cultural role.

thereto. Initially, the protection of cultural values and relaxation options was thought to be of the highest priority, at present, the most important goal is to preserve biodiversity, in particular the threatened species of flora and fauna. Prohibition on the development of any residential buildings and any transport infrastructure within the borderlines of and around the park raises a number of controversies as it limits the development options in Stockholm, where demand for residential apartments much exceeds the supply. This is the reason why many attempts to establish any further national city parks in Sweden have been unsuccessful.

The formula of national city parks was applied on a larger scale and further developed in Finland, where the following parks were established: Hämmenlinna (2001), Pori (2002), Hanko (2008), Porvoo (2010), Kotka (2014) and Kuopio (2017)[5]. The Finnish Ministry of the Environment, which approves or rejects any park establishment motions of the local authorities, has worked up uniform assessment criteria, which if complied with, positively qualify the area for the status of the national city park:

- diversified environment, whose components play an important role in the preservation of natural and cultural heritage as well as in the preservation of bio-diversity and the beauty of landscape,
- location ranging from the city centre to the city outskirts;
- ecological continuity forming green corridors that link urban areas with natural landscape,
- the range and network of connections that create a mutually supplementary eco-system and allow for relaxation options between the city districts.

In Finland, parks are planned with the prevailing purpose of integrating the city centres with components of natural landscape such as forests, mountains, river valleys or the sea shore. Another form of nature protection, which links the national city parks with protected recreation areas, has been conceived in the USA. The areas, classified as *Urban National Recreation Areas*, serve mainly the relaxation and social leisure needs and their inclusion within the framework of the national city parks has created new quality of nature protection adjusted to the needs of urban societies (RUNTE, 1987).

Such areas combine the function of conservation of nature and public enjoyment and may be potentially located in zones of critical importance for the preservation of natural balance in an ecosystem situated at a borderline of the

[5] So far, eight national city parks have been set up and the next five are awaiting the decision of the Ministry. These are: Helsinki, Tampere, Savonlinna, Kokkola and Rovaniemi parks. Source: Ympäristöministeriö, https://ym.fi/en/national-urban-parks, accessed Dec 06 2020.

city and rural areas. Italy and Spain - countries characterised with a decentralised system of nature protection - have developed the form of periurban parks, the idea of which is to connect green urban areas with forests and rural areas and to ensure access thereto to the urban dwellers. For example, there are 21 of such periurban parks (*parques periurbanos de conservación y ocio*) in Andalusia, accessible to 3.5 million inhabitants, of which 1.4 million are the city dwellers (ESPINOZA, 2010). In Lombardy six such periurban parks have been established, of which Parco Agricolo Sud, part of the green ring around Milan, stands out with its high value. The Park contains river valleys, swamps, meadows, forests and above all farmland (MOSCHINI, 2015).

Another example of an interesting concept of a nature park accessible to the public (urban dwellers in particular) is the Zurich Sihlwald Naturerlebnispark (Nature Discovery Park). This is another, apart from periurban parks, form of protection of endemic species of fauna and flora that is open to the public. Under the regulation of the Swiss Federal Council, this type of a park can be set up even up to 20 km away from the city, however, the main criteria underlying its establishment, similarly as in case of *Urban National Recreation Areas* in the USA, consist in the pro-social function and ecological education implemented therein through outdoor adventure.

3. Urban models of a biosphere

The concept of the Nature Discovery Park was based on a universal model of a biosphere reserve developed within the framework of the UNESCO programme - Man and Biosphere (MAB) - to harmonise the protection of natural and cultural diversity in view of economic and social growth. To meet that purpose, biosphere reserves are to serve three functions:

- protective function with regard to landscapes, eco-systems, species and endemic flora and fauna
- development function with regard to ecologically and socially sustainable economic development
- logistics function with regard to scientific research, exchange of information and education at a local, national and global level.

Within the framework of MAB programme, a special team for researching the application options of urban biosphere reserves was appointed in 2000. In cities, an urban biosphere reserve is defined as a site characterized by important urban areas within or adjacent to its boundaries where natural, socio-economic and

cultural environments are shaped by urban influences and pressures (UNESCO, 2004). Flexible division between the strictly protected central zone, the buffer zone of precisely delimited borderlines and the interim zone has underlain the creation of four spatial models of urban biosphere reserves:

- Urban Green Belt Biosphere Reserve,
- Urban Green Corridor Biosphere Reserve,
- Urban Green Area Cluster Biosphere Reserve,
- Urban Region Biosphere Reserve.

Depending on the local conditions, these models may overlap and create a number of variations, at the same time, the distribution and size of respective zones: the central one, the buffer one and the interim one can additionally give rise to a great number of reserve variants adjusted to the natural and cultural conditions and to the needs of the inhabitants. Furthermore, zones within the biosphere reserve may be replaced with an alternative model based on e.g. "theme zones" using the landscape components or works of architecture[6]. What's also important for potential areas of urban biosphere reserves is the fact that they should collaborate with other cities or rural areas by creating the so-called "collaboration zones" for the benefit of the sustainable development, which then stand a chance to become key components of a bioregion.

Fig. 1 - Theoretical models of biosphere reserves in reference to the bioregion scale: a) Green Belt Biosphere Reserve, b) Urban Green Corridor Biosphere Reserve, c) Urban Green Area Cluster Biosphere Reserve, d) Urban Region Biosphere Reserve. Drawing by the author.

Conditions precedent that urban areas aspiring to gain the status of an urban biosphere reserve need to meet include: developed plans of protection of urban eco-systems and their implementation options, among others by means of innovative design projects that may increase the surface of green areas and their

[6] Taking into account the human need of place identification by its specific/characteristic features, the "theme zones" model seems more legible to the inhabitants as regards nature protection. Creating relations with respective places is particularly significant for today's local communities, for that reason the designs of respective zones in Kristianstads Vatternriket harnessed the advantages of the landscape components and of particular facilities e.g. the Naturum Vatternriket building, designed by White Arkitekter. Source: https://vattenriket.kristianstad.se/, accessed Aug 28 2019.

biodiversity through the forestation of areas of environmental use, re-naturalisation of post-industrial sites and parts of their infrastructure, water retention, etc. Traditionally understood as protection of biodiversity, the protective function of an urban biosphere reserve may be extended with the protection of innovative urban forms of natural and cultural diversity, e.g. urban farms and gardens („Prinzessinnengärten: anders gärtnern in der Stadt", 2012), bee farms and organic start-ups. Amstrong and Lopes defined such reserves as "flexible infrastructure" that could be easily adapted to the temporary use of urban space, which, owing to the said flexibility, has become "the scope of innovative planning" (AMSTRONG, LOPES, 2016, p 21-22).

In this sense, activities undertaken at a smaller scale, consisting in the creation of biological "habitats integrated with a building", i.e. green walls and roofs (in this also „stepped green roofs"), must be viewed as more and more important. Appropriate density of their distribution can form a coherent network of ecological corridors connected with a rich, patchwork structure of small biotopes e.g. Host and Nectar Garden Building designed by Husos Architects or Bosco Verticale by Stefano Boeri.

Fig. 2 – Prinzessinnengärten Prinzessinen Garten in Friedrichshain-Kreuzberg district in Berlin. Social and ecological urban farm, where over 500 types of vegetables and herbs are grown, is also the stage of concerts, theatre performances, lectures, etc. Photo by the author.

Some of such biotopes (habitat areas) can be assigned with exceptional protection status for the reason of their high environmental value. The green roof of Sharrow School in Sheffieldwas assigned with the status of a *local nature reserve*, despite the fact that it fails to meet all the criteria developed by Natural England (NE)[7]. This multi-level garden of an area of 2,000 m^2 recreates the landscape and flora of the nearby Peak District National Park that features calcareous grassland, wildflower meadows and swamps as well as urban post-industrial sites shaped with crushed brick, gravel, stone and dead trees. Part of the garden was left in the brown roof form (natural biological succession).

Fig. 3 – Sheffield Council Design & Project Management, Sharrow Primary School, Sheffield, 2007. The school roof garden, listed as a *local nature reserve*, is surrounded with a buffer zone in the form of a municipal park. Photo by the author and the website https://www.greenestatelandscapes.co.uk/case-study/sharrow-school/ accessed Mar. 10 2020,

In accordance with the NE guidelines, the school building is located in the park buffer zone, thus, its protection is not essential but recommended and may be realised in the form of an ecological corridor which connects the local nature reserve to the overall ecological network. In such a case, the reserve shall be deemed as the network node. Because NE has assumed that *local nature reserve*s shall serve educational and research functions, their buffer zones may be composed of areas that correspond to the definition of the interim zones in biosphere reserves. The functions designed for a *local nature reserve*, such as education, tourism or recreation, on the one hand, contribute to the

[7] This is a non-ministerial body of the British government (set up in 2009) whose purpose is "to help conserve, enhance and manage the natural environment for the benefit of present and future generations, thereby contributing to sustainable development". NE approves or rejects applications filed by local authorities for the entry of respective regions into the list of *local nature reserve*s. https://www.gov.uk/government/organisations/natural-england/about.

conservation of the area by attracting certain groups of visitors, and on the other hand, extend the range of impact of the reserve and increase its positive influence upon the quality of life of the inhabitants by providing them with eco-friendly services. The aforementioned only confirms why it is so important to properly distribute nature reserves in the cities and their suburbs. According to NE, 1 hectare of green areas should be envisaged per 1,000 inhabitants. Therefore, we can observe a general tendency of establishing urban natural reserves of small surface areas, even in densely developed areas. For example, in London there are 110 *local nature reserve*s of highly different nature, often pre-determined with features of their location, e.g. in post-industrial areas and an Abandoned Railway Line (Parkland Walk).

4. Urban Renaturalisation – Urban Renaturalisation Area (URA) concept

Post-industrial areas and abandoned infrastructure, remaining after the glory days of the heavy industry, usually occupy critical locations in the cities. The aforementioned Parkland Walk extends over 14.3 hectares, forming a 5.2 km long corridor of greenery between Finsbury Park and Highgate suburban area. High Line in New York is "only" 2.33 km long. Green zones created from the converted Scalo Farini and Scalo Cristoforo in Milan, as designed by Agenti Climatici i OMA, will respectively occupy 25 and 14 hectares[8]. These numbers clearly illustrate the scale of the arrangements and design issues related therewith. Apart from man-designed green areas, there are also areas naturally reclaimed as a result of a number of factors (including financial, legal and social), which first became residual spaces, and then were re-naturalised. Such areas fail to classify for any forms of protection and are often deemed as wasteland, despite the fact that in many cases they have created unique architectural conglomerates adapted to the conditions of an urban eco-system, dominated with pioneer, mainly synanthrope species of trees and bushes. For the reason of natural processes, free of any human interventions, such eco-systems often become habitats of protected species of animals (e.g. bats use abandoned buildings as places of breeding and roosting). The presence of protected species in a given area may be a solo criterion for inclusion of that site in the Natura

[8] Conversion of Scalo Farini and San Cristoforo into green areas is only part of a large project of regeneration of seven abandoned railway stations in Milan (Farini, Porta Romana, Porta Genova, Greco-Breda, Lambrate, Rogoredo, San Cristoforo), which in total occupy over 125 hectares, of which around 200,000 m^2 shall continue to serve the railway transport function and over 675,000 m^2 shall be designated for greenery. This is one of the largest and most ambitious projects of this type in Europe.

2000 protected zones, however, this form of protection is insufficient in view of the area specifics, i.e. architectural and natural forms combined together.

For that reason, a new form of protection of post-industrial and post-military sites that perform important biodiversity functions in a city shall be introduced. Such protected areas shall then stand a chance to become part of the urban eco-system. All forms of human interventions should be banned on such re-naturalised areas and facilities, except for those intended for the preservation and conservation of their structural components that might otherwise pose danger to visitors. Removal of unnecessary surface and harmful materials should be also permissible, with the reservation that all the building works, technologies and materials must not adversely affect the natural processes undergoing in the eco-system. Urban Renaturalisation Areas (URAs) may also serve valuable educational and/or research functions through the use of the biotope structure and creation of the buffer and interim zones. This will not only allow us to protect URAs but also to extend their borderlines. It will, furthermore, facilitate the creation of green corridors leading to further and further green areas. This way, they might become promoters of a bioregion.

5. Summary

Protection of green areas in cities, starting from green roofs in the city centres ending on protection forests, is of key importance for the creation of a bioregion. Regardless of the adopted forms of their protection, the prevailing issue is that, if a decision to protect a given area is made after completion of relevant social consultations with various groups of stakeholders, then it should be final and binding. The example of an urban park in Oslo (Norway) shows that narrowing down the scope of such consultations may impede the general procedure of establishing other similar parks. On the other hand, ambiguous wording of protection criteria may result in regular breaching thereof. Due to imprecise provisions of the Polish law on land of ecological use, its surface area is continuously shrinking due to on-going development. Poznań has lost 5650 hectares of high value landscape and bio-diversity areas and 868 hectares of land of ecological use (GIEDYCH, 2018, p. 201). There are no adopted mechanisms that might permit relevant entries to be made in the planning documentation to promote the formation of bioregions. The city has always been a tool for the stimulation of civilisation development and protection, for the protection of freedom and culture and on the same basis, it must become a tool for the protection of nature. Thus, any part of urban greenery should be seen as a link

creating the overall structure of sustainable urban environment that not only consumes but effectively protects and recreates its natural resources. Nature Urbaine[9], the biggest rooftop farm in Europe, can be referred to as a perfect example of the evolution of forms and spaces in the cities and of re-naturalisation of some of them.

Following that line of thought, evolution of urban living environment should take into account the natural resource governance prescribing how the citizens can benefit from environmentally-friendly, sustainable development and enjoy the slow life, without any financial or political pressure.

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Good practises in special order and urban planning at the beginning of XXI century. Polish approach.

Adam Nadolny

Abstract

The ideas considered in this paper aim to present the relevance of the development of spatial order in reference to the Polish towns. The main research objective is to identify the phenomenon of the so-called "good practices" in reference to the issue of spatial order in Poland and to present this process from different social and legal perspectives as well as from the perspective of the designing process.

KEYWORDS: good practices, spatial order, polish urbanisms

1. What does good practice mean in spatial order development in Poland

The issue of spatial order in Poland has been analysed for a long time now by a team of experts - architects, urban planners, spatial planners, sociologists and others. All of the aforementioned professional groups agree that there is a strong need for good practices in the development of spatial order in Poland, they, however, view the issue differently and refer it to different values. Long-term negligence in this respect, resulting, among others from the lack of sufficient local zoning plans, strongly affects the changes in the landscape of Polish cities, towns and rural areas. These phenomena affect different levels of sensual perception of space. Such changes consist in, among others, slight modifications of the public space, transformations of the farm land into urban zones, transformations of the historical city centres and many other aspects of human interference into urban space[1].

Each of the adopted urban plans, which finally results in the change of space and landscape does not necessarily have to render positive effects or be socially

[1] This article was written within the framework of the research project entitled "*Mapping of architectural space, the history, theory, practice, contemporaneity"* the author participated in at the Faculty of Architecture, Poznan University of Technology, Poland.

acceptable. As regards the latter, being part of our studies here, namely the acceptance of space, Poles often fail to respond properly. The professionals and experts generally agree that we do have a problem with the spatial order. Therefore, the opinion of the majority of Polish respondents in our opinion poll, who positively evaluated the surrounding space, was rather surprising to us - 80% of the respondents said that everything was fine and nothing should be changed (SPRINGER, 2013).

We should, thus, ask this question: since architecture is so well perceived why are we still seeking 'good practices' in the development of spatial order? We could risk the statement that good examples should be unambiguously named and explicitly visible. Unfortunately, it is not so. Finding a good example requires much searching effort, proper content related knowledge and experience to evaluate it. Superficial knowledge as well as the statement that we like it are not sufficient. In-depth analyses of the issue require much more.

2. Factors affecting the development of the idea of spatial order

Good practices in the development of spatial order result from several factors. First of all, proper strategy of acting in space. Starting from planning at the national scale and ending on the local planning – it all strongly affects the issue of space and we should be aware of it. In many European countries planning has been highly ranked as advanced and multi-dimensional discipline focused on designing and research activities.

In our Polish reality we certainly aspire to follow a similar direction but we are not always able to catch up with Europe. We are trying to adapt our urban planning activities to the European requirements. At this stage of our studies, we need to refer to another factor, namely urban planning legislation and the associated legal regulations.

In Poland we are at present at the stage of negotiating many of the binding regulations and provisions of applicable planning laws. Nevertheless, without them, no development of spatial order would ever be possible. Of course, we are aware of deficiencies or ambiguities of these laws, which lead to different interpretations of the same provisions. We must, however, remember that the law itself has no causative power, it is only a tool in the hands of different groups of stakeholders (MIERZEJEWSKA, 2009).

The third important factor here is the designing activity as such. Should we want to approach this issue from a scientific point of view, we could well turn to the standard definition of designing, which maintains that it is an act of

creating in urban and non-urban space. This definition, however, fails to precisely define the creative activity, the results of which could be unambiguously defined as examples of "good practices" in the development of spatial order.

Designing a spatial solution, be it an architectural object in the municipal structure or a road transport solution, shall require the fulfilment of a number of conditions included in the planning guidelines and separate regulations. A positive example of good practices not only entails the act of creation but also the compliance with the local conditions and the applicable provisions.

Coming back to our attempt of providing a definition of good practices in Poland, it must be unambiguously stated here that good practices are a sequence of spatial activities, which apply the binding legal regulations in order to create architectural objects, urban plans and infrastructural plans of superior spatial, social and marketing value.

Good practices also involve positive environment for the activities, which we could view as corrective activities or activities improving the quality of space in Polish cities/towns.

Good practices in the development of spatial order are never one dimensional with respect to scale and the obtained results. Many places in Poland show distinctive features, which determine their identity (PARYSEK, 2003). Their preservation and continuation of their development is not an effective tool in the increase of competitiveness between the regions. If, in a given region, we can identify several examples of good practices in the development of spatial order, then there is a chance that there will be more and more of them in future.

Appropriate guidelines (and this is where good practices shall play their role) which activities should be continued and which amended will certainly positively affect future planning and designing decisions.

The examples presented herein are in a way a collection of good practices and a source of inspiration. To sum up, good practices in the development of spatial order are multi-dimensional and timeless practices, which respect the genius loci of the place and the expectations of the local community.

3. Implementation of investment projects and reality behind the process. Obstacles affecting the implementation of projects featuring good practices

In the analysis on the obstacles impeding the implementation of projects featuring good practices, which occurred in the presented examples, we have

identified several factors contributing, to a smaller or larger extent, to the occurrence of one or several difficulties. One of such major factors is the regulation of ownership titles. This was a frequent issue in the projects under the analysis. The problems related to ownership mainly concerned modernization or revitalization of old industrial plants, factories or post-industrial or post-mining areas in general. The right of free disposal of the real property would entitle the investors to apply for co-funding from the EU funds designated for the support of local initiatives of modernization of infrastructure and other initiatives.

Another factor, which can affect the implementation of good practices, are the spatial planning related activities. In some of the analysed cases there were no local zoning plans or improper wording of such local zoning plans in effect posed organisational or designing problems. Such situations often required the change of the study of the development conditions binding for a given town or municipality or otherwise the implementation of the intended project or spatial plan would have been impossible.

Fig. 1 - Eko-Miasteczko project in Siewierz Jeziorna in 2017 Author: Mycielski Architecture & Urbanizm, architectural design studio from Warsaw. Source: http://mau.com.pl/

Fig. 2 - Eko-Miasteczko project in Siewierz Jeziorna in 2021, Author: Mycielski Architecture & Urbanizm, architectural design studio from Warsaw. Present image of the center Source: https://www.siewierzjeziorna.pl/galeria/

Eko Miasteczko project in Siewierz Jeziorna [Fig.1 and Fig.2] can serve as an example of good cooperation of the investor and the municipality[2]. In order to implement the project of a complex of multi-family buildings, the binding study of the development conditions needed to be changed and the local zoning plan had to be worked out. The plan became the starting point for the spatial changes. As regards the project in question, the cooperation between the investor's firm - TUP SA (at present ALTA SA) with the Town and Municipality of Siewierz and Mycielski Architecture & Urbanism – MAU, architectural design studio, was extremely valuable and is worth mentioning here[3]. As a result, the study of the development conditions was changed and, on the basis thereof, a new local zoning plan was worked out for the area covered with the project. The project was the result of the Charrette workshops held in 2007 in Siewierz[4].

[2] The area of the investment project was situated in the southern part of Poland, in the town of Siewierz Jeziorna, located near Przeczycko-Siewierski reservoir, Dąbrowa Górnicza and Katowice. Stage I of the project and its conception lasted from 2007 to 2011 and stage II was to be implemented as of 2013.

[3] Authors of the changes of the study of the development conditions and the local zoning plan, Terplan Katowice.

[4] The name Charrette originates from the French work 'charrette' [cart] used by assistants working at the Academy of Fine Arts in Paris to collect the [team] works at the deadline of the exams. At present it is a method of holding urban planning workshops. They consist in the open designing, in which all the interested parties can participate. The final result ofsuch designing process must be accepted by all the participants or otherwise it will not be deemed satisfactory.

Dąbrówka Osada Leśna project is another example of such cooperation. The housing estate located at the road to Poznan was built on land that was originally the agricultural land[5]. The previous land development plan was connected with the spatial policy of Skórzewo Municipality.

The demand for new residential investments combined with the construction of A2 motorway to Berlin and S11 expressway made the area of the future investment an interesting alternative for the inhabitants of Poznan. The Municipality did not hesitate to cooperate with the investor in order to create new space meeting the criteria of spatial order. The designed program of functions of the housing estate fully met the criteria due to superior spatial solution, good urban planning, the assumptions matching the outstanding and well-designed architecture. As a result there of, the investor created urban space which can serve as a good example for other, similar projects in Poland[6].

The limitations imposed by the city conservator are often a factor, which to a large extent, impede and prolong the investment works. In some cases, strict approach of the conservator may give rise to creation of an outstanding piece - the aforementioned 'strict approach' shall mean activities positively fostering the designing process. The Frederick Chopin Museum in Warsaw[7] was the case. The fact that the implementation of the project required a demolition of a historical tenement house located within the investment premises raised a number of controversies. Due to a number of motions from groups focused on the preservation of the memory of historical places in Warsaw, the implementation of investment got extended. However, protests of the associations of art historians and lovers of historical sights were successfully prevented because the size and the architectural form of the building in question was recreated in the new design. In effect, an attractive architectural building block was erected, which supplemented the development in the block of the streets in the city centre[8]. It, furthermore, affected the surroundings as regards its urban and architectural scale.

[5] Chief designer: architect Piotr Pietkiewicz, architect Remigiusz Fiszer, architect Szymon Osijewski, architect Pawel Kardach, Tomasz Łubiński, Bogusława Bryl, engineer Pawel Matuszek, architect Adam Wędrychowicz.

[6] Osada Leśna was assessed as one of the best developed public areas in Wielkopolska region. Such was the decision of the jury of the competition for "The best developed public space in Wielkopolska", held in 2012 by the Polish Society of Urban Planners. The competition was held under the honorary patronage of the Marshal of Wielkopolskie Region. The distinction was awarded for the 'investments connected with the designing of public space and its implementation in Dąbrówka".

[7] Authors: Stelmach i Partnerzy Architectural design studio, construction 2007-2010.

[8] The presented building is located at ul Tamka 43. It is a corner lot in the shape of a prolonged rectangle located at the end of the continuous development reaching a small square in front of the Ostrogscy Palace, the seat of the Frederick Chopin Museum in Warsaw. The originally located on the lot, low tenement house - one of the oldest, preserved in this part of Warsaw centre - was pulled down due to the construction works. Its imprint is visible in the façade of the building from ul. Tamka

Fig. 3 - Osada Leśna Dąbrówka near Poznan. Source: http://dabrowka.com.pl/pl/galeria

The new building, due to its architectural attire, may be classified as architecture of the historical background of the Ostrogscy Palace. The building has accommodated numerous institutions focused on research and promotion of the artistic output of Frederick Chopin. It has also launched the discussions on the issue of coexistence of modern architecture and historical spatial context. The construction of the Frederick Chopin Museum contributed to the spatial activation of Śródmieście district. We shall note the fact that the investment introduced new spatial quality and underlined the values of the already existing investment projects. Another example of good practices, where the investor also experienced obstacles, is the project of the Scheibler's Lofts in K. Scheibler Complex of Factories - Księży Młyn in Łódź, in other words the project of adaptation of the old Karol Scheibler cotton mill at ul. Tymienieckiego[9] in Łódź[10].

[9] The historical building of Karol Scheibler factory in Łódź, the remaining part of the 19th century industrial history of the town, is located in the city centre and well-communicated with different parts of the city. The spatial planning is a superior example of the 19th century industrial architecture in Poland.
[10] Authors: architect Paweł Marciniak, architect Dariusz Witasiak and his team and the Australian designer Gary Wolff. „Sztuka użytkowa" Sp. z o.o., Łódź, construction 2007-2013

Fig.4 - Scheibler's Lofts in Łódź. Source: http://www.bryla.pl/bryla/51,85301,7904417.html?i=12

Limitations posed in the conditions issued by the conservator translated into a very long period of the implementation of the investment. However, the preservation of the historical structure of the buildings and the spatial layout of the post-industrial complex as well as the restoration of the major original details and fragments of the buildings, which bear witness to the original functions thereof, have rendered a superior final effect.

Despite numerous, strict limitations of the conservator, the investor succeeded in removing from the design any conversions which would be constructed later than any other historical extensions. The investor also tried to restore the original colours of the buildings and to reproduce the window and door joinery using modern materials.

To sum up this stage of our studies, the cooperation between the investor and the city conservator have always raised numerous discussions. Each party has its arguments and is trying to convince the other. But for the willingness to cooperate on the part of both parties, many of the presented here projects would have never been constructed. The final effect is their added value, being a positive example of good practices.

An interesting aspect of good practices observed at the stage of designing is the issue of the relations between the investor and local authorities. In some

cases, the process of designing buildings or spatial planning is impeded due to lack of understanding on the part of local authorities. Based on the analysed examples, we can observe that typically the investor, in a rational way, using relevant arguments, has to convince the local authorities to accept his/her plans and designs. After the initial stage of mutual mistrust, the relationships improve and both parties start cooperating.

It must be remembered that the investors tend to forget that their project or the investment cannot exist without the spatial interrelations. Thus, what they propose is just part of a larger entirety and as such should be preceded with in-depth studies and analyses. However, once the completed investment becomes a positive stimulant for local activities or becomes an added value, it starts to be positively assessed by the authorities and local community. We should also remember about these aspects of good practices.

The obstacles sometimes posed before the investments, which promote good practices, stem from the lack of understanding on the part of the inhabitants. It should be stressed here that negative activity of the local press, traditional press and the on-line news fosters such attitudes of the inhabitants. In many instances, the problems resulting from the lack of understanding of the investment could have been avoided but for the tabloid journalists seeking some sensational news rather than focusing on content related discussions over the projects or investments. It frequently happens that the public image of good practices suffers due to erroneous or insufficient information. This is confirmed with the results of the analyses of numerous Internet websites featuring space or urban planning. Brief press notes do not contribute to the topic but only try to spot problems where there are none. This may be due to our mentality, thus, within the framework of the information contained herein, we would like to address the authors of the articles on good practices in the media and request them to observe reliability and to select content related information in their pieces of writing. The factors which impede the implementation of projects featuring good practices may be defined as follows:

- unregulated ownership title;
- no updated local zoning plans or poor quality thereof, which prevents the implementation of projects;
- problems related to a change or adoption of local zoning plans;
- impediment related to the applicable regulations concerning the historical buildings and conservative approach of the offices proper for the protection of sights with respect to the revitalisation thereof;
- projects of private investors, which focus too much on the economic aspect exclusively;

- binding legislation pertaining to, among others, public procurement and tender procedures;
- lack of understanding of local authorities for the projects which may contribute to improvement of spatial order;
- lack of understanding for new investments on the part of the inhabitants;
- insufficient promotion of the undertaking in the private and public media.

4. Activities supporting the implementation of projects featuring good practices

One of the most important activities, which positively facilitate the implementation of projects, which feature good practices, is the cooperation at different levels of decision making process in the offices of local and self-government authorities. The possibility of a dialogue between the authorities and the investors is also an important factor. If the relations between the two cooperating entities are proper and based on partnership principles, this then facilitates the creation and development of good practices.

A factor facilitating good practices is decreased bureaucracy and easier and faster access to documentation and its circulation in the offices. We can improve this process by sharing the information on the achievements and relevant comments on public or industry specific forums. Forums where the contractors can publish their own comments, stressing therein positive issues, presenting the problems they faced, their doubts, intricacies of the law or problems with performance of works can positively contribute here. Should such a website for the exchange of comments and views be hosted, we might be able to work out our common standing and create the tools for facilitating the implementation of projects featuring good practices.

Furthermore, supporting activities should also include promotion and popularisation of good spatial solutions among the inhabitants of the cities, decision makers or journalists who do not specialise in this issue on daily basis. Implementation of projects which feature good practices should involve a certain type of mission - "I know the principles of good spatial order so I would like to share this knowledge". We could deem it as the so-called "whisper marketing"[11].

Another important factor, which can improve the response to activities connected with designing in compliance with good practices, is the social

[11] Marketing activities aimed at communicating the information to the recipient via direct 'spontaneous' oral discourse.

dialogue. „Łódź – Stitching up the city" project can serve as an example in this respect.[12]. The project consisted in a cycle of workshops focused on competitions and discussions pertaining to the future of urban planning in the centre of Łódź[13]. Owing to the social support and a large scale discussions, the organisers had an opportunity to work out the framework of cooperation between the urban planners and the inhabitants. In general, the city shall be improved for benefit of its inhabitants, thus, such a process can, not be top planned. As a result, a website for discussions on the issues of spatial planning was set up. Due to such activities the city/town inhabitants can feel that the changes are not top imposed by the politicians only but that they are also involved in the process. Such a project is also like a business card for the institutions involved in the creation of the urban space in the city/town. Promoting such a project in the media, in social media and the Internet must be viewed here as important and valuable. Activities supporting the implementation of projects featuring good practices may be defined as follows:

- cooperation at different levels of the decision making process is an important factor;
- in case of private projects the cooperation between the investor and the authorities and decision making bodies is essential;
- appropriate presentation of good practices in traditional and electronic media;
- in order to broaden the minds of the communities it is necessary to organise the workshops and educational courses for the inhabitants;
- openness of the investors and local authorities to changes which may be brought about by the projects compliant with good practices.

5. Mechanisms facilitating the implementation of projects featuring good practices

As aforementioned, one of the key mechanisms which enables the implementation of good practices is the cooperation of the decision makers and the authors of the projects. Mutual trust and the willingness to create a timeless

[12] Organiser the City of Łódź – Municipal Urban Planning Studio, Polish Society of Urban Planners - branch in Łódź.

[13] The entire area of the city centre in Łódź at different levels of the perception of the municipal space. The planned project is an ideal supplement to the spatial policy of the city, which uses modern urban planning tools applied in Europe, such as the social dialogue, social participation and the similar.

piece is a must here. An example of such a piece is the Culture Park in Cracow[14]. The creation of the park was to preserve and display the cultural heritage and the historical landscape of the urban layout of Cracow city centre within the borderlines of Planty Park and Wawel Hill[15]. The investment project was also to help protect the line of historical development, the size and the architectural forms of the buildings situated in Cracow city centre. The composition of Planty Park in Cracow and its green areas, in particularly the historical gardens, squares, green hills of Wawel Hill were also subject to these protection activities. Within the framework of the project, the following aspects were introduced: designs of small architecture pieces (NADOLNY, 2015), advertising banners and street poles, whose uniform appearance will maintain a uniform spatial order in the historical part of the city. It must be stated here that such an approach of the authorities of Cracow and the proposal of ready made solutions contributes to the support of projects, which feature good practices. It also raises the awareness of the inhabitants and investors, who will then be more willing to implement other undertakings in the city centre. The Culture Park in Cracow is to improve the aesthetic quality of the old town complex via the integrated system of visual information and the uniform small architecture forms[16].

Another example of the mechanisms facilitating the implementation of projects featuring good practices is the organisation of competitions. Here, we can use the example of the construction of the Museum of the History of Polish Jews in Warsaw.[17]. The construction of the museum complex required cooperation at different levels of decision making. Both designers, contractors and the project supervisors made their best efforts for completion of the investment on time. Owing to efficient management, some of the tasks were completed ahead of the schedule.

[14] The Park was set up by virtue of the resolution no. CXV/1547/10 of the Council of the City of Cracow of 3 November 2010 on the creation of the Old Town Culture Park.

[15] The borderlines of the Culture Park are delimited with the streets: Straszewskiego, Podwale, Dunajewskiego, Basztową, Westerplatte, Św. Gertrudy, Bernardyńska, a section of Vistula Boulevard to Podzamcze street which crosses Straszewskiego street.

[16] A coherent concept was worked out, comprising the main guidelines concerning the options of locating small architecture forms, advertisements and boards in the city centre. An important aspect of these activities are the designs of the aforementioned forms and an attempt of consistent application thereof.

[17] Authors Lahdelma & Mahlamäki designer's studio, Finland, cooperation - Kurylowicz & Associates architectural design studio, Poland, construction period 2007-2013.

Fig. 5 - Museum of the History of Polish Jews in Warsaw. Source: https://histmag.org/1000-lat-polskich-Zydow-9047

The high quality of the building and its aesthetics refraining from any spatial dissonance is also praiseworthy[18]. The project is an example of private and public activities and cooperation. The construction of the museum was supervised by the Town Hall of the capital city of Warsaw, co-financed by the Ministry of Culture and National Heritage in capacity of the public investor. The funds for the exhibition facilities, for education and research activities of the museum were secured by the responsible association - Jewish Historical Institute.
Mechanisms supporting the implementation of projects featuring good practices may be defined as follows:

- cooperation at different levels of the decision making process within the

[18] The presented here project was in a way a milestone in contemporary Polish museology. The erected structure, apart from the architectural form, was designed to perform many different functions, among others it is to accommodate a multi-media exhibition concerning the history of the Jews in Poland in the time span of hundreds of years. The modern building block nicely corresponds to the context of the place. It refrains from dominating the urban landscape but it nicely complements it in this part of Muranów district. As a result new public space is created and the museum building and the historical context of the Monument to the Ghetto Heroes complements its entire composition.

municipal organisational structure proper for urban planning, architecture and spatial order is an important element here;
- the competitions organised should rather focus on the selection of the best design rather than on the price (i.e. possibly the lowest costs);
- official procedures and tender procedures should be simplified.

6. Organisational and formal solutions worth promoting for the purpose of popularisation of good solutions

One of the most important tasks of the formal organisation of promotions of good practices is the early age education in the field of urban planning and architecture at schools. Such education shall translate into the acquisition of good taste and also into more stringent requirements of the Polish people as regards the development of spatial order (PARYSEK, 2008). It is also a good way of making young people more sensitive to the spatial phenomena inherent in their daily contact with the surroundings.

The exposure to good practices in architecture, urban planning and public space is of great value to a young man. This type of activities (practical activities in a way) shall allow for the creation of a new group of recipients, who, owning to the knowledge gained, will be able to judge on their own whether the space around them has been correctly planned and designed or not. Educational Programme "Shaping Space" implemented by the Polish Chamber of Architects may serve as a good example here[19]. The programme is dedicated to secondary level schools. It focuses on the analysis of the neighbourhood and the conclusions thereof make up the starting point for further research on a number of issues related to architecture. Basic assumptions of the programme are, among others, development of spatial awareness, understanding technical and aesthetic aspects of architecture, development of the understanding of the designing process and its implementation and also appreciation of the architectural heritage. In selected schools the pilot version of the programme has already been tested. 400 students from 13 secondary level schools from 5 regions have participated therein[20] The programme shall be launched in November 2013 and shall cover secondary junior schools as well as the secondary technical schools and grammar schools all over Poland. The

[19] Honorary patronage: Ministry of Culture and National Heritage and Ministry of National Education.
[20] Education in the field of aesthetics, architecture and urban planning for young people aged from 16 to 18 via a dedicated educational programme. Improvement of common aesthetic and spatial awareness and development of proper conduct in this respect - and thus, improvement of the quality of aesthetics in the entire country in the long time perspective.

Organiser hopes that several dozen schools from every region in Poland will join the programme. The schools which have participated in the pilot version have confirmed their participation in the final version. Acquisition of new schools for the programme is the responsibility of the Regional Chambers of Architects in Poland and they, thus, engage in relevant talks with the local self-governments. At present, the conclusions have been drawn from the pilot version and works on the final version have commenced. The impact of the project shall consist in the architectural knowledge and awareness acquired by the students that will be transposed in future into proper acts undertaken in the field of architecture and aesthetics.

Another aspect here is the promotion of good practices via competitions, organised mainly upon the initiatives of the municipal and communal authorities in cooperation with such organisations as the Association of Polish Architects or the Polish Society of Urban Planners. The experience of these organizations combined with many years of practice shall guarantee the best competition results. On the other hand, the winning designs/projects due to the quality thereof and their impact shall guarantee the increase of the quality of space in Poland. This shall, in turn, contribute to an increase in the number of interesting and outstanding projects featuring good practices.

Simplification of the tender procedures applicable to public procurement is also an important issue here. The selection of the cheapest proposal gives no guarantee for the task to be performed with due care. This often translates into poor quality and poor final effect of the project. Good practices should focus not only on the effect, that is the final product, but they should also open up the discussion on the quality of a complex process of its erection - from the conceptual design to the implementation.

Within the activities of the organisation of projects, which could potentially become examples of good practices, elaboration of a good and rational feasibility study is a crucial aspect. This way formal and financial misunderstandings can be prevented. Proper financial evaluation of the planned project will safeguard its success.

Promotion and marketing are equally important organisational and formal activities in the process. The time devoted to the project and funds invested in the creation of space shall also account for its popularisation. Unfortunately, the results of the analyses of promotional materials have proved that the information made available to the public by the investors and self-government entities is of low quality. In many cases basic data is missing, e.g. there are no names of the authors of designs/plans or the names of contractors. Copying contents of the application for EU co-funding cannot be called promotions.

Examples of good practices should become key components of marketing strategies in the Polish cities and towns.
Organisational and formal solutions which should be promoted to popularise good solutions:

- educational programmes presenting the idea of spatial order to the society;
- observance of the rule that, in case of major projects, architectural and urban planning competitions should be carried out under supervision of the Society of Urban Planners and the Association of Polish Architects;
- reference to examples of good practices as part of creating the genius loci via marketing activities of the authorities of towns and municipalities;
- promotion of examples of good practices in the electronic media, social media etc.

7. Legal solutions facilitating good practices in the planning process

The binding in Poland system of legal acts, which could be viewed as supporting and propagating good practices in spatial order development, mainly includes the *Building Law*[21] and the *Law on Spatial Planning Development* [22] Each of these Laws has many times been updated, amended and supplemented. Nevertheless, the changes do not facilitate the development of spatial order in all the aspects. The persons, who on daily basis, need to apply these laws are fully aware of numerous deficiencies, which may result in the creation of space that will not fully meet the educational tasks and that has nothing to do with good practices. The need for more clarity in the legal acts pertaining to spatial planning should be also indicated here. Provisions of the law on spatial planning development should more precisely regulate such issues as the selection of the building colours, for instance (NADOLNY, KRUŚ, 2015). Furthermore, some provisions have been appealed against on the grounds that they are contrary to the constitution. On the other hand, experiences of many European countries (among others Germany, Holland) show that we can manage spacial development as an added value and not as a burdensome obligation.

There is one, key aspect the planning documentation cannot change - namely the mentality of the people and their total lack of aesthetic taste. The educational activities have already been mentioned here a number of times. From the point of view of architects and urban planners, we are of the opinion that we should work out, within the framework of corrective activities, common national

[21] Journal of Laws of 1994 no 89, item 414.
[22] Journal of Laws of 2003 no 80, item 717.

standards applicable to architectural designing and spatial planning. Excessive interpretations of the said legal acts issued by numerous institutions should be limited. The uniform guidelines should apply in the entire area of Poland - in such formal and legal conditions positive effects may be expected in the development of spatial order and, thus, more and more examples of good practices. One of the basic components in the creation of good practices is the observe of the law - such is one of the most important conclusions hereof. Legal solutions facilitating good practices in the planning process may be characterised as follows:

- the binding planning legislation needs to be adapted to the actual challenges and problems;
- all Polish planning standards, clearly showing how to approach the spatial order, need to be introduced.

8. Conclusions

Good practices in the development of spatial order is a complex process, resulting from the work of architects, urban planner and officials. In my opinion the reception of good practices by the inhabitants of the cities and towns is one of the most serious problems. Over the last dozens of years the educational process and the development of good taste among the Poles have been much limited. This has contributed to the lack of positive response to the changing space. In many cases, after the commissioning of the investment, its parts are often devastated, painted with graffiti, damaged or vandalised by their public users. It is not a rule, of course, but it happens. Such state of affairs mainly results from the lack of knowledge, involvement and lack of good citizen's attitude. In many cases we seem to be ignorant of the fact that space is our common good.

By consultations with the inhabitants, educational workshops focused on the issue of space and focused on how to share it and use it, we can broaden the knowledge of the public with respect to this complex issue and change their attitudes. Lack of perspective thinking will definitely not contribute to the implementation of projects which could become positive examples in area of the development of spatial order.

Spatial order and good practice in this respect are not deemed as a marketing product. They can be used as part of a marketing campaign, part of the new image of the city, town, village or region (MIERZEJEWSKA, 2010). Location of a good product in the landscape shall translate into pride felt by the inhabitants.

In the middle ages the inhabitants felt proud of the erection of a cathedral for example, we can also feel as proud today having accomplished at least one workpiece featuring good practices in the preservation of spatial order. As examples here we can name projects completed in smaller towns e.g. centre of Siechnice, Marina in Konin.

Since the middle of the 1990s our cities have been spreading outside (there are more and more suburbs) whereas the excessive numbers of suburbs create a number of different problems: traffic, social and planning problems. On this road to 'better future' we tend to forget the great value of space. We do not respect it because in our opinion we have plenty of space and we tend to abuse it without any limits. The compact city idea, where all types of space are rationally used and make up one, coherent entirety, encourages us to come up with good designs, which improve the quality of spatial order (NADOLNY, KACZMAREK, 2020).

Looking back to the range of projects under the analysis here, we can come to the conclusion that positive reception of good practices results from numerous campaigns and educational programmes which positively affect the communities, therefore such campaigns and programmes should continue to be developed and promoted at different levels (BIELSKA, WENDLAND, DELNICKI, 2020).

Accounting for the experiences, we can draw respective conclusions for the implementation of research projects in the nearest future. Research on sub-urbanisation in its broad meaning shall be of key importance. In effect, programmes preventing the spread of the Polish cities and construction of endless suburbs should be worked out.

Application of good practices for marketing and promoting purposes is also important. Today, numerous media broadcast negative messages - they mainly present the phenomena which should convince Poles that Poland is an ugly country. Whereas the few messages promoting positive examples simply disappear in the media buzz. We should care more to change these proportions.

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The system of protected areas as the core element in a new vision of the Metropolitan City of Palermo[1]

Filippo Schilleci

Abstract

The process of urbanization is considered as one of the most significant anthropic alterations of the environmental framework, the present study attempts to understand spatial characteristics of urban growth and its impacts on environmental components in Metropolitan City of Palermo. One area where the levels of unbuilt and valuable soil consumption, and the consequent forms of environmental and territorial fragmentation risk compromising not only the landscape-environmental value of the territories involved, but their identity.

Starting from these premises, this contribution explores the reciprocity relationship between built environment and open territory, with the aim of identifying possible territorial rebalancing strategies based on the enhancement of environmental systems.

KEYWORDS: environmental systems, metropolitan area, bioregional approach

1. Introduction

The concept of bioregion comes from the more complex one of bio-regionalism, which Peter Berg (1977; 1978), between the late 1960s and early 1970s, described as a cultural phenomenon with political, economic and environmental consequences, based on the identification and study of natural defined areas, called bioregions, under the principles of ecology. Starting from the observation of the territory, as a place where people live and work, Berg identifies it as a unique and homogeneous sphere where on the one hand all the

[1] This chapter is an extended version of the chapter: SCHILLECI F., GIAMPINO A. AND TODARO V. (2021), "Forms and processes of settlement pressure on natural systems", in LO PICCOLO F., PICONE M., TODARO V., (eds.), *Urban Regionalization Processes*, Springer, Cham.

elements and actions are combined, and on the other the morphology, spaces and inhabitants are integrated.

This definition brings

> *[…] attention to the relationship between city and countryside, to their organic connection deformed by the economic-financial logics that reduce the soil and physical components to being normalised supports of market mechanisms […]* (BUDONI, 2013, 20).

This distortion is detectable by the etymology of the word bioregion itself. To bio-regulate is to govern life, and that of governing it is an action founded on the rules of the natural environment and not on humans' ones. They are geographical units that follow ecological rules, without a pre-established territorial dimension, showing characters of homogeneity. Examples are river valleys or mountain ranges, territories where different ecosystems may coexist (POLI, 2012). Consequently, the territory - from a bioregionalist perspective - cannot be identified based on economic-administrative criteria but should be interpreted and defined as a set of bioregions. This aspect recalls another very important and effective concept of interpretation and design of the territory, that of connectivity and ecological infrastructure (SCHILLECI, 2012).

The current patterns of settlement sprawl have determined an arrangement of the territory that is heavily affected by forms of human pressure (demographic, relative to human settlement, infrastructural, productive). Those forms mainly weigh on valuable farming land, fringe areas of transition among urban agglomerations and natural and semi-natural systems, protected or not. Given these processes, the last 20 years have seen scientific research in the field of urban and regional planning underlining the importance of networks and ecological connections for the overall protection of the territory. Actually, the complexity of the ecological network concept derives from its different components, that is the reticular and the ecological component.

The network concept, that is a system of relations, refers to a systemic approach concerning the whole territorial structure (MOUGENOT, ROUSSEL, 2002) and leaves no doubts at a theoretical level; nevertheless, its implementation is complex, especially in building and maintaining territorial connection between nodes (in this case, ecological nodes) and in integrating different network systems (a network of networks). The adjective ecological in territorial experiences is not always referred to pure ecological processes (biotic and abiotic processes), but rather acquires an evocative value (FRANCO, 2003) and concerns other sectors, from administrative management, to territorial policies, to the participation of society.

Starting from these premises, this contribution analyzes the urbanisation processes occurring in the metropolitan context of Palermo. One area where the levels of unbuilt and valuable soil consumption, and the consequent forms of environmental and territorial fragmentation risk compromising not only the landscape-environmental value of the territories involved, but their identity. Such dynamics must be countered with a rebalancing action aimed at reaffirming environmental, cultural and identity values through the revalorisation of those territorial components that must necessarily regain recognisability and acquire new structuring value in the future organisation of the territory. In more general terms, in Sicily, the absence of environmental assessment tools and the disconnection between urban and regional planning, and sector planning have determined an inadequate control level off human pressure on environmental systems. Regarding this general framework, this article clarifies and reformulates the reciprocity relationship between built environment and open territory, with the aim of identifying possible strategies to manage the phenomena of urban sprawl in the metropolitan context, a main objective of European territorial policies (EEA, 2006) and of many national policies of the member states.

More specifically, for its characteristics Palermo is particularly suitable for becoming a reflection field where the perspectives on ecological networks could be put into practice.

2. Knowledge elements from the territory: the Metropolitan City of Palermo

The historical-physical identity of the Palermo area has been built on a morphological structure, enclosed in the orographic system (that develops inland) and the coastline, where the coastal plains alternate with the narrow beaches. A territory where the small agricultural villages have been counterpoints to the seaside villages in a system that has always depended on the city of Palermo (DI LEO, 1997; COSTANTINO, 2008). Recent urbanisation processes have kept this functional link with leader cities, on the one hand causing a mostly residential growth of top-tier municipalities and on the other causing an erosion of the coastlines due to the seasonal tourism for the Palermo population.

The metropolitan territory of Palermo is bounded by the sea on the north and by an area of strong and striking contrasts, the landscape of the Madonie, on the east. Going through the territory, one will encounter a great number of different landscapes. The so-called landscape of the plain is linked to the image

of the Conca d'Oro, which was once rich in water, fertile and entirely covered with citrus plantations and vineyards, and which, starting from the post-War period, has rapidly and deeply changed its features under the effect of fast-growing cities. The hills that surround it have harsher features, while the mountain strips greatly differ from the coast landscape.

This quick interpretative glance at the landscape features of the territory, which give the idea of a unicum, of a single even though variegated entity, is distorted by the transformations that have fragmented, if not destroyed, those elements that could ensure continuity, thus creating a loose array of parts (REGIONE SICILIANA, 2005).

On the other hand, the relationship between anthropic and natural landscapes is quite tight and very often marked by conflicts. The morphology of the territory, with a high degree of mountainousness, in fact compresses the urban area on the coastline and limits the penetration effects inland to the strip of municipalities that are closer to the capital city. Therefore, the result is a predominantly coastal urban system with some inland penetrations that emphasize the growth potential of the system to the detriment of environmental and landscape resources as well as a rebalancing of functions and services.

19 out of 82 municipalities of the metropolitan area of Palermo are located along the coastline where contradictory protection and transformation actions take place more frequently than anywhere else. Despite some minor centers of the metropolitan area are much dynamic the main peculiarity of the metropolitan area is its monocentric coastal structure in which Palermo prevails over the rest of the territory.

The coastal territory which is run through, as it happens all over the entire Italian coastline, by linear transport infrastructures and large production plants. In the Sicilian case, these conditions have dramatically boosted uncontrolled and unruled illegal building all along the metropolitan area and consequently worsened environment fragmentation and isolation: the coastal natural areas have been cut off from inland areas. Especially in the eastern part of the metropolitan area of the municipal territory of Termini Imerese, an industrial pole on the coast is an element of fragmentation with great impact on the environment and has deeply changed the coastal landscape of the area.

Moreover, the infrastructural system formed by the motorway, railway, and state road that run along the coastline makes up what is called a multiple linear system of fragmentation and isolates the coastal environment from the provincial inland territory. This condition jeopardizes biodiversity causing progressive death of natural habitats (BATTISTI, 2004), and the landscape diversity of the metropolitan territory.

In relation to the outlined framework, the Metropolitan Area of Palermo has a heritage of natural areas, archaeological sites, biotypes of great importance inducing intepreting its territory not so much through the administrative demarcation, but as part of that broader environmental system that affects the entire region.

In this regard, the texture of areas of high environmental value is represented by twelve natural reserves, imposed by RL 98/1981, and subsequent amendments thereto, from forty-six SCIs and three SPAs and four Special Areas of Conservation (SACs). They have been identified by the implementation of Habitats 92/43/ EC and Birds 79/409/EEC Directives. In addition, they fall back inside two protected marine areas: the Ustica marine area set up with DI of 12.11.1986 and that of the Cape Gallo-Isola delle Femmine established with Ministerial Decree (DM) of 24.07.2002 and one regional park (Madonie) (Fig. 1).

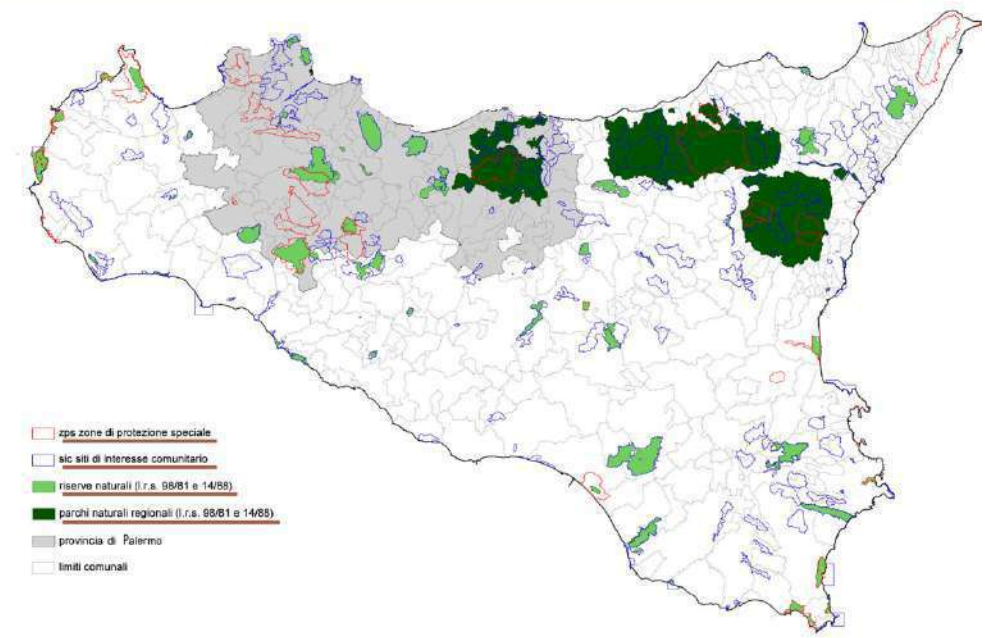

Fig. 1 - The system of protected areas in the Metropolitan City of Palermo (Source: author's elaboration).

In addition to the presence of areas of natural interest, subject to different protection schemes, it is possible to trace an interesting system of valuable agricultural areas (environmental and landscape interest), which contribute to outlining the identiy value of this area. In particular, it addresses two prevailing agricultural landscapes: the orchards and the olive groves. The former stretches

along the coastline between Palermo and Trabia, the latter stretches from the internal areas of Altofonte up to the last coastal fringes of Termini Imerese. To these landscapes, the agricultural system of the vineyards that extend from the Western fringes of the Metropolitan Area towards Alcamo (in the province of Trapani) must be added. Unfortunately, in reference to the agricultural landscape it should be noted that in the last decade the Utilised Agricultural Area (UAA) in Palermo has grown from 236,764 ha (2000) to 266,362 ha (2010).

Starting from the knowledge of these systems linked to the territory, both anthropic and natural, it is necessary to create integrated reticular models which, if properly planned and managed, can be configured as the main systems on which to structure policies capable of stimulating new sustainable and compatible territorial transformations.

3. Anthropic pressures and identification of "problematic nodes"

Related to the settled system, it is possible to identify three sub-systems that respectively fall back around three urban focuses of the metropolitan area: Palermo, Carini and Termini Imerese. The area of Palermo is mostly affected by the presence of typical residential scattered development which denies any form of relationship with the road system. The Carini context is characterized by the widespread presence of leapfrogging development, pronged and unclear type without interruption, stretching from the far northern suburbs of Palermo up to the municipalities of Partinico and Balestrate. This area has a high degree of complexity, in relation to the presence of a productive/commercial district running along the SS 113 raising the linear typical shape.

In the Termini Imerese area, unlike Carini, we can see a greater presence of pronged settlements which stands on historical paths of roads connecting the residential areas, while - as happens in the Carini area - the area stretching between the SS113 and coastline, the residential urbanizations assume a linear configuration, as the presence of parallel productive/commercial blocks are found, in this case, to the coast and bordered by infrastructural ways formed by the highway, the state highway and the railway line (Fig. 2). This location results in a fringing fragmentation of wide-range environmental impact which has in fact distorted the coastal scenery of this area, producing high levels of division between the coastline and the natural system characterized by the Riserva Naturale Orientata (RNO, Oriented Nature Reserve) of Mount San Calogero.

Fig. 2 - Spatial pattern of division between the coastline and the natural system in municipalities of Cinisi and Terrasini (Source: Schilleci, Giampino, Todaro, 2021).

In the western part of the same sub context - stretching between the towns of Altavilla Milicia and Trabia - the low-density residential linear strip settlement (originally included between the railway line SS 113 and the motorway and which later expanded beyond the highway route) has generated increasingly rarefied forms which determines levels of complex fragmentation in comparison with both foothill agricultural surroundings and the natural system in which the SCI Mount Cane, Pizzo Selva a Mare, Mount Trigna falls.

In the framework of Carini, the presence of different forms of urbanization - associated with the productive/commercial block and the infrastructure parallel to the coastline and within the Plain of Carini - determine a single macro system which generates multiple types of fragmentation. In fact, you can find both forms of pressure on agricultural systems, which are nowadays residual ones, and on the highest natural environmental systems.

In relation to the conditions of particular environmental conflict detected, the current environmental heritage protection regime is inadequate. In fact, it mainly responds to a rigid model that pits protected areas against areas with the

same environmental value but unprotected. This condition, in terms of territorial distribution, is found both along the coastal strip and in the internal areas. In general terms, it is therefore increasingly necessary to integrate the current protection model with a view to promoting the establishment of an integrated environmental heritage management system.

4. A proposal for an ecological network for the Metropolitan City of Palermo

The system of anthropic pressures described has led to the significant alteration of the traditional landscape mosaic and to the accentuation of forms of environmental fragmentation, not only in correspondence with "special" areas of natural interest but, in general, on all the components that characterize the landscape matrix - coastal environment.

Starting from the system of environmental resources and its fragmentation detected in the analyzes, the "construction" of the ecological network of the Metropolitan City of Palermo cannot, therefore, fail to take into account the "environmental" value of the landscape matrix of the entire coastal strip and relate to it in an attempt to reconstitute the aforementioned continuity.

The outlined ecological network hypothesis, therefore, identifies as "nodes" the areas in which there is a particular concentration of areas of environmental interest and valuable agricultural areas. Specifically, there are three "nodes" (Fig. 3):

- Node of the Carini Plain (east of Palermo), consisting of the presence of areas of natural interest (in particular SCI and SPA);
- South-Western node, characterized by the presence of the agro-ecosystem of the vineyard, which extends beyond the limits of the Metropolitan Area in the direction of the Alcamo territories;
- Eastern Node, characterized by the presence of citrus and olive grove agro-eco-systems, which extends beyond the limits of the Metropolitan Area in the direction of the system of areas of natural interest (reserves and SCIs) which ends to the East with the Madonie Park.

In relation to the linear or area elements for the ecological-functional connections between nodal areas, the guidelines identified have a dual nature:

- Ecological corridors, with a prevailing North-South direction (sea-mountains). In particular, it concerns the director that connects the Carini Plain Node with the natural system of the Sicani Mountains (to the West) and the director that connects the Eastern Node with the natural system of

the Sicani Mountains (to the South) and with that of the Madonie (at East). In addition to these, the function of "pure" ecological corridor carried out by the Oreto river in Palermo, which connects the sea with the crown of mountains surrounding the city, should be underlined;

- Agroecosystems, with a prevailing West-East direction. They take on particular importance at the western and eastern extremes of the Metropolitan Area in correspondence with the main valuable agricultural systems identified (vineyards, citrus groves and olive groves). These systems can perform environmental connection functions to support the natural reference system, in many cases also performing stepping stone functions.

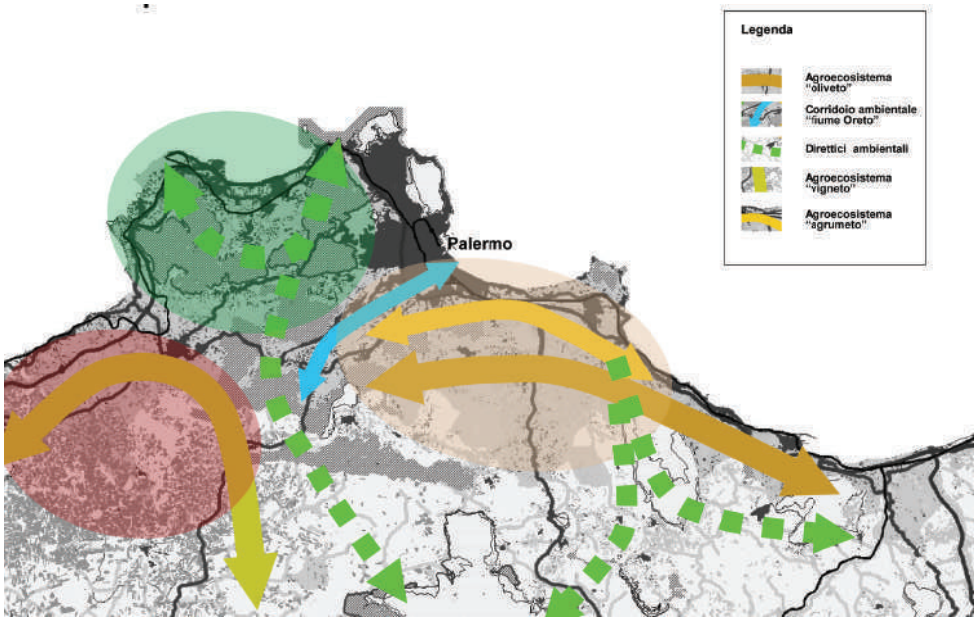

Fig. 3 - Hypothesis of an ecological network in the metropolitan area of Palermo (Source: Schilleci, 2008, 171).

5. Conclusion

In relation to the conditions of particular environmental conflict detected, the current environmental heritage protection regime is inadequate. In fact, it mainly responds to a rigid model that pits protected areas against areas with the same environmental value but unprotected. This condition, in terms of

territorial distribution, is found both along the coastal strip and in the internal areas.

In general terms, it is therefore increasingly necessary to integrate the current protection model with a view to promoting the establishment of an integrated environmental heritage management system. It is necessary to find the territorial specificities that the settlement pressure has not changed, just as it is necessary to reconstruct the conditions of environmental continuity (ecological network) at local and territorial level (FORMAN, 1995; FORMAN, HERSPERGER, 1997; GAMBINO, 1997; FILPA, ROMANO, 2003). This perspective makes the coordination of safeguarding policies even more necessary between the bodies responsible for the management of areas of environmental interest and the municipal administrations in the direction of activating alternative protection paths to the traditional constraint-type ones, which directly affect the policies and on territorial governance instruments (SCHILLECI, 2005).

The regional situation is rendered all more serious by: the poor diffusion of territorial and vast area planning (the Regional Master Plan has never been endorsed, and just one out of nine provincial capital has endorsed the Territorial Provincial Plan); the difficulty of integrating territorial policies and specialized planning tools, falling within the competence of different agencies (regional and provincial councillorship, Monuments and Fine Arts Office, port agency, free association of municipalities, etc.); the difficulty of a complete and efficient application of the environmental assessment tools regarding projects, masterplans and programs, such as Environmental Impact Assessment (EIA), Strategic Environmental Evaluation (SEA), Environmental Incidence Assessments (EIncA). With reference to the case of matropolitan City of Palermo, although it suffered very much about the anthropic pressures exerted mainly by the growth of the settled system, the heritage of the natural interest areas reported to the context of Palermo, still maintains significant levels of identity and awareness whose value is given, however, to the individual plans and therefore is not protected nowadays adequately and organically. In this territorial context, in fact, it has been approved neither territorial plans (SCHILLECI, 2005), particularly at metropolitan level, nor existing protection tools related to areas of natural interest.

The close relationship between natural and anthropic system, especially if it is related to urban contexts, requires a territorial planning released by sectoral traditional approaches, to move towards integrated and broad planning and organization able to govern the complex territorial dynamics that are related to settled forms and open spaces. In the attempt to provide directions for planning/programming tools and for the future territory government law for

the control of settlement sprawling and the reduction of its impact on the environmental systems, the investigation has shown that the design solution for the sprawl territories is not to be found in banal action of building compaction, but it needs to be a unitary project, made of different elements, where the spaces of emptiness are close to compact ones, in a systemic logic supported by an intermodal transportation forms.

In fact, a possible strategy of control of the urban pressure can be implemented by establishing a system of environmental connections which relates the green areas of the city with the territorial suburban ones in such a way as to project the metropolitan contexts sustainable towards patterns of land -use planning (SCHILLECI, 2008). This strategy underpins a dual functional value: ecological value, so that one can systematize areas of natural interest to make possible the natural biological exchanges between them and the already existing species; anthropic value, so that one can enhance the system of consumption of such areas for social and recreational purposes.

Starting from these considerations, in relation to the addresses for urban planning, it is possible to identify some elements for the definition of a territory plan on metropolitan contexts (BRYANT, 2013), that it cannot disregard:

- recognition, within the individual areas of urban growth, settlement rules that respect and strengthen the territorial matrix (specifically it is constituted by the potential elements of ecological-environmental link and agricultural areas of advantage) resulting in structuring value;
- pursuit of a compact city model and the concentration of its future growth along the nodes and the present infrastructures, which will attract future settlement demand, with structural effects in the overall organization of the territory and able to reduce disorderly growth;
- pursuit of a model of territorial development in ecological, social and productive balance, with its territory, based on the development of the specificity of the individual local nodes (MAGNAGHI, 2010).

In this frame, within urban planning, the territorial project of sprawl territories will be based on the definition of settlement expansion models able to acknowledge, respect and strengthen the territorial matrix as a structuring element, with structural order resulting in territorial organization to avoid messy development. All these questions impose a reflection on the existing tools to address such territories.

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Bioregional experimentations in Central Tuscany: the Left Bank of Arno Agricultural Park project and the Montalbano Organic District

Elisa Butelli

Abstract

The urban bioregion is a territorial scenario reconnecting the co-evolutionary relationship between human communities and the environment, settlements and open areas. Starting from a recognition of local heritages and identities, the bioregional project translates their characters into contextualized rules that direct territorial structures towards a polycentric/reticular dimension, a conservation/enhancement of local resources, a reconstruction of ecosystem balances and of virtuous relationships between urban systems and agro-forestry spaces. Especially in periurban areas, the latter play thus a key role in the bioregional transition, both as producers of ecosystem services and as sites of experimentation for the reestablishment of city-countryside relationshipsat the morphological-landscape, production and functional level. In them, multifunctional agriculture promotes proximity supply chains of production and consumption, and activates networks of services and functions that can represent, for the city, a new system of public spaces at the regional scale.

This article presents two Tuscan cases of bioregional experimentation that can be analyzed according to such coordinates, the Left Bank of Arno Agricultural park and the Montalbano Organic district, whose generative paths were personallyattended by the author. Both represent innovative and pact-based, cooperative and multi-sector territorial management models, which allude to a new paradigm of integrated and self-sustainable development with a multidimensional and multi-actor character; capable of limiting land consumption, recovering degrade and generating new public space, and thus fosteringthe bioregional vision of a world formed by local territorial systems in virtuous interaction.

KEYWORDS: bioregional experimentation, territorial management models, local resources

1. Introduction

Urban bioregion, as intended in this essay, represents a territorial[1] scenario set up by virtuous and coevolutionary interconnection between settlements and open spaces, and aimed at creating a self-sustainable system (MAGNAGHI 2014; 2020; POLI, SARAGOSA 2014; FANFANI, POLI 2017). Therefore, a bioregional project identifies and describes the coevolutionary relations between man and environment as identity characters, finding in them the principles of domestication of the environment apt to create heritage values; it also translates these principles in local rules which must be revived in order to orient the management of transformations and the territorial design towards a polycentric and reticular dimension, virtuous relations between urban systems and agro-forestry areas, restoration of ecosystem balances, protection and enhancement of territorial heritage and local resources. Within this frame agro-forestry spaces, especially in periurban areas, play a key role as they do not only carry out a multitude of "ecosystem services" (COSTANZA ET AL. 1997; MEA 2005) but contribute significantly to the recomposition of the City-Campaign relationship in morphological-landscape, production and functional terms (DONADIEU 2006; FERRARESI 2009; GISOTTI 2012; MAGNAGHI, FANFANI 2010); an enhancement of these spaces, indeed, through also the implementation of a multi-functional agriculture (BELLETTI ET AL. 2002; CASINI 2009), allows to support and increase proximity supply and consumption chains (CALORI 2009; FANFANI 2009), as well as to activate, on agricultural areas, service and function networks that can represent, for the city, a new public space system at the regional scale (POLI 2014).

Also as regards Tuscany, a bioregional project must necessarily be hinged on enhancing and organizing such spaces into a system and on maintaining the polycentric nature of the settlement system; this character, although recognized by the Regional Landscape Plan as a heritage value to be treated as a regional structural invariant[2], has been progressively and deeply weakened in Central Tuscany by the powerful conurbation which extends, from Florence to the west, along the imaginary ellipse touching the cities of Prato, Pistoia, Lucca, Pisa and

[1] As usual in the Italian "Territorialist School" (see <https://en.wikipedia.org/wiki/Territorialist_School>, last accessed October 2021), this essay assumes Alberto Magnaghi's definition of "territory" as "a highly complex living system […] produced by the long-term", coevolutionary and synergic "interaction between human settlements and the environment, cyclically transformed by successive civilizations" (Magnaghi 2005, 62): therefore, all following occurrences of the term and its derivatives should be read with this meaning.

[2] Regione Toscana's "Piano di Indirizzo Territoriale con valenza di Piano Paesaggistico" (Territorial Organization Plan with the value of Landscape Plan), approved in 2015, assumes "the polycentric and reticular character of settlement, urban and infrastructure systems" as its third invariant.

going back through Pontedera, Fucecchio, Empoli and Signa (MAGNAGHI, FANFANI 2010).

In this spatial framework the most critical area, both for the intensity of frequently conflicting functions and for the progressive erosion of agro-forestry areas, is certainly the sub-regional ambit of the Florence Plain, straddling both sides of the Arno river. Over the past fifteen years, this area has been subject to political-institutional actions aimed at building processes to protect and enhance rural areas, especially in relation to their peculiarities and potential in terms of endogenous resources. Over the years, such initiatives have implied the design of two multifunctional periurban agricultural parks, intended as tools for the implementation of the Central Tuscany bioregional scenario and the promotion of an integrated development model based on a new city-countryside covenant: the Florence Plain Park, laying in the right hydrographical side among the Municipalities of Florence, Sesto Fiorentino, Campi Bisenzio and Prato, and the Left Bank of Arno Park in the left side, in the areas of Florence, Scandicci and Lastra a Signa. Both parks face a densely urbanized territory which, however, maintains a significant endowment of rural areas, not rarely high value in terms of agricultural productions and ecological-environmental features, whose protection is essential to counteract the copious criticalities haunting this land which has been dramatically transformed since the 1950s (BUTELLI 2015). West of the Plain, a further experimentation has taken place in recent years, the construction process of the Montalbano Organic District[3] which also represents a tool for a bioregional transition. What follows gives an account of the cases of Left Bank of Arno Agricultural Park and Montalbano Organic District, whose generative paths were directly followed by the author.

It is worth noting that an agricultural park, as understood in this article, is not to be read as a protected and prohibition area, but rather as a laboratory-area for the development of renewed leisure, slow mobility (cycle paths, bridleways, pathways), environmental and production interconnections between the city and the rural countryside. It is a privileged area for design experimentation, where the presence of agricultural matrix and work can trigger innovative and diversified activities such as environmental and naturalistic education, urban welfare (social and health care activities, social gardening and leisure farming)

[3] From a regulatory point of view, in Italy organic districts are today recognized through the Budget Law no. 205 of 27 December 2017, which for the first time establishes "fooddistricts" on national soil as a new development model for agro-food industry pointed at providing opportunities for growth and revitalization of both supply chains and territories as a whole; organic districts are therefore food districts. They are also specified in the Bill no. 988 "Provisions for the protection, development and competitiveness of agricultural, agro-food and aquaculture production using organic methods", approved by the Italian Senate in January 2021.

and the direct purchase of locally made food products. Likewise, as for organic districts, the reference is here to an innovative tool whose functions are not limited to the promotion of products made without harmful synthesis substances, but which, through an agreed governance developed "from below", combines this goal with a 360-degrees promotion of territories in order to reach a full development of their economic, social and cultural potential. Such tools – Increasingly emerging in the Italian and international panorama – are therefore characterized both by an effective integration between agriculture and other economic activities related to the countryside, and by their potential ability to protect landscapes, contrast criticalities as pollution, land consumption and degrade, safeguard and enhance territorial heritages.

2. The Left Bank of Arno Agricultural Park

The Left Bank of Arno Agricultural Park project[4] represents a multidisciplinary and multilevel experience as well as an interesting and innovative case of participatory, interactive spatial planning at the bioregional scale in Central Tuscany (POLI 2019). Indeed, the Park project – started in 2014 and supported by the Metropolitan City of Florence together with the Municipalities of Florence, Lastra a Signa and Scandicci[5] and the Department of Architecture of the University of Florence – took shape within the frame of the participatory process "Farming with the Arno. Riverside agricultural park"[6], which obtained the support of the Regional Authority for the guarantee and the promotion of Participation instituted by the Regional Council of Tuscany (Regional Law no. 46/2013), with the aim of creating a periurban and suburban agricultural park through the active involvement of various public, private and private-social local actors.

The project area – about 9,500 hectares – Includes both the flat land laying south of the Arno river and adjoining it, characterized by dense urbanization and residual periurban agriculture, and a portion of a hilly land, characterized by high quality crops and large forestry areas. In this area, the participatory process – an intense research/action process that lasted more than a year – has worked

[4] The whole project and the related participatory process are described in Poli 2019 by Daniela Poli, scientific coordinator of the project.

[5] To be precise, the park area includes District 4 of the Municipality of Florence and a large portion of the municipal areas of Scandicci and Lastra a Signa.

[6] The participatory process began with a Memorandum of Understanding (2012), later (2014) finalized with a grant from the Regional Authority for Participation and a further co-funding from the involved local authorities.

to enhance agriculture in intermediate territories, recognizing the inhabitants and farmers an active role in feeding the city, reducing ecological footprint, caring the riverside, promoting an increase of biodiversity and in the production of goods and services for the benefit of the entire local community (GILIBERTI 2015).

To do this, the process has constantly held together local knowledge and 'expert' knowledge through a double level of governance – an "Area Table" made up of representatives of the institutions and associations involved, and a second level represented by the direct participation of dwellers, farmers and active citizenship – in order to build a hypothesis of transformation organized through agreements between institutions and local society in its various forms and parts, focusing on collective advantages and on shared rules.

The process had as its main objective the promotion of a sustainable territorial transition through a bioregional design pivoting on agricultural multifunctionality (i.e. on all those functions agriculture can perform in addition to production: tourism, hospitality, teaching, fruition, social, cultural, etc.), endogenous resources and heritage elements; this in order to patch up the city-countryside relationship and to show how agriculture, in its multidimensionality and multifunctionality, may be able to restore territories and ecological networks, to build sustainable food networks, landscapes and "collaborative local communities" (POLI 2019, 22), and to regenerate the urban form by integrating with other local activities (catering, food trade, tourism, sport, etc.).

The project core is represented by the "Strategic scenario of an agricultural park for the Left Bank of Arno area" (Fig. 1), a multiscalar and multidisciplinary vision that takes on the bioregional identity features, in their long-lasting invariant elements, as a structuring reference for the organization of human settlements, from the regional to the urban scale, towards reticular, polycentric and non-hierarchical models.

It is a territorial design that integrates and organizes numerous proposals for territorial redevelopment starting with the restoration of ecosystem relationships, severely compromised in this area in terms of environment and quality of life. This is indeed an area affected, from the 1950s onwards, by a pressing and massive urban pressure (ALBERTI ET AL. 2019), where the strong residential, industrial and infrastructural urbanization has created a dense lowland conurbation, especially in the Municipality of Scandicci, and environmental fragmentations which prevent biotic connections between the Arno and the hills (LOMBARDI, TRIVISONNO 2019).

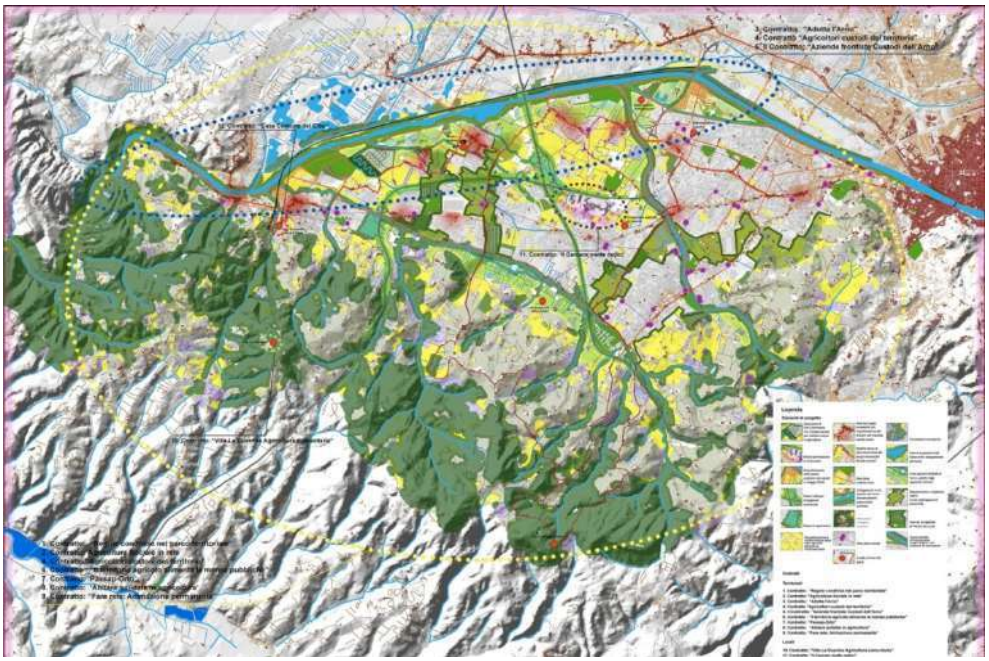

Fig. 1 - Transformation scenario of the multifunctional and shared agricultural park: the integrated territorial design implemented through social contracts (POLI, 2019)

Starting from the identified criticalities and patrimonial elements, in order to return centrality to the Arno river and its tributaries, as well as to enhance and restore the ecological network, actions were planned such as: the opening of agricultural green passages, the organization of a network of soft mobility routes, the functional enhancement of waterways and riparian areas, the provision of tree-lined belts to mitigate the impacts of fast roads. Furthermore, in order to redevelop periurban countryside with a new agriculture and new logistic services for the Park – core theme of the project – the scenario includes some strategic actions such as restoring farming activities in private fallow areas or making them available for rent[7], enhancing community gardens (for educational, therapeutic and work/social rehabilitation purposes), allocating public land to the project[8] and organizing, within the Park, territorialized food chains apt to network local farms and places of sale and consumption. As for the latter point

[7] The analysis showed that many agricultural lots in the study area are not properly cultivated, but just maintained with periodic mowing; out of the almost 5,000 hectares of agro-forestry land, 103 non-cultivated hectares were registered. This is an important loss of lands that could perform relevant functions for local food supply.

[8] The project surveyed all the public areas in the Park and many of these were found to be underused, unused or used in ambiguous ways.

in particular, the scenario provides for the enhancement of local products through their supply to the local network of public canteens.

In the scenario there are no longer outskirts, but many small cities skirting an Arno enjoyable again, with vegetable gardens, fields and orchards outlining the urban edge and the riverside, with a rural system that offers food and produces landscape as well as ecosystem services for its dwellers: a fly-wheel to activate new local economies, sustainable development and new lifestyles.

The extremely innovative element of this case is that the project is imagined as implemented through an agreed governance, built through forms of voluntary partnership among local actors: public bodies (municipal and regional administrations, management bodies such as the Basin Authority and the Reclamation Consortium, schools, hospitals, detention centres, etc.), private actors and private-social entities (associations, social groups, etc.), which together draw up a mutual pact.

The project plot is then put into practice through twelve social contracts animating territories, divided into 9 sub-regional and 3 local contracts according to the extent of land surface they are supposed to affect (BUTELLI ET AL. 2019).

Through these agreements all the actors, each for their own competences, help implement the project actions, also establishing shared forms of funding, management and monitoring.Although not yet formalized, the Park is included in the Strategic Plan 2030 of the Metropolitan City of Florence (CITTÀ METROPOLITANA DI FIRENZE 2018), which indicates it, together with the Plain Park, as a pivot for the reconstruction of the lowlands agro-ecological network and to satisfy the ever growing social demand for proximity open spaces, usable and rich in significant environmental and cultural values.

3. The Montalbano Organic District

This case is located in the geographical area of Montalbano, sort of a naturalistic island in the midst of the big cities of the Florence Plain and the villages of lower Valdarno which includes 10 municipalities[9]. It represents an interesting example of integrated project, at the bioregional scale, for a sustainable transition involving food supply chains and territorial organizational models; a project in which rural development and participation play key roles, set off thanks to a lively social fabric (POLI 2018) and the support of the University of Florence.

[9] Capraia e Limite, Cerreto Guidi, Larciano, Lamporecchio, Vinci, Carmignano, Quarrata, Poggio a Caiano, Monsummano, Serravalle Pistoiese.

The process began in 2014, with the creation of two organizing committees that, in 2015, would join together with a single statute and give birth to the Association for the Montalbano Organic District, established in January 2016 through the involvement of numerous local, public and private stakeholders (farmers, ethical purchasing groups, citizens and academics), including municipalities.

The construction of the Association was a long journey that, thanks also to the great ferment developed around the topic, followed a "bottom-up" approach, made up of meetings and debates between farmers, ethical purchasing groups, teachers and citizens sensitive to health and environmental protection; this approach started from the need of local actors to create a shared and agreed path to generate a change in the organizational model of distribution and consumption – which should be based on organic and sustainable agricultural practices – as well as a planning tool aimed at social cohesion and at the improvement of public policies already in place (BUTELLI, TANGANELLI 2019).

To these purposes, the Association today brings together a very varied group of local actors – not only active citizenship but many associations, ethical purchasing groups and farms – which, in self-organizing mode, meet in thematic commissions in order to carry out the related projects through activities aimed at highlighting local tangible and intangible heritages, and putting them at the core of the Organic District implementation process. These mainly include activities for the promotion of local products and short supply chains, training activities for farmers, seminars and information days, local control campaigns about the use of synthetic substances, naturalistic walks, rediscovery of the abandoned building heritage, promotion of territorial knowledge even through photography workshops.

After the birth of the Association and in the same year, a Memorandum of Understanding was signed between the 10 municipal administrations and the University of Florence (DiDA[10]) in order to define an integrated territorial agreement for the Montalbano Organic District aimed at enhancing agricultural and territorial heritage and at increasing social cohesion. The agreement goals, which fully embrace those of the Montalbano Association, are to: improve the quality of life environment; develop strategic planning in the framework of a multifunctional, territorial agriculture; strengthen local agro-food networks and support organic production; guarantee Montalbano hydrogeological stability and a role of ecological corridor; involve citizens in an agreed territorial management through participatory processes.

[10] Department of Architecture, Laboratory "Plans and Projects for Cities and Territories", Research Unit "Urban Bioregion Project"; scientific coordinator: Daniela Poli.

Within the framework of the Memorandum, and through the synergy among University, municipalities and the Association, the Conference "Montalbano in transition"[11] was held in January 2017 in order to undertake a consulting process among stakeholders, pointed at identifying strategies, opportunities and directions for the effective construction of the Montalbano Organic District and for the territorial transition towards a bioregional, reticular and self-sustainable model; a model based on the patrimonialisation of endogenous resources and on the closure of cycles and whose primary tools are healthy and environmentally friendly agro-ecological productions, enhancement of biodiversity, fight against climate change, energy saving and a greater parsimony in the use of water resources.

Not only that: the Montalbano Organic District, in parallel with the support given to local agriculture and the spread of organic culture, assumes the much wider challenge of mending the city-countryside link in an integrated and transversal way, managing the different industries and activities that can coexist in the area (such as tourism and social farming) starting from the enhancement of heritage elements and of agricultural multifunctionality.

With these assumptions, the conference addressed some extremely important issues necessary for the future of the Organic District area including:

- The promotion of a new peasant rurality integrated with local economies, linked primarily to food and wine, rural and landscape eco-tourism, based on the enhancement of pathways, bridleways and environmental resources as well as on innovative and locally widespread reception systems, relying on to the network of villages (widespread hotel) and farms;
- The reconstruction and strengthening of local agro-food system, which must be oriented towards a balance of local supply and demand and in which public catering (school canteens) plays a crucial role in supporting an agricultural transition towards organic, short supply chain networks and a diet anchored to local products (BRUNORI, GALLI 2017);

[11] The Conference, which through participatory round tables addressed the possible conversion of the entire territory towards organic farming, multifunctionality and differentiation, represented an extremely dense and significant opportunity for discussion and participation. Within the framework of the Memorandum, the municipal administrations asked the Laboratory "Plans and Projects for Cities and Territories" to write the "Manifesto for the future of Montalbano" as a first summary of research activities carried out, goals emerged from the Conference, meetings with administrations, associations and local community: the Manifesto is now available at <http://www.cittaeterritorio.it/wp-content/uploads/Manifesto-per-il-futuro-del Montalbano_22_settembre_2017.pdf> (last accessed October 2021).

- The definition of an innovative energy model apt to redefine local supply, including local (energy) resources and eliminating the production of waste related to forestry and pruning.

To date, although the Montalbano experience is not yet in a fully operational phase, there are many social dynamics and networks already in place, starting with the Association which keep working the sustainable transition goals described above. The project has not yet fully developed its potential due to dispersion and conflict, mainly linked to the coexistence – in the area and within the very Association - of different visions and needs and to the lack of a coordination agency able to catalyze trust and effectively deal with administrations.

4. The Agricultural Park and the Organic District as tools for implementing the bioregional scenario

The experiences described show that tools like agricultural parks and organic districts are remarkably interesting and effective in order to foster a regional planning based on the enhancement of endogenous resources, small villages, agro-forestry spaces – even the most marginal ones – and on inclusive mechanisms for the involvement of local actors. Increasingly more metropolitan areas, in Italy, rely on such tools for the recovery of virtuous city-countryside relationships, the promotion of local productions and to encourage a healthy and quality local agriculture, able to support and stimulate local economy in a sustainable way. Indeed, the cases of transition of complex territorial systems towards new experiences based on the bioregional principles of potential closure of cycles, territorial patrimonialisation and community self-government are multiplying. These are forms of territorial development and government based on the growth of "democracy of places" through a grassroots management, often implemented by project communities "for which the re-appropriation of decision-making powers on their own life environment is collective, direct, social and not delegated" (GISOTTI, ROSSI 2020, 113).

In this context, experimentations like the Left Bank of Arno Agricultural Park and the Montalbano Organic District, although different in morphological and typological terms, represent innovative and agreed management models focused on the enhancement of agricultural multifunctionality (BELLETTI, BUTELLI 2018) of great strategic value in order to favour, in Central Tuscany, a transition towards the urban bioregion, understood as a form/project of coevolution between the urban and the rural that regains its own spaces

(FANFANI 2015) and as a project of rebalancing and enhancement based on a strongly multipolar territorial vision.

Indeed, these highly cooperative and multi-sector tools seem capable of activating a gradual territorial conversion towards a new paradigm of integrated and self-sustainable development with a multidimensional and multi-actor character. A development shared among the various private and public entities, based on a renewed city-countryside covenant aimed not only at enhancing the role of urban and periurban agriculture – and the related supply of ecosystem services – through agricultural multifunctionality, but at the same time at limiting land consumption and repairing situations of physical and environmental degradation, thus generating a new multiscalar public space.

Furthermore, through dialogue and coordination with local administrations, they are able to strongly enhance proximity agriculture, orient production and organize innovative short supply chains (BELLETTI, MARESCOTTI 2012) through the implementation of a sustainable local food system hinged on collective consumption, primarily school canteens. This represents a central element to develop a new management paradigm, at the service of public policies, apt to build the innovative model of a polycentric region formed by local territorial systems interacting with each other (MAGNAGHI, FANFANI 2010).

Agricultural parks and organic districts can therefore play a key role in the policies of territories in transition, acting as agreed and multi-sector governance tools, at the bioregional scale, for the management of territorial networks and as a fly-wheel for integrated local development of economies based on the enhancement of heritage and identity peculiarities.

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SECTION III - NEW LOCAL APPROACHES
BIOREGIONAL EXPERIENCES IN SARDINIA REGION

City-Countryside. Principles, invariants and project

Carlo Atzeni, Francesco Marras

Abstract

This research is part of active and long studies of the DICAAR of Cagliari, about the relationship between architectural and landscape design in historical, urban and rural contexts. The city and the field are the result of centuries-old stratifications whose forms-structures are based on long modifying processes and which offer the architect and planner a complex field of action. Understanding the rules of both is a necessity for conscious intervention and in which the construction of knowledge can support choices in action. Urban analysis, type-morphological studies, the relationship of historical textures and settlement fabrics represent the essential tools of reflection in which the place acquires a key role in the ability of the project to be located. Two research projects are proposed here: the support for the Detailed Plan for the historic center of the city of Cagliari and research for the rural landscapes of Sardinia, guidelines for the sustainable design of inland areas. These show different aspects of an operational model on the city and on the countryside that uses the project as a tool for continuous testing on the territory. The general approach is to intervene in a systemic and inter-scalar way, through a concrete implementation and acupuncture in the actions.

The research aims to define an operational strategy that reconsiders the role of private individuals within the city and landscape project, triggering new conditions and ways of using spaces, in favour of hybrid forms of habitat and production. In the first case, the project proceeds through guiding projects that allow to activate new dynamics of interaction between the historical itineraries of the consolidated city and the voids caused by the bombings of 1943. In the second case, instead, the aim is to define an operational strategy for the project in the rural landscape by rethinking the role of companies and their relationships with historical infrastructures and rural routes. The construction of a renewed form of partnership in the landscape and in the historic city produces complex and multifunctional services and spaces for the construction of dynamic places able to reactivate and strengthen an awareness of the territorial context.

KEYWORDS: historical city, rural landscape, research by project

1. Introduction

This paper describes the development of an ongoing research work on the transformation of consolidated contexts which is divided in two research branches developed by DICAAR for the historic city of Cagliari and for the rural and agricultural landscapes of the inland areas of Sardinia, aimed at exploring the multi-functionality of the existing production facilities and the resulting opportunities in terms of architectural innovation for the city and the countryside. The research work questions the role that architecture could play in an idea of land development which is based on new paradigms of cultural and settlement sustainability (DE MATTEIS, 2009), without prejudice to active protagonism and the deep-rooted nature of the local communities.

The city and the countryside are equally the outcome of overlapping layers of centuries-old building practices and propose a complex framework for the project of their transformation. The construction of a transformation language is deeply tied to the specific site and cannot be ascribed to ready-made models or solutions; it is rather configured as something that deeply penetrates places like a silent modification of the specific present (GREGOTTI, 1984). In the two areas, the question of modification is related to a maintenance and care-taking approach applied to a consolidated heritage consisting of buildings but also of a regional-scale system made up of paths, trails, settlements networks and of land, water and soil-shaping management devices, capable of imparting shape and structure to the landscape in a productive direction.

The rethinking of the historical city and of the historical landscape starts from the reading of dynamic structures which are still capable of answering in an effective way to the needs of the communities that live there, according to a procedural logic that is based on a continuous transformation of the space of the habitat. A design reflection which, both for the Countryside and the City, is based on a research for relevancy with regards to the sites, with the aim of proposing a modification in continuity (ROGERS, 1997) with local settlement traditions, consistent with historical values and with the memory of places, which therefore contributes to rewriting tradition while keeping it alive (BAUMAN, 2011) and which, at the same time, frames the territory as a historical construction (TURRI, 2002). Inside the given framework, this paper focuses on two experiences:

- on one hand, the City, through the consultancy work provided for the Detailed Plan for the Historic Centre of Cagliari, seen as a strategic and operational rethinking tool which is based on projects which have an inter-

scalar approach capable of being "acupunctural" and systemic at the same time;

- on the other hand, the Countryside, through an ongoing guide project in Marmilla, a historical region of south-central Sardinia, whose development has aimed at creating a multi-scale relationship between the multi-functionality of farms and the sustainability of construction work, using an adaptive and resilient design strategy which is founded on principles of intervention reversibility and of reconfiguration over time of the transformation processes.

This work is part of the series of studies undertaken by the Region of Sardinia for the future extension of the intervention guidelines for inland areas included in the Regional Landscape Plan.

2. City and Countryside

According to Mumford, the city is the point of maximum concentration of the energy and culture of a society, and it represents the symbol of social relationships between people. It also expresses a more physical and productive aspect, related to working with the soil as a result of the long process of time in its construction and sedimentation action (MUMFORD, 1938). The productive nature of the city binds it directly to the field, to such an extent that it actually constitutes its *raison d'être*. In this sense, the case of Sardinia is paradigmatic, although the more strictly urban phenomenon is limitedly developed. Nevertheless, the settlement dimension of the city of Cagliari had always been, up to the last century, strongly linked to the production areas of the primary sector; in particular, to the proximity scale of the horticultural culture of the "*appoderamento*" in the periurban areas and of the viticulture in the hills close to the main urban centre, while at a larger scale, such settlement is more related to the open-field cereal production in the great plain of the Campidano and in the upland system mainly in Trexenta and Marmilla.

The rural past of the urban centre left traces of the structure and of the morphological and typological setting of the historical fabrics of the settlement: here, in fact, some portions of fabric include parts of the historical gardens which used to surround the urban nucleus; for example, in the district of Villanova, next to the liberty-style villas dating back to the end of the nineteenth century, there is a fabric which, although being mainly characterised by the Gothic plot and terraced houses, embraces a porosity generated by the inclusion of old orchards inside the blocks. The deep relationship between urban forms

and countryside forms is an interesting aspect of Sardinian settlements where the relationship between the village and the countryside is an indissoluble bond governed by long-lasting rules and settlement invariants which have allowed and allow for the management of the dwelling-countryside ecological cycle which has historically supported the agricultural economy. This bond is the reason for compact settlement centres as a protection of the countryside in Sardinia, often far from major centres and the very few cities on the Island and still poorly connected (ORTU, SANNA, 2008). The Marmilla, where the villages have been resisting for several decades with increasing difficulty against the phenomenon of depopulation and economic crisis, is a tangible expression of this historical structure: agriculture is the primary activity and resource of the area in which the settlement fabric, made of small compact villages which are thinly distributed throughout the territory, is overlapped by a dense infrastructure network with a "neuronal" character, constituted by the system of paths that connect the villages to the fields, defining the identity of the rural landscape.

Communities are nowadays affected by the lack of balance that during the long-lasting pre-modern tradition held them bonded to their territories. This regional area, in fact, has been exploring and applying for several decades a model of local development which refers less to an "industrial" dimension of mass tourism and more to sustainable forms of tourism which rely on the cultural and rural structure of the territory and on the quality of the resulting production and archaeological landscapes. This model is based on the recognition of the specific nature of farming practices, the quality of the product and the identity of places. The farms are in fact - as main players in the rural landscape system which together with the quality of products constitute the base of a renewed development model - capable of expanding their offer of services and of common goods inside the paradigm of multi-functionality (VAN DER PLOEG, 2003), starting from traditional production activities and their specialisations. The inner areas can then be reconsidered and designed both as recipients but also and especially as providers of collective goods and eco-systemic services that work on the short chain and on an economy which is more and more oriented towards the principle of the "zero km". This idea of the rural farm that turns into a production device and common-goods supplier is not only referred to production, but also to aspects that are mostly related to the operation, care and maintenance of the territorial network and its structures. Among these, for example, there is the continuous maintenance action of all those structures that allowed for the active and productive conservation of the landscape, of its biodiversity and, more generally, of the traditions and cultural heritage that have generated it; we should also point out the importance of

actions such as the regeneration and hydraulic control, the use of renewable energies, the reduction of the factors and behaviours that produce pollution, the recycling and even social inclusion, local services (such as education and training) and leisure activities. These are non-reproducible goods and services related to the territory which play a role in safeguarding and taking care of it (MAGNAGHI, 2000; DE MATTEIS, 2009).

2.1 Self-sustainability as a principle

In this framework, the research projects presented herein, acquire centrality in the definition of a caring action towards the landscape where resources and communities are capable of finding new conditions of interaction and balance.

The challenge is to redefine alternative and proactive forms of co-production and eco-shared services (REBOIS, 2018), which see the places of rurality and the plots of the consolidated city as a structural palimpsest from which to be generated, with the aim of attracting people back to their territory, through forms of (consortium and/or cooperative) self-organisation. We are therefore referring to the hybridisation between forms of organisation that relate to the urban dimension and those that relate to the rural space, in a continuous and mutual admixture, without prejudice to their own identity, which is constituted by a plurality of characters, and to their complementary historical functionality (inhabited space/village, rural space/countryside, walled city/historical paths) (ATZENI, DESSI, MOCCI, 2018).

From the rethinking of the role of private entities/individuals, in fact, it is possible to trigger active and shared conditions of space usage: hospitality, sales, promotion and training. These activities may be an integrating action for both the small farms in the countryside, whether these are historical farms or more structured and established companies, and the fabric of villages, with the aim of increasing the hybridisation between habitat and production and, at the same time, creating shared and self-representation spaces. In this way, activities with a public-cultural and collective character can find place in special rural districts, activating a renewed functionality and use of the agricultural landscape through the knowledge and rediscovery of its ecological and environmental features.

The research work focuses on the possibility of creating hybrid spaces, spaces of differences where new forms of relational space are capable of activating relationships between the public and private spheres, and increase the attractiveness, promoting economic and human resources according to a renewed paradigm of multi-functionality of the agricultural space. With these intentions, places can reactivate self-propulsive dynamics, restarting from their

heritage and the long-lasting elements which characterise them. The historical infrastructures and the ecological connections of the agricultural landscape running in parallel with the main paths and the roads which structure the urban areas, constitute the backbone of the territorial network. These are elements onto which we could fasten the design interventions and the measuring devices of the "acupunctural" operation, within limited and defined time intervals. In this sense, therefore, the paths that create a hierarchy and provide structure to the consolidated fabrics, constitute the body of the guide-projects which work on the walled city of Cagliari through the proposition of strategic and integrated transformations inside urban voids generated by the bombings of World War II which are still unused. The almost-random sequence of these voids, creates a new strategic potential at the urban and architectural scale, allowing for a morphological and typological rethinking in terms of permeability and porosity of fabrics, of passages which were impossible until now. All this would produce use and leisure possibilities for the historical city or for some of its significant portions which would create additional relational meanings between the existing parts and the new ones. In this complex and multi-layered palimpsest, the guide projects welcome and enhance the agricultural parts which are incorporated into the consolidated fabric; these, together with the rethinking of the public spaces in a sustainable way (new urban green areas, bioclimatic control through new drainage and permeable surfaces and natural shading systems), contribute to the definition on a punctual scale, of the already-large urban park system of the historical city which consists of the gardens located along the trace of the old walls, of the Botanical Gardens, the Parco di Palabanda, the Roman Amphitheatre and the linear park of Buoncammino. Furthermore, the paths, in this case concerning the accesses and the crossing of the rural mosaic and of the "*poderale*" mesh, introduce new use possibilities for the field according to the slow times of agricultural penetration.

In the proposed design experiences, the path represents the reorganisation tool of a series of historical traces which, inside the urban setting and the fields, constitute the base layer of the new architectural interventions, where the project often only removes or adds new layers in a selective way. Working on the network allows us to control the ecological dimension of production, ensuring a historical principle of places: self-sustainability. It is therefore necessary to promote the local capacity for self-organising, enhance the territorial "*milieus*" capable of providing examples of active territoriality which responds to external changes, the production of a territorial added-value for the management of public/common assets and of private companies that can embrace new possibilities for development within them.

1. Cagliari, Quartiere di Castello

2. Gergei, Regione storica della Trexenta

3. Cagliari, Torre dell'Elefante e Bastione Balice

4. Las Plassas, Il castello di Marmilla

5. Cagliari, Rapporto tra Bastione di Santa Croce e i Quartieri di Castello e Stampace

6. Regione storica della Marmilla, Rapporto tra villaggio e campo aperto

Fig. 1- Structures of longue durée. Fabrics, points and aggregates.

In addition it is useful to think about the changes and the project as a follow-up system, a memory and redefinition system of a process that is based on the multi-scale nature of the signs of the territory, the historical layers and principles that govern their management; in this framework, the operational and construction aspect of the project constitutes the element which is capable of fully controlling the production cycle by holding thought and action together and avoiding dangerous and harmful "energy dissipations".

3. Cagliari: a plan for projects

The research project on the historical city of Cagliari is based on a series of methodological tools for the Detailed Plan, which is inscribed in the context of a larger work on the historic city that the School of Architecture of the University of Cagliari has been carrying out since 2010. The Plan, in addition to an analysis of shapes and types in the four historical districts of Marina, Stampace, Villanova and Castello and to the specific study of the individual building units, offers a multi-scale project which creates a structure with a system of strategic and thematic projects (Urban Historical Park, the system of the walled city, Cagliari City of Culture-City as a Museum, Sustainable urban redevelopment-Pirri) and of guide projects which have a more operational nature and aim to redevelop complex and multi-layered compartments together with the definition of a number of strategic itineraries which connect the four historical districts of the city, reconnecting therefore the east and the west side of the city. In particular, two different itineraries produce this result: one is tangent to the walled city, under the walls in the margin between the districts of Marina and Castello, and the other one crosses the upper part of the city, defining ascent paths and internal crossings which, passing through Castello, connect the district of Stampace on the west side with that of Villanova on the east.

In this paper we will mainly focus on the first transversal path because of its character of urban interstitium and because it represents an internal reading, re-discovery and re-signification device of the multi-layered nature of this portion of the historic city. Here, in fact, different cities or different phases of the same city overlap each other, and the layered system of fortifications (Pisan, Catalan and Piedmontese) interacts with the urban façades of the late nineteenth and early twentieth century, which are structured according to narrow medieval lots. The supporting subsoil of the stronghold and its bastions constitutes the base of the city and, at the same time, the karstic nature of its soil represents a vital

element because it allows for the collection and management of water inside the underground cavities and therefore allows the historical city to self-sustain itself.

The many underground water tanks allowed the district of Castello to have a constant supply of water through a system which allowed for its storage while protecting the resource from winds and surface evaporation; in addition, the network of underground passages, creates a dual crossing plot of the historical centre that represents a further layer of protected and hidden crossing paths mainly used as war shelters. The understanding and a new meaning interpretation of the base system of the historical city and of its almost-visceral relationship with the soil, together with its ascent paths, represent the main nucleus on the strategic transversal itinerary which reconnects in spatial and experiential succession a number of voids in the fabric caused by the bombing in 1943. These urban voids are configured as awaiting spaces, whose potential has not been addressed for decades. If on the one hand they keep the memory of the war disaster alive, on the other, they highlight a structural inertia to changes, with regards to which the community of Cagliari awaits answers.

Along the development of this transversal strategic itinerary, the historical walls and bastions constitute the backbone, the plan, topographic and architectural directrix which is marked by the terraces of the Bastione del Balice and of the Bastione di San Remy (both public spaces with a significant value which are incomplete in their urban potential. The voids caused by the bombing varied in terms of public or private ownership. For this reason a coordination between the parties is necessary, through public-private integrated programmes aimed at pursuing the following objectives:

- consolidating the public use of land, even in the spaces which are currently private property, in order to strengthen the relational dimension of collective spaces. This can be achieved by exchanging those spaces with other public properties;
- increasing the urban character of the micro-interventions by promoting architectural quality and the morphological, typological and use reinterpretation;
- encouraging the rethinking of open spaces through sustainable strategies that improve the micro-environmental living quality of the dense and consolidated city centre;
- activating quality processes with particular reference to design competitions which include the coordination and cooperation between public and private property.

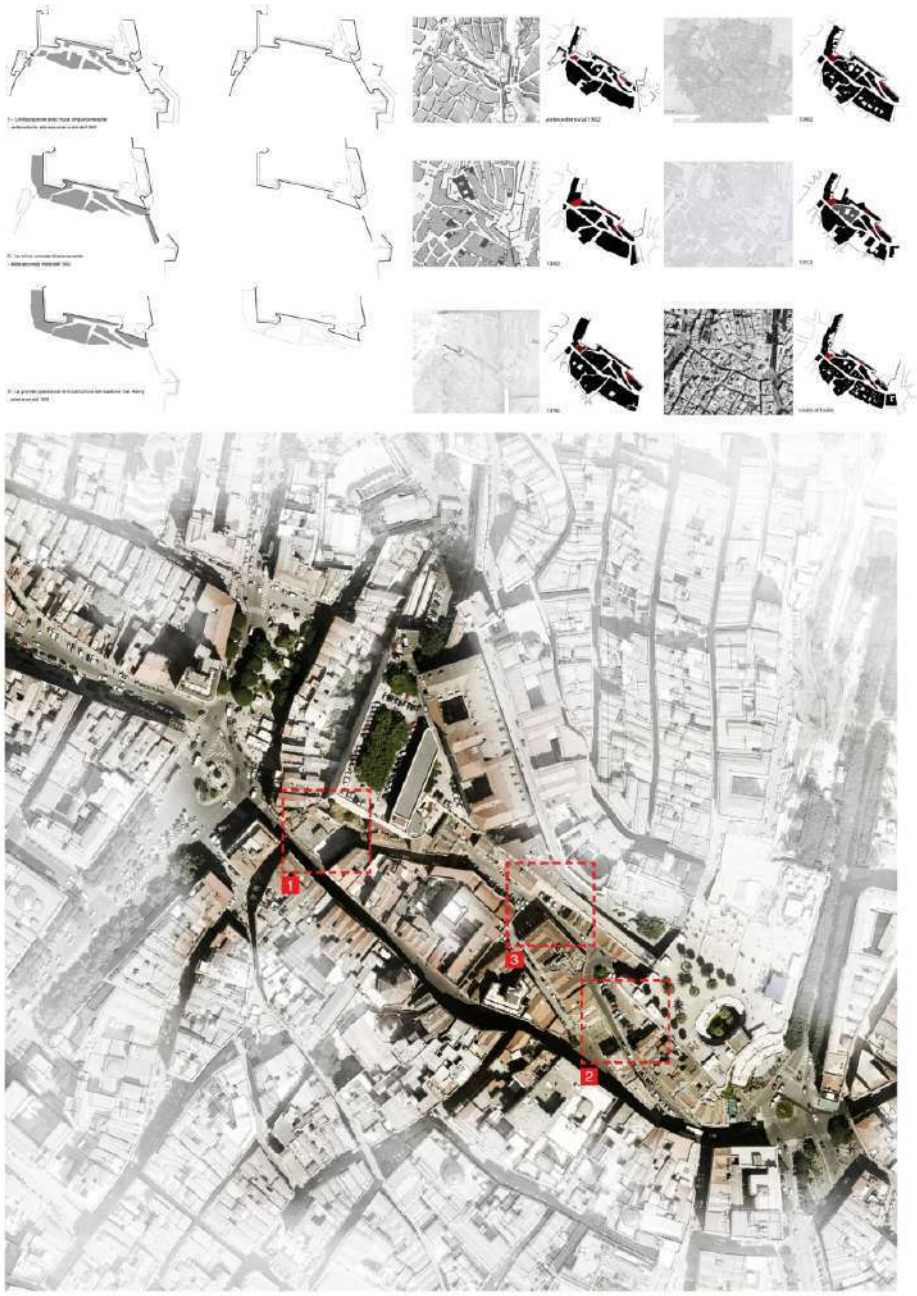

Fig. 2 – Cagliari walled city. The Itinerary Bastione del Balice - Porta dei Leoni.

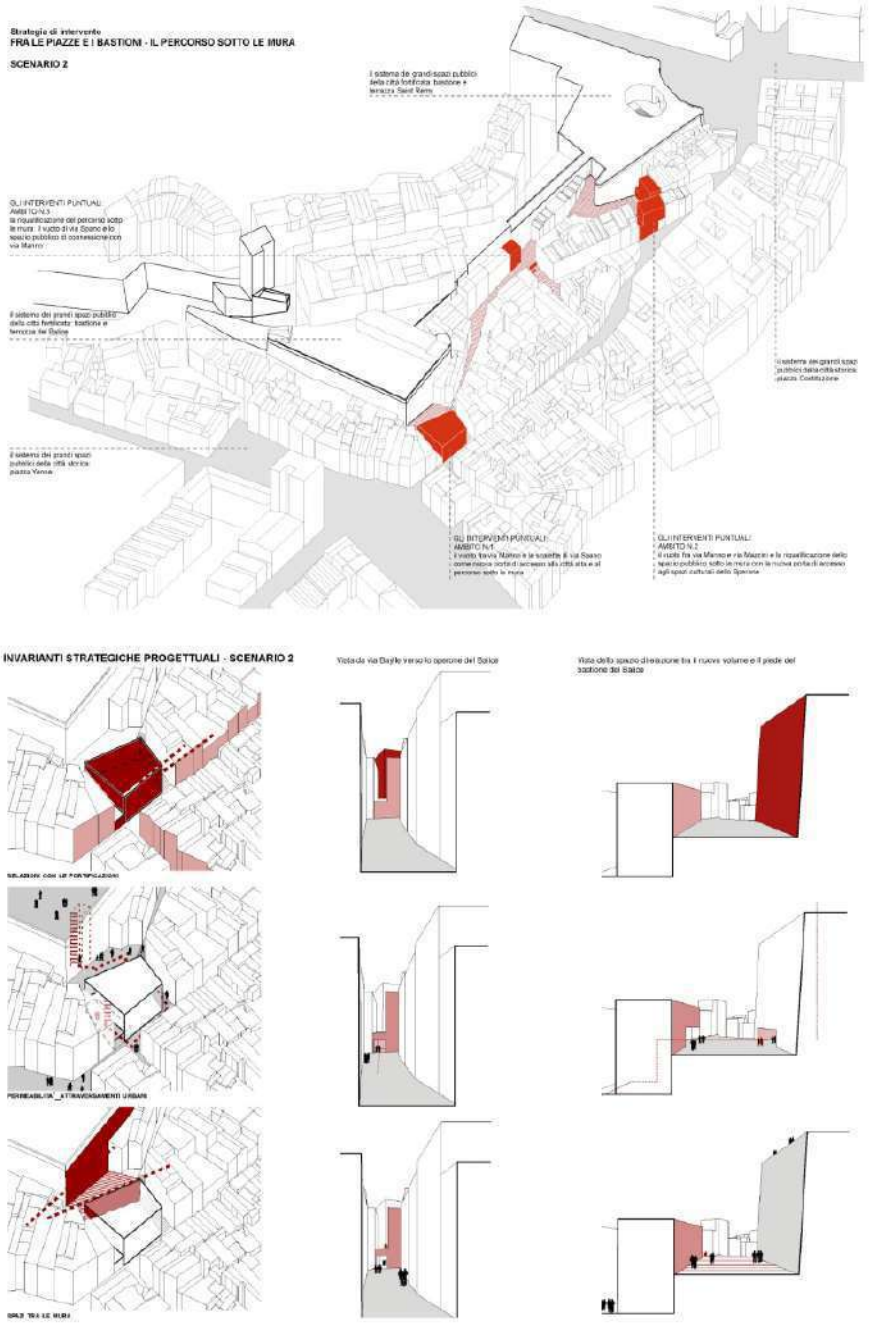

Fig.3 – Project of an urban void along the Itinerary Bastione del Balice - Porta dei Leoni.

The guide projects, with their architectural references, aim at defining a set of founding principles for the redevelopment of the voids, starting from the concept of continuity understood as a historical consciousness (ROGERS 1997), i.e. from the willingness to create an interpretive modification capable of implementing the transformation impulses of the city. Within this framework, the type represents one of the structural invariants of the urban fabric that is the object of the design, with the idea of introducing those modifications which allow for the evolution of the type itself, making it a dynamic and lively concept for the shape of the city, according to the logic of continuity mentioned above. The wall and its "massivity" represent architectural characters of the city and not only of its buildings, with which we can interact with an approach which is punctual and systemic at the same time.Similarly, the porosity which makes the void penetrable on an urban scale, ensures bioclimatic conditions of greater habitability of the public space and a thermal and hygrometric functioning which is controlled and sustainable.This aspect represents the reinterpretation of a topic of the stone-built historical city, which has always and can still welcome natural elements within its fabric. These principles have a significant role in two projects which have been selected because of their role of new doors for the upper part of the town. The first one is the void between via Manno and Via Spano, which is configured as a rediscovered access to the upper part of the city and to the path below the walls of the city; the second one is the void between via Manno and via Mazzini which is part of the ascent path towards the Porta dei Leoni and Bastione dello Sperone. In these two areas, with the aim of recreating the urban façade, the type and its variation, the wall "massivity" and the porosity are combined with the intention of reinterpreting some of the founding features of the settlement cultures which typically belong to the consolidated city and propose new urban architecture elements which are permeable and deep-rooted (ATZENI 2017).

The relationship with the monumental defence structures of the city is solved by introducing green areas, in continuity with a historical process which positions green spaces right behind the walls. In the cases under consideration, these interstitial spaces, in addition to preserving the integrity and readability of the fortifications, allow for the enhancement of the public and private green spaces, thus improving the micro-climatic conditions at the small scale.

3.1 Marmilla: projects for a plan

The site-specific approach to places is developed inside a research project that is framed within the studies of the DICAAR on the rural landscapes of

Sardinia. In this case, the relationship between a rural settlement structure with a narrow mesh configuration is combined with a system of farms with the aim of defining a guide project which creates an interaction between the public and private spheres and defines a production system inside the historical region of Marmilla. The "neuronal" network forming the system of historical paths and public spaces captures, at the different scales, the geography of the mutations and the processes which activate practices and uses, thus defining spatial configurations that are often founded on the principle of self-organisation.

The field plots, the volume and the type of tree crops, the lines of windbreaks and the water-management systems and devices, allow the project to reinterpret uses, habits, resources and weaknesses of the place through the rethinking of spaces to be used for new activities at the service of the countryside. These take on a role of liaison and mediation with the rural world which is no longer understood as an environment of work and production but also as a scope of collective enjoyment. The objective is to confer an active role to the spatial crossing systems and the countryside public management, a new importance to activate possible uses which have been unexpected and unthinkable until now: a public space in the countryside conceived as an infrastructure of the "slow time" where one can come into contact with the operating dimension of the productive landscape which transforms each one of us (TURRI, 2001) into a potential vision which is the actor of the rural space and no longer a mere spectator. All this requires an idea of development which relies on strategic areas, on rural farms and aggregates and proposes the recovery of the existing structures with a strong historical and cultural character that are typical of the long-lasting settlements and are suitable to embrace new uses. We are referring, for example, to the architectural rethinking and reinterpretation of old castles, of the stations of the railway line which were abandoned several decades ago, or the "road workers' houses" along the internal road network. These structures are dotted around the territory and represent shared reference and recognition elements for the communities, sometimes even representing proper icons (or *iconemi*, TURRI 2001) for the same communities. Architecture establishes a dialectic relationship with the place. The overlapping of the collective and private networks allows us to intervene on the place through the activation of new and different life cycles of the same portion of territory.

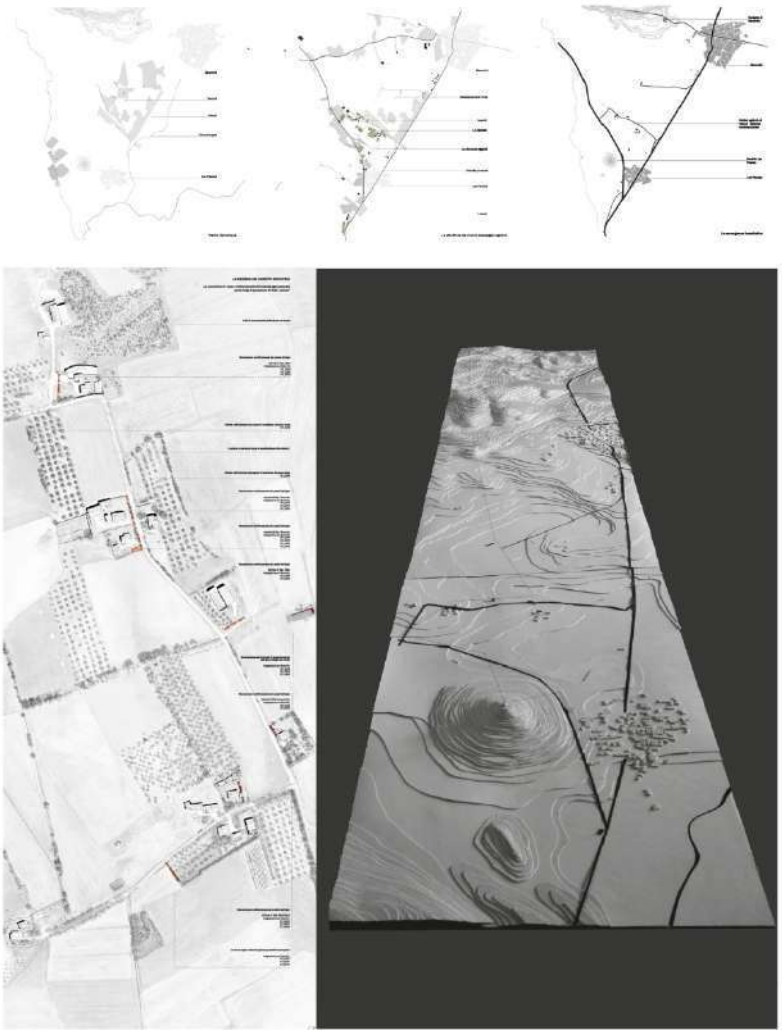

Fig. 4 – The historical region of Marmilla. Axis of archeological sites: the Castle of LasPlassas, the nuragic complex of Barumini. Result project of International Summer School of Architecture. Sardegna il Territorio dei Luoghi: I paesaggi rurali. 2015. Atelier coordination: C. Atzeni S. Mocci, A. Dessì, F. Marras, A. Perra

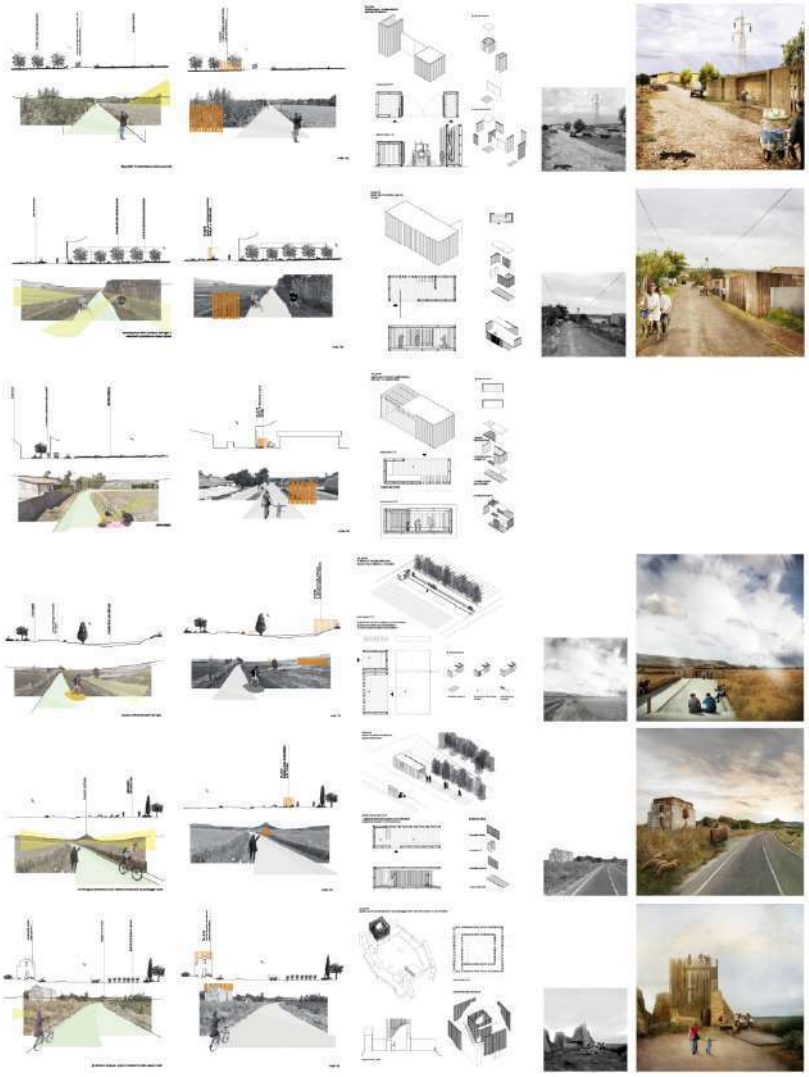

Fig. 5- Matrix of invariants. The scheme shows the interface between farm and public space, water spaces and points of control o the territory: the castle of Las Plassas and roadman's houses.

These processes translate into the formal and architectural principles of a kit at the service of the countryside and of its public spaces: devices that are completely adaptable to the place and reversible, small volumes, platforms and multifunctional walls, thus contribute to enrich the network. New spaces for events and experiences, collective and recreational spaces to stay, equipped with

"niche-volumes" and "shelter-volumes" for people and for gentle mobility means; the multifunctional walls along the existing windbreaks define a spatial reconfiguration and potential use façade, new accesses, thresholds which create relationships between spaces and spatial transitions, areas to rest and to selectively contemplate the context. All these elements/objects which populate the countryside can evolve and adapt through time assuming a clearly greater value in hospitality terms. This design approach acts according to a principle of capillarity, of percolation between the existing weaves, with the goal of building and/or re-building a structure of public spaces as an integration of the complex private and production network.

In this regard, the farm can represent the decisive factor for the construction of a rural multifunctional network. In particular, the project focused on the network of farms established by ETFAS. The regular mesh of the "appoderamento" and the proximity solutions of the farms offer the possibility of discovering the theme of the agricultural district which opens up to multi-functionality, with the intent of verifying the capacity of architecture to transform these spaces. The project explores the definition of an enclosure-wall as an element of spatial appropriation which marks and consolidates the presence of the farm in the territory, relying on the contemporary reinterpretation of an archetype of the land protection farmhouse. The intention is not to introduce an additional degree of urbanity, but rather to ensure a better permeability between inside and outside, defining a "light" perimeter which is completely reversible with respect to the "hard core" inside the farm. The idea is that the enclosure has a "thickness" which can be used to create new multifunctional spaces for the farm and generate a new interface with the public space.

The minimum unit of the enclosure is the rural kit (in its variant for supporting the farm), i.e. a number of devices which are capable of introducing new spaces for different uses. The rural kit consists of simple and self-constructable elements: a base platform, a roof, a continuous wall and a slat wall through which the composition is capable of articulating the parts of the enclosure. These elements combine two aspects, self-construction and the definition of a coordinated image of the farm. The kit aims at reducing the heterogeneity which is usually related to the current forms of self-construction, connecting it to a common image of the farm and of the potential rural district. The modularity of the elements of the kit define spaces with different permeability, open to the uses of contemporary hospitality (short stop for lunch), micro-commerce (selling products of the farm) and energy production (integration with micro-wind turbines and solar panel systems). The project, in

this way, searches for a sustainability model based not only on the recyclability of materials and on their reversibility, but also and above all on a cultural sustainability which challenges the themes of the self-production and self-construction of the building elements with an active community engagement.

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Smart Tourism Governance for Urban Bioregion: An Evaluating Approach to the Relationship between Coastal and Inland Areas of South Sardinia

Alfonso Annunziata, Giulia Desogus, Chiara Garau

Abstract

In recent years, the governance of smart tourism has been radically changed from a strictly technological approach to one that highlights the issues of place. This has led to the definition of territorial ecosystems, not necessarily linked to administrative boundaries, but which can be linked to the urban bioregion. The latter in fact allows for a polycentric organization of the tourism structure based on small territories, identified through the study of the relationships between human settlement and the environment. This polycentric bioregional approach is even more significant in island contexts that by their geographical configuration have natural and demographic disadvantages. The aim of this chapter, with this background, is to frame the concept of smart tourism in an island bioregion as a possible development approach for inner areas through linking tourism goals with coastal areas. To this end, the authors, starting with a theoretical discussion of the relationship between smart tourism and urban bioregion in an island system, analyse the historical region of Sulcis Iglesiente, characterised by a complex infrastructural and urban system polarized around two major centers (Carbonia and Iglesias). Smart tourism emerges as a central aspect of policies aimed at countering depopulation, social exclusion and economic depression in less developed inner areas. The methodological approach used combines geo-spatial analysis and spatial syntax techniques to describe in quantitative terms the distribution of cultural heritage components, relevant habitats, opportunities for recreational activities, tourism-related services and accessibility conditions. The paper concludes by identifying patterns of centrality and integration that can enhance tourism potential in an island bioregion.

KEYWORDS: Urban Bioregion; Smart Tourism; Space Syntax Analysis; Smart Governance

1. Introduction

The quality of tourism as a factor capable of improving the economic growth, employment and social development of member countries is increasingly in the interest of European politics, especially after the further stoppages due to the Covid-19 pandemic (ZHANG AND YANG, 2016; PILLMAYER, M., ET AL., 2021).

Over the last fifteen years, rapid technological development has introduced attention to smart tourism management capable not only of measuring and evaluating existing data, to offer the user an easier and faster type of tourism through smart end-user applications; but also, to improve the economic potential and the social and experiential aspect that the city could offer (GRETZEL ET AL., 2015; BUHALIS AND AMARANGGANA, 2014). The concept of smart tourism has changed over time: in the 2000s a holistic vision prevailed, in which it is seen as a smart set of demand, use and management of demand techniques and marketing techniques. Subsequently, an ethical vision reformulated the concept of smart tourism where it is considered as a form of profound civic engagement (LI ET AL., 2017). Recently, smart tourism is strongly connected to the idea of smart destination and more generally of Smart Cities, smartphone apps, smart cards, smart people-citizens, Augmented Reality (AR), and personalized experiences (GAJDOŠÍK, 2018; BARALLA ET AL., 2021). Smart tourism is a critical element of the smart cities' strategies and it is based on the integration of data on tourist activities, the consumption of products and cultural and social resources (ZHANG AND YANG, 2016; DIAS ET AL., 2021), by favouring new market conditions through dynamic mechanisms of choice of destination, also made possible by ICT. In this regard, the World Tourism Organization (UNWTO) - the United Nations agency responsible for the promotion of responsible, sustainable and universally accessible tourism – underlines in 2018 the need to define a tourism governance that has as its objective the search for smart destinations that connect routes based both on the inclusion of local communities and on the information to be given to tourists (UNWTO, 2018).

This underlines the need to think about three factors, closely linked to each other, fundamental for smart tourism: the first are local businesses that "should take a more proactive approach by integrating recently developed technologies into their daily business functions, eventually incorporating ICT into their business mission" (LAW ET AL., 2014). This, as GRETZEL ET AL. (2015) underline should support the exchange of tourism resources to improve the tourism experience. The second crucial factor for smart tourism is the tourist experience connected to the tourist himself. In fact, over the years, tourists have changed

their behavioural approach in choosing destinations. Through the use of their personal technologies, they not only organize the best experience, but also, they choose the best destination in terms of ease of travel, booking and services. The third factor is the smart destination that "facilitates the visitor's interaction with and integration into his or her surroundings and improves the quality of the experience at the destination as well as residents' quality of life" (IVARS-BAIDAL ET AL., 2021; 9).

These three factors are part of a tourism ecosystem (PERFETTO ET AL., 2018; GRETZEL ET AL., 2015; ZHANG ET AL., 2012), linked to the concept of smart tourism which, as GAJDOŠÍK (2018) supports "it is based on the idea that nothing works individually, but it interacts within the ecosystem to evolve" (GAJDOŠÍK, 2018, 27).

Smart tourism, therefore, is no longer linked only to the use of technologies, big data and city dashboards but also to the definition of territorial ecosystems, not necessarily linked to administrative limits, on which to apply policies aimed at smart tourism. Indeed, "administrative divisions may be misleading as a unit of decision making for tourism planning and management, since they may comprise several areas with different tourism functionality" (HERNÁNDEZ-MARTÍN ET AL., 2017, 43). The identification of appropriate place-based areas, managing and governing smart tourism policies can (i) favor the development of the economy even for small businesses outside the city of arrival (factor 1), (ii) improve the tourist experience (factor 2), (iii) increase the knowledge of places that are not yet purely touristic and their infrastructural planning (factor 3).

The authors identify in the bioregion, a possible place-based area for a smart tourism governance because "the bioregional vision directs the action of policies and the territorial project from the category of attractiveness to that of hospitality, aimed not only to external users but, also and above all, to permanent residents" (FANFANI, 2014, 82). In addition, tourism planning on a bioregional scale allows an organization of the tourist facility based on small local areas, identified through the study of the relationship between human settlement and the environment (MAGNAGHI, 2014; COLAVITTI, 2020). In fact, the same constitutive elements of the bioregion allow to identify dynamics of tourist increase linked to the culture of the place, to society and to the economy, through the enhancement of heritage in the tourist/user circuit and access to the territory (BUDONI, 2018; MAGNAGHI, 2020).

In particular, the authors identify the bioregion of Sulcis Iglesiente in the south-west of Sardinia (Italy) as case study. This choice is particularly emblematic because, on a regional scale, it is linked to the concept of insularity

and its non-homogeneous development between stronger coastal areas and weaker inland areas (COLAVITTI, ET AL., 2019).

Within this framework, the aim of this chapter is to highlight the importance of smart tourism governance for an insular bioregion as a possible development approach for inland areas through the connection of tourism objectives with coastal areas. To do this, this chapter begins with a theoretical discussion on the relationship between smart tourism and urban bioregion in an island system. The authors highlight how on an island context the concept of bioregion could play a pivotal role for the development of inland areas through integrated smart tourism and territorial planning policies (paragraph 2). In support of these reflections, the authors focus on the theories of bioregionalism linked to the polycentric system of settlements and urban centralities as a possible concrete application to island territories. Subsequently, a method for the quantitative analysis of the smart-tourism potential is presented and applied to the case study of the Sulcis Iglesiente region. The methodological approach combines geo-spatial analysis and space syntax techniques to describe in quantitative terms the distribution of components of the cultural heritage, significant habitats, opportunities for leisure activities, tourism-related services and the conditions of accessibility. The methodological framework is presented in section 3, and the findings from the analysis of the area of study are presented and discussed in sections 4 and 5. Finally, section 6 shows the results of the research.

2. The relationship between Smart Tourism and Urban Bioregion in an island system

Island systems have serious and permanent natural and demographic disadvantages for which they deal with greater challenges to reach the socio-economic development levels of non-island territories (GARAU ET AL., 2020a). However, if on the one hand the structural disadvantages are limits for the island contexts, on the other they offer an opportunity to rethink the territory (GARAU ET AL., 2019; 2020B). In fact, the insular context allows to generate conditions of internal social and economic network to improve the daily comfort and the quality of life of the users of the island territory or parts of it. In an island region, territorial development becomes even more important for the difference between coastal and inland areas, for the limited amount of usable land, for the historical dynamics between city and countryside and above all for the limited and seasonal nature of the markets that enjoy a single economic sector, tourism, which represents the main source of income (BOOTHET AL., 2020; CROES ET AL., 2018; SANTANA-GALLEGO ET AL., 2011; BUTLER ET AL., 2017). Indeed, "an

island is an ecologically isolated self-contained territory with a principal and network of smaller cities and villages. In many islands, in recent decades, tourism has formed the main source of income" (DOMINGUEZ ET AL., 2017, 236).

In order to favour long-term sustainable development, in these contexts, it is therefore necessary to focus on a governance system aimed also at encouraging active tourism (ARAÚJO VILA, 2020), by triggering dynamic relationships in the various poles of interest between coastal areas and inland areas, and by focusing on actions aimed at the place-based enhancement. For this reason, the planning and implementation of tourism policies should be defined at the most appropriate territorial level. For selecting the appropriate territorial level within an island, a polycentric system based on bioregional borders could favour the socio-economic development of the entire region starting from the analysis of the functionality of urban settlements and their interconnections within the bioregion.

The definition of an urban region is "a set of strongly anthropized local territorial systems, interrelated with each other by environmental relations characterizing a bioregion (a valley system, an orographic node, a hilly system, a coastal system and its hinterland, etc.) and characterized within them by the presence of a plurality of urban and rural centers" (MAGNAGHI, 2014, xi). This definition leads to reflect on the bioregional approach as a planning and land management tool that plays an important role not only in the city-countryside relationship (DUŽÍ AND FANFANI, 2019) but, above all in an island system, between coastal and inland areas. This relationship in a bioregionalism vision is outlined by a socio-economic and political system that aims at a "co-evolutionary balance between human settlement and the environment" (MAGNAGHI, 2018, 29). From this point of view, the planning system of an urban bioregion, in literature is linked to a polycentric settlement model (DUŽÍ ET AL., 2019; GOESS ET AL., 2016), suitable for managing in social and productive terms the relationship between the urban system and the environmental structure of the surrounding bioregion (FANFANI, 2018). Furthermore, the environmental contexts on which the bioregion is based have "generated long–lasting structures that altogether serve as the starting point for bioregional territorial planning and a new balanced polycentric urban system" (DUŽÍ AND FANFANI, 2019, 5).

Indeed, "cooperative behaviour between the cities of a polycentric urban region as a form of regional governance can also increase the region's functional character, and thus allow to act in a more concerted way to address intra-regional governance" (GOESS ET AL., 2016, 2039). In its bioregional value, the polycentric system can develop a network of systemic connections that can radically change

the socio-economic and productive aspect of the area concerned, while still respecting the historical and environmental ties that it has created over time.

Within this system, smart tourism becomes "a characteristic voice of the socio-economic profile of the urban bioregion" (FANFANI, 2014, 82), through the activation of new communication networks within an ecosystem formed by smart technology infrastructure, digital business and smart tourist destinations. In an island context, characterized by a strong socio-economic inhomogeneity between coastal areas and inland areas, the formation of a polycentric tourist structure has a stronger value for the creation of a homogeneous development for evaluating the characteristics of the coastal areas, by balancing internal dynamics.

For understanding how a good governance on smart tourism can balance the gap between zones in an insular context, the authors decided to take Sardinia as a case study, particularly emblematic for its morphological, political and social characteristics that are resulted over time, into strong geographical and economic disparities between coastal and inland areas. These disparities led to the identification of major hubs with high capacity for growth and attractiveness, and of less developed hubs (GARAU ET AL., 2020A). Furthermore, Sardinia presents a considerable variety of structural and settlement contexts, linked to: 1) demographic concentration in coastal areas that causes serious dysfunctions of the local economy which, especially in the case of inland areas, distorts the structure and spatial distribution of the market of work and employment; 2) the lack of infrastructure and access to services in smaller centers (DESOGUS, 2016; CRENOS, 2018; STRATEGIA NAZIONALE PER LE AREE INTERNE, 2019); 3) the absence of a social and economic cohesion policy between the island's centers which makes possible to enhance the different peculiarities of the coastal areas and counteract the inefficiencies of inland areas, while involving the entire regional territory. In fact, within the European Union funding programme 2014-2020, Sardinia, together with Abruzzo and Molise, belongs to the Italian regions that encounter great difficulties in promoting the economic and social development of inland areas.

In particular, this chapter analyses the possible dynamics of tourism development in the Sulcis Iglesiente bioregion. This is done to understand how the implementation of a polycentric tourist network can favour cooperation between inland and coastal areas in the bioregion, taking into account the socio-economic relations between these centers.

3. Research methodology on evaluating to the relationship between coastal and inland areas of the bioregion of Sulcis Iglesiente (Sardinia, Italy)

The historical region of Sulcis Iglesiente is selected as the area of study (Figure 1). The Sulcis Iglesiente region emerges as a heterogeneous landscape system, characterised by the complex infrastructural and urban system, inherited from its industrial and mining past, polarized around the major urban centers of Carbonia and Iglesias, by components of a cultural heritage incorporating significant testimonies of the Nuragic, Phoenician Punic, roman, medieval and modern era, and by a multifunctional ecological network incorporating areas of high naturality, natural reserves, Site of Community Importance, important plant areas and Special Protection Areas.

As a consequence, smart-tourism emerges as a central aspect of policies aimed at contrasting depopulation, social exclusion and economic depression.

The analytic method is aimed at the quantitative description of the potential of a bio-region in terms of promotion of smart tourism. The analysis is articulated on six steps: I) identification of the area of study; ii) definition of the unit of analysis; iii) definition of categories denoting specific dimensions of the bio-region potential; iv) identification of available databases; v) definition of pertinent sub-indicators and of functions for normalizing and aggregating individual sub-indicators into category indicators and into a synthetic index of the Bio-region smart tourism potential (I_{SMART}); vi) data collection, calculation of sub-indicators, normalization and determination of category indicators and of a synthetic index of the bio-region smart tourism potential. (I_{SMART}).

The unit of analysis id represented by the cell of 1000 meters per side of a regular grid overlaid to the area of study. The cell size is selected based on two criteria: ensuring the adequate resolution of the description of the area of study, and reducing time-consumption and computation power required by the procedure. The categories identified refer to the six dimensions of natural potential, cultural potential, potential as a destination, potential as a central space, recreational potential, infrastructural potential. The natural potential refers to the distribution of components of the ecological infrastructures and is determined as the ratio of the individual cell comprising a habitat or area of community interest and the density of point components of the ecological and geomorphological structure.

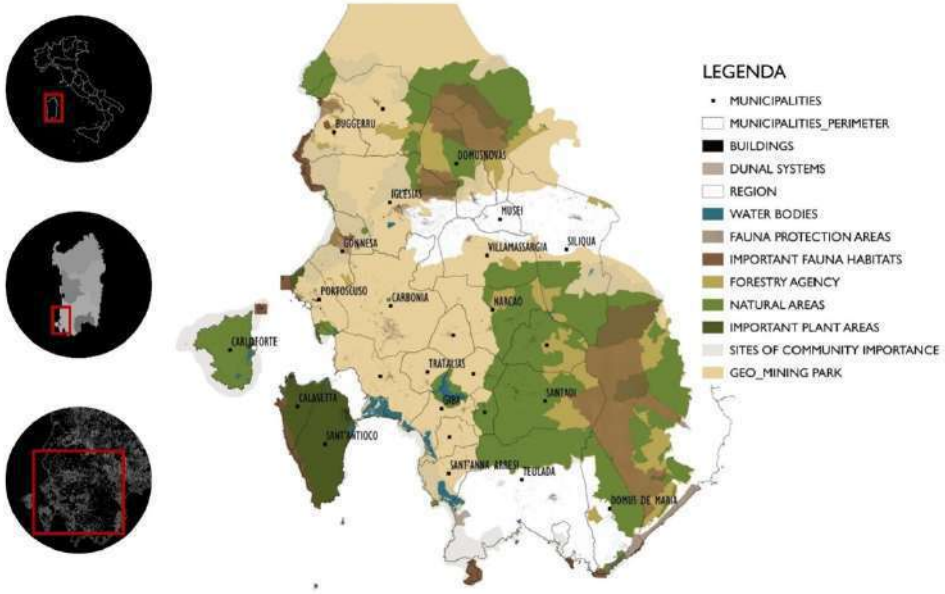

Fig. 1 - The Area of Study: The Sulcis Iglesiente Region in South-west in Sardinia (Italy)

The types of area are based on categories identified by the Regional Landscape Plan of the Sardinia Region. Pertinent data are retrieved from the territorial information system of the Autonomous Government of the Sardinia Region. The types of area considered include: areas at elevation superior than 900 meters; historical salt flats; important plant areas; important fauna habitats; area managed and protected by the regional forestry agency; density of natural caves; areas of fauna protection; regional and national parks and reserves; areas of special protection; sites of community importance; dune systems; coastal buffer zones, natural and artificial water basins. A further element considered, is the inverse of the density of road segments. Road density is considered, in fact, as an indicator of the negative influence of urbanization and anthropic practices on ecological structures.

The cultural potential refers to the presence of significant tangible cultural components. It is determined by the density of point components of the cultural heritage, of museums, and by the ratio of cells surface area comprised into abandoned mining sites, or into the historic nuclei of urbanized areas. The potential of the individual cell as a destination and its potential as a central place, refer to the configurational properties of road infrastructures across the area of

study. Configurational properties determine the conditions of access of the locations, represented by the square grid cells, of the Sulcis Iglesiente region. Configuration, in fact, refers to the set of spatial relations among parts that are interdependent and embodied in an overall structure.

Distance, conceptualized in metric – Euclidean distance – topological – the number of intermediate spaces between any origin and destination spaces – and angular terms –the sum of angular deviation along the path from an origin space to a destination space – emerges as the fundamental relation. The potential of a space as a destination is measured in terms of its integration, thus, in terms of its distance from any other space comprised in a specific spatial structure. The potential of a location as a central space, is determined as a function of angular choice: choice measures, in fact, the probability that a location is comprised in the shortest path from each space to any destination space. Both choice and integration variables can be calculated at based on a specific radius distance. Setting a radius distance implies that topological and spatial relations are calculated considering spaces comprised within a predetermined range from a specific origin space.

As a consequence, the potential of a location as a destination and its potential as a central space are determined, for each cell, as the normalized mean of the product of the values of the configurational variable calculated at radii 2000, 6000 and N.

The recreational potential of the individual cell refers to the density of touristic points of interest (POIs). POIs include a set of coastal locations, and of sites relevant for their archaeological, historic, aesthetic importance. Lastly, the infrastructural potential refers to the equipment of a location in terms of accommodation facilities, services, bus stops, train stations, parking areas, ports.

Category	Environmental Component	Sub indicator	Formula
Natural environment components	Historical salt flats	R_Salt	A (Salt)i/ ACi A(Salt)i = Surface area of historical salt flats in Cell i-th; ACi= Surface area comprised in cell i -th
	Areas at elevation > 900m	R_900	A(900)i/ACi
	Natural Caves	D_Cav	N(Cav)i/ACi
	Important Plant Areas	R_IP	A (Plant)i / ACi
	Important fauna habitats	R_Hab	A (Habitat)i / ACi

	Areas managed by the regional forestry agency	R_For	A (For)i / ACi
	areas of fauna protection	R_Fauna	A (Fauna)i / ACi
	Regional and national parks and reserves	R_ Res	A (Res)i / ACi
	Areas of special protection	R_ZPS	A (ZPS)i/ ACi
	Sites of community importance	R_SIC	A (SIC)i / ACi
	Dune systems	R_DS	A (DS)i / ACi
	Coastal buffer zones	R_CB	A (CB)i / ACi
	Natural and artificial water basins	R_Bas	A (Bas)i/ACi
	Road Density	RDI	1-[L (R)i /ACi]
Indicator			
Natural Potential		N_POT	(N_POTi – NPOTmin) / (N_POTmax – N_POTmin) N_POTi = (R_900 + R_Salt + R_IP + R_Hab + R_For + D_Cav + R_Fauna + R_ Res + R_ZPS + R_SIC + R_DS + R_CB + R_Bas + RDI)
Cultural Heritage	point components of the cultural heritage	D_CH	N_CH_Pts_i / ACi
	Museums	D_Mus	N_Mus_i/ ACi
	Nuclei of original urbanization	R_NOUrb	A_(NOUrb)i/ACi
	Areas of the Geo-mining park	R_GMP	A (GMP)i / ACi
Indicator			
Cultural Potential		C_POT	(C_POTi - C_POTmin) / (C_POTmax - C_POTmin) CULT_POTi = (D_Ch_i + D_Mus_i + R_NOUrb_i + R_Min_i)
Destination Potential	Road infrastructure	INT	(A_INT 2000*A_INT_6000*A_INT_N) A_INT_2000= Segment Angular Integration Radius = 2000 m A_INT_6000= Segment Angular Integration Radius = 6000 m A_INT_N = Segment Angular Integration Radius N

Central location potential	Road Infrastructure	NACH	(NACH_2000*NACH_6000*NACH_N) NACH_2000 = Normalized Angular Choice Radius = 2000 m; NACH_6000 = Normalized Angular Choice Radius = 6000 m NACH_N = Normalized Angular Choice Radius = N
Recreational Potential	Points of Interests (POIs)	D_POIs	N_POI_i / ACi
Infrastructure	Accommodation	D_ACC	N_Acc_i/ACi
	Bus Stops	D_BS	N_BSi/ACi
	Train Stations	D_TS	Dist_Ts < 500 m = 1 500 m < Dist_TS < 2500 m = 0.5 Dist_TS > 2500 m = 0
	Parking Areas	D_PA	N_PA_i/ACi
	Ports	D_Por	N_Por_i/ACi
	Restaurants	D_Rest	N_Rest_i/ACi
Indicator			
Infrastructural Potential		IN_POT	(D_ACC+D_BS+D_TS+D_PA_+D_Por+D_Rest)
Bio-region smart tourism potential.		($I_{\_SMART}$).	N_POT+C_POT+INT+NACH+D_POI+IN_POT

Category indicators are calculated as the sum of individual sub-indicators. The aggregation of different variables requires the definition of normalization functions to convert heterogeneous variables in quantitative homogeneous terms. Individual sub-indicators are normalized via sigmoidal functions, and expressed by values ranging from 0 (worst condition) to 1 (ideal condition). Given a sub-indicator i, and calculated its value Vi, the sigmoidal function is:

$$Vi_{norm} = (Vi - Vi_{min}) / (Vi_{max} - Vi_{min})$$

Category indicators are then normalized, via a sigmoidal function and aggregated into the synthetic index of the bio-region smart tourism potential. ($I_{\_SMART}$).

The results obtained from the utilization of the analytic method are presented and discussed in the sub-sequent sections.

4. Results

The results reveal a distribution of the smart tourism potential defining a reticular pattern polarized around main urban centers (Carbonia, Iglesias, Portoscuso, Sant'Antioco, Carloforte) and along coastal areas. In particular, Sant'Antioco and San Pietro islands emerge as relevant sites for smart tourism, revealing a particular combination of areas of ecological and environmental significance – including important plant areas, areas of fauna protection, sites of community interest - tangible testimonies of a unique cultural heritage, and density and diversity of POIs.

Relevant spots are represented by the localities of Santadi and Pantaleo, in the internal area, and are determined by the significant natural potential, resulting from the concentration of regional reserves, areas managed by the Forestry Agency, Sites of Community interest, areas of fauna protection. A vast area, along the southern coast, reveals a marginal smart tourism potential, despite the presence of relevant point of interests, including Chia and Domus de Maria.

In detail, the natural potential, or the ecological significance of an area, is relevant along coastal areas, in the islands of San Pietro and Sant'Antioco, and, in particular, in the internal areas comprised in the Linas-Marganai Regional Park, in the areas of fauna protection of Monte Arcosu and Is Cannoneris, and in the Sulcis Regional Park. The Sant'Antioco island, in particular, is listed as an important plant area. The Normalized Difference Vegetation Index, an a-dimensional variable indicating the vegetation density on an area, underlines the ecological significance of the core areas of the Linas-Marganai Park, of the Monte Arcosu and Is Cannoneris reserves and of a further area, adjacent to the Barbusi reserve.

The analysis of the cultural potential reveals a concentration of localities relevant in terms of density and diversity of tangible components of the cultural heritage in the island of Sant'Antioco, around the village of Carloforte, and along a linear system of urbanized nuclei, polarized around the centers of Gonnesa, Bacu Abis, Iglesias, Carbonia, Tratalias and Giba. This system of areas of cultural significance incorporates the Eneolithic and Neolithic necropolises of Marchiana and Montessu, the Nuragic sites of Seruci, Monte Sirai, Is Collus, the Phoenician – Punic sites of Monte Sirai and Sulci, and the roman-age settlements of Sulcis Iglesiente.

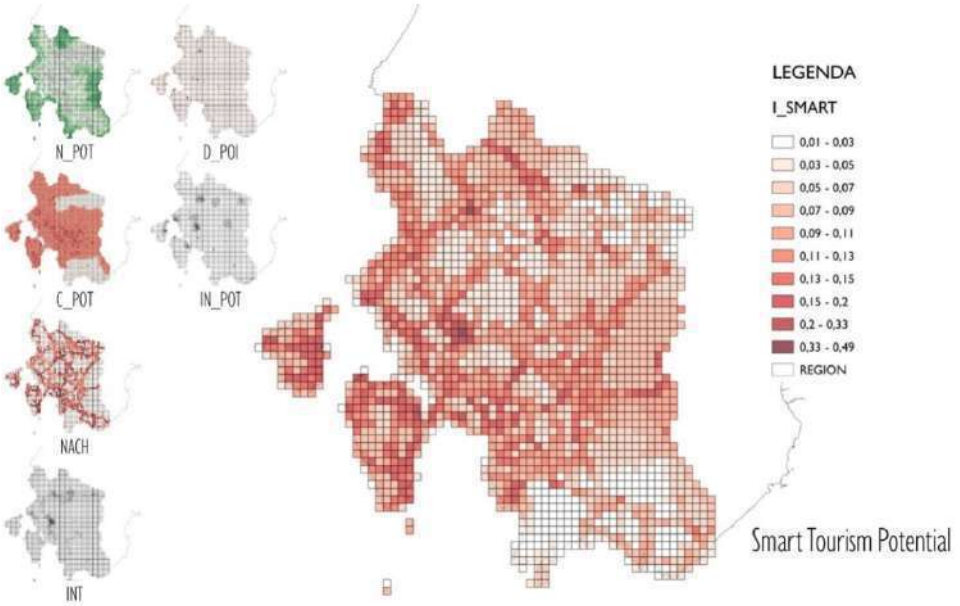

Fig.2 - Distribution of values of the I_SMART indicator across the area of study

The distribution of the values of the potential as a central place indicator, based on values of angular segment choice, underlines the emergence of areas adjacent to road infrastructures, and in particular of areas along national roads 130, 126, 195 and 293, and along provincial roads 2, 85, and 107. The distribution of the values of the potential as a destination, based on the configurational variable of normalized angular integration, underlines the urban areas aligned along the national roads 126 and 130, including the municipalities of Domusnovas, Iglesias, Gonnesa, Portoscuso and Carbonia.

The quantity of POIs is modest. The distribution of destinations defined as significant for tourism underlines the emergence of the historic districts of the municipalities of Iglesias and Sant'Antioco, the coastal area in the municipalities of Gonnesa and Calasetta. Lastly, the infrastructural potential of the area of study, determined by the distribution of accommodation facilities and nodes of the transport system, reveals the concentration of infrastructure and services in urbanized areas - including the municipalities of Carbonia, Iglesias, Portoscuso, Carloforte, Sant'Antioco – that comprise the linear settlement system extending along the infrastructural bundle formed by the Railroad and by the national roads 130 and 126. Moreover, the distribution of the values of the infrastructural potential indicator confirms the existence of a central void, delimited by the

municipalities of Narcao, Villamassargia, Iglesias and Carbonia, and of a meridional void, delimited by the localities of Chia, Narcao and Porto Pino, hence of areas revealing a marginal smart tourism potential.

The results presented in this section, and their implications in terms of perspectives for policies of development of smart tourism, are comprehensively analysed and discussed in the subsequent section.

5. Discussion

The analysis of the smart tourism potential of the Sulcis Iglesiente bioregion results in several relevant considerations. Firstly, the emergence of a reticular pattern, revealing a relevant density and diversity of POIs, cultural components and natural areas, along the irregular grid of road infrastructures and of urbanized areas. The deformed T-structure intersecting the municipalities of Iglesias, Gonnesa, Carbonia, Portoscuso emerge as a central system. The V structure including Calasetta, Sant'Antioco and the coastal area of Maladroxia and the Y structure in the island of San Pietro, including the localities of Le Tonnare, Capo Sandalo, Carloforte and the coastal area of La Bobba constitute further relevant territorial system in terms of smart tourism development. A complementary consideration concerns the mergence of vast voids, hence of areas revealing a marginal potential, comprising the internal areas delimited by the reticular system of road infrastructures and denser urbanized areas. These voids partly coincide with the peripheral areas comprised among the municipalities of Iglesias, Musei and Domusnovas, with the undulating areas delimited by the municipalities of Narcao, Villamassargia, Iglesias and Carbonia, and with the meridional areas, around the municipality of Teulada and the military base of Capo Teulada.

A further consideration, regards the diversity of natural, cultural, land-use components of the area of study, resulting in the suitability of the Sulcis Iglesiente bioregion for the implementation of policies for the development of smart tourism. In particular, the analysis reveals the centrality of the infrastructural system extending in the plain areas – and determining the reticular pattern –as a structure defining corridors for the intensification and implementation of policies of re-development and regeneration of the area of study. In particular the disused infrastructural system, related to the dismissed mining and industrial plants, comprising railroads, secondary and local roads, intersecting the internal areas are an opportunity for the construction of a dense system of greenways and of paths for soft mobility. Moreover, the disused

building stock, associated to the industrial past of the region, represents a significant opportunity for the intensification and distribution of services and facilities instrumental to support smart tourism and eco-tourism and to reduce the condition of segregation of the population resident in the dispersed settlement system of the internal undulating areas.

A further consideration concerns the need to implement the territorial information system for supporting research and policy development related to smart and eco-tourism. The construction of informative layers based on databases respondent to criteria of currency, consistency, completeness, and accuracy of data is relevant to facilitate the analysis of the bioregion, the definition of policies and for supporting tourists' experience: on the one hand, the availability of complete, consistent and accurate data support scholars, professionals and decision-makers in the development of territorial analysis and in the identification of the resources and criticalities of a region. On the other hand, territorial data can be utilized to structure web-Gis applications, so as to provide users with tools for retrieving information and visualizing multi-medial content related to the natural and cultural components of the bio-region landscape, for route planning and for finding services, amenities and POIs.

6. Conclusions

The objective of the study presented in this chapter is to frame the concept of smart-tourism within the context of the discourse on the bio-region. More precisely, this study proposes a method for the analysis of the multi-functionality of a landscape, resulting in opportunities for the development of a holistic form of tourism, based on leisure activities, and on the experience of aesthetic values, formal and informal environmental education, spiritual and religious values, cultural diversity, systems of knowledge, social relations and sense of place embodied in historically important landscapes and culturally significant species. The proposed method produces a quantitative description of the bio-region landscape aimed at underlining the distribution of the components of the cultural heritage, natural areas, significant habitats and ecosystems, points of interest, infrastructure, services, and at underlining criticalities, represented by segregated areas. The application of the proposed analytic method, thus fulfills the objective of increasing the understanding of places and of supporting territorial and infrastructural planning. Planning actions informed by geographical knowledge are, in turn, the precondition for promoting the development of the tourism related service economy in peripheral areas and, as

a consequence, for improving the tourist's experience. The relevance of the proposed method is twofold: First, it enables a synthetic, understandable description of a bioregion, central to the identification of strengths and of emerging criticalities, and, consequently, central to the definition of criteria and objectives of policies of sustainable development and of strategies of territorial planning. In particular, the analysis of the Sulcis Iglesiente bioregion results in the identification of a pattern of smart tourism potential, or attractiveness, determined by the emergence of specific corridors, characterized by high centrality, integration and density of areas of environmental and cultural importance. Second, the proposed method introduces space syntax techniques in the analysis of a bioregion, so as to identify patterns of centrality and of integration.

The calculation of the configurational variables of integration and choice results, in particular, in the recognition of the infrastructural system as a fundamental structure for the organization of the territory. Most central and integrated road infrastructures, thus individuate privileged corridors for the location of new hospitality facilities and tourism and travel related services.

The validity of the proposed approach depends on the quality of available data, and, more precisely, on their uniqueness, accuracy, completeness, consistency, currency, timeliness. In particular, data retrieved from open-source databases and from the territorial information system, are often redundant, inaccurate, incomplete, and outdated, in particular with regard to the presence and location of hospitality facilities and tourism related services.

The future development of the research will focus on four aspects: i) the calculation of indicators of diversity of POIs and of components of the cultural heritage; ii) the determination of weights, based on experts' and stakeholders' assessment, so as to take into account the relative importance of different types of tourism related service; iii) the integration of the analysis of the recreational potential of individual units of analysis via the evaluation of the frequency of related geo-referenced social media posts; iv) the definition and analysis of design scenarios.

As a result, the enhancement of techniques of spatial analysis is central to support decision-making processes and offer insight on the factors affecting experience and patterns of behavior of the different populations of a bioregion. In this respect, an improved analytic tool could be a relevant framework for strengthening territorial policies and governance, and planning actions related to the development of smart-tourism service industries.

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A possible network of agreement for Santa Gilla lagoon in Cagliari

Michela Mascia

Abstract

The transformation of the spaces shown in peri-urban and infra-urban contexts, invested by planning processes conducted purely with the criteria of economic growth and disconnected from territorial resources, is the tangible sign of the phenomenon of deterritorialization which has intervened to sever the connection between the city and the territory between man and the place.

The isolation of natural areas, the weakening of the local production-consumption system, the exposure of the territory to new unfamiliar functions are elements that can be identified in the area of Cagliari, specifically on the soils between Santa Gilla lagoon and the urban centre of the metropolitan city.

The analysis of the case, conducted in the context of a degree thesis, has developed the awareness of the need for a bioregional planning approach, capable of intervening on the physical space with involvements that integrate resolutive actions of the social, economic, and cultural problems linked to the deterritorialization, according to the orientation indicated by the Europe 2020 strategy.

This approach led to a design outcome focused on the lagoon contract, through which we intend to configure a landscape reconstruction path that redefines the shape of a peri-urban territorial public space, maintaing the nature of the place and, at the same time, carrying out innovative services for the city. In order to pursue a long-term vision, a network of interventions is thus defined which, through the redesign of abandoned areas and the redevelopment of marginal ones, defines the uses of the land and suggests new functions that meet the objectives identified in the contract. These are interventions that aim to create points of contact between two dinstinct and separate entities, as they are at present, city and lagoon, not only in space and physical terms, but through a series of intangible actions that contribute to the construction of the landscape.

KEYWORDS: contract of lagoon, bioregion, network of agreement

1. The bioregion: an alternative and sustainable territorial strategy

The city consumes the territory. It steals the soils from long-standing uses that over time have allowed the preservation and functioning of the landscape, due to the human need to live close by the most attractive centres, when living in the centre itself becomes unsustainable. It fragments the spaces for the human need of large-scale displacements that a monocentric system entails. In this fragmentation, the natural element, not functional to the urban machine, finds its physical isolation and moves away from collective reach, with consequences of abandonment and failure to recognize the essential role it plays in improving the quality of life.

The displacement of man from the territory, from physical becomes cultural. In addition to the interruption of the ecosystem network and the settlement of unsustainable models (which consume soil, energy, material resources and produce pollution) and lacking the civic dimension of the city, the community loses recognition of its local identity, which is the reason of care of the locations. A loss that leads to the abandonment of the local economy and rural territory, replaced by the consumption of foreign products. A process that reduces the local economic power and exposes the soils to new uses, based on the economic statement of a few to the detriment of the environment and the community, and indeed increasing the subtraction of the territory from the reach of its inhabitants.

The bioregion, even before defining itself on the place, is therefore based on a reconsideration of the economic system, by supporting the local economy of the territory, whether existing or to be restored which is linked to the territory itself and its resources. An economy therefore strongly contextualized and unavailable elsewhere. An economy capable of putting the character of the places at stake and thus assuring their duration and proper functioning.

The urban bioregion is therefore designed for those who make the local economy, and who are directly involved by becoming actors in the construction of the bioregion. A system, in which citizens and local economic actors can intervene, in decision-making terms, in the reconstruction of a place, becoming owners of the place itself, intended as a "common good" (MAGNAGHI, 2014).

The bioregionalistic space is therefore a territorial area, in which the natural element characterizing and structuring the territory, or the agricultural system, relates to man and urban centres, through its enhancement and its placement in an economic framework, capable of respecting its characters and safeguarding it. A territory that therefore rediscovers its own geographic, historical and

cultural identity, in which the local community can "re-inhabit-the-place" (BERG, 1978).

In a society where everything is consumption, it is necessary, through the bioregion, to produce new suburban realities in which the agro-environmental safeguard, the eco-landscape requalification and the use of public territorial spaces, constitute an innovative way of "consuming" the territory, which does not tend to waste the resources, but rather guarantees their protection and promotes local economies. New realities not in contrast with the natural element and the rural system, but capable of preserving the forms of the non-man-made territory, and at the same time giving new forms and meanings to the urban boundaries.

It becomes clear that this direction in planning processes can have very different outcomes, depending on the reference context, and in particular depending on the relationship of the territorial space with the urban centres, and on the size of the latter. They exist also conditioned by the type of economic activities to be exploited (agriculture, fishing, tourism) and by the possibility of relating them to territorial settlements, pursuing a sustainable integrated development.

The River Contract constitutes an operational instrument of territorial governance, capable of giving substance to the bioregionalistic thought and the desire of reterritorialization that some places express, especially those in which there is an invariant characterizing structural landscape, felt by the community and which is configured throughout history as a leading element in the evolutionary processes of that territory (BASTIANI, 2011).

The aims pursued by these types of planning support tools, are linked to both the reduction and prevention of hydraulic risk and to the enhancement of the river asset with actions aimed at protecting the environment and biodiversity. Thus increasing usability, spreading local culture, the promotion of sustainable tourism in alternative to the predominant formulas, initiatives for social inclusion and cohesion, and the economic support of local production activities not in conflict with environmental sustainability objectives.

Even though the contract was created to improve the management of the water resource and protect its quality, it was later constituted as a multi-objective and transdisciplinary tool, which pursues landscape redevelopment, local development, social inclusion and collective participation in decision-making processes.

The promiscuity of objectives promotes planning of the physical space, which through redevelopment of the places affected by the presence of water, enhances economic activities in harmony with the environment, creates spaces

of public utility and reconnects man with the environment. An approach in line with the Europe 2020 Strategy, which integrates space interventions with resolving actions of social, economic and cultural problems linked to de-territorialisation.

In the urban context, river contracts can provide the city with naturalistic spaces, constituting a polyvalent and multifunctional ecological network legible on a large scale, in which the water element constitutes the founding structure upon which the territorial space can be reorganized, connecting fragmentary elements of different nature (settlement, infrastructural, environmental) and, at the same time, proposing itself as a cultural identifying factor.

2. About the lagoon of Santa Gilla

In the metropolitan area of Cagliari, the presence of water is a constant, more in lagoon than in river terms. A presence that does not cross the settlements, but has contributed to their formation and distribution along the edge of the water spaces, both sea, lagoon and pond.

The regional law n. 31, 7 June 1989, containing "Rules for the establishment and management of parks, reserves and natural monuments, as well as areas of particular naturalistic and environmental importance", aims at the constitution of a single park including the great structural invariants of the metropolitan landscape in order to integrate these elements with urban centres, enhancing them from a naturalistic, environmental, economic and social point of view, with particular attention to wetlands.

The lagoon of Santa Gilla emerges among the structural invariants of the Cagliari landscape (CORONEO, 2011; GIROT, SIDDI, 2009). A reality with a significant landscape value and no less important from the ecosystem based point of view, being a container of biodiversity. An element on which various protection constraints hang (SIC, Site of Community Interest ITB040023 "Pond of Cagliari, Saltworks of Macchiareddu, Lagoon of Santa Gilla", designated pursuant to Directive 92/43 / EEC "Habitat"; SPA, Zone of Special Protection ITB044003 "Pond of Cagliari" designated pursuant to Directive 79/409 / EEC "Wild birds"; IBA, Important Bird Area; the area is part of the European ecological network of Special Conservation Areas called "Natura 2000"; the permanent wildlife protection and capture oasis "Pond of Santa Gilla and Capoterra" pursuant to LR 23/98; the Ramsar area "Pond of Santa Gilla" (Ramsar code: 3IT018); the Regional Nature Reserve proposed pursuant to LR 31/89). None, however, have been followed up by a coordinated and unitary

planning with the aim of enhancing the lagoon territory, giving significance to the constraints and overcoming the conflict between safeguard and development possibilities.

Despite the recognition of the environmental, natural, eco-systemic value of the Santa Gilla lagoon, it appears to the eye as an artificial landscape, in which the human hand has distorted the original structure, creating various problems and contributing to the estrangement of a highly appealing space from collective reach.

First the installation of the Contivecchi salt pans, thus the construction of heavy infrastructures (railway, airport, expressways) on the eastern side of the lagoon, which have catalysed industrial activities by characterizing the urban margins along this axis. Then the building of the industrial agglomeration of Macchiareddu to the north-west of the lagoon, and finally the construction of the commercial port and the adjoining bridges. Today, these constitute an indiscreet landscape presence, suffered by the lagoon and with which one is forced to confront, a presence which has negatively intervened on the aesthetic quality of the landscape without, however, rewarding the territory of the promised economic benefits.

3. The lagoon contract as a link between city and territory

All these elements have intervened in the deconstruction of the territory, which has become mere support for the functioning of the urban-settlement system. Having undergone these transformations solely for the pursuit of economic interests, it has lost its fair value, supplanting in this geographical area, the economic activities with a long tradition and in harmony with natural resources, exposing them to new functions, far from local characteristics. A place that therefore exemplifies the de-territorialisation process.

The City and lagoon are physically and culturally separated. A particularly legible separation by the space between the eastern shore and the metropolitan conurbation, in which urban growth has opposed the lagoon to the most inhospitable functions, has marginalized the empty spaces of the territory and water, from the spaces of civilization. Almost as if to nestle once again, having learned the Pisan lesson, among modern fortifications consisting of industrial urban boundaries and heavy infrastructures, which separate the city from its territory, discarding places which were protagonists of the local past and consigning them to isolation, neglect, and abandonment. Although fragmentary and isolated by an impeding geography, there is still evidence of a forgotten past

and opportunities for using the lagoon that can become a junction between the lagoon and the urban centres.

The need to repossess an environmental asset of recognized ecosystem, landscape, economic, social and cultural value, moves towards greater spatial integration between the city and the lagoon, aided by actions that can enhance the Santa Gilla lagoon, through the start-up of new local economies and the support of existing ones that are not in conflict with safeguarding the ecosystem. Where the perimeters of environmental, wildlife and landscape protection are not sufficient to limit transformations, to increase local economies linked to a sustainable use of resources, to return a common good to the community, resorting to the formulation of the Lagoon Contract can be decisive in changing the current state. Thus integrating the lagoon, and therefore the natural element and its ecosystem services, to the cultural heritage through built capital, human capital and socio-cultural capital, generating an interaction between landscape and economy.

The contract therefore proposes to configure a landscape reconstruction pathway that outlines the shape of a suburban territorial public space, maintaining the nature of the place and at the same time carrying out innovative services for the city. A public space that is pushed out of the role of mere support to the urban machine, to become a landscape to be experienced, enhancing the resources offered and seizing new opportunities to link city and territory. Thus redelivering the places to the collective social reach, in order to catalyse co-evolutionary relationships between the city and the lagoon ecosystem, overcoming the contrast between city and territory evident in the landlocked spaces, in non-locations, in those abandoned areas due to the prevalence of economic interests in the processes of spatial transformation. Also creating new opportunities for local development that take advantage of the urban proximity of the place. A long-term future scenario can thus be suggested, through which the possibility of granting a number of interventions (large-scale strategies, operational actions and small punctual interventions) that affect the area, converging in the same direction, in order to trigger a reasoned transformation that can enhance the lagoon of Santa Gilla.

Various interested public bodies, such as the Autonomous Region of Sardinia, the Metropolitan City, the various municipalities involved, and other bodies responsible for managing the water resource, can promote the Laguna Contract project. The promotion must have the objective of involving the economic actors concerned, those who benefit from the lagoon and the lagoon territory from several fronts. Individuals interested in safeguarding the environmental asset and conserving its productive capacity, who use the

environmental resources and at the same time undertake to actively intervene in safeguarding the lagoon and its shores, making their economic, human or cognitive resources available.

The objectives that the contract must pursue will also be drawn up based on the interests of the actors involved, without disregarding the general ones. More specifically: environmental and landscape safeguarding; hydrogeological safety (understood not only as a reduction of risk but also as overcoming the constraint through new functions compatible with the risk itself); economic, social and cultural development; accessibility and usability; rapprochement between man and the environment.

Once the goals have been defined, it will be necessary to deploy them, with a unitary design, which helps to make the place legible, outlining a green infrastructure of the metropolitan scale, of supra-local interest that connects the settlement reality with the landscape-territorial reality of the lagoon. Contemporarily suggesting actions and interventions on a local scale, aimed at optimizing ecosystem services, offered by the naturalistic context and its proximity to the city, with particular reference to cultural ecosystem services, whose emphasis is on bringing the inhabitants (and users in general) to the place, based on local development and innovation generated by contextual coefficients and therefore unavailable elsewhere.

This design identifies four areas of intervention of different consistency, which can constitute connection points between the lagoon territory and the urban centres. These abandoned or marginalized areas enjoy the proximity of both elements, natural and settlement. Public spaces that can become usable, bringing man back to attending the water spaces. Spaces that can provide the metropolitan city with places of high naturalistic value, capable of providing ecosystem services by improving the quality of life of the inhabitants and intervening in improving the attractiveness of the city. Spaces that, if properly re-functionalized, can catalyse the local micro economy. Through this space, the lagoon becomes part of the territorial map, according to a cultural, economic, social meaning, in line with the fullest meaning of landscape.

4. Four points of contact

The first of these areas falls within the municipal area of Assemini, north of the lagoon, between the urban centre and the last stretch of the Mannu River, a tributary of the lagoon. The intervention consists in reconciling the urban fabric to the river and lagoon system. An action requiring the reconversion of two

important industrial buildings, abandoned some time ago, redesigning green areas belonging to the above-mentioned buildings, and the maintenance and safety of the existing unpaved roads in order to create cycling and pedestrian paths along the channels, which lead to the lagoon and connect to the Giliacquas site. The first building is that of the former Scanu Furnaces, abandoned about 20 years ago, which, located near the railway station, constitutes an ideal connection point between the urban fabric and the landscape. Due to its position and given the considerable size of the built complex, it would become a container for various attractions capable of reconnecting Assemini to this portion of the territory. Attractions such as recreation and cultural spaces (libraries and reading areas, spaces for craft workshops linked to the ceramic production of the tradition of Assemini) but also commercial, creating a marketing channel for all those local food products, offered by the sustainable use of the territory, promoted by the lagoon contract. Redevelopment of the area through the design of wet gardens, which incorporate the 25 hectares of stretches of water, making them usable by the public and thus improving the environmental facilities of the urban centre will assist the architectural renovation of the building. The design of these areas is not limited to the creation of a park on the model of gardens, but proposes the innovative use of green spaces, in ways that can attract the citizens, or more generally the city-users to territorial repossession, through the destination of part of the area, to vegetable gardens and cuillette orchards. These constitute a form of alternative market in which the customer collects the desired product, and at the same time, it represents an opportunity for the consumer to experience the territory directly, thus promoting an innovative use of the productive area. A solution that in the proposal also has implications of social inclusion, as the management of these spaces is designed to be entrusted to the weakest social categories, selected after evaluating pre-established socio-economic requirements.

The second site to be reconverted is the former Laveria Mineraria named after Henry Louis Mermod, recently abandoned. On the site, there is a complex of buildings built in 1953, and enlarged and renovated in 1970, with an area of relevance to be reclaimed, dominated by mounds of bleached sand, mining residues from the fluoride process. The reconversion provides for the realization of new recreational functions, through the design of spaces that can contain training activities, for example spaces for the organization of seminars, workshops, courses of various kinds, especially aimed at environmental education, as well as spaces containing cultural events and exhibition spaces (photographic competitions, extemporary painting competitions, land art festivals). The aim is to enhance and promote the existing natural heritage,

exploiting in this sense also the open spaces, after environmental reclamation of the site and environmental mitigation interventions. In fact, the pertinent area is dominated by the presence of mounds of sieving scrap, which visually impose themselves on the landscape, surrounding depressed areas characterized by the presence of water. In the project, these become new lookout points on the landscape, after re-naturalization through plantation of a new vegetative mantle and the creation of equipped green areas, integrated with cycling-pedestrian paths. The sunken areas of the site can become tanks with controlled infiltration, and function as a water reserve to be reused for agricultural needs. This would make it possible to strengthen the naturalistic matrix of the site and at the same time integrate the possibility of fruition with the usefulness of the spaces serving the territory.

To complete the intervention and improve fruition, in addition to refurbishing the existing unpaved road outside the perimeter of the park, the parking areas will be equipped with areas for bike sharing, in order to allow those arriving by car, or by train, to travel across the location and enjoy the landscape, with sustainable means.

The area, classified by the urban municipal plan as a general services area to be used as a park, will thus constitute a single system of multifunctional spaces, increasing the usability of the area thanks to new attractions, removing these buildings from oblivion, and at the same time enhancing a naturalistic area, characterized by the presence of water. A large park of supra-municipal interest, capable of providing the metropolitan city with a natural element of prestigious environmental value, and with a renewed cultural-recreational value.

The second area of intervention concerns the village of Giliacquas, established as a spontaneous settlement in the territory of Elmas, north of the airport, near the Sestu Stream, occupying the airport security area. Anglers, who practiced their activity in this stretch of the lagoon, built the first houses. Today the district is home to about two hundred inhabitants, some of whom have withdrawn from work related to the lagoon. The houses are separated from the urban fabric of Elmas by the railway line, and connected to it solely by via Giliacquas, which has already been upgraded.

The settlement nucleus has an almost direct relationship with the water, from which it is separated by a strip of land of 30 are, of variable depths, from a maximum of 70m to a minimum of 25m.

Currently, the Municipal Urban Plan of Elmas classifies the built-up area as residential zone, defined as an area subject to recent construction in the absence of prior planning, to be re-developed and completed. While the area of almost three thousand square meters, between the houses and the lagoon, is defined as

an area to be used as a park and facilities for sports and leisure. Finally, it recognizes the environmental and landscape value of the place, classifying the riparian areas as safeguard zones.

The municipal plan classification expresses the intention of redeveloping a location that has a strong landscape value, giving it a new interpretation in a tourist-oriented key, safeguarding and promoting small-scale fishing, still practiced, which is the subject of the relationship between man and environment. The redevelopment has already partly taken place, through the construction of a 2 km cycling/pedestrian path, which flanking the southeast side of the settlement, connects the area with the rural church of Santa Caterina di Semelia, towards the Cagliari lagoon banks. The route crosses two wooden bridges, one of which crosses the Sestu Stream thanks to a span of more than 40 metres, allowing fruition to an otherwise inaccessible stretch of lagoon landscape. The intervention is designed with the utmost respect for the environment through the construction of a stabilized dirt base and a lighting system powered by solar energy.

To complete the redevelopment and respond to the objectives of the contract, the proposal provides for several interventions. Firstly, the arrangement of the area in front of the houses as a park by implementing vegetation and installing urban furniture (seating and lighting) to improve the usability and liveability of the open space which has important landscape qualities and also providing the settlement nucleus with a relational space, currently absent or not designed. Secondly, the construction of a 150 sq.mt. wooden shed characterized by reversibility and flexibility intended to partly house the storage of fishing nets and equipment as well as partially covered stalls for the direct sale of local fish on defined market days, in order to support the characteristic activity of the location and assist the local micro-economy, favouring the rapprochement between producer and consumer. Then, the creation of an area for events, an open space in front of the wooden shed, in order to welcome visitors on recreational and cultural occasions, new and existing, promoted by local associations, also taking advantage of the reversible covered space, periodically used for market days. Finally, the rationalization of the existing landing points, through the construction of wooden piers to replace the existing ones, intended to accommodate both local boats and become a landing point for small (sustainable) boats to be used for tourism and recreation on the lagoon. The piers will be designed in wood, in line with the local geometry, in order to maintain the character of the landscape intact. Through this intervention, the green metropolitan infrastructure offers a point of use of

the lagoon landscape, but also an access point to the lagoon, or a landing place for those who sail on the lagoon.

The third intervention constitutes the recovery of the complex of buildings housing the disused power plant, which came into operation in 1924 by the Sardinian Electric Company, later passed to the ownership of national electric company, due to nationalization. Long disused and in a state of neglect, it is an opportunity for architectural recovery aimed at creating a new public space with direct access to the lagoon, which could be seen as a reunion point between the lagoon and the city, helping to revitalize a marginal urban area, already involved in important transformation projects. The re-functionalization proposed here intends to create a workplace based on the promotion of innovative forms of self-enterprise, based on co-working and offering a modern working environment suitable for new professions and companies linked to the knowledge and creativity economy, which can facilitate access to tools, services, relationships, skills and opportunities to share. A space in which young companies or start-uppers can take advantage of a working space with low rent prices and participate/organize workshops, pitches and talks in a highly stimulating and synergistic context. Promoting new entrepreneurial forms capable of activating an innovative local economy, digitalized, creative, and therefore strongly linked to technological, scientific and industrial research, with possible implications for the sector of environmental safeguard and territorial and social enhancement.

To integrate the productive/working function, there are spaces dedicated to workshops, conferences and exhibition-demonstration events linked to the activities present. There are also other spaces with receptive functions with dining areas, hospitality and sales points, accessible to all. A space dedicated to a museum that can spread knowledge and preserve the memory of the previous function of electricity production. Open public spaces used as gardens and characterized by the presence of water with an ornamental function, which constitute direct access to the waterfront equipped with a landing point for boats, necessary to rationalize the current use of this stretch of the lagoon shore.

The proposed re-functionalization also intervenes in the area behind the road of Viale Elmas, presently classified by the current urban municipal plan as a safeguard area with prevision for reconversion for economically productive use of the territory, for which the planting of vegetable gardens/cuillette orchards is suggested, with management methods similar to those already described. This would create a unique opportunity for the use of an area occluded by the buildings and road infrastructures. A use that thus supports the bio-regionalist intentions and that is economically productive, with a limited public cost, and at

the same time respectful of the environment, in order to bring the urban dweller closer to the natural environment, through the re-appropriation of an area otherwise omitted from any use.

The intervention also provides for maintenance of the unpaved roads along the naturalistic area along the lagoon, accessible from the open spaces of the Enel area and connected to the dirt road that continues along the banks. In addition, San Simone Street, which constitutes direct access to the buildings of the former power plant, reconnects to the city by crossing the area of San Paolo next to the transformation envisaged by the masterplan, winner of the 2016 Periphery Call. Minor interventions on the connection systems to integrate the lagoon landscape with the urban environment and strengthen the ecosystem function of the riparian naturalistic area, already subject to protection.

Finally, the last intervention provides for the redevelopment of a marginal area of the city, Perdixedda Street and the area surrounding the tower of the Quarta Regia. In this area, the port infrastructures and related activities and in particular, the cutting of the bridge that connected Cagliari to its historic fraction of Giorgino, have cut off and made inaccessible a historically significant stretch of the lagoon shore. Significant both for its function of access to the isthmus and because it preserves a material testimony of the vocation of the place in the past, as well as an architectural element with a strong identity value. The area is affected by transformations in progress or on paper. Specifically, it is included in the 14-20 metro PON project (National operational programme "Metropolitan cities 2014/2020") for the metropolitan city of Cagliari, identified as a section of the connecting corridor between the town of Cagliari, the Municipality of Elmas and the airport. The plan provides for the construction of a cycling-pedestrian bridge, which is necessary to reconnect the city to the coast of Giorgino, where significant architectural episodes of local history survive. Furthermore, the dock of the port, which joins Perdixedda Street and is intended to accommodate fishing boats, has already been built. The proposal is limited to the redevelopment of the aforementioned street and the surrounding area, including the area around the Quarta Regia designed as a park. Both have the aim of enhancing the monument that is otherwise not very usable and to give access and enhance the stretch where the lagoon is in communication with the sea, and which constitutes the gateway to the isthmus. This redevelopment includes the construction of a cycling/pedestrian path that connects to the one provided by the PON metro, in Sant'Agostino Street, and leads to the park of the Quarta Regia, or branches off to cross the Scaffa canal, joining Dei Calafati Street. The path will be illuminated and inserted in an equipped green belt, allowing access to the area below the old bridge and the

Tower of the Quarta Regia. In the area where the tower stands, the surrounding area of the monument provides for adequate paving, increasing the greenery with the inclusion of native plant species. On this stretch of the lagoon shore, to help improve fruition and recall the historical use of the place, the intervention provides for positions for amateur fishing, in fact already practiced. The intervention aims to constitute the gateway to the lagoon and to the green infrastructure defined by the four interventions and by the cycling/pedestrian path that connects them, given its proximity to the urban centre of Cagliari, also restoring the direct connection between the latter and the coast of Giorgino, suffering from oblivion, inaccessibility, abandonment and decay. An intervention which, even if of reduced consistency compared to the others described above, underlies the enhancement of a place of important local historical memory.

The intervention, although the last one described here, is not intended as a final step in the redevelopment of the lagoon area. Rather, it aims at the continuation of the green infrastructure on what was historically called La Playa, which, although detaching itself due to the well-known transformations from the lagoon shores, is in effect an integral part of the lagoon system of Santa Gilla, as it is a constitutive element of the lagoon itself. A part of the territory, in which in a not too remote past, ways of urban life linked to the use of the landscape were typical and of which weak traces of local proto-tourism remain, an important piece of the history of Cagliari, to which more attention should be given.

A place worthy of careful landscape redevelopment, which can be set up like the interventions described above, with the aim of reuniting city and territory, through innovative forms of use, and new opportunities for use.

5. *Do ut des*, the care of the place

The landscape design suggested by the contract through the actions described develops a landscape requalification, in which the public bodies that adhere to the contract will make the greatest contribution. A redevelopment that does not want to be an end in itself, but rather intends to deliver the place to its users, and to the economic actors who benefit from this redevelopment. Users who are committed to the construction of the landscape defined by the contract, contributing to the achievement of the strategic objectives defined by the agreement, and undertaking to carry out the actions envisaged by making its human, knowledge and financial resources available. Commitments that will be

signed by legal forms of scheduled bargaining attributable to the legal formula of a public-private partnership.

A commitment that fully adheres to the *Do Ut Des* logic of any contractual form and refers to the section of the Geddiana Valley in which the figures who destroy the landscape contribute to repairing the same.

It is therefore necessary to mention some of the intangible actions that the contract provides for and constitute the contribution of the voluntary adherents. The contractual proposal in fact, provides for the establishment of a quality brand, aimed at promoting local products and inserting them within a local commercial chain, rewarding production activities that commit to adopt agricultural or fishing practices, not in contrast with environmental safeguard and which do not compromise the functioning of the lagoon ecosystem. Together with the quality brand, other monetary compensation measures can be adopted for the same purpose (eg: exemption from the IMU tax), based on the calculation of the loss of earnings due to the adoption of sustainable practices (eg: organic farming). In the agricultural sector, an important contribution can come, in addition to sustainable cultivation practices, from the restoration of the rolling function performed by the drainage channels of agricultural land, useful to limiting the damage of floods, to the production itself and more in general to the territory. Small hydraulic works that can be performed by the operators themselves, even by equipping themselves with shared excavation equipment. Among the actions envisaged by the contract is the constant monitoring of the lagoon shores, to avoid improper use of the same, such as the abandonment of waste, a very common practice in the past and which periodically reappears, reducing the quality of the water and negatively intervening on the fishing activities. The benefits of the quality brand, and the organization of market days, also taking advantage of the spaces provided by the redevelopment of the Giliacquas site, can be returned by the operators of the fishing sector themselves, making their human resources available, in monitoring the banks, and providing for the timely reporting of improper use.

Operators in the tourism sector benefit from the proposed redevelopment interventions, which contribute to increasing a territorial tourism offer, with seasonally adjusted alternatives. They can thus undertake to promote a sustainable use of the lagoon, and in the case of catering activities, encourage the consumption of local food products.

The proposed contract can also be addressed to the digital entrepreneurship sector with a technological and research orientation. The operators can benefit from a stimulating and formative workspace, at a subsidized rent, provided for in the refurbishment of the former power plant, and return something in terms

of innovative solutions for environmental protection, or for the identification of circular economy circuits, which trigger a productivity linked to the territory and repairer of the same.

The definition of the Santa Gilla Lagoon Contract was formulated as part of a thesis work, in which an attempt was made to transpose the principles of the land to the physical space of the territory through the definition of uses and the suggestion of new functions of reterritorialization.

Fig. 1 - Overview of the interventions suggested by the lagoon contract

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Bioregional planning for the recovery and valorisation of military heritage in small Mediterranean islands. The experience of San Pietro island in Sardinia

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Abstract

The paper illustrates and reflects upon a case study of recovery, enhancement and sustainable reuse of cultural and natural heritage in small Mediterranean islands following the bioregional planning model.

On the base of the pilot project carried out for the military heritage of San Pietro Island (Sardinia, IT) within the research project "ISOS - Sustainable islands: Network of islands for the long-lasting development and preservation of heritage" (Interreg Italy-France Maritime Program 2014-2020), the paper provides some guidelines for the construction of knowledge frameworks inspired by the bioregional planning aimed at guarantying the coherence among the recovery and reuse of military architectures, the management of landscapes and natural resources and the organization of new settlements in small islands.

KEYWORDS: bioregional planning, small islands, military heritage

1. Bioregional planning: a reference model for an integrated and sustainable valorisation of military heritage in small islands?

The bioregional approach developed by the Italian Territorialist School from the work of Alberto Magnaghi, is characterized by a project of territory based on the circular economy.

The bioregional planning governs and rules all together the local economy (wealth equally distributed in the territory, including the peripheral zones), the socio-political aspects (self-government of land for sustainable lifestyles and production), and the environmental dimension (natural ecosystems and quality of living). It aims to mend and rebalance the relationships that link human settlements with agro-forestry systems to rebuild ecological networks and their ability to self-reproduce (MAGNAGHI, 2000; MAGNAGHI, 2014a, 2014b).

The foundations of bioregional plans and projects are: the local knowledge and practices related to landscape making and landscape management; the environmental networks; the cities and polycentric urban systems; local production system; local energy resources and plants (energy self-sufficiency); multifunctional agro-forestry structures; the structures of community self-government that stimulate participatory federalism, in order to increase the resilience of the local context and strengthen the idea of "community" (Tab.1). Bioregional plans and projects work on "territorial types" at different scales: from the neighbourhood to the urban region (MAGNAGHI, 2014a, 2014b). They are illustrated in Table 1.

Tab. 1 - Foundations of the bioregional plans and projects. Source: COLAVITTI ET AL. (2018b) on MAGNAGHI (2014b)

Foundation element	**Planning tools**	**Implementation target area (Territorial Types)**
1. Local knowledge and practices related to landscape making and landscape management	− 'Statute of places': long-lasting planning rules for the self-reproduction of local ecosystems − Plan of the industrial zones to be installed: quantitative and qualitative indication of the requirements for the production activities (what, how, how much, where to produce) and the settlement models (locations, dimensions, types, materials and construction techniques, environmental and energy balances) − Plans, parish maps and other communication materials about the transformative strategies designed for and with the inhabitants	All types of bioregion: − local territorial system − district system − drainage basin − coastal system with its inland − urban region − landscape area
2. Environmental networks	− Map and reconstructions of the ecological and hydrological networks − Ecological networks project: multifunction infrastructure corridors (rivers, canals, infrastructures on rail, road and soft mobility); design rules for ecosystem services (agriculture, forests, river banks, waste cycle, water cycle, etc.)	− Regional ecological and hydrological networks
3. Cities and polycentric urban systems	− Planning rules and projects for open spaces (regional scale): margins, boundaries, gates, connections between rural and urban spaces, mountain-plain connections	− City of cities (urban region)
	− Planning rules and projects for the containment of the expansion and the quality of the urban environment (local scale): *mixité*, settlement densification, public spaces and neighbourhood facilities, reorganization of public transport, pedestrianization of urban	− Inhabited countryside (widespread rural buildings, villages, farm-villa systems, farmhouses, rural ecovillages) − City of eco-

	areas, short agro-tertiary supply chains.	neighbourhoods − Network-city connected by infrastructure corridors (roads, railways, rivers, paths, horse trails, cycle paths)
4. Local production system	− Integrated production districts − Enhancement of local supply chains − Planning rules and plans for production sites	All types of bioregion: − local territorial system − district system − drainage basin − coastal system with its inland − urban region − landscape area
5. Local energy resources and plants	− Energy diagnosis of the territory (energy modelling) − Network energy systems (smart grid): widespread and integrated systems of small and medium-sized plants	All types of bioregion: − local territorial system − district system − drainage basin − coastal system with its inland − urban region − landscape area
6. Multifunctional agro-forestry structures	− Urban and suburban agriculture projects ('green and blue' infrastructures, cycle paths, tree-lined canals, etc.) − Projects for historic rural landscapes − 'City-country pacts': multi-scalar neoruralism projects	All types of bioregion: − local territorial system − district system − drainage basin − coastal system with its inland − urban region − landscape area
7. Structures of community self-government.	− Pacts among the local actors who have common interests in local development strategies (e.g. 'river contracts', joint water management tools)	Regional and sub-regional administrations: − Municipality − Union of Municipalities − Metropolitan Areas − Mountain Communities

Bioregional planning is the basis of innovative planning tools adopted in Puglia and Tuscany: landscape plans, food provision plans, city-country pacts, river contracts, multifunctional agricultural parks. Here the bioregional planning guarantees the coherence among the recovery and reuse of listed buildings and sites, the management of cultural and natural landscapes and the organization of new settlements in the target area. They recompose the prescriptions and the constraints of the pre-existing plans in a single planning tool by identifying the areas and methods of mending the local bio-geo-economic systems, communicating the technical standards of implementation in new and more communicative ways (drawings, sketches, 3d models, etc.) (VALENTINI, 2018).

Bioregional planning is now spreading in Italy. The most recent projects include the Montalbano Biodistrict project launched in 2016 and the Pontina Bioregion project in 2017 (PES, USAI, 2018).

The paper investigates on the application of bioregion planning to the valorisation of the military heritage of small Mediterranean islands, where recovery projects already pay a great attention to the environmental and social impact of the restoration works but lack of wider and comprehensive strategies to re-activate typical local products, develop new circular economies and diversify the tourist offer, as illustrated in the following paragraph on the base of the ISOS project experience.

2. Valorisation of military heritage in small islands: international experiences looking for an integrated approach

In urban areas the intervention on military architectures strongly influences the creation of institutional moments for sharing ideas and conflict resolution. If properly coordinated and harmonized, the recovery projects represent an opportunity for the construction of new territorial and governance arrangements in cities and territories. In isolated regions, such as mountains or smaller islands, the recovery of military landscapes often represent the unique chance for the territory to flourish again (COLAVITTI, 2018; COLAVITTI ET AL. 2018a).

Small Mediterranean islands are historically characterized by rapid development and subsequent abandonment linked to the emergence or the disappearance of the geopolitical balances which, in the various eras, determined the island strategic importance from the defensive and commercial point of view. These vicissitudes are reflected in the military architectures spread along the island coasts which often represent a trace of the past but also an important element of the local identity (COLAVITTI ET AL., 2019).

International research networks like the International Scientific Committee on Fortifications and Military Heritage (ICOFORT), established by the ICOMOS in 2005, or the International Society for Mediterranean Fortifications (FORTMED) actively research and promote the valorisation of Mediterranean military heritage[1]. Moreover, Mediterranean islands have an active role in European cooperation programs, in particular in the INTERREG Italy-France Maritime program 2007-2013. Several projects on cultural heritage protection

[1] The publications of the FORTMED network are available at: <https://fortmed.blogs.upv.es/abstracts-papers/> (accessed 03 April 2019).

find place under this program: FOR_ACCESS on the recovery of defensive fortifications at tourist purpose, ARCIMED on waterfront regeneration in small islands, MED-PHARES on Mediterranean light houses and light stations (COLAVITTI ET AL., 2019).

At national level some programs are implemented by the offices responsible of State properties and by coastal protection agencies. For example, the program "Valore Paese - Fari" on lighthouses and light stations carried out by the Italian State Property Office (2015-2018) or the "Programma di Valorizzazione del patrimonio-marittimo costieri della Sardegna", carried out by the former Coastal Protection Agency of Sardinia Region (IT).

In the last European and National programming the valorisation of cultural heritage is meant as an opportunity to attract investments and activate new circular economies, transforming small islands into "territories of excellence", i.e. territories where the inhabitants treasure the characteristic economies of their places and innovate them according to an integrated and multi-scale territory project. The research project "Sustainable islands: network of islands for the long-lasting development and preservation of heritage" (ISOS) funded under the Interreg Italy-France Maritime program 2014-2020, responds to this approach[2]. With a view to environmental sustainability, the ISOS project aims to create a network of French and Italian islands committed to the preservation of island heritage and the implementation, with local operators, of pilot actions focused on natural resources and heritage management (renewable energy, sorted waste collection, etc.). The project partners work together to develop a sustainable approach in heritage preservation and valorisation under the international program "Small Sustainable Islands" (SMILO). At the end of the ISOS project, the partners who have co-build sustainable strategies for the protection of natural and cultural heritage to the benefit of the population will be appointed with the "SMILO Sustainable Island" label (NERONI ET AL., 2017).

The first phase of the ISOS project was dedicated to the recognition and identification of military architectures and compendia present on SMILO islands (Fig. 1). The properties were analysed together with the landscape and territory in which they are located. The recognition and collection of the materials related to each property was carried out, including the documentation of the recovery projects (closed, planned or ongoing). For the ownership regime, the urban

[2] The project is managed and implemented by Sardinia Region with the scientific support of the Department of Civil and Environmental Engineering and Architecture (DICAAR) of the University of Cagliari (Scientific Coordinators: Prof. Colavitti A.M, Prof. Fiorino D.R.). The author took part to the phase 1 and 2 of the ISOS project as Research Fellow at DICAAR.

planning rules and the environmental constraints affecting the heritage sites reference was made to documents, databases and webGIS of the competent administrations. The materials so collected where reordered, classified, digitized and, finally, implemented in an *ad oc* information system.

The research and public interventions devoted to military heritage valorisation mapped in the first stage of ISOS project, pay a great attention to the environmental and social impacts of the recovery project (COLAVITTI ET AL., 2019). They are distinguished by the recurring use of concerted planning tools, the framing of projects in wider territorial strategies (e.g. the Territorial Coherence Plan *Schéma de Cohérence Territoriale* – *SCOT* in French islands) and long-term project visions based on:

1) an analysis "by systems" of the environmental, socio-economic and settlement dynamics of the islands;
2) an effective communication of the planning implementation rules through new communication strategies and awareness raising activities aimed at final recipients.
3) a synergy between the economic, spatial and socio-cultural system virtuously set by the communities in the area.

The recovery projects are in line with the bioregional planning model, which presents, as an additional and enriching element, a particular attention to the typical local productions and new circular economies in order to diversify the tourist offer. For this reason, the research team decided to apply the bioregion planning model to the pilot experience planned for the phase 2 of the ISOS project, described in the next paragraph.

Fig. 1 – Mediterranean islands forming the ISOS project partnership

3. Applying the bioregional planning to small islands: the design of an integrated valorisation strategy for the military heritage of San Pietro Island (Sardinia, IT)

The pilot experience of the ISOS project concerned the design of a sustainable and integrated valorisation strategy of military heritage in a target island. It relied on the concept of 'territory of excellence' coming from the studies on the territorialisation of protection: from the museum to the ecomuseum; from the 'natural beauty' to the landscape, from the archaeological site to the stratified topographical context, from the protected natural areas to the eco-territorial networks, from the monuments to the historic centre, from the cultural and natural heritage to the territorial heritage (CHOAY, 1992), from the site protection/conservation to the territory project (BELLANDI, MAGNAGHI, 2017; MAGNAGHI, 2000; MAGNAGHI, 2014a, 2014b).

The island chosen as a target was the San Pietro Island in Sardinia (IT) because of the representativeness of its military heritage and the outstanding territorial context – where military landscape interfaces with rural, historical-cultural and economic-productive landscapes.

3.1 The geographical and historical, context

The San Pietro Island is located on the south-western coast of Sardinia (IT) with an area of 5,023 hectares and a coastline of about 28 miles. It is a hilly island characterized in the western part by a long cliff coast and in the eastern part by a low flat coast. The valleys have a radial pattern and diverge in the central part of the island, sometimes creating deep canyons, crossed by torrential streams of water (RACCIS, 1995).

The walled town of Carloforte, the island's main settlement, was founded in 1738 following the concession of the island by King Carlo Emanuele III to a group of families originally from Pegli, in Liguria (IT), but escaping from Tabarka, Tunisia. The walls protecting Carloforte were built between 1738 and 1814. The walls facing west are preserved as well as a small section to the north and some forts: Forte Santa Cristina, Forte Santa Teresa, Forte Emanuele and Forte Beatrice - the latter deeply transformed (ASTE, CAMBIGGIO, 2005; VALLEBONA, 2013) (Fig. 3). In the centuries the following defensive architectures were added to the walled town: the Guardia Mori fort built around 1850, the lighthouse of Capo Sandalo activated in the 1864 and still in operation, the anti-aircraft and anti-ship battery «Tommaso Zonza», entrusted to the Navy between 1935 and 1940 to control the navigation during the Second World War

(Amoruso, Bartolomei, 2009; Calanca, 2006; Grioni, Carro, 2014; Monteverde, Belli, 2003). These are the military architectures involved in the valorisation strategy of the Isos pilot experience (Fig. 2). Coral and tuna fishing were the main economic activities of the Carloforte community which were supported by the salt production at the Salina di Carloforte (1770-1990) and by the shipbuilding industry (linked to the mining industry up to the 1920).

The relationship with the rural areas was characterized by a temporary frequentation supported by small buildings called *baracca carlofortina*, a construction type from Tabarka. The resulting landscape was very different from the open field system of Southern Sardinia. Wine production used non-local species such as *ramungiò* and *girò*, now included in Sardinian grapes lists, and used the cultivation technique called "su piede franco".

Today tourism is the main economic resource on the island. In addition to beach tourism, the island is part of the geotourism circuits due to its geological history, natural monuments and geosites. Few tuna processing factories (*tonnare*) are still active and there are projects to preserve the Latin sail boat tradition (Repetto, 2017). Rural buildings are used mainly as a widespread hospitality system (Raccis, 1995). The wine business was restarted only recently thanks to a winery that has planted vineyards in the Tanca Fiorita area (Rossi, 2010).

3.2 The existing planning framework

The San Pietro Island is included in four different natural protected areas. The walled town is protected as a 'landscape asset' by itself, in addition to the protection measures envisaged for the forts, monuments and buildings within it (Legislative Decree n.42/2004 art.143).

In 2017 a new Municipal Urban Plan[3] was adopted but the adjustment with respect to the Regional Landscape Plan (Rlp) is still in progress. The Detailed Plan of the historic centre[4] has already been adapted to the Rlp, and definitively approved by the City Council in 2018. Both planning instruments include strategies for the landscape enhancement and recovery.

An integrated system of tourist routes was designed in the Provincial Urban Plan and implemented thanks to the project 'System of integrated thematic itineraries for the enhancement of the rural areas of the Sulcis Iglesiente' by the former Province of Carbonia-Iglesias (now: Southern Sardinia Province). Further tourist routes have been set thanks to the projects 'Tuna Route', 'Via del Sale', 'Bonespirit' and 'Street Bit', this latter was built by the local schools thanks

[3] Italian: *Piano Urbanistico Comunale – Puc.*
[4] Italian*: Piano Particolareggiato per il Centro storico –Ppcs.*

to the regional program 'Iscol@'. The result is a rich but redundant offer accounting ten urban culture trail and twenty-five nature trails[5].

3.3 The design of an integrate valorisation strategy for the military heritage

The construction of a bioregional strategy for the Island of San Pietro, started from the analysis of: the environmental components of anthropic origin; the historical rural areas; the settlement types. This takes place on the basis of the bibliographic sources[6], the first cadastre and the recent cartography, in particular that of the RLP, PUC, and PPCS. A substantial difference emerged between the north-western part of the island, more rugged and wild, and the remaining territory, gradually tamed thanks to penetration roads that have remained unchanged until today (Fig. 2).

Once the historical uses of the territory were outlined, the most recent changes were analyzed on the basis of the land use maps produced by the Sardinia Region in 2003 and 2008, the only ones to have Corine Land Cover legend classes detailed at level 3, 4 and 5, which are necessary to distinguish crop mutations on the considered scale. In order to verify the evolution of the territorial dynamics from 2008 to today, reference was made to the PUC land use charter, adopted in 2017, which presents the same level of detail.

This brought to light a reorganization of complex crop systems for wine production in the central part of the island and a reconstitution of the vegetation cover in the western one. Evolutionary dynamics which, in marginal areas, come into conflict with the tendency of complex cultivation systems to reorganize themselves as tourist-residential settlements (Fig. 3).

The analysis of territorial dynamics and their representation "by systems" according to the graphic standards of the Italian Territorialist School (MARSON, 2016; VALENTINI, 2018), highlighted the 'Territorial Types' composing the San Pietro Island as a bio-geo-economic system and the contradictions and innovations that characterize the current land-use framework (Fig. 3):

- protected natural landscapes;
- rural and semi-natural landscapes, including the neo-rural landscapes of vineyards and agro-forestry;
- widespread settlements;

[5]They are collected in the guide "Trekking on the Island of San Pietro" created by the Tourist Development Consortium of the Municipality of Carloforte, available at: <https://turismoita.wordpress.com/itinerari-trekking-sullisola-di-san-pietro-sardegna/>(26.04.2020).

[6] In particular, RACCIS (1995).

- peripheral settlements
- compact settlement (the walled town);
- innovations: resumption of wine production and replanting of permanent crops (olive groves, orchards); enhancement of natural resources with new urban green areas ("salt road" and new green paths provided by the PUC);
- contradictions: forecast of new tourist settlements on the sidelines of recent agro-forestry systems, expansion of the neo-rural landscapes of vineyards towards protected natural areas, interruption of tourist routes outside the urban centre.

On these bases, following a multi-scale approach, an integrated strategy for the enhancement of military architecture has been defined, consisting of three integrated tourist fruition systems:

- SYSTEM 1- Traditional crafts: the network includes routes and sites concerning the traditions of the island community: fishing and seafaring – coral and tuna fishing, shipbuilding, salt activity (1.1); mining activity – island mining sites, mining ports, union movements (1.2); rural activities – viticulture, typical horticultural production, traditional rural buildings (1.3).
- SYSTEM 2 - Environmental and natural resources: this system includes natural monuments, geosites, panoramic viewpoints, beaches of high landscape value and the routes connecting them. The routes are identified with respect to the constraints imposed by the protection zones and usability (paved road, stabilized road, paths). The main objective is the identification and re-assembly of the existing slow mobility systems controlling the visitors' footprint.
- SYSTEM 3 - Historical and cultural heritage: the network includes the main archaeological sites and monuments respectively linked by three thematic routes: archaeological (3.1), religious (3.2) and military-defensive (3.3). They systemize some of the solutions proposed by the Detailed plan of the historic centre.

The System 1.1 "Traditional crafts – Rural landscapes" is the main innovation that the bioregional planning model brings to the pilot compare to the good practices of valorisation identified in the ISOS project.

A tourist trail dotted with traditional rural buildings that connects the places of wine production (where guided tours are carried out) to the fort of Guardia Mori - the highest place on the island from which all the vineyards, orchards and olive groves are visible, up to the streets of Carloforte walled town where it is possible to buy and consume typical local (Figg. 4-5).

It is therefore a strategy that aims to enhance the neo-rural landscapes in a supply chain perspective, not always present in similar experiences identified in

the ISOS project[7]. Starting from the current state of accessibility and usability of the military architectures of the San Pietro Island, the strategy provides, through the detail of the three fruition systems, the guidelines for the future enhancement and reuse of buildings and sites. The strategy makes so according to the methods and interventions outlined in the first phase of the ISOS project (see the voice "Valorisation and uses" in Figure 4), but it focuses more strongly on the re-discovery and mending of the bio-geo-economic balances that formed the backbone of the small islands for centuries and which, through new circular economies, can outline a sustainable tourism model in the long run.

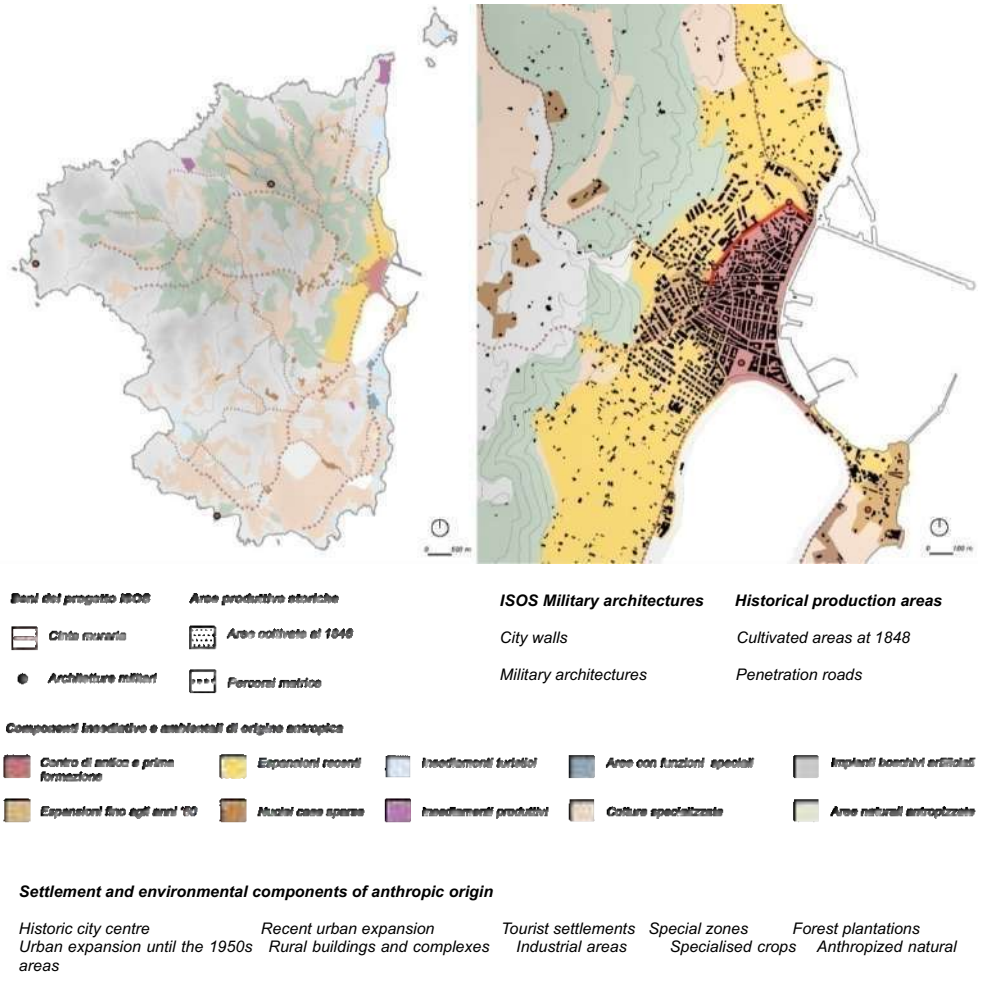
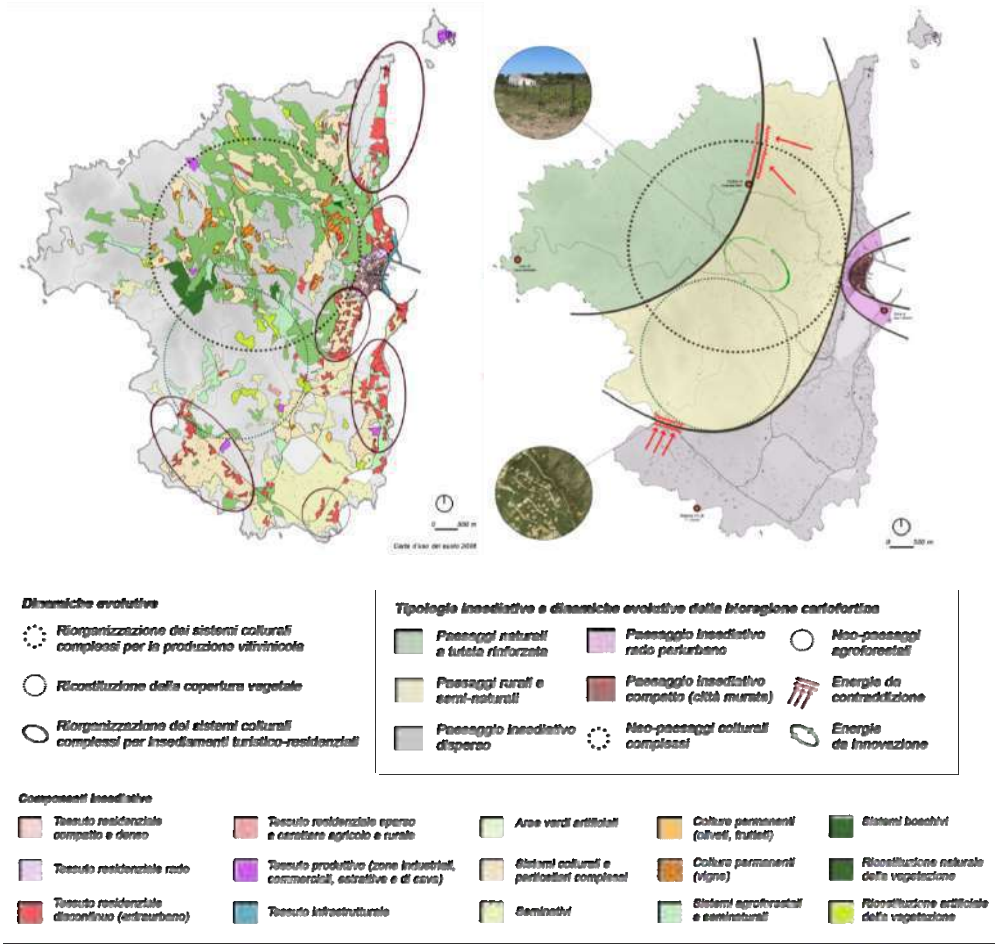


Fig. 2 – The San Pietro Island bioregion: settlements and environmental components of anthropic origin

[7] In particular, the fortified abbey of Lerin Island (FR) or the former prison of Capraia Island (IT).



Evolutionary trends

Resumption of wine production

Reconstitution of the vegetation

Tourist settlements in rural areas

Territorial types

Protected natural landscapes

Rural, semi-natural landscapes

Widespread settlements

Peripheral settlements

Compact settlements

New landscapes of vineyards

New landscapes of agro-forestry

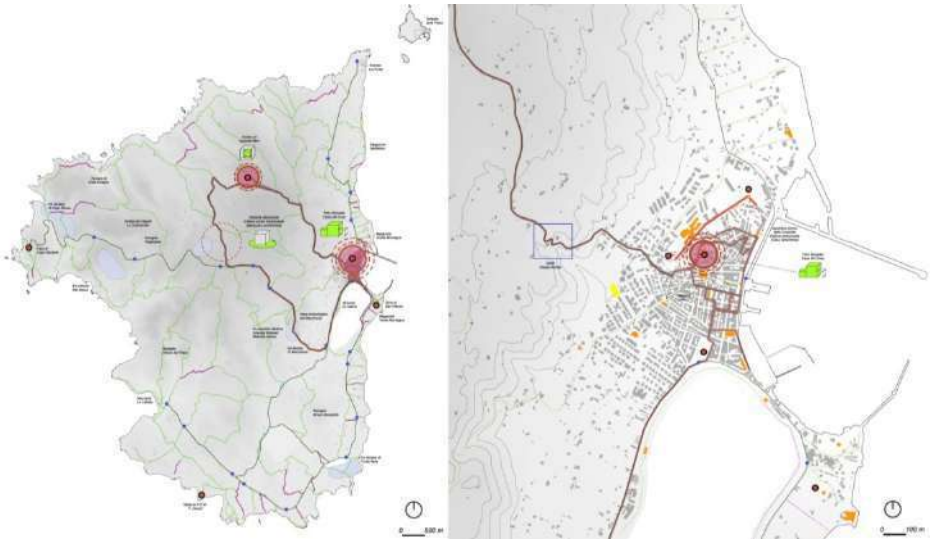
Contradictions

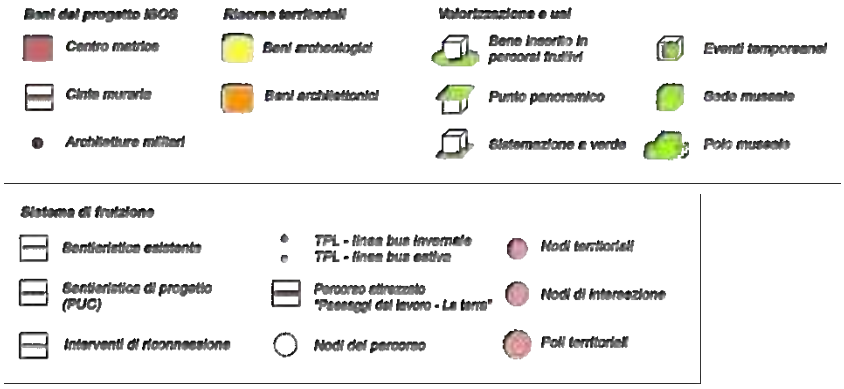
Innovations

Settlement and environmental components of anthropic origin

Compact residential fabric	*Rural residential fabric*	*Green areas*	*Orchards, olive groves*	*Woodlands*
Peripheral residential fabric	*Production area*	*Complex crop systems*	*Vineyards*	*New natural vegetation*
Discontinuous residential fabric	*Infrastructures*	*Arable lands*	*Agro-forestry, Semi-natural lands*	*New artificial vegetation*

Fig. 3 – The San Pietro Island bioregion: evolutionary trends and territorial types

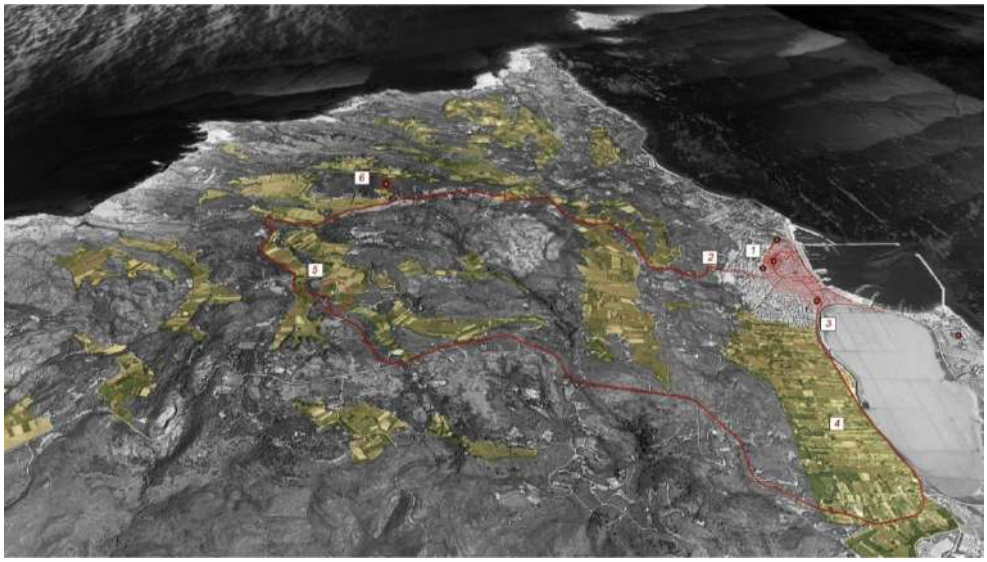




ISOS Military architectures	Cultural sites	Valorisation strategies and uses	
Walled town	Archaeological sites	Trail node	Temporary events
Urban walls	Listed buildings	Panoramic viewpoint	Museum
Military architectures		Green area	Multifunction cultural hub

Fruition system 1.1		
Existing trails	Winter bus line Summer bus line	Nodes
Planned trails	Trail 'Traditional crafts – Rural landscapes'	Intersections
Reconnections	Trail nodes	Hubs

Fig. 4 – Fruition System 1.1 – 'Traditional crafts – Rural landscapes'



Beni del progetto ISOS

- Centro matrice
- Cinta muraria
- Architetture militari

Sistema di fruizione

- Percorso attrezzato "Paesaggi del lavoro - La terra"
- Neo-ecosistemi rurali (sistemi particellari complessi, erbe e seminativo, vigneto, oliveto e frutteto)

- Nodi del percorso
- Nodi di intersezione
- Poli territoriali

Strategia integrata di valorizzazione della bioregione carloforina

1. Costituzione del Polo museale "Casa del Duca e Forte di Santa Cristina" come punto di partenza dei percorsi turistici riguardanti la comunità carloforina (storia, paesaggi del lavoro, sistemi di difesa)
2. Riqualificazione della Salita Giorgio Rombi
3. Riqualificazione e completamento del percorso di fruizione turistica lungo le ex saline
4. Linee guida per la configurazione degli accessi e degli edifici lungo il percorso fruitivo delle ex saline
5. Valorizzazione del Fortino di Guardia Mori come portale di accesso ai percorsi naturalistici dell'isola
6. Inserimento nel circuito turistico dei neo-ecosistemi rurali in un'ottica di filiera (luoghi di produzione, vendita e consumo)

ISOS Military architectures	***Fruition System 1.1 –'Traditional crafts – Rural landscapes'***	
Carloforte walled town	*Tourist trail*	*Nodes*
Urban walls	*Neo-rural ecosystems*	*Intersections*
Military architectures	*Widespread settlements*	*Hubs*

Integrated valorisation strategy for the bioregion of San Pietro Island

1) Creation of the Museum "Casa del Duca e Forte di Santa Cristina"

2) Upgrading of the Giorgio Rombi climb

3) Completion of the existing tourist trail along the former salt pans

4) Recovery and configuration of the entrances and buildings of the former salt pans

5)Recovery of the Guardia Mori fort as a gateway to the island's nature trails

6) Inclusion in the tourist trail of the neo-rural ecosystems, following the production chain (i.e. put together the places of production, sale and consumption)

Fig. 5 – The San Pietro Island bioregion: guidelines for an integrated valorisation strategy

4. Conclusions

The cultural and landscape heritage can represent an important resource to reach the goal of environmental sustainability but small islands rarely valorised it according to the idea of what, in the specialist literature, is indicated as a 'territory of excellence'. A territory where the inhabitants take advantage of the economies that are characteristic of their places, making their production system work and exporting it to the outside.

Public planning and projects remain focused on buildings despite a progressive territorialisation of protection while the social and economic relationships that link historical military heritage to the island communities − the so-called intangible heritage − are left in the background. Despite this, the good practices emerged in the research show that a sustainable recovery and reuse is possible when:

1. Involved actors dialogue and elaborate new technical-administrative tools clarifying the respective tasks and responsibilities (e.g. the co-planning processes adopted by Sardinia and Tuscany regions to adapt municipal urban plans to landscape planning or the enhancement agreements for lighthouses adopted by both regions). This applies to the public actor but also to privates who own/manage certain military assets under concession: the cases of ownership and exclusive management are in fact being reduced in favour of more complex management models;
2. owners and citizen associations actively collaborate with the protection authorities (being aware of not having the necessary resources and skills to take care of the site);
3. the recovery project is framed within other existing or planned public initiatives (European, national, regional, local projects).

In this regard, the bioregion represents a device for an integrated and multi-scale territory project. As illustrated by the pilot of San Pietro Island, a bioregional project can handle, at the same time, the economic dimension (a local development that produces wealth equally distributed in the territorial system, including the peripheral sites), socio-political (self-government of the places of life and production), environmental (functioning of the territorial ecosystem and quality of living). These three dimensions of the bioregional model constitute a strong element of identification of the territory and a necessary framework to develop integrated valorisation strategy for the cultural heritage of every territory. Without this framework of reference, the recovered sites may suffer of a premature abandonment, underutilization or overuse (redundancy of the tourist offer).

The main lesson learned from the pilot experience of San Pietro Island is the bioregional planning is flexible and adaptable and, thus, applicable to very different contexts: from big cities up to insulated and remote rural lands, like in mountains and small islands. The ISOS project evidences, like the Montalbano Biodistrict and the Pontina Bioregion projects, confirm that exploring the potentials of bioregional planning outside big cities trying to recover and valorise rural ecosystems is one of the most challenging research paths for planners in the future.

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Local identity and territorial patterns in the Cagliari's bioregion

Francesco Pes

Abstract

The first studies on the Cagliari's bioregion got started in 2015 thanks to the research of the Department of Civil, Environmental Engineering and Architecture - DICAAR (University of Cagliari). These works show a complex system in which importantterritorial values and criticalities coexist together. The latest researchcomes with the analysis of the context through the seven constituent elements for bioregional places developed by Alberto Magnaghi and some case studiesabout Cultural Ecosystem Services.

In this contribution, in a first step towards the definition of territorial patterns, five distinct settlement systems of this unique local system are identified. Furthermore, a strategic scenario is formulated through the definition of a series of spatial patterns. The cultural references for this approach go back to the studies of Thayer in 2003, who in his work "LifePlace: bioregional thought and practice", elaborates 24 patterns for the Sacramento Valley bioregion. The 30 context-specific patterns identified for the Cagliari bioregion are divided into five categories: environmentalpatterns, anthropic patterns, patterns of conflicting areas, historical and archaeological patterns, patterns of alternative and auto-sustainable economies. The combination of these elements on the territory is capable of expressing multiple aspects of local territorial identity, unexpressed potential, critical issues and possible development paths. The objective is to outline a possible strategy that could lead the whole system toward a state of self-sustainability.

In conclusion, the complex spaces of rural complexity, the heritage of the historic centers and the richness of the archaeological heritage, together with those "energies of contradiction" coming from the grassroots initiatives of local communities, are the supporting elements of a possible future scenario. These energies can generate new forms of awareness and resilience. The enhancement of groundbreaking methodologies based on the evaluation of Cultural Ecosystem Services at the micro-scale in certain critical areas, can highlight intangible aspects of the identity of the place and unexpected connections

between the inhabitants and their living environment. From this viewpoint, the active involvement of citizens from the earliest stages of construction of the methodology plays an essential role.
KEYWORDS: bioregion, patterns, local identity, ecosystem services

1. Introduction

The metropolitan context of Cagliari has great potentialities and several critical aspects. A quarter of the Sardinian population is settled in the regional Capital city and its hinterland, around a wetland system of great ecological value. Earlier studies about the construction of the bioregion of Cagliari date back to 2015 and have been made by the Department of Environmental Civil Engineering and Architecture - DICAAR[1]. The aim was to document the historically balanced relation between urban centres and the surrounding countryside of that unique regional context[2]. All this through the recovery of the traditional knowledge closely tied to the territory and through the study of the necessary conditions to create a circular economy ecosystem (COLAVITTI, PES, 2017; COLAVITTI ET AL. 2018). At first, the research covered the analysis of the context and some occasional grass-root initiatives carried out by public authorities, associations and individuals (PES, 2016).

Then, the uniqueness and the complexity of this dense context have been read through the lens of Magnaghi's seven constructive elements of bioregions (MAGNAGHI, 2014), outlining a critical overview about strengths and issues and a possible territorial project for the proposed bioregion of Cagliari. More recently, the focus has been mostly put on the opportunities given by the creation of the Metropolitan City of Cagliari and the research about place identity and cultural aspects of the bioregion, through the assessment of Cultural Ecosystem Services (COLAVITTI, PES, 2019). We can go a step further, attempting to systemize this knowledge and formulate a bioregional strategic scenario. At first, the analysis will be based on the identification of five settlement systems, in which the historic polycentrism can still be read in the folds of contemporary metropolis. Secondly, a set of 30 'territorial patterns'

[1] The research group is coordinated by Anna Maria Colavitti, Professor of Urban Planning at the University of Cagliari.

[2] As stated by Magnaghi, an urban region is defined as "a set of densely anthropized local territorial systems, related to each other by environmental relations characterizing a bioregion (a valley system, an orographic node, a hilly system, a coastal system and its inland area, etc.) and characterized by the presence of a plurality of urban and rural centres" (Magnaghi, 2014, p. XI). In the case of Cagliari's bioregion, we have a typical coastal system with its inland area.

grouped in five categories will be proposed for this context. Some of these territorial patterns represent a direct expression of the identity of the place: they are the result of long cycles of *territorialisation*, *de-territorialisation* and *re-territorialisation* that occurred over time (RAFFESTIN, 1984; MAGNAGHI, 2000). The cultural references for this approach can be identified with the American landscape architect Robert L. Thayer, creator of the life-place land patterns (THAYER, 2003), and the Austrian architect Christopher Alexander (ALEXANDER, 1977).

2. The urban systems of Cagliari's bioregion

It is possible to recognize five distinct, though not separate, settlement systems. Such systems are the result of the combination of historical urban forms and contemporary urban development trends:

- The context of the regional capital city with its hinterland area around the Pond of Molentargius, which forms the first metropolitan belt. It is composed by the urban centres of Cagliari, Selargius, Monserrato, Quartu Sant'Elena and Quartucciu. The welding of these urban areas as a continuous conurbation, urban sprawl, and the presence of a dense infrastructure network are now in an advanced state, causing fragmentation of ecological networks and loss of resilience;
- Growing urban centers of the second metropolitan belt, in which population growth and urban expansion are recent phenomena. Strong economic and identitary relations with rural ecosystems still exist in this context. This system consists of the urban centers of Capoterra, Sestu, Sinnai, Settimo San Pietro and Maracalagonis;
- The context of coastal urban sprawl, both in the west and the east coast of the Gulf of Cagliari. This extremely fragmented and dispersed form of urban settlement is largely made of second homes and touristic areas. In some of these areas, it is possible to identify conflicts with the historical agricultural land-use tradition and the physical characteristics of the river basin, resulting in extremely high hydrogeological risks. Coastal urban sprawl phenomena affect mainly the territories of Quartu Sant'Elena and Maracalagonis in the west, and Pula and Capoterra in the east;
- Urban settlements along the Rio Mannu river. The location of these settlements provides a clear expression of their strong historical relationship with the water resource. The involved municipalities are Elmas, Assemini, Decimomannu and Villasor;

- The network system of urban centers in the Campidano valley. These Towns show a well-defined urban edge, presenting a high degree of preservation of their historical feature and still expressing an important socio-cultural bond with rural land. Fig. 1 represents an overview of the identified settlement systems and their mutual relations.

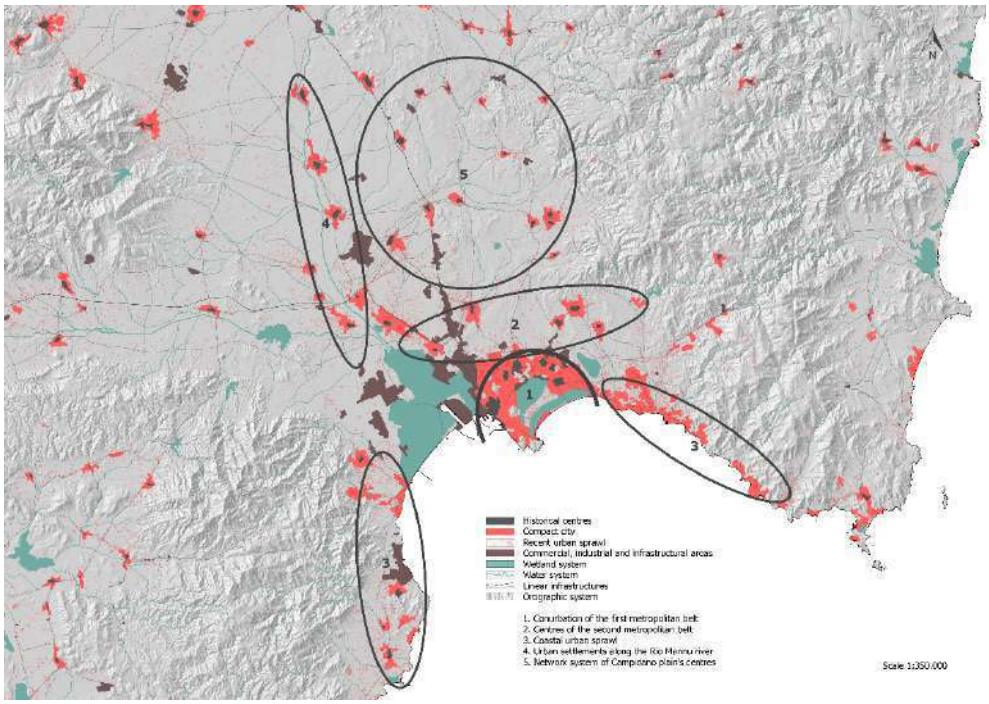

Fig. 1- Urban systems of the Cagliari's bioregion. Source: author's own elaboration

3. A proposal of territorial patterns

Proposing an operative life-place planning hypothesis, Thayer recalls the work of Lewis Mumford for its contribution to regional planning and Ian McHarg for the ecological planning, setting a system of 'life-place land patterns' which varies from region to region and, combined with each other, form a system of networked relationships (THAYER, 2003, 169).

Thayer then defines a set of 24 multilevel, multifunction, and site-specific patterns for the Sacramento Valley bioregion, as a result of a collaborative

community-based process. These patterns are grouped in 3 categories[3] and represent a minimal vocabulary for the interpretation of the life-place (*ivi*, 230).

Tab. 1 – Territorial patterns for the territorial context of Cagliari

Category	Pattern
Environmental patterns	Wetland areas system
	Water system
	Coastal system
	Bioregional wilderness
	Endangered rural heritage
	Life-place foodshed
	Nearby nature
	Transition areas
Anthropic patterns	Historical and compact city
	Commercial, industrial and infrastructural areas
	Linear infrastructures
	Energy production systems
	Waste treatment systems
	Water treatment systems
Patterns of conflicting areas	High hydraulic hazard areas
	High geomorphological hazard areas
	Highly polluted areas
Historical and archeological patterns	Nuraghi
	Caves
	Human dwellings and Nuragic villages
	Necropolis – tombs
	Tombs of the Giants
	Coastal towers
	Dolmens
	Menhirs
	Domus de janas
Patterns of alternative and auto-sustainable economies	Educational Farms
	Social Farms
	Solidarity Purchase Groups (SPGs)
	Shared Gardens

[3] Life-place patterns for the Sacramento Valley bioregion are divided as following: Biodiversity framework (cat. I), which includes Living Corridors, Whole watersheds, Foothill conservation areas, New floodways, Restored basin mosaic, Daylighted streams, Nearby nature, Bioregional wilderness. Agricultural Heart (cat. II), which includes Farmland preservation, Bioregional water, Life-place foodshed, Expanded farming role, Natural beef, Cover crops, Tailwater ponds, Natural edges. Regenerative Communities and Infrastructures (cat. III), which includes Compact cities and towns, Infill development, New village centers, Regenerative transit, Recycled water, Photovoltaic roofs, Natural drainage, Urban-to-nature pathways.

According to Thayer's approach and reflecting on some experiences put in place by the Italian bioregional school, it is possible to build a strategic proposal focused on the territorial context of Cagliari. This proposal can be structured in five categories of patterns, which are context-based and represent a direct expression of the local identitary patrimony (Tab.1).

3.1 Environmental patterns

This category represents the backbone of the proposed bioregion. The wetland areas system includes the complex inter-connected ecologies of Santa Gilla Pond - Molentargius Pond - Salt marshes and some smaller areas in the western part of the Campidano.

The Rio Cixerri and the Flumini Mannu are the main rivers of the water system and the two main tributaries of the wetlands system. A large number of seasonal rivers and small streams also characterizes the water basin. The coastal system of the Gulf of Cagliari is one of the most important invariants of the bioregional context: Cagliari has always had an interdependent relationship with the sea, being historically a thriving centre that dealt with shipping trade with other Mediterranean Countries. The presence of the oil industrial plant in Sarroch on the western coast of the Gulf, extensive coastal overbuilding generated by tourist flows, and coastal erosion represent the most serious challenges. The Bioregional wilderness pattern represents all those areas with minimal presence of human-related activities and high levels of biodiversity, like woodlands, state-owned forests, and Mediterranean scrub. Bioregional wilderness pattern areas are located at the extreme margins of the bioregion, in correspondence with upland regions of *Monte Arcosu* and *Monte Linas* on the west side and *Monte dei Sette Fratelli* on the east side.

The pattern of endangered rural heritageconsists of a mosaic of little farmland parcels with different cultivation types and represents a fundamental historical invariant in the plain of Campidano. The enhancement of this rural system of small diverse crops through local community-pacts and multi-functional agricultural parks is essential to maintain a high level of territorial identity and rural biodiversity and to work towards the regeneration of peri-urban degraded areas (FANFANI, MAGNAGHI, 2009; FERRARESI, 2009; POLI, 2015). Some planning tools at the local scale already foresee the creation of a multi-functional agricultural park in the 'Plan of San Lorenzo', located in the northern part of the metropolitan area.

The Life-Place foodshed includes other production areas, including both permanent and annual crops. Abandoned crop fields and other places where the

local productive vocation has been lost, can be also considered as a potential life-place foodshed. The fundamental strategies used for recovering the productive vocation of the territory, enhancing local productions and building shorter supply food chains, consists in supporting Alternative Food Networks (AFNs) and setting up local "Food Pacts" among citizens, associations, farmers, and local institutions (DI IACOVO ET AL., 2014). Nearby nature pattern is composed of urban green areas included inside the compact city: these spaces represent crucial biodiversity reserves and an important socio-environmental resource for citizens. *Monte Urpinu*, *Monte Claro*, the Hill of *San Michele,* and *Terramaini* are some examples of this pattern inside the City of Cagliari. The main strategy for these spaces consists of building a network of ecological corridors between them and connecting this network with peri-urban spaces and the nearby countryside.

At last, transition areas cover all those natural spaces that are neither specifically agricultural nor completely natural. Likewise, complex parcel spaces represent a link between urban and rural territory, these areas can be considered as transitional spaces between the productive countryside and the bioregional wilderness system. Recent trends show a significant reduction in both number and size of this kind of spaces.

3.2 Anthropic patterns

The compact city includes a great variety of spaces, as historical centres, more recent urban development and residential suburbs, according to surface soil sealing. As shown in the analysis of urban systems, the historical polycentrism of the metropolitan area is still recognisable. Nevertheless, recent trends show an ongoing growth of urban sprawl and soil consumption in peri-urban agricultural spaces. There are mainly two types of spaces considered for commercial, industrial, and infrastructural areas: spaces that lie along transport corridors and industrial spaces unevenly dispersed across the territory. As for the compact city pattern, the trend moves toward an ever-increasing growth of these areas at the expense of productive territory.

Linear infrastructures are organized hierarchically: the *SS130* from Cagliari to Iglesias, and the *SS131* from Cagliari to Sassari, are the two main highways. The railway is an important cultural-historical element. The strategy aims to recover historical rural routes and enhance an alternative road network based on 'soft mobility' for all user categories.

The local energy system is mainly based on production from fossil fuels, with a widespread presence of energy plants throughout the territory. The strategy

focuses on the transition to a sustainable low-carbon future. In this vision, energy should be produced through a decarbonized energy mix at the micro-scale (FANFANI, 2014). Local climatic conditions are particularly favourable to develop solar and wind energy systems. The closure of the waste cycle at a local level is another key point of bioregional contexts. The waste treatment system relies on incineration plants or landfills. In particular, the territory includes seven waste treatment plants, four hazardous waste incineration plants, a waste-to-energy plant and an equipped landfill. The main goals are the optimization of waste cycles through recycling processes and strategies, the shortening of the production chain through local supply chains, and the reduction of packaging volume. Protection of water resources and reconstruction of water environments are the major challenges that need to be addressed today. The approach consists of implementing forms of community-based agreements between citizens and local institutions, as "River Contracts" and Lagoon Contracts (MAGNAGHI, GIACOMAZZI, 2009; POLI, 2015)

3.3 Patterns of conflicting areas

It is possible to detect an evident conflict between natural hydrography and recent urban settlements: the intensification of climate events caused by global warming, soil erosion and a significant waterproofing of large portions of territory basin, led to an increased vulnerability. According to the Hydrogeological Local Plan – PAI, the most critical areas are located north of the Pond of Santa Gilla at the confluence of Cixerri and Flumini Mannu rivers and along the eastern slope of the Sulcis massif in the west part. Geomorphological hazard areasare often associated with hydraulic risk. Industrial plants close to high-value natural ecosystems and densely populated areas in the first and second metropolitan belt constitute one of the most critical conflicts of the whole system. The two main centres, both on the western side, are the 'Macchiareddu-Grogastu' industrial pole, which partly lies over the Pond of Santa Gilla, and the oil refinery of Sarroch.

3.4 Historical and archaeological patterns

Patterns of historical and archaeological invariants represent a core element of local identity and consist of different types of heritage belonging to different ages: the whole Island of Sardinia presents one of the richest archaeological records in the Mediterranean (DYSON, ROBERT, 2007).

Dolmens and menhirs are the oldest artefacts discovered. *Nuraghi*, *Domus de Janas*, tombs, burial sites and coastal towers are other key components of the archaeological heritage. The densest areas of the historical and archaeological heritage of the bioregional system are located at the eastern shore of the Santa Gilla Pond and near the coast all along the Gulf of Cagliari. The tomb complexes of Tuvixeddu and the ruins of the Punic city of Nora have been well preserved to the present day and are among the most famous archaeological sites of the bioregion.

3.5 Patterns of alternative and auto-sustainable economies

The patterns of alternative and auto-sustainable economies represent different types of local initiatives carried out by grass-root communities throughout the bioregional territory. All these initiatives, as the "contradictory energies" mentioned by Magnaghi, expresses the forces capable of generating new spatial and immaterial forms of resistance to the ongoing de-territorialisation process, especially in metropolis (MAGNAGHI, 2001).

The system of educational farms and social farms is widely diffused in the territory: these community-based activities involve the multifunctional aspect of agriculture, through collaborations with schools, agritourism and promotion of local food and wine. Furthermore, these initiatives enhance social inclusion through projects aimed at disadvantaged people and migrants.

On the other hand, the network of Solidarity Purchase Groups -SPGs mainly concerns urban areas. This food network system expresses its potential through direct sales between producers and consumers. SPGs are based on principles of food sovereignty and favours those biological-natural products delivered through short supply chain channels. Shared gardens initiatives are supported by citizens' associations in which landowners make their cropland available for all the members. These initiatives can be mainly found in urban and peri-urban metropolitan spaces.

4. Concluding remarks

The central position in the middle of the Mediterranean Sea, the insular nature, the importance of the archaeological heritage recognized at the international level, the glaring contradictions between the legacy of the Past and the contemporary development trends: all these aspects contributed to form a

unique territorial context. Furthermore, it has been shown that the analysis of the bioregional territory highlights some critical issues, such as the conflict zones in the western part of the bioregion in a territory characterized by serious hydro-geomorphological vulnerabilities, the presence of heavy industry with the generation of severe environmental contamination, and a tourist development model which destroys the coastal ecosystem. Here after, some considerations for future work are given.

The first reflection concerns the bioregional patterns that have been described in this work. Some of these patterns reflect the identity characteristics of the place and represent a step towards the recognition of the importance of protecting this territorial patrimony against the impact of the ongoing de-territorialisation processes.

Specifically, actions should be focused first on rural areas, raising social awareness about their importance. Farming land with high functional and productive complexity, which are part of the endangered rural heritage, are extremely vulnerable due to the expansion of conurbations and the transition to simpler forms of agriculture. From this perspective, the valorisation and interconnection of those local initiatives described as 'patterns of alternative and auto-sustainable economies' can greatly enhance the resilience of the whole context. Fig. 2 represent a focus on the localisation of the Patterns of alternative and auto-sustainable economies, in relation with environmental patterns and anthropic patterns.

Historic centres are another important element of the identity of bioregional systems. Those cities that are part of the metropolitan area preserve traces of their reticular polycentrism, still visible in the forms of the urban fabric. The urban centres of the inner areas preserve a compact spatial shape, but their economies are affected by a model of territorial relations based on the central-peripheral paradigm. In order to break this paradigm, a strategy based on safeguarding and revitalising minor historic centres, valorising the widespread archaeological heritage and promoting local products can accomplish some rather interesting results. New, innovative methodologies based on the analysis of Ecosystem Services (POLI, 2020), and specifically on Cultural Ecosystem Services (COLAVITTI, PES, 2019) can be further explored as a tool to detect at the living community-scale other intangible identitary aspects of the relationship between inhabitants and their life-place. The active involvement of citizens, associations and local stakeholders already in the first steps of the process is a crucial aspect: local context conditions vary continuously in place and time, and there is rarely a single, one-size-fits-all methodology.

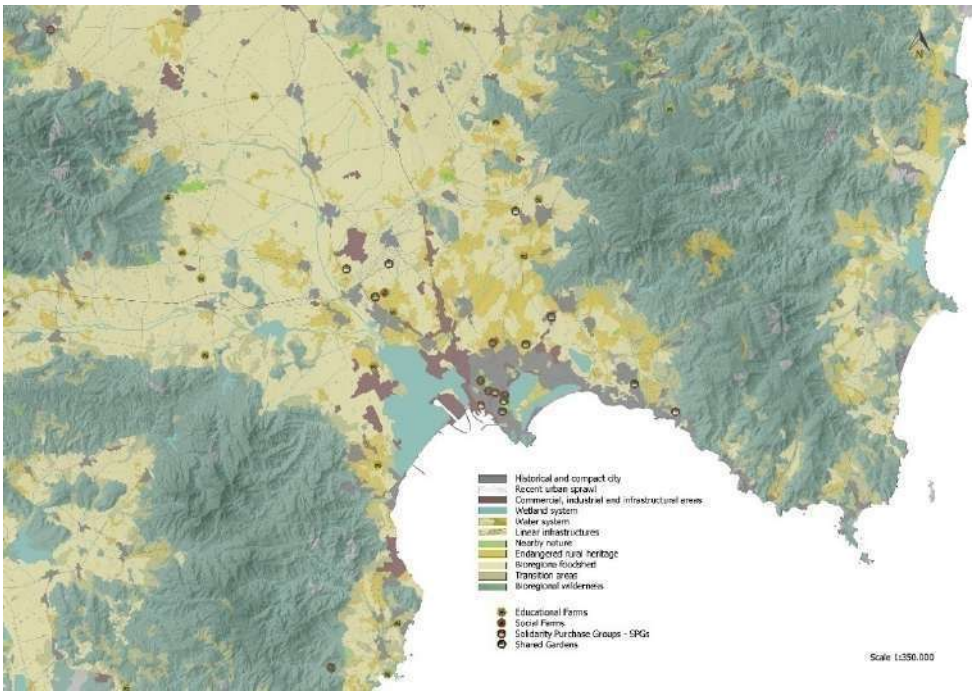

Fig. 2 - Focus on Patterns of alternative and auto-sustainable economies. Source: author's own elaboration

In conclusion, it is possible to look into the question of the governance level. We have consciously chosen not to bind the bioregion in rigid and immutable borders, which simplify reality by establishing an "inside" and an "outside" and imposing a break to complex territorial and spatial relationships. Nevertheless, an intermediate level of governance between the regional level and the local level is indispensable to handle common issues among different municipalities. In 2016, the creation of the Metropolitan City of Cagliari[4] was seen as a good opportunity to address some inter-municipal common issues through a bioregional approach. However, a recent reform[5] has redefined the territorial framework of the Metropolitan City of Cagliari, including territories that have little to do with the bioregional context outlined so far. A governance asset that is consistent with the bioregional context is still far from being found.

[4] In its previous spatial configuration, the Metropolitan City of Cagliari included the Municipalities of Cagliari, Assemini, Capoterra, Decimomannu, Elmas, Maracalagonis, Monserrato, Pula, Quartu Sant'Elena, Quartucciu, Sarroch, Selargius, Sestu, Settimo San Pietro, Sinnai, Uta, Villa San Pietro.

[5] The new territorial asset of Sardinia has been defined according to the Regional Law n.7/2021 adopted on April 12, 2021.

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Territorial dynamics and settlement development in low-density areas. The case of Ogliastra in Sardinia

Alessio Floris, Sergio Serra

Abstract

The processes of marginalization and socio-economic depression strongly affect the inner areas of Italy, far from the main centres of agglomeration and delivery of essential services, but at the same time characterized by important environmental, landscape and cultural resources that are the result of long-term processes of territorialisation. In the Sardinian regional context, the case study of Ogliastra is selected in order to investigate the issue of territorial dynamics and settlement development of low-density territories. It is an example of the critical balance between internal and coastal areas, where settlement development has encouraged the polarization of economic activities and the concentration of the population near the coast, leading to a gradual and apparently inevitable depopulation of the mountain villages. The geographical conditions and the infrastructural deficit have determined a situation of insulation for long centuries, which has deeply affected the economic development of the territory and has marked some features difficult to erase in the social and productive structure. At the same time, it has also made communities less disposed to accept the changes imposed by globalization trends, preserving environmental and historical-cultural resources and the territorial heritage from economic pressure. The paper analyses the territorial context and the polycentric settlement system of Ogliastra focusing on processes related to the development of the tourist industry, based primarily on coastal heritage as an attractor of seaside tourism. In particular, it proposes a territorial interpretation of the elements that represent the local identity and environmental and cultural features in a bioregionalism perspective. The final reflections focus on the need to define local development strategies that integrate the social, economic and territorial components in a project based on the principles of co-evolutionary balance and territorial equity.

KEYWORDS: low density areas, territorial dynamics, depopulation

1. Introduction

According to the bioregionalist perspective, the territory is "a living system of high complexity", the result of dynamic and long-term relationships between the human and natural components (MAGNAGNI, 2010). In line with the ideas of Patrick Geddes, the territorial project takes as a priority the enhancement of the uniqueness of each region and each city, the result of a co-evolutionary process between place, work and folk (GEDDES, 1970).

An analytical and knowledge framework that highlights the specificities of the context should support the bioregionalist project, which is also based on the forms and relationships of all components of the territory. In particular, it is necessary to overcome the principle of identification of the territory on the basis of purely economic and administrative criteria to move to the interpretation of the territory as a set of bioregions, unique and homogeneous areas where the morphology, the spaces and the inhabitants are integrated. These are spatial units characterized by functional, urban and ecological complexity, due to the presence of different environmental, hydrographic, settlement and landscape systems and consolidated relationships between plains, hills and mountain valley systems (SCHILLECI, 2018).

The development of urban, infrastructural and rural systems has historically involved orographic nodes and river valleys, following territorial accessibility. The interpretation of historical processes of territorialisation provides the framework for the application of models of self-sustainable development and self-determination of local communities (MAGNAGHI, 2020; SCHILLECI, 2018).

The contribution reconstructs and analyses the settlement process of the region of Ogliastra, on the eastern coast of the island, characterized by historical phases of territorialization and deterritorialization that have partly broken some established balances between the coast and the inland mountains.

Finally, it discusses the issue of the relationship between inner and coastal areas affected by tourism flows that lead to significant changes in the socio-economic structure and in the identity features of the territory.

The knowledge and interpretative framework defines some key issues to recognise the co-evolutionary process that links the human settlement and the environment, integrating the natural, human and social components within bioregionalist scenarios of territorial rebalancing and sustainable local development.

2. Ogliastra and the territorial insulation. An island within an island

The region of Ogliastra, as well as most of the Sardinian territory, has historically been characterized by a condition of strong insulation, described as a sunken area that looks like a circular amphitheater, separated from the central parts of the island by a crown of mountains of more than 1300 meters (Fig.1). The French geographer Le Lannou describes the eastern coast as "[...] of the least accessible. The entire southern part [...], drawn by a large fracture line, is constituted, on the front of a rigid wall, by a discontinuous fringe of thin marshy plains, where the mouths of the watercourses are lost." (LE LANNOU, 1979, p.54).

Fig.1 - The morphology of the territory (Authors' elaboration).

Fernando Clemente suggests a delimitation of the territorial unit of Ogliastra, by identifying strong relationships with the south-eastern part of the island (Sarrabus) that have partially affected the territorial structure (CLEMENTE, 1964). The Gennargentu mountain range, which constitutes the center of the territorial unit, encloses a settlement system which has been preserved almost unaltered over time, extending southwards to the shore of the Tyrrhenian Sea. The delimitation of the territorial unit is based on the geographical limit, rather than following the administrative limits of the municipalities or of the historical regions. To the north, the mountainous crown, which reaches the sea in the municipalities of Urzulei and Baunei, joining the peaks of the Gennargentu mountain range, rises above the sea up to the 1834 meters of Punta Lamarmora.

The conformation of the Ogliastra territory can be compared to a cavea opened towards the eastern coast on the plain of Tortolì and enclosed by a very irregular mountainous layout. The valleys of the inhabited centers, for long stretches deeply embedded in the mountains, are so narrow as to allow only the passage of their watercourse, generally of torrential character. The basin of the Flumendosa River is the center of the mountain summer grasslands district of Ogliastra and is the hub of sorting and confluence of flocks. To the south, the altimetry results in a further closure above Tertenia and continues on to the Quirra plateaus (CLEMENTE, 1964).

The deep geographical separations, due to the morphology of the territory and to valleys embedded between mountains, are factors of fragmentation and closure, strongly limiting the territorial accessibility. Even today, some urban centers, separated by morphological limits (a mountain, a cliff, a river), are independent communities, with different customs, traditions, dialect forms, although not very far from each other. The structure of the village is almost self-sufficient to allow it to survive the condition of isolation, without being dependent on any neighboring commercial villages. Neither the coming of the motor vehicle at the beginning of the century has deleted the archaic characters, which reflect the territorial fragmentation and the general insulation of the island in the Mediterranean.

In the second half of the XIX century the internal movement was extraordinarily limited, also because of the difficulties offered by the mountains to the infrastructuration of the island. If the use of more modern transportation has partially reduced the insulation, it has not affected the consolidated conditions such as the distribution and structure of the population, the archaism of agricultural methods, the mediocrity of commercial trade (LE LANNOU, 1979).

The maritime transportation, given the presence of harbour structures on the coast of Arbatax since the Roman age, has always represented an effective system of connection with the external world, both from the commercial and touristic point of view (PORCU, 2002).

The construction of the current harbour of Arbatax dates back to 1861 and was completed in 1893. Another important step for the improvement of the accessibility to Ogliastra is represented by the realization of the railway connection from Cagliari to Tortolì, completed in the 1894, which aimed to overcome the condition of insulation of the settled communities, connecting them with the whole island. The project of the secondary railways, as an integration of the main network to connect the main cities of the island and the harbors, provided for narrow gauge lines with a reduced width of the railroad track that enabled to cross the mountains more easily.

When the train was first launched, it represented for Ogliastra a remarkable opportunity for progress but, in the Fifties, the government focused on investment in road infrastructure for private transport, and for this purpose long stretches of railway track were dismissed. At the end of the Nineties, the railway network of Ogliastra was closed to local public transport and converted into a service for tourism with the creation of the Trenino Verde (little green train), which takes its name from the small size of the line and vehicles and the way it passes through an uncontaminated environment which has made it one of the main components of the regional tourist attraction (BOCCONE, 2009).

The line of the green train allows slow excursions following routes that offer a unique landscape through endless climbs or dizzying descents along the sides of steep valleys. It has attracted over time flows of visitors, even on a daily basis, to marginal inland villages and has stimulated the birth of several economic activities, such as guide companies, trips, accommodation, catering and crafts. The road infrastructure system is essentially based on the national road 125 "Orientale Sarda", established in third decade of Ninetheen to connect the centers of the eastern coast, from Cagliari to Olbia. The original route is particularly tortuous, adapting the road scheme to the territorial morphology, in some cases going close to the coast, with panoramic views of remarkable landscape interest, in other cases crossing more inland areas. Starting from the 2000s, some sections have been replaced by the new 125, with a more regular route and a wider road section, which is progressively decreasing the traffic crossing urban centers, reducing journey times and greatly improving accessibility to the Ogliastra territory. In 1923, the journey time by public transport of the Cagliari-Muravera- Tortolì route, 145 km long, had a duration of 8 hours (RUJU, 2015).

3. The territorialisation process: the balance between coast and mountain

The number of archaeological sites confirms that the territory of Ogliastra has been populated since the Neolithic. The transition from a dispersed habitat to a cluster of structures in the form of typical Nuragic villages took place already in the pre-Roman era, but over time the population has remained extremely dispersed with rare urban centers of modest size. A large part of the territory has not undergone anthropization processes, with large natural areas consisting of grasslands and uncultivated productive land, as well as forests of holm oaks, on the east of Gennargentu in the municipalities of Villagrande and Baunei. In the phase from the Ancient to the Medieval period, there was no reorganization of the rural society, which is based on the isolation and productive autonomy of the villages. The concern for security had a decisive influence on the structure of the Sardinian rural habitat, with a preference for the hills and mountains, far from the sea, perceived as an element of vulnerability and danger. Between the XI and XIV centuries, community uses constituted the main defense of the settled populations against the insecurity of place and time (LE LANNOU, 1979).

The morphology of the territories has greatly influenced the organization of the road network and the development of settlements. The crown of centers, which follows the mountain ridge, is affected in part by mountain pastures (Baunei, Urzulei, Talana, Villagrande and Villanova, Arzana, Gairo, Osini and Ulassai), and in part by cultivation carried out around the settlements and in the valleys facing the coast (as is still the case for Gairo, Osini, Jerzu and Lanusei). The high mountain area, above an altitude of 700 m, is mainly used for summer pastures and has historically established relationships with the valley areas of the plain of Tortolì and Sarrabus in relation to the phenomenon of transhumance of the flocks (Fig.2).

The settlements often found their location at high altitudes, in accordance with the pastoral tradition of the population interested in mountain pastures and with the greater safety offered by the mountain compared to the coastal valleys, where summer pastures were located. In the hills and plains of the coast other settlements were formed, which had more accentuated alternatives of malaise and well-being but which in recent times have become increasingly important (Loceri, Bari Sardo, Tortolì, Arbatax, Lotzorai, Girasole and Triei) (CLEMENTE, 1964).

Fig. 2 - The routes of transhumance. 1. Far transhumance; 2. Minor transhumance; 3. Main gradients that directed the minor transhumance. (Source: Le Lannou, 1979, p. 216)

The process of territorialization enforced the differentiation between mountain and coastal areas and, at the same time, was structured around strong relations of economic dependence. The Carta de Logu of the XIV century introduced a clear distinction between the mountain areas reserved for flocks (saltus) and the territory to be ploughed and cultivated (viddazzone), which was closed after sowing to prevent the entry of livestock. The mountain villages are characterized by open pastures of flocks of sheep and goats, which does not necessarily correspond to a collective property but often are lands privatized since a long time.

The practice of transhumance determines the nomadic character of the populations, in which the pastoral economy imposes a perpetual mobility, with the transfer of the flocks to the plains in the period between October and May as a remedy against the cold. These movements sometimes require journeys of 30-60 km to reach the plains of Ogliastra, around Tortolì, or Sarrabus, on either side of the lower course of the Flumendosa. The transhumance is generalised

but one-way direction: the shepherds of the villages in the plains do not move their flocks to the mountains but associate the livestock farming with the extensive cultivation of wheat (LE LANNOU, 1979).

The map of municipal districts emphasises the link between mountains and the coast. The territory of the mountain municipalities appears particularly stretched towards the coast. The conformation of Gairo is singular because it presents a narrowing in the center to reach the sea with a very extended front. Other municipalities are close to the coast but cannot reach it, with the exception of a few administrative enclaves in the Salto di Quirra area, shared between several inner municipalities (Fig.3).

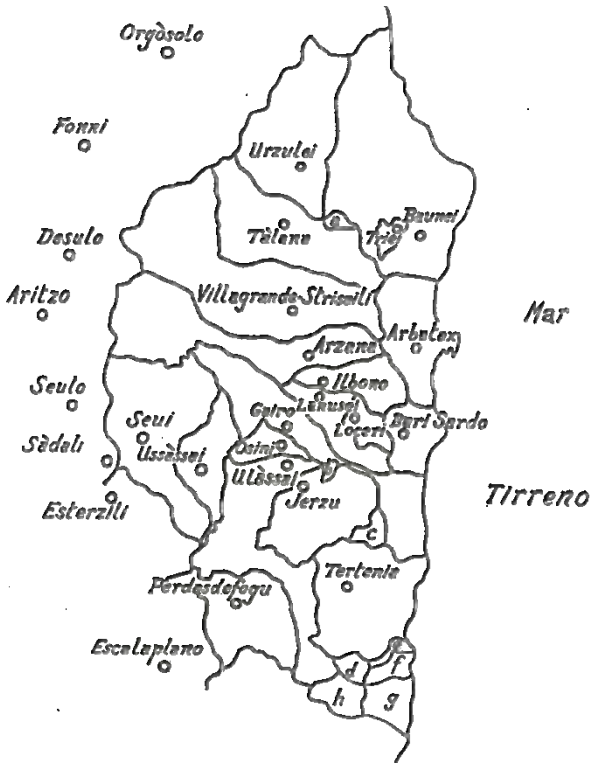

Fig. 3 - Municipal districts on the east of the Gennargentu mountain range. Municipal territories stretched from the central mountain ridges to the Tyrrhenian coast. The letters refer to enclaves. (Source: Le Lannou, 1979, p. 219)

The settlement structure was strongly influenced by the sea, which pushed the population towards the inland and created a dispersed habitat where, still today, the population density in the territory is particularly low (from 275

inhabitants per square kilometer in Tortoli to less than 9 inhabitants per square kilometer in Talana). Poor communities, withdrawn on themselves, confined until today in an isolation that resists to the actions of our time.

Around the XIV and XV centuries, the island experienced a drastic reduction in population and a settlement catastrophe with substantial losses of villages, from which Ogliastra remained unscathed (DAY, 1987; ORTU, SANNA, 2009). The relationships between lowland villages and mountain centers are the representation of the historical opposition between two deeply hostile worlds, that of pastoral nomadism and that of village agriculture. As in the rest of the coastal strip of the island, with the exception of Cagliari and the rare seaside villages, also in the east coast there are no major urban agglomerations in the more than 200 km from Olbia to Cagliari. The plains on the coast are usually dependent on the villages of shepherds in the center, with the exception of some cultivated areas such as the vineyards of Lanusei and Jerzu or the orange groves of Tortoli and Muravera.

In the XIX century Lanusei represented an important administrative center, capital of the province, with a territory of about 2270 square kilometers, which included the eastern slopes of the mountains of Barbagia and reached those of the Sette Fratelli, not far from Cagliari. It was composed of three departments called Agugliastra, Cirra and Sàrrabus (ANGIUS, 2006), of which the first corresponds to the region of Ogliastra. Since 1927 the territory of Ogliastra is included in the province of Nuoro and we had to wait until 2001 to see the recognition of administrative autonomy, with the establishment of two provincial capitals, Tortolì and Lanusei. In 2016 the territory came back under the management of the province of Nuoro but, with the reform of local governments in 2021, it is expected the re institution of the intermediate institution.

In the first decades of the twentieth century, the economy of the territory was based exclusively on the primary sector, in particular sheep breeding and agriculture. Also the economic sectors showed remarkable differences between the coastal areas, where the sheep breeding prevailed, and the mountain centers, devoted to the breeding of goats and pigs. Less relevant is the cattle breeding, limited to some difficult pastures.

Ogliastra is mentioned among the areas of specialized cultivation of olive trees, which has a wide spread in the rest of the island, particularly around the town of Lanusei. Greater importance assumed instead the cultivation of wheat and, to a lesser extent, of barley, practiced in the upper parts of the territory. Viticulture characterizes very vast areas of the hills between Lanusei, Bari Sardo and Jerzu, although the total surface reserved to vines is quite modest. In fact,

usually the cultivation of the vine is associated with fields of cereals, orchards, olive groves and almond groves, which are located on the first slopes of the villages of the plains and hills enclosed by the pastoral mountains (LE LANNOU, 1979).

4. Experiences of modernization and deterritorialization

The settlement system of Ogliastra has maintained, at least until the second post-war period, a situation of substantial stability, characterized by a low population density and by a prevalent concentration of the population in the high areas, with some poles providing services, among which emerges the town of Lanusei that, until the Sixties, exceeds Tortoli in the number of residents (in 1961 Lanusei 5449 inhabitants, Tortoli 4588 inhabitants).

Despite the still strong condition of isolation, in the early sixties, there were some attempts to modernize the local economic system, with the application of the industrial model. In 1962, the President of the Republic established the first industrialisation center of Tortolì Arbatax, later named the Industrial Consortium of the Province of Ogliastra. The construction of the Arbatax Paper Mill in 1963 was the most important industrial experience in the history of Ogliastra. Located in a flat area close to the port of Arbatax, at that time it represented the second largest paper industry in Europe. At the peak of its production growth, it was able to cover 60% of the national demand for newsprint and had over 1000 employees. In 1972, the Intermare Sarda of Arbatax was founded, a specialized engineering company of the ENI Saipem group, which is still active in the industrial area of Tortolì.

In connection with industrial activities, the port is also involved in a project for the development and strengthening of the structures related to the sea transport of materials produced by the factories, in addition to the activation of the Genoa-Olbia-Arbatax line (PORCU, 2002). Also the subsequent construction of Arbatax Tortoli airport was aimed at the development of the paper mill which, in 1973, passed to a new management and, after several failures and recovery attempts, ceased production in 1989. After the last unsuccessful attempt to restart, in 2005, the Arbatax Paper Mill was definitively dismissed and all components removed, with the partial reuse of the area.

The radical political and economic transformations that have affected the territory of Ogliastra and the entire region in the last seventy years have modified the ancient and consolidated systems of life and relationships and have had a significant impact on the territorial and landscape structures, particularly in the coastal strip. Until the 1950s, the coastal landscape of Sardinia presented limited

episodes of urbanization, which testified to a low propensity for the sea by the population, for historical and geographical reasons, but also a limited fruition from the outside. The advent of industry and the introduction of innovative practices related to the tourist economy, through the adoption of development models unrelated to the local context, led to a rupture of the historical balance between coast and inland that had until then guided the settlement development (PRICE, 1983). The lack of attention to the sea had allowed the preservation of coastal landscapes that, in the second half of the XX century, are sometimes transformed to give rise to new places, often artificial and impersonal, such as those of production, vacation residence and low-cost tourism (MADAU, 2009).

The development of new economic, productive and touristic activities, has resulted in important flows of population that, from the mountain centers, have moved towards the plain, in particular in the area of Tortolì, which becomes an important node of the polycentric settlement system of Ogliastra. The strategic and barycentric position, in relation to the territorial context and to the infrastructural system, made it more accessible and suitable to assume the role of regional trade center and to gradually absorb the migratory flows.

The progressive abandonment of the mountain, clearly appreciated by its inhabitants, determines the consequent loss of some traditional economic activities, such as sheep-breeding and agriculture (CLEMENTE, 1964). Lanusei continues to represent an important pole for the provision of services, such as the hospital and the courthouse, but undergoes a remarkable demographic decline. While Tortolì registered 10,743 inhabitants, in the last census of 2011, Lanusei has little more than half of them (5,492 inhabitants).

The modification of the territorial equilibrium also has repercussions on the urbanization of the territory, as shown in Figure 4. The centers of ancient and first formation are affected by a significant growth of urban fabrics, especially from the Fifties to today, mainly located in coastal centers, especially in the conurbation of Tortoli, where urbanization reaches the coast with the tourist and industrial settlements.

In 2006, the Regional Landscape Plan (RLP) introduced restrictive measures to contrast the anthropization processes along the coast, in particular the construction of accommodation facilities and tourist settlements.

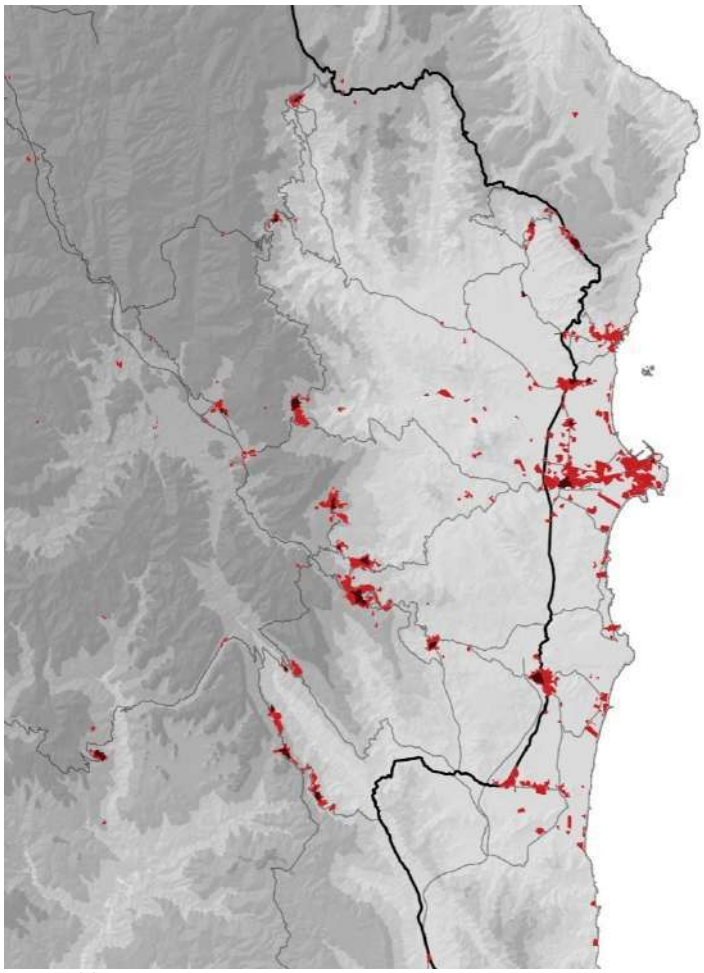

Fig. 4 - The settlement system. In dark red the centers of ancient and first formation, in light red the expansions from 1930 to the present (Elaboration of the authors on RLP data)

There is a strong relationship of interdependence between landscape and tourism. On the one hand, tourism benefits from landscape and environmental resources to attract flows of visitors but, at the same time, subjects to anthropic pressure a limited resource, whose exhaustibility compromises the strategic tourism project. The consistency of hotel and non-hotel accommodation in Sardinia for 94% of the number of beds is located in coastal areas. A survey conducted on 27 areas of coastal landscape of the RLP shows that, in Ogliastra, the supply of accommodation represents 6.5% of the total number of beds in the coastal strip of the island, of which almost 58% is made up of an extra-hotel offer, vacation homes, bed and breakfast and campsites (MADAU, 2009).

In summary, since the Second World War, the territory of Ogliastra, like the rest of the island, has experienced socio-spatial imbalances, the result of heterogeneous processes of deterritorialization, linked in particular to the progressive and constant displacement of populations from the inland areas towards the coastal and urban centers, the crisis of the primary sector that fed the economy of small inland centers, the gradual failure of attempts at industrialization promoted in the sixties (STRINA, 2021).

5. Conclusions. Bioregionalist approaches to territorial rebalancing

The case study of Ogliastra is a paradigmatic example of the settlement and socio-economic dynamics characteristic of low population density contexts that are facing phenomena of deterritorialization, economic and demographic decline combined with a crisis of identity, cultural and landscape values. The interpretative framework of the polycentric settlement system highlights the direct link with the morphological and environmental components and with the hydrographic structure (Figure 5). The infrastructural element constitutes a factor that catalyses the settlement development, with direct effects on the accessibility inside and outside the territorial area.

The contemporary dynamic linked to the growth polarization in the area of Tortolì, a privileged area of attraction of tourist flows, does not necessarily have to be contrasted, in an attempt to reverse the trend of depopulation of the minor mountain centers. Tortolì provides space for a range of different economic activities, most of which are located near the coast, in an industrial area which integrates manufacturing, commercial activities and other economic sectors linked to fishing and tourism. On the mountain side, on the other hand, traditional local productions are progressively being lost and a patrimony of agricultural land, mostly for public use, is being abandoned and underutilized. It is necessary to redefine an economic network which is able to connect tourist flows and receptive activities with a renewed and quality agricultural production, which can be integrated with the enogastronomical sector.

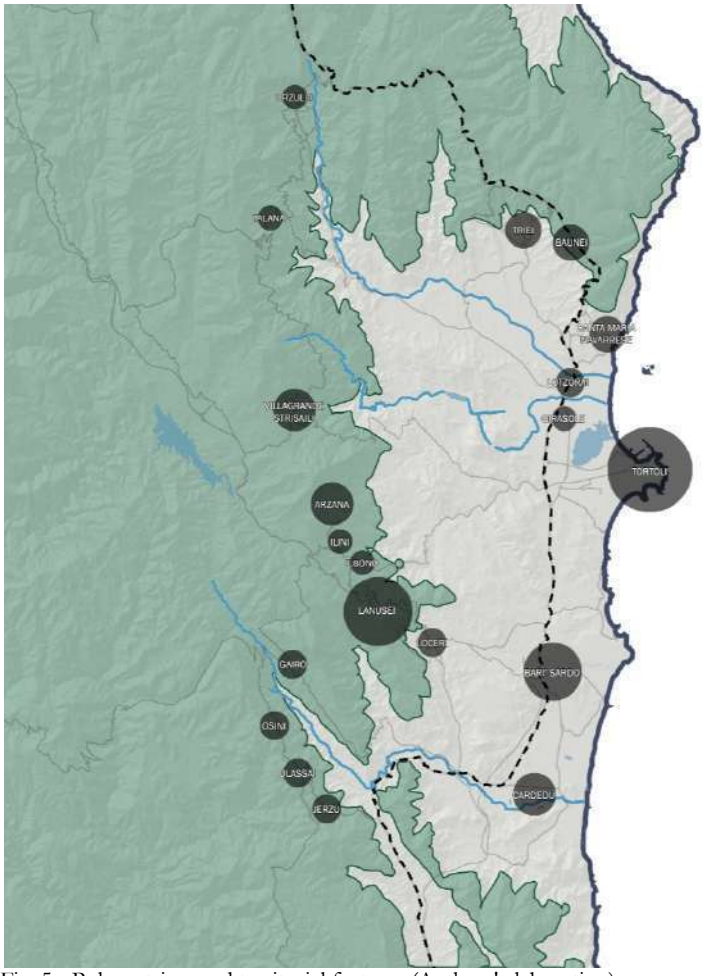

Fig. 5 - Polycentrism and territorial features (Authors' elaboration)

In this direction, the bioregional paradigm allows to interpret in an innovative way the relationship between territorial heritage and local production system, promoting a new pact between city and countryside that can support the reorganization of contemporary urbanization in a polycentric system characterized by less dependence on the outside. The development of locally based economic systems are functional to the reproduction of its life cycle through productive activities that enhance the specific qualities of the territorial assets peculiar to each bioregion (MAGNAGHI, 2020). The urban policies of conservation and protection of the landscape, the environment and the historical and cultural heritage should be oriented towards active policies to promote processes of reterritorialization. It is no longer acceptable to simply

impose restrictions, but it is necessary to involve local residents and producers in the reconstruction of territorial values according to an integrated vision of the territory that connects agroforestry spaces to productive and settlement systems, according to models of self-sustainable local development (MAGNAGHI, 2012; 2020).

An attempt to define some planning guidelines for the landscape of Ogliastra has been carried out by the Regional Landscape Plan to be integrated in the adaptation of the local urban planning. The settlement crown of the slope centers (Lanusei, Ilbono, Elini, Arzana, Villagrande Strisaili, Talana, Urzulei, Triei and Baunei) represents a central element in the landscape project for the fruition and the reorganization of the relationships between the internal areas and the coastal strip.

The requalification of the environmental and road connections between the centers of the settlement crown on the eastern side of Gennargentu and the coastal plain has the aim of strengthening the perception of the system of relationships that structure the landscape area. The strengthening of the tourist and accommodation system must be combined with the objectives of environmental protection, urban sprawl containment and historic buildings recovery.

The touristic development of the mountain centers must be integrated with the local productive activities and with the traditional characters of the area. For the centers of the coastal plain, located along the state road 125 Orientale Sarda, it is expected the strengthening and integration of services of local interest through interventions on an inter-municipal scale for the redevelopment of the road corridor of connection. In particular, for the settlement system of the plain of Tortoli, integrated inter-municipal interventions of environmental and urban regeneration are foreseen, which allow to enhance the system of wetlands of Tortoli, consisting of the pond, the rivers (Riu Girasole, Riu Primaéra) and the neighboring coasts.

The development of the touristic potentialities of the territory involves the enhancement of urban and touristic services and of the activities related to the harbour of Arbatax. The landscape project also requires the promotion of local productions and rural agricultural and zootechnical activities typical of mountain and coastal areas, through a sustainable use of environmental and natural resources which guarantees the regeneration and the functionality of ecosystem services.

The preservation of crop diversity allows to ensure the environmental quality of the area, to preserve a habitat suitable for wildlife survival, and to maintain the orographic conformation and hydrogeological balance of the area.

However, these strategies are ineffective if not implemented through a detailed knowledge and design framework in the municipal plan (COLAVITTI ET AL., 2018; 2019).

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Green infrastructure and protected areas: A study concerning Sardinia[1]

Sabrina Lai, Federica Leone, Corrado Zoppi

Abstract

According to the European commission, green infrastructure (GI) is conceived as a strategically planned network of natural and semi-natural areas. This definition highlights three important issues: environment protection, ecosystems multifunctionality and ecological connectivity. Building upon a methodology that identifies a Sardinian regional GI in relation to four values (conservation value, natural value, recreational value and landscape value), this study aims at assessing the suitability of areas situated within and outside protected areas' boundaries to be included in the above-mentioned Sardinian regional GI. In relation to conservation value, outcomes reveal a higher suitability of patches situated within protected areas to be included in the regional GI, whereas in relation to the other three values, the behavioral patterns are less evident. These results suggest specific policy recommendations such as mitigation of land-taking processes, increase of Natura 2000 Network's size, accurate identification of landscape goods, and improved accessibility to sites characterized by outstanding natural beauty.

KEYWORDS: green infrastructure; ecosystem services; Natura 2000 Network; environmental planning.

1. Introduction

This study builds upon a methodology applied in previous studies by Arcidiacono et al. (2016) and by Lai and Leone (2017), which both map a regional GI taking an Italian region as a case study. In the former, a GI for Lombardy was identified as a multifunctional GI taking into account three values: natural value, recreation value, and landscape value. In the latter, a

[1] This chapter is extracted from: Lai S., Leone F e Zoppi C. (2018), "Implementing green infrastructures beyondprotected areas", *Sustainability,* vol. 10, 3544; doi:10.3390/su1010354413

Sardinian GI was identified based upon four factors, i.e., adding to the three values used in Arcidiacono et al. (2016) a fourth layer accounting for conservation value.

Conservation value (VAL_C) is based on the presence of areas whose natural characteristics are particularly important because hosting habitats rare, endangered, or representative of European biogeographical regions (i.e., habitats of community interest under the provisions of the Habitats Directive (no. 93/43/EEC)). Such habitats are meant to be maintained or restored in a favorable conservation status, and their presence calls for the designation of Natura 2000 sites, when criteria listed in Annex III of the Habitats Directive (concerning representativity, size, conservation status, and significance of the site) are met. According to a recent study (SALOMAAET AL. 2017) carried out to explore Finnish experts' perceptions on GI implementation, the importance of GI in relation to biodiversity conservation has been emphasized by the majority of respondents. Moreover, GI can contribute to the reduction of habitat fragmentation which is one of the primary causes of species extinction (WEBER ET AL., 2006).

Natural value (VAL_N) is related to biodiversity's capacity of providing ecosystem services (ES); hence, it implies ecological integrity and current levels of ecosystem functions, key to supplying human-demanded ES. As such, under the Millennium Ecosystem Assessment (2003) classification it would be categorized under the supporting services group. In the literature, trade-offs between ES are often analyzed and assessed through land use/land cover changes (SHARMA ET AL., 2018; POLASKY ET AL., 2011; YANG ET AL., 2018). For example, Yang et al. (2018) studied the impacts of land use changes on ES trade-offs in the case of Yahne watershed in the Loess Plateau, China. In particular, their study investigates land use patterns that mitigate conflicts between food supply and conservation measures in order to be included within future restoration policies.

Recreation value (VAL_R) concerns the landscape attractiveness for recreational activities. Landscapes and natural habitats are accounted for when choosing holiday locations or doing outdoor activities (prominently, active tourism), thus they positively affect both local communities' and tourists' quality of life and wellbeing, while also benefitting local economies. Therefore, recreation value accounts for cultural ES, as classified by the Millennium Ecosystem Assessment (2003). In the literature, recreation value is assessed through monetary analyses (SERKAN, REHBER, 2008; MARTÍN-LÓPEZ ET AL., 2009; LANKIA ET AL., 2015; MAYER, WOLTERING, 2018) or through non-monetary analyses (HEAGNEY ET AL., 2018; FONT, 2000; RALL ET AL., 2018). In

the last decades, non-monetary methods based on social media approaches have been used to assess recreation value (WOOD ET AL., 2013; SONTER ET AL., 2016; HAUSMANN ET AL., 2018). For instance, Cunha et al. (2018) evaluated recreation services combining social media-based methods (using the InVEST recreation model) and official data sources in the Northwest coast of Portugal.

Finally, Landscape value (VAL_L) accounts for the interactions between natural and human factors that have shaped European cultures, as per the European Landscape Convention, and it is here assessed based on the endowment of natural and cultural resources, which are identified as landscape-related goods by the Italian Code on cultural goods and landscape (Law enacted by decree no. 2004/42). Various authors have highlighted the importance of landscape value within spatial planning (ZOPPI, LAI, 2010; ORANTES ET AL., 2017) and also in relation to the definition of GI (ARCIDIACONO ET AL., 2016).

Once a regional GI is identified, the eligibility of areas located inside and outside protected areas (national and regional parks, sites protected under the provisions of the Ramsar Convention and sites belonging to the Natura 2000 Network, identified with reference to the Habitats Directive and to the Birds Directive (no. 2009/147/EC)) are assessed on the basis of the four factors indicated above.

The discussion on the relationship between the regional GI and protected areas provides important insights concerning the definition and implementation of spatial planning policies aimed at increasing the ecosystems' capacity of providing services by spreading environmental protection beyond the boundaries of protected areas, and by proposing a holistic planning approach based on the implementation of the regional GI.

The study is structured as follows. The next section describes the methodological approach and the regional context for its implementation. The third section shows the results concerning the spatial taxonomy of the eligibility of areal units to be part of the Sardinian regional GI, on the basis of the four factors indicated above. In the final section, the outcomes and proposed directions for future research are discussed.

2. Materials and Methods

The Sardinian region, an Italian island of approximately 24,000 km^2 in size, is here taken as a case study. Protected areas (which include national parks, regional parks, Natura 2000 sites, and wetlands of international importance, hereinafter 'Ramsar sites') concern around 19% of the island's land mass. Since

2006, a Regional Landscape Plan (RLP) is in force; such plan does not contain any provisions for a regional GI.

As Fig. 1 shows, two national parks, four regional parks, five marine protected areas, 125 Natura 2000 sites and eight Ramsar sites are included in the study area.

As stated in the introduction, VAL_C accounts for the presence of natural habitats regarded as worth preserving in a favorable conservation status by the European commission. VAL_C is here computed following the methodology provided in a regional report (CRITERIA; TEMI, 2014a), where habitats of community interest are classed and prioritized with a view to defining a regional monitoring plan. VAL_C is assessed only in those areas where habitats of community interest have been identified, as:

$$VAL\_C = P \times (R + T + K) \quad (1)$$

where:

- P stands for priority; it accounts for the presence and significance, in a given land parcel, of habitats of community interest as listed in Annex I of the Habitats Directive, and can only take three values: P = 0 if no habitats of community interest are present (which also entails that in such cases VAL_C = 0); P = 1.5 in case of a priority habitat (these are defined as natural habitat types in danger of disappearance, calling for an early implementation of conservation measures, and marked with an asterisk in Annex I of the Habitats Directive); P = 1 otherwise;
- R stands for rarity and, for each habitat, it is quantified based on the habitat's occurrences within the Sardinian Natura 2000 standard data forms, normalized in the (1–5) interval. The fewer the occurrences, the higher R is;
- T stands for threats and is quantified based on the number of threats listed in the regional Natura 2000 standard data forms, normalized in the (1–5) interval. The more the threats for a given site, the higher T;
- K stands for knowledge, which was assessed, for each habitat, by experts in the field of natural conservation within a regional monitoring program (CRITERIA; TEMI, 2014b) by using qualitative judgments (good, acceptable, sufficient, poor). In this study, the qualitative score was next turned into a quantitative one, within the (1–4) interval. The maximum achievable score is lower than those of both R and T to take into account the subjectivity embedded in the experts' judgments. Incorporating expert knowledge in assessing ecosystem values and services is a common approach that can be found, for instance, in

Burkhard et al. (2009; 2012), or in de Groot et al. (2010). The lower the level of knowledge on a given habitat, the higher K is, because, in line with the precautionary principle, low knowledge on a certain habitat's spatial distribution and conservation status calls for greater attention and stricter conservation measures.

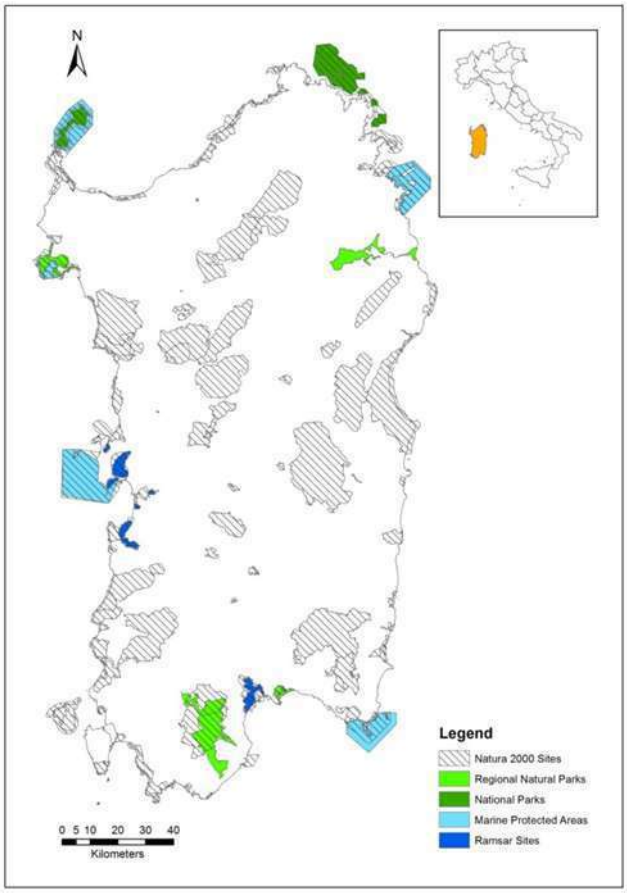

Fig. 1 - Study area.

As for the spatial identification of the regional GI, the methodology developed by Lai and Leone (2017) is applied here. Hence, four factors (VAL_C, VAL_N, VAL_R, VAL_I) representing the landscape's multifunctional character are calculated and mapped using GIS.

As a result, VAL_C can range between 0 (where no habitats of community interest are present) and 21. The values were next normalized in the (0–1) interval.

VAL_N is assessed and mapped using the 'Habitat quality' model of the 'InVEST' software program and ranges between 0 and 1. Input data used to feed the model are provided in Tab. 1.

VAL_R was assessed and mapped using the InVEST model 'Visitation: recreation and tourism', which harvests data from the social media Flickr, whose users can upload georeferenced pictures. The area of interest is fed into the model, which next calculates the 'photo-user-day' (PUD), i.e., the total number of pictures uploaded by each single user in a certain cell (whose size is set by the modeler) and in a single day. PUD was assessed within cells of 500*500 meters and considering pictures uploaded between 2010 and 2014. VAL_R equals PUD normalized in the (0–1) interval.

VAL_L refers to landscape assets as listed in, and protected by, the RLP. For each type of asset, a score ranging from 0 to 1 was assigned by experts. The higher the score, the stricter the rules provided within the plan to preserve that specific type of asset, and hence the higher the landscape value implied within the plan. In the event of overlapping landscape assets, the score corresponding to the strictest protection level in that area was assigned.

Tab. 1 - Input data used for the Habitat quality model, data used and authors' elaborations

Required Input	*Data Used*
Land use/land cover map	Regional vector land cover map produced by the Regional administration of Sardinia in 2008, third level of the CORINE nomenclature, rasterized.
Threats to habitats	A list of threats to biodiversity, identified on the basis of Natura 2000 standard data forms pertaining to Sardinian Natura 2000 sites. To each threat, a weight and a distance decay were assigned based on the outcomes of a survey involving five selected experts in the field of biodiversity and environmental assessments.
Impact sources	A raster map showing the spatial distribution of each of the 10 above-mentioned threats.

Accessibility to sources of degradation	A vector map describing accessibility to sources of degradation, under the assumption that the stricter the legal/institutional protection, the lower the accessibility. On this basis, the following three protection levels were mapped: regional and natural parks, together with public woods managed by the Regional forestry agency (highest protection level: accessibility set to 0.2); Natura 2000 sites (intermediate level: accessibility set to 0.5); and the remaining part of the island (lowest level: accessibility set to 1).
Habitat types and sensitivity of each habitat to each threat	A matrix listing land cover types (third level of the CORINE taxonomy) in the first column; for each land cover, a (0–1) score of its suitability to be regarded as habitat (second column), and a (0–1) score of its sensitivity to each of the 10 above-mentioned threats (3rd to 12th column) is given; sensitivity levels were assigned through an expert-based approach.
Half-saturation constant	Default value (i.e., 0.5).

VAL_C, VAL_N, VAL_R, and VAL_I, all taking values between 0 and 1, were mapped and summed using GIS techniques, which returned a map showing the total value (VAL_T), ranging from 0 to 4.

This study aims to assess whether and how each of the four values affects the suitability of areas (within or outside protected areas) to be part of a regional GI. To this end, two macro-categories were differentiated: a) natural protected areas (including national parks, regional parks, Natura 2000 sites, Ramsar sites); b) the rest of the island (unprotected areas). Among natural protected areas, marine protected areas were not included because the analysis only concerns terrestrial areas. VAL_T occurrences were arranged into tertiles. For both macro-categories (i.e., natural protected areas and unprotected areas), for each VAL_T tertile and for each of the four values (i.e., VAL_C, VAL_N, VAL_R, and VAL_I), parcels showing null values were observed and the percentage of their area with respect to the total area of the macro-category in the tertile was calculated. For both macro-categories and for each tertile, the means, medians and standard deviations of each of the four values were also taken into account.

This study focuses on the definition of spatial planning policies aiming at enhancing the environmental quality of the Sardinian region by increasing the size of the regional GI. These policies concern areas that are not eligible to be

part of the regional GI, that is, the patches taking null values in terms of VAL_T. These areas are targeted for improvement in their present status of non-eligibility in order to increase the size of the regional GI, and, by doing so, the dissemination of its beneficial effects. Results, discussion and conclusions compare the outcomes related to VAL_T and its four determinants with regards to protected and unprotected areas, and identify policy recommendations taking account of the findings coming from this comparative assessment, based on the analysis of the spatial taxonomy of null values of VAL_T.

3. Results

The outcomes of the analysis are provided in Fig. 2 and 3, and Tab. 2.

The three smaller frames on the right-hand side provide, at the local scale, some examples concerning (top to bottom) VAL_C, VAL_L, and VAL_N. As for VAL_C, the detailed map makes it evident that in the surroundings of Bosa (a historic town in north-west Sardinia, a quite renowned tourist destination), large patches of habitats of community interest are located between two protected areas (namely, SAC ITB020041 'Entroterra e zona costiera tra Bosa, Capo Marargiu e Porto Tangone' and SAC ITB020040 'Valle del Temo' to the left, and SPA ITB023050 'Piana di Semestene, Bonorva, Macomer e Bortigali') outside their boundaries. Thus, such habitats currently do not enjoy any protection under the Habitats Directive.

With regard to VAL_L, the detailed map shows that inside the SCI ITB041112 'Giara di Gesturi', a basaltic plateau in the inner part of the island, known for its temporary ponds, cork trees, and wild horses, some small patches of land taking high values of VAL_L can be found. These mainly refer to 'nuraghi', prehistoric megalithic buildings that date back from the second millennium B.C. to the Iron Age (DE MONTIS, CASCHILI, 2012) and that are a distinctive feature of Sardinian prehistoric culture. Only some rough estimates of the total number of nuraghi in the whole of Sardinia are available, ranging from around 7000 (BLAKE, 1998) to more than 7000 (MINCHILLI, TEDESCHI, 2017) to more than 8000 (RENDELI, 2017), with many either incorrectly located or not unearthed yet. Finally, the third frame concerns the area between the SCI ITB041105 'Foresta di Monte Arcosu' (partly included in a regional park) to the left and the SAC ITB040023 'Stagno di Cagliari, Saline di Macchiareddu, Laguna di Santa Gilla' (partly designated also as SPA), in the outskirts of the island's capital city, Cagliari, to the right. As the detailed map shows, while inside the two protected areas, VAL_N takes very high values, between the two protected areas low values

can be found. This is mainly due to three reasons: first, the land cover, when not artificial, is seminatural as opposed to natural; second, the high accessibility due to the presence of main road infrastructure; and third, the presence of a large industrial site, including an incinerator, a windfarm, a saltpan, and what remains of industrial buildings and activities installed in the second half of the 20th century.

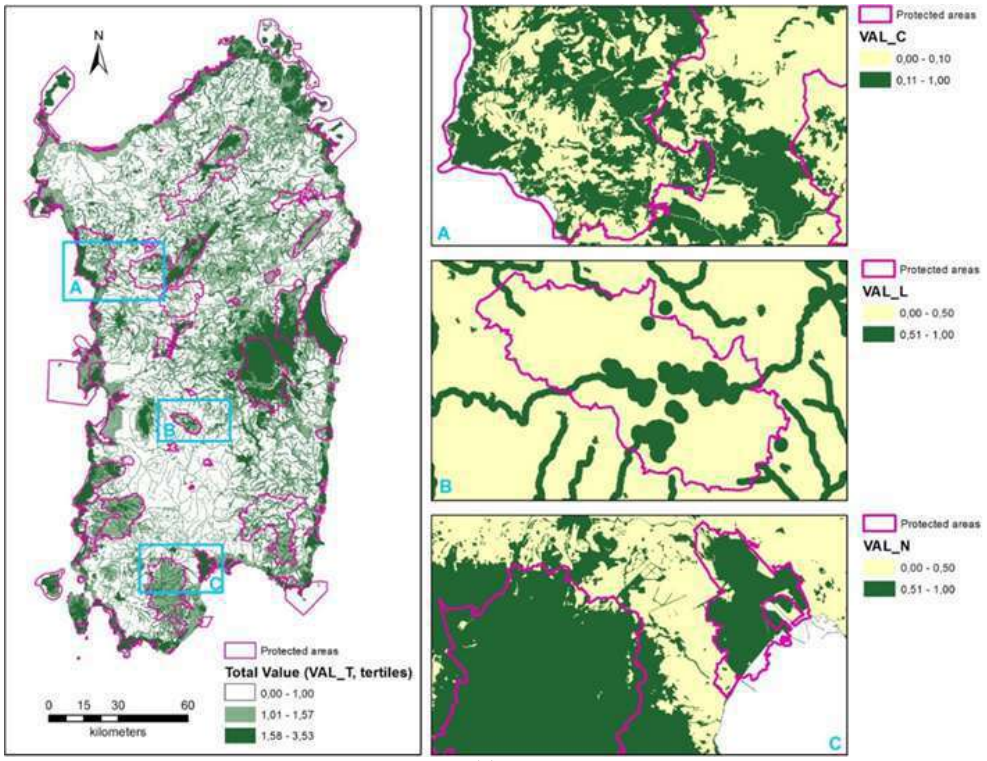

Fig. 2 - Spatial distribution of the total value (VAL_T), classed into three tertiles (left); some local examples concerning VAL_C (a), VAL_L (b), and VAL_N (c) (right)

In Fig. 3, the spatial layout of the four values (VAL_C, VAL_N, VAL_R, and VAL_L) is provided; for each value, null and non-null occurrences are differentiated. Furthermore, in each frame, the protected areas' boundaries are also shown, so as to qualitatively appreciate differences in each value's occurrences within and outside protected areas. For instance, VAL_N's null occurrences can generally be found outside protected areas; this also applies to VAL_C, but, contrary to the previous case, null occurrences largely prevail over non-null ones.

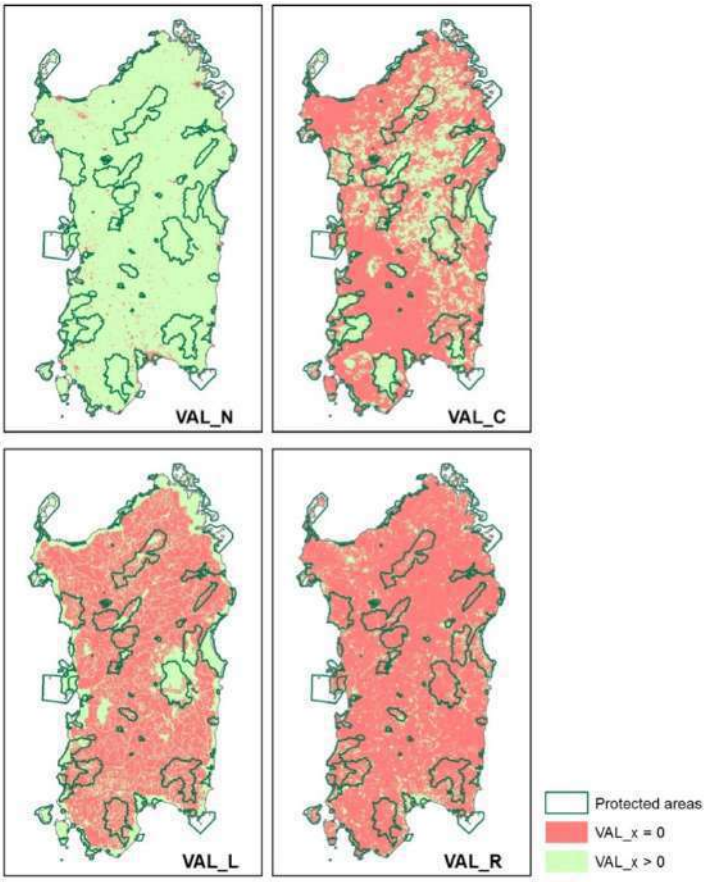

Fig. 3 - Spatial distribution of VAL_N, VAL_C, VAL_L and VAL_R showing patches having null and non-null values

Table 2 shows the quantitative results of the analysis, grouped into the two macro-categories of natural protected areas and unprotected areas (first column); for each, the results are further grouped according to VAL_T tertiles (second column). Next, let us denote VAL_x as any of the four values (i.e., VAL_C, VAL_N, VAL_R, or VAL_L): in the third column, for each macro-category and for each tertile, some descriptive indicators are provided: VAL_x's mean value, median and standard deviation; number of patches taking the null value of VAL_x together with the percentage of patches with reference to the total number of patches belonging to the corresponding macro-category and tertile; total area of patches taking the null value of VAL_x together with the percentage of the area taking the null value of VAL_x with reference to the total area included within the corresponding macro-category and tertile.

Tab. 2 - Mean value, median, standard deviation, number and total area of patches with null value, percentage of the number and of the total area of patches with null value in relation to, respectively, the total number and total area of patches in the reference tertile, for both natural protected areas and unprotected areas and for each of the four values

		VAL_C	VAL_N	VAL_R	VAL_L
Natural protected areas (467,635.13 ha)					
1st tertile: VAL_T = [0–1] (94,150.93 ha)	mean	0.13	0.55	0.002	0.11
	median	0.00	0.50	0.00	0.00
	standard deviation	0.17	0.33	0.01	0.31
	no. patches VAL_x = 0	17,366	4526	23,944	24,401
	% patches VAL_x = 0 [1]	63.34	16.51	87.34	89.01
	total area VAL_x = 0 [ha]	87,332.79	2063.00	89,766.74	93,097.17
	% area VAL_x = 0 [2]	92.76	2.19	95.34	98.88
2nd tertile: VAL_T = [1–1.57] (148,548.90 ha)	mean	0.25	0.47	0.017	0.57
	median	0.29	0.50	0.01	1.00
	standard deviation	0.21	0.44	0.04	0.49
	no. patches VAL_x = 0	16,661	20,482	24,064	20,825
	% patches VAL_x = 0 [1]	33.99	41.78	49.09	42.48
	total area VAL_x = 0 [ha]	30,961.17	3244.88	123,262.52	120,388.14
	% area VAL_x = 0 [2]	20.84	2.18	82.98	81.04
3rd tertile: VAL_T = [1.57–3.53] (224,935.30 ha)	mean	0.34	0.89	0.024	0.95
	median	0.36	1.00	0.00	1.00
	standard deviation	0.24	0.23	0.07	0.18
	no. patches VAL_x = 0	21,452	2102	44,796	2741
	% patches VAL_x = 0 [1]	24.41	2.39	50.98	3.12
	total area VAL_x = 0 [ha]	45,805.20	509.24	160,293.70	9970.11
	% area VAL_x = 0 [2]	20.36	0.23	71.26	4.43

Unprotected areas (1,940,665.60 ha)					
1st tertile: VAL_T = [0–1] (1,015,579.00 ha)	mean	0.08	0.53	0.005	0.05
	median	0.00	0.50	0.00	0.00
	standard deviation	0.15	0.29	0.02	0.21
	no. patches VAL_x = 0	132,144	22,824	129,865	157,793
	% patches VAL_x = 0 [1]	79.62	13.75	78.25	95.08
	total area VAL_x = 0 [ha]	963,608.81	50,825.56	940,178.56	999,186.97
	% area VAL_x = 0 [2]	94.88	5.00	92.58	98.39
2nd tertile: VAL_T = [1–1.57] (563,063.30 ha)	mean	0.15	0.60	0.012	0.61
	median	0.00	0.50	0.00	1.00
	standard deviation	0.21	0.33	0.04	0.48
	no. patches VAL_x = 0	73,136	15,193	67,584	43,224
	% patches VAL_x = 0 [1]	64.27	13.35	59.39	37.98
	total area VAL_x = 0 [ha]	271,474.10	21,355.85	448,720.03	328,386.09
	% area VAL_x = 0 [2]	48.21	3.79	79.69	58.32
3rd tertile: VAL_T = [1.57–3.53] (362,023.30 ha)	mean	0.24	0.86	0.019	0.96
	median	0.29	1.00	0.00	1.00
	standard deviation	0.23	0.23	0.08	0.16
	no. patches VAL_x = 0	40,890	868	64,398	2338
	% patches VAL_x = 0 [1]	43.43	0.92	68.41	2.48
	total area VAL_x = 0 [ha]	198,254.15	1134.46	305,528.38	17,732.95
	% area VAL_x = 0 [2]	54.76	0.31	84.39	4.90

[1] percentage of patches with VAL_x = 0 with respect to the total number of patches in the corresponding tertile. [2] percentage of areas with VAL_x = 0 with respect to total area included in the corresponding tertile. VAL_x = (VAL_C, VAL_N, VAL_R, VAL_I).

4. Discussion

In Section 2 above it is highlighted that this study aims at identifying spatial planning policies to improve environmental quality in Sardinia by increasing the size of the regional GI. Such policies primarily target patches taking null values in terms of VAL_T, therefore, from the multifunctionality standpoint, this refers to areas that do not perform any of the functions implied by the four values. As a consequence, planning recommendations provided in the following paragraphs ultimately aim at achieving multifunctionality.

The outcomes of this study show evidence that VAL_N takes rather high average values, both in the case of protected and unprotected areas, with reference to the third tertile of the total value. Moreover, VAL_N takes comparatively lower average values with regards to the first and the second tertiles (0.55 and 0.47 respectively in case of protected areas, and 0.53 and 0.60 in the other case). In all three tertiles, the sum of the areas of patches showing null values for VAL_N is relatively small, both in the case of protected and unprotected areas, since it never exceeds 5%.

That being said, in terms of spatial policies aimed at strengthening the eligibility of areal units to be part of the Sardinian regional GI, the taxonomy of VAL_N suggests that two types of plan actions should be taken into account as particularly effective, both in the case of protected and unprotected areas. The most important of these is related to patches showing non-null values, especially in case they belong to the first or second tertiles of the total value distribution. In these tertiles, the mean and median values of these patches are in the range 0.4–0.6, and they are quite similar to each other in the case of protected and unprotected areas; standard deviations are also quite similar. As a consequence, they entail plenty of room for improvement. Indeed, two variables should be targeted in effective spatial policies: 1) the reduction of threats, which, for instance, can be implemented through the renaturation of soils sealed as a consequence of urbanization, the removal of illegal (and legal) waste disposal sites, the regeneration of undergrowth, monitoring pasture and grazing land condition, and moving industrial facilities which generate dangerous environmental impacts (as, for instance, in the Cagliari case mentioned in Section 3, and mapped in Figure 2C); and 2) the mitigation of land-taking processes and of land cover transitions characterized by qualitative degradation (LAI ET AL., 2017a; 2017b); indeed, it must be taken into account that the most outstanding issue which influences VAL_N is the quality of land cover.

The implications concerning VAL_C are quite different. The mean and median values of patches of protected areas concerning the three tertiles are

significantly higher than the corresponding values of unprotected areas (except for the median value in the first tertile, which equals 0 in both cases); this comparison is made robust by the similar values concerning the dispersion of the distribution, as highlighted by the standard deviations.

Values are generally very low with regards to the first tertile, since, in both cases, the share of patches which show null values is over 90% of the total area. With regards to the second and third tertiles, the share of the area of null-value patches of protected areas is quite lower than in the case of the first tertile (around 20%). This occurs in the case of unprotected areas as well, even though the share of the null-value area is more than double.

The most outstanding policy recommendation aimed at increasing the eligibility of patches to be included in the regional GI is that the environmental protection regime related to habitats and species should be extended beyond the boundaries of the Natura 2000 sites (as, for instance, in the Bosa area in Section 3, mapped in Figure 2A), since conservation measures concerning Natura 2000 sites are already in force in these areas. Moreover, it has to be stressed that the total surface of unprotected areas is about fourfold the surface of protected areas, which confirms that planning and normative efforts should be concentrated on additional measures to identify and protect habitats and species, in order to increase the eligibility of patches to be included in the regional GI.

The taxonomy of VAL_L shows different features as well. The area of the null value patches belonging to the third tertile is very low both in case of protected and unprotected areas, and, consistently, the area of the non-null value patches is high. The area of the non-null patches within the second tertile goes down, dramatically and consistently in both cases, even though the share of the area of null-value patches located in protected areas is higher than in the case of unprotected areas, which implies that the number of landscape assets located in unprotected areas is relatively higher than in the case of protected areas. Finally, VAL_L is close to zero in protected and unprotected areas belonging to the first tertile.

Policy planning implications concerning VAL_L are quite straightforward. Planning measures with regards to protected and unprotected areas should aim to analytically and extensively identify the landscape assets related to historic and cultural resources (as, for instance, in the Giara area in Section 3, mapped in Figure 2B, whose prehistoric remains might not be fully explored), and to the environmental framework.

This is a fine-tuning operation entailed by the co-planning procedure concerning the definition and the adoption of municipal masterplans, which involves the national Ministry of cultural goods and activities and of tourism,

the Sardinian regional administration, and the local municipalities. Moreover, the identification of a GI can benefit not only environmental resources, but also social and cultural resources, as exemplified by Orantes et al. (2017) who develop a methodology to implement a GI plan, based on the integration of social and cultural assets, in the case of Yesan, Korea.

Finally, with reference to VAL_R, the share of the area of the null-value patches of protected and unprotected areas is higher than 70%, irrespective of the tertile. The values related to protected areas within the second tertile are comparatively higher than the other case, whereas the opposite holds for the third tertile.

A possible explanation, in the case of the second tertile, is that the outcome is likely to depend on the different environmental protection regimes in force, which make unprotected areas comparatively more accessible, and, for this reason, it is easier for tourists to post images concerning unprotected areas. However, the low accessibility effect can be more than compensated by the attractive features of protected areas within the third tertile, characterized by the highest environmental and landscape quality, which might explain why the number of images posted from these areas is comparatively larger.

Various studies (AMOAKO-TUFFOUR ET AL., 2012; HEAGNEY ET AL., 2018; FONT, 2000) demonstrate that recreational attractiveness, conceived as recreation demand, is influenced by different site attributes, such as accessibility and presence of accommodation options. Heagney et al. (2018), by exploring the influence of several site attributes on recreational demand in relation to 728 protected areas, located in the state of New South Wales, Australia, indicate that accessibility represents a value added that needs to be assessed in terms of recreational potential from the early stages of the site establishment-related planning process, although the establishment of any protected area entails a base level of recreational demand due to visitors' expectations of the existing site values.

5. Conclusions

This study evaluates the suitability of areas, inside and outside protected areas, to be included in a regional GI, identified through four values (conservation value, natural value, recreational value and landscape value). In particular, this methodology attempts to operationalize multifunctionality, one of the two key concepts that characterize GI, and to derive planning recommendations that, by increasing the values of each factor, and hence the

total value, focus on the multiple functions implied by the factors in order to increase the eligibility of null patches to belong to the regional GI.

The first advantage of the proposed methodology is that it shows a certain degree of flexibility which can be easily used to analyze other Italian and European regional contexts, since the Natura 2000 Network spreads all over the European union countries, under the provisions of the Habitats and Birds Directives, and Natura 2000 sites are identified and described in the Standard data forms, as stated by the Decision no. 2011/484/EU of 11 July 2011. The other protection regimes that the study takes into account are easily comparable to the European union's regimes, even though the national contexts show differentiated institutional frameworks. Moreover, the flexibility of the methodology makes it possible to add new values for obtaining the total value, in relation to the normative, social and economic characteristics of other national contexts. A very interesting aspect with regards to comparative studies concerning European countries is the definition of recommendations related to planning policies, with reference to both analogies and differences, and to public institutions and bodies involved in the implementation of these policies. Second, the proposed methodology uses data, such as land cover/land uses maps or data from social media, that are readily available.

On the other hand, the study shows some limitations that should be addressed in future research. First, the issue of leisure and tourist attractiveness needs further specific insights and represents a promising field for further study, since the recreational value is rather volatile and its measures are questionable. Integrating the judgments of non-experts, such as citizens and local communities, could be a possible future research direction in order to obtain social-perceptual information on cultural and recreational services, by building upon works such as Rall et al. (2018) who study the added value generated by public participation on GI, in particular in relation to cultural and recreational services. Second, there is room for improvement in the way the total value is here calculated. As in the first case, non-expert judgments could be embedded in the definition of the total value, which, in the present version, is calculated as a sum of the four values. Future research could consider calculating the total value as a weighted sum, where the specific weights of each single value are defined through a combination of judgments from both experts and non-experts. It is expected that, by including non-expert opinions such as those from local communities, weights would be location-specific and time-specific.

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Author Contributions

Sabrina Lai (S.L.), Federica Leone (F.L.), and Corrado Zoppi (C.Z.) collaboratively designed the research and jointly wrote Sections 1 and 5. Individual contributions are as follows: F.L. wrote Section 2; S.L. wrote Section 3; and C.Z. wrote Section 4.

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Conflicts of Interest

The authors declare no conflict of interest. The founding sponsors had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, and in the decision to publish the results.

Collaborative geodesign: sustainable scenarios for the Cagliari metro area

Michele Campagna

Abstract

This chapter presents the Metropolitan City of Cagliari sustainable development geodesign study. The study was carried on in 2018 under the umbrella of the International geodesign Collaboration. The aim of this chapter is twofold as it discusses both how strategic scenario planning can unfold in a collaborative way, as well as how technology advances can either support the process and improve the design in addressing current sustainability challenges.

KEYWORDS: geodesign, strategic scenario planning, metropolitan city

1. Introduction

Sustainable development is the term commonly and broadly, often generically, used to describe a complex range of principles, and practices aiming at meeting "the needs and aspirations of the present without compromising the ability of future generations to meet their own" (BRUNDTLAND, 1987). The implementation of sustainable development principles requires both technological and social settings should be organized so that anthropogenic activities would not endanger the capability of the ecosystems to absorb their impacts. However, from the general definition to the operational strategies and actions to be implemented at the local level the way is not straightforward. Back in 1992, the Rio Declaration on Environment and Development was adopted by the United Nations introducing 27 principles to achieve sustainable development, and Agenda 21 set the operational framework to implement sustainability principles. While to date, the implementation of those principles and programs still are to be fully achieved, still many Countries around the world are working globally and locally in that direction in many domains, such as, among other, aiming at addressing climate change. In addition, the approach to sustainability since the early stages continued to evolve introducing further tools to help communities around the world to reach the objective, including the UN

Agenda 2030's Sustainable Development Goals (SDG), which represents a way to transpose global principles into operational objectives, globally and locally.

Indeed sustainable development is a complex and multifaceted concept, and this is possibly why its holistic implementation is far to be fully achieved to date. It concerns the complex relationships between humans and the environment and it requires both the wise management of natural resources as well as the reduction of pollution originating from human activities. Though it also pertains social aspects such as balanced distribution of wealth and the broader democratic participation in decision-making. In this respect, the contribution of science and technology is seen as necessary support for informed decision-making.

When it comes to spatial planning and design traditional approaches seems to be limited in addressing the complexity of current challenges. Innovation is required both with regards to actions of physical transformation as well as to the processes we organise to plan and implement them. However, innovation may requires a substantial paradigm shift which is often not easy to achieve. Good principles, even when they are broadly adopted, often need time to be fully implemented by a practice in evolution. In Europe, as well as in many other Countries worldwide, environmental protection has since decades been acknowledged as a priority of utmost importance, nevertheless this common goal is far to be achieved. In our current days in Europe, at the time of the COVID19 pandemic the *green new deal* and digitalization start to be seen as major strategies to address urgent environmental challenges as well as an opportunity for revitalizing an economy affected by profound crisis. However, it should not be forgotten that earlier attempts of introducing innovation towards environmental protection still somehow failed to fulfil their objectives, and further efforts should be indeed put into place. More specifically, Environmental Impact Assessment and Strategic Environmental Assessment where firstly introduced in Europe by Directive 85/337/EEC and by Directive 2001/42/EC, respectively, as innovative measures to avoid projects and plans were adopted without a precautionary assessment of their possible negative impacts on the environment would be carefully assessed (and considered acceptable) in the face of the expected benefits. These regulations transposed many sustainability principles, including protecting natural and cultural resources, ensuring transparent and informed decision-making as well as fostering inclusive participation of stake-holders, and to a certain extent, of the broader local communities. Nevertheless the implementation of the innovation put forward by the Directives is still far to be achieved. This is not necessarily due to lack of political will or of poor performance in institutional settings, but often also by

a frequent lack of suitable methods and tools in planning and design. In this sense, while the Directives in principle require to change the process through which projects and plans are made, and EIA and SEA should be seen as an enrichment of design and plan-making, in reality frequently these are parallel processes, or even serial in worst cases. Extensive surveys carried on in the last decade by the European Commission shows that EIA and SEA frequently fail to fulfil their substantive requirements, including developing project/plan alternatives, robust impact assessment, transparency and accountability, to name few. A sound EIA/SEA process indeed would require a paradigm shift in design and plan-making which is often still poorly understood by many professionals and practitioners. Recent research in geodesign (CAMPAGNA, DI CESARE, 2016), contributed to shed light on how the normative and technical settings should be enhanced to effectively respond to the current urgent call for innovation. From the methodology point of view, recent advances in geodesign research may offer reliable tools to bring innovation into the planning and design practice, making value of the digital spatial data resources made accessible by the growing Infrastructure for Spatial Information in Europe (INSPIRE, Directive 2007/02/EC).

In the light of the above premises, this chapter introduce the geodesign approach as a way to bring innovation in spatial planning aiming at fulfilling more sustainable processes and planning and design products.

2. Geodesign: grounded in the past, oriented towards future

Geodesign is a methodology approach to spatial planning and design which aims at bridging the gap between geography and design, or more operationally to change geography by design. As such geodesign has old roots grounded in the tradition of architecture, urban and regional planning, landscape architecture and planning trough the work of pioneers such as Howard and Geddes, Wright and Neutra, Olmsted and Manning, Lynch and McHarg, to name few. It is due however mostly to the work of Carl Steinitz the contemporary view of geodesign which couples in his framework for geodesign (STEINITZ, 2012) the environmental planning approach – the McHargh's idea of design with nature - to collaboration and negotiation in spatial decision-making with the support of state of the art digital technology, which characterise the current geodesign approach. The role of technology is not a merely instrumental quantitative value, for it allows the creation of multi-scale interactive computational environment (or digital twins) which if properly used may produce substantial quality

improvement in the planning and design process and in its results contributing to address some of the most urgent challenges of our time. In fact, while geodesign can eventually using traditional media, technology enables and boosts data integration and analysis, simulation of territorial dynamics, real-time interactive alternative collaborative design, real-time impact assessment, effective negotiation. As such, not only the real-time impact assessment of design alternatives enable their interactive improvement, but the alternatives are actually created iteratively based on environmental considerations, which is one of the most crucial and less understood and practiced step in the SEA compliant plan-making.

3. The role of technology in geodesign

While geodesign make extensive use of state-of-the-art digital technologies to support the process (i.e. geodesign as a verb, STEINITZ, 2012), technology innovation is also seen as an important component of project (i.e. geodesign as a noun, Steinitz, ibidem) intended and able to address current challenges. This dual technology innovation perspective may be grounded in the principle that urban (or territorial) systems evolve along asymptotically towards a point of failure (WEST, 2017), and to avoid its crisis innovation is actually needed. Along a similar line of thought, in 2021 the Bertrand Piccard's Solar Impulse Foundation, has officially passed the mark of 1000+ identified solutions to protect the environment in a financially profitable way. Geodesign research has also recently addressed the question of how technology innovation may improve the quality of spatial planning and design in order to address current sustainability challenges thanks to the work of the International Geodesign Collaboration (IGC, https://www.igc-geodesign.org/) a global network of about 250 (mostly) academic partners aiming at promoting the geodesign approach within academia to train future professionals to handle current sustainability urgent issues (Fisher et al, 2020). Similar issues, though with a more general research perspective, is also the main focus of the thematic group New Technologies and Planning of the Association of European Schools of Planning (AESOP, http://www.aesop-planning.eu/blogs/en_GB/new-technologies-planning). The model in Figure 1, synthesises this dual vision.

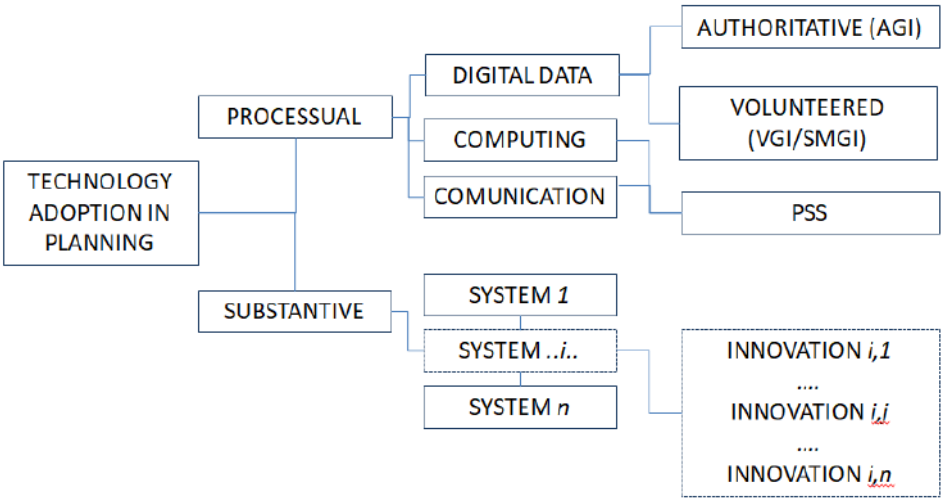

Fig. 1–New technologies in planning

From the process perspective, while being not necessarily needed for its successful application, geodesign makes the most value when relying on recent advance in technology both in procedural and substantial form. Recent developments in spatial and temporal Information and Communication Technology offers unprecedented potential in supporting the planning process in all of the common design tasks including representation, analysis, forecasting, and assessment. The diffusion of geographic data involves authoritative and volunteered geographic information sources. In Europe, Directive 2007/02/EC established the INfrastructure for SPatial InfoRmation in Europe (INSPIRE) offers seamless open access geographic information concerning most needed spatial data themes. In addition, the developments and the diffusion of geographic Internet technologies, such as geo-browsers, enabled the rising of neo-geography (Haklay et al, 2008). In the last decade or so, the research on Volunteered Geographic Information (VGI) and Social Media Geographic Information (SMGI) bloomed, demonstrating unprecedented capabilities in monitoring not only the physical environment but also social behaviours and dynamics (CAMPAGNA, 2016) in real-time.

Computing power has dramatically increased as well in the last decade, pushing gegraphic data processing and visualization to an unprecedented level. Software development faced constant advances, up to extending Geographic Information Systems (GIS) in fully and seamlessly supporting planning and design tasks thanks to the diffusion of Planning Support Systems (PSS).

Nevertheless, bottlenecks where often found in limiting the widespread diffusion of PSS in the planning practice, and among them the lack of sound theory (or methods) behind was possibly one of the most relevant. This issue was actually addressed in the design of the GeodesignHub web PSS (BALLAL, 2015). In his PhD thesis at University College London, Ballal designed a PSS focusing on the process relying of state of the art open-source geographic web technologies and basing the structure of the workflow on the Steinitz' framework for geodesign (STEINITZ, 2012).

In the next section, the geodesign study on future scenarios of the metropolitan city of Cagliari is presented as example implementing the approach.

4. Future scenarios for the Metropolitan City of Cagliari: a geodesign study

While the author carried on several iteration of the Metropolitan City of Cagliari between 2016 and 2021, both in research, teaching, and real-world planning settings, the case study presented in this section was conducted in 2018 in order to apply the IGC approach. The presentation of the case study is reported aiming at highlighting how the process (and the adopted technology) enabled the collaboration of dozens of participants, who in the limit of a 15 hours long workshop developed alternative planning scenarios in a collaborative way. Similar results have been successfully obtained with the same approach, although with slightly difference settings, in the geodesign workshop conducted in 2021 within the making of the strategic plan for the metropolitan city.

Geodesign applies system thinking so allowing to consider a study area in a comprehensive way. The study was built applying the Steinitz's framework (2012) for geodesign. Professional GIS software and the Geodesignhub web-based PSS were used to prepare and conduct the workshop respectively. The workshop preparation consisted of the understanding of past, current and future territorial dynamics in the area with regards to selected systems including green and blue infrastructures, agriculture, industry, commerce and energy, transport, lower and mix-higher-density housing, institutional services (i.e. IGC standard systems) plus cultural heritage as relevant system in the study area. An evaluation model was built for the 10 systems at hand Figure 2), which as output produced 10 evaluation maps. Each evaluation maps classifies in five categories the suitability for changes for one of the systems, identifying areas where: 1) actions are not needed because the system is already working well; 2) actions are not feasible; or

3-5) actions are increasingly feasible, suitable, or very suitable. As such the knowledge building part of the process assisted by GIS, which is nevertheless iterative in implementing the representation, process and evaluation model of the framework is summarise in the 10 maps as input for the creation of planning alternatives, for impact assessment and for decision-making is summarised in a set of color-coded digital maps.

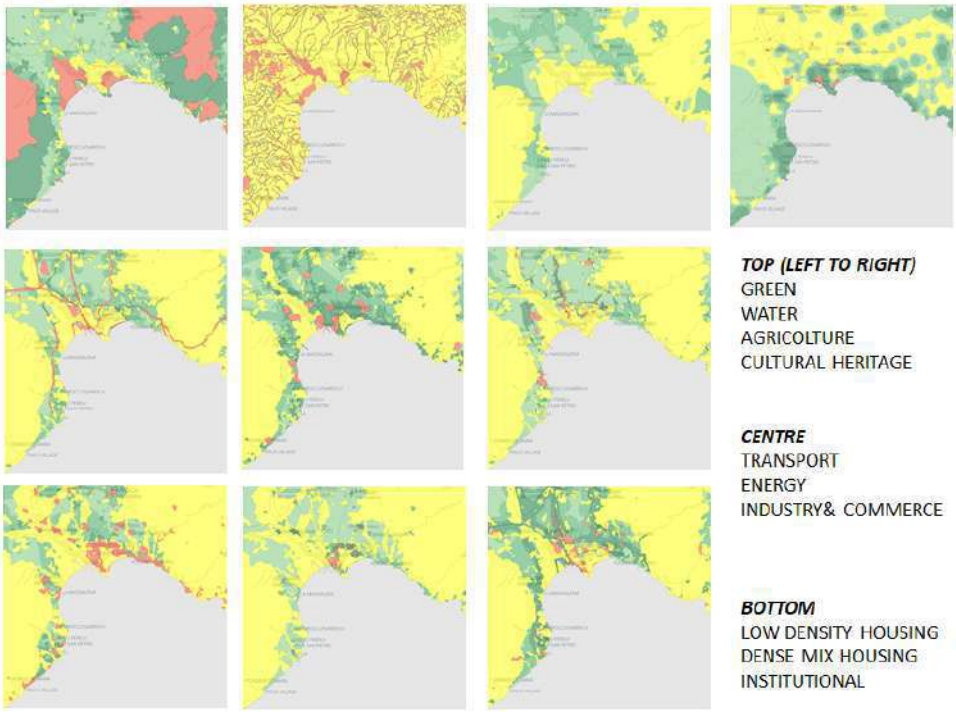

Fig.2 –Evaluation maps for the 10 systems in the Cagliari IGC 2018 study

Based on evaluation maps' input, in the first phase of the workshop more than fifty participants proposed and shared with others individual diagrams representing project and policies in a sort of bottom-up design crowdsourcing. This is the first step where collaboration happen as each participant is able to propose and to communicate to others ideas for change based on system suitability. All the diagrams proposed by the participants are "collective property", to be used by design teams in the following phase (Figure 3).

Fig.3 – Examples (excerpt) of design diagrams matrix. Diagrams representing projects and policies are arranged by system and color-coded. The matrix usual includes several dozens of diagrams.

In the second phase of the workshop, the individual participants join a design team. Each team have its own individual set of objectives, which can be based on actual needs and interest which may be competing or conflicting with others as it mostly happen in the practice, or on different time horizons and degree of technology innovation as it is the case with the IGC format.

Based on that, each teams explore the diagrams and select those which fulfil their objectives or scenario requirements depending on the workshop settings. This way complex integrated design alternatives, or syntheses, are generated, and iteratively assessed in terms of impacts, and improved. In the final phase of the workshop, alternative syntheses are compared, and mediated through negotiation among teams, until a final synthesis is reached based on consensus.

In the Cagliari IGC 2018 workshop in particular design teams were required to develop different scenarios for 2035 and 2050, acting as Early Adopters (i.e. technology innovation is adopted in the 2035 scenario), Late Adopters (i.e. technology innovation is adopted after 2035 in the 2050 scenario), Non-Adopters (i.e. no technology innovation 2050).

Figure 4 proposes the final scenarios of the Cagliari IGC 2018 study.

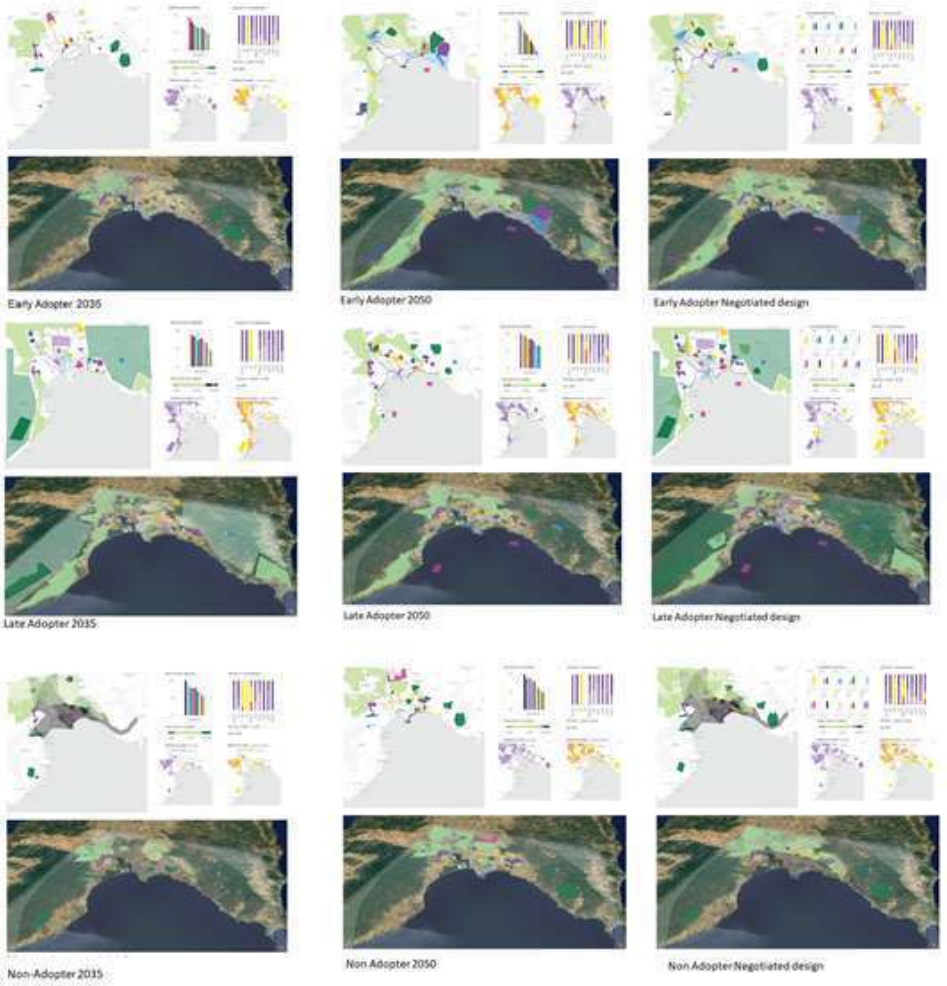

Fig.4 – Each frame shows a scenario in 2D and 3D, the team decision-model, and the impacts. The right column proposes the negotiated design for each technology innovation scenario requirements (i.e. EA, LA, NA)

5. Discussion and conclusions

The case study briefly reported in section 4 streamline the geodesign workshop workflows in its main phases. As it is shown, the final design is obtained with the collaborative contribution of all the participants who propose individual projects and policies, integrate them in complex comprehensive syntheses, and mediate alternative scenarios through negotiation toward

consensus. The approach may be applied in a variety of settings depending on the local context and objective of the design study for research and education purposes (as in this example), as well as in real-world strategic planning processes. The evaluation maps represent in an explicit way locational system opportunities and constraints scoping and guiding design alternatives, which are then subject to impact assessment iteratively. Negotiation help to mediate solutions for different, competing, often conflicting interests of the involved parties.

The process is fast if compared to other methods especially in real-world planning process, and it does not requires any technical skills, resulting accessible to any kind of social actor. A number of case studies are available in literature documenting the involvement of school-children, elder people, or other social groups which usually are not able to join a planning process either for institutional or socio-technical issues.

In addition, beside reaching agreement and consensus very fast, the process results as enriching experience for the participant. In the case study, a class of more than fifty civil engineering students with little or no previous knowledge of planning and of geographic information technologies completed their tasks in five 3-hours sessions only, showing as surprisingly fast learning curve both in planning and design, and in using state-of-the-art digital technology. As such the geodesign approach is very promising both in research and education for future planners which are likely to be challenged by urgent and unprecedented global and local sustainable development issues, as well as in the real world planning practice, where traditional methods often shows failures in their capacity to address our current complex and urgent challenges.

In summary, the current geodesign experiences were successful in:

- Making value of digital data sources and supporting digital technology;
- Supporting informed collaborative decision-making;
- Enabling the participation of actors which traditionally have limited opportunities for participation;
- Making the process transparent;
- Improving the understanding of complex territorial dynamics and proposing integrated solutions thanks to system-thinking;
- Finding rapidly solutions based on consensus;
- Exploring the potential for technology innovation in the design.

Geodesign research and practice, in its current meaning, in a sense is still in its infancy but it is attracting fast growing widespread interest of scholars, educators, and practitioners. More efforts are needed to test and apply the approach but early results are definitely promising.

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The book focuses on bioregionalist theories and experiences as an alternative way of reading and designing local contexts, based on the recovery of the co-evolutionary relationship between human settlements and territories to achieve a self-sustainable and non-hierarchical system of urban and rural centers, according to Alberto Magnaghi's vision. The work has developed a broader discussion among researchers from different European backgrounds about the ways in which processes related to bioregionalism, looked at in a transdisciplinary way, can lead to interesting applications and analytical insights, that are useful for reviewing and strengthening community self-organization and reflecting on the constitutive foundations of the relationship between communities and their territories. The collaboration between the French school of Bordeaux, the Tuscany school and the Cagliari school gives back a diversified overview of materials and references for the possible application of the bioregionalist model. The contributions discuss many issues related to the governance of metropolitan areas and the management of the urban-rural relationship with suggestions for interpretation and design in a bioregionalist perspective, the themes of urban green, land vulnerability, and agricultural supply chains in rural and peri-urban spaces and new food economies in metropolitan areas.

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