

TeMA

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The special issue collects the proceedings of the Session "Smart and Resilient Cities: Ideas and Practices from the South of Europe" of the European Conference On Climate Adaptation (ECCA), held in Copenhagen in May 2015. The contributions shed light on the relationships between the emerging paradigms of Smart City and Resilient City, providing hints for developing integrated strategies in the face of climate change.

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SMART AND RESILIENT CITIES

IDEAS AND PRACTICES FROM THE SOUTH OF EUROPE

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SMART AND RESILIENT CITIES

IDEAS AND PRACTICES

FROM THE SOUTH OF EUROPE

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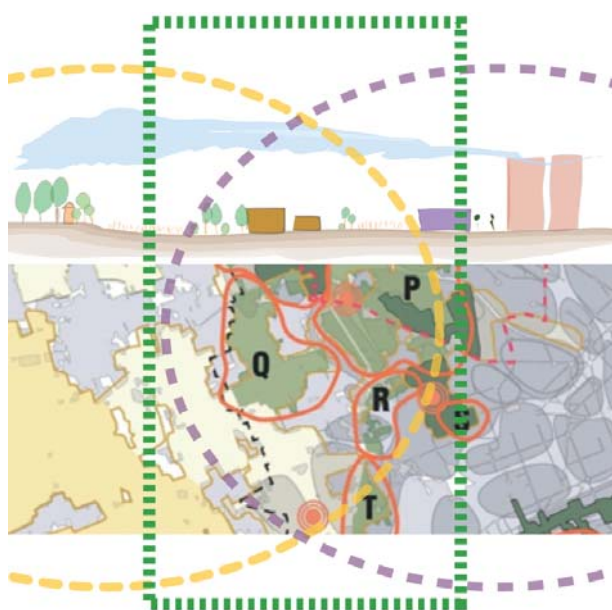
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THE POTENTIAL OF PERIURBAN AREAS FOR THE RESILIENCE OF METROPOLITAN REGION

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ABSTRACT

The paper aims to present as an organic structure the outcomes from various pieces of research and consulting activities developed over the last few years (2011-2015). Shared topics are: urban-rural partnerships, food planning, metropolitan polices and the territorial resilience of periurban areas.

In the first part (the core of the paper) the paper underlines critical questions and establishes needs so as to move towards a new approach to development processes in periurban areas. The paper uses some key concepts to present the main outcomes: 1. Understanding complexity (multi-scales in space) and dynamics (multi-scales in time); 2. Identifying all the resources and opportunities; 3. Crosscutting and multi-issues.

In the second part (in the final part) the paper proposes the "Ecotone" metaphor to support innovation in the approach to periurban areas. It is a "zone of transition between adjacent ecological systems, having a set of characteristics uniquely defined by space and time scales and by the strength of the interactions between adjacent ecological systems" (Hansen et al, 1992). In these terms, periurban areas may be assumed to be ecotonal zones of transition between urban and rural or natural systems. Using the concept of "ecotonal buffer of transition" to approach the periurban systems it is possible to connect main needs and critical questions underlined to a homogeneous framework and to emphasize on the strategic role that the periurban systems play for the future development of metropolitan regions oriented to a improvement of resilience of socio-ecosystems. In the final part the paper focuses on the governance of urban rural partnerships and research perspectives.

KEYWORDS:

periurban, urban-rural partnership, resilience, ecotone

1 INTRODUCTION

1.1 THE REASONS FOR, AND AIMS OF, THE PAPER

The paper aims to present in an organic structure the outcomes from various research and consulting activities developed over the last four years (2011-2015). Shared topics are: urban-rural partnerships, food planning, metropolitan polices and the territorial resilience of periurban areas.

The two main activities are:

- CIVES (citizen towards sustainability), a participatory process towards the definition of shared visions for a large portion of the Milan municipal area between Naviglio Grande and Naviglio Pavese. The project has involved associations, stakeholders, institutions and local communities with a view to developing shared strategies and projects for urban and rural environmental quality improvement and the integration and strengthening of rural and urban alliance;
- Urban Rural Partnerships in Metropolitan Areas (URMA - <http://www.urma-project.eu/>) is an INTEERG IV C program (2012 –2014). The Pilot Case developed by the Lombardy Region focuses on the periurban areas in the western portion of the Milan metropolitan area.

The project has involved researchers and consultants specialized in various fields. As a matter of fact, this provided the opportunity to study the issues and topics on a crosscutting (but homogeneous) basis, merging different points of views and activating fertile links and connections between different literature disciplines, knowledge systems and approaches.

1.2 THE CONTEXT

The “context” could be considered the “Pilot area” identified for the URMA project by the Lombardy Region. The “reference context” scale is compared with metropolitan and local scales. The Pilot context is localized in the Metropolitan area of Milan in the Lombardy Region (Figure 1).

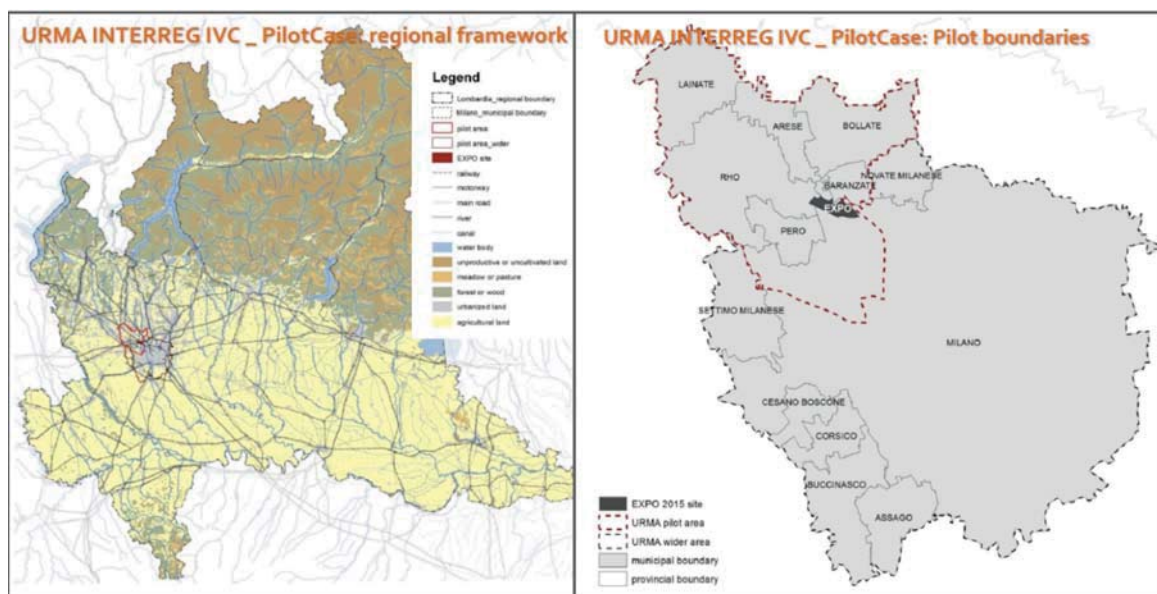


Fig. 1 Localization of the “Lombardy Pilot Case” for the URMA project: the localization in the Lombardy Regional context and in the metropolitan area of Milan. The Pilot includes two different boundaries: the Pilot boundaries and the wider context used to characterize the periurban system.

The context chosen is very stimulating in terms of transformation and trends (the EXPO site and a large range of connected projects, such as Waterway, the rural heritage presentation project etc., are within the context), critical pressures and critical problems for the ecosystem and environmental components, as well as the complex dynamics involving social and economic components.

1.3 EMERGING QUESTIONS AND KEY CONCEPTS

A shared set of “critical questions” and “needs” have emerged thanks to a variety of research projects, consulting activities and workshops (particular mention should be made of the role of REsilienceLAB, a network of professionals and researchers devoted to the study of Resilience, promoting workshops on the different applications of the “resilience” approach to territorial complex systems). In the paper, the needs and critical questions are associated to some key concepts.

Key concept 1. Understanding complexity (multiscales in space) and dynamics (multiscales in time)

Based on research concerning the Pilot context, it is clear that pressure on single open/rural surfaces is a significant problem, but the main critical problem is related to the fragmentation process taking place in periurban open areas. The fragmentation (due to both urbanization and infrastructure) implies a) a contraction of agricultural production surfaces (the non-cultivation of fragmented contexts). The process implies a trend of under management of the non-cultivated surfaces in decline (both in terms of recognition of their value in terms of agricultural interest and the perception of communities). In general, the surveys have confirmed the positive correlation between the continuity of the rural system (low level of fragmentation) and the presence of “good practices” (such as local networking, associations, local food buying groups, local parks): conversely, surface/sub-systems with a high level of fragmentation (due to infrastructure, urban sprawl, industrial/other isolated settlements...) are not involved or are the target of initiatives of “valorization” (not related to the development of settlements).

The areas characterized by a high level of fragmentation show a specific fragility/vulnerability due to a low level of identity and low value in terms of agricultural production.

From the technical point of view, it is necessary to develop surveys and assessment processes able to identify the fragilities that characterize these portions of the periurban areas. The methods have to approach the “periurban” not as isolated surfaces but in terms of “transition transects” from the rural/natural to the urban system in order to overlay different information from the database able to represent the complexity of environmental, social, economic and governance dynamics, and the flows that link the rural/periurban/urban systems and dynamics (in terms of scenarios or transformation factors).

Key concept 2. Identifying all the resources and opportunities

The complexity and richness of the Milan metropolitan area were evident during the CIVES and URMA projects: it is a complex and multi-faceted scenario from the point of view of the functions and services performed by the periurban areas and the policies and projects activated for the improvement of periurban areas promoted by institutions, but also by a large range of associations. The large consensus that supports local food distribution and consumption is also evident. The panorama also shows situations of periurban surfaces “neglected” due to isolation (in the midst of infrastructure nodes, including settlement development areas, deriving from industrial or other uses). Rural buildings and (unused) rural cultural heritage may be included in the “neglected” or degraded category.

Key concept 3. Crosscutting and multi-issues

The main difficulties/barriers to the implementation of integrated projects relate to the rigidity of the institutional framework in terms of competencies (different scales and bodies have responsibilities and competencies for water, rural, natural, soil, urban plans and management) and in terms of a lack of crosscutting governance instruments. The existing governance framework is not able to support/implement

the crosscutting proposal and projects proposed by individual associations or private enterprises. In particular, if these proposals imply multi-issue actions and solutions (involving, at the same time, agriculture innovation, water management, ecosystem improvement and urban neighborhoods renovation, etc.).

Key concept 4. The periurban system as strategic buffer for a new metropolitan development [functions and services]

The “periurban” transition belt plays a relevant and strategic role in the future vision and development of metropolitan polices: these areas can receive/embrace several functions essential to the adaptation and survival of the urban area (ecosystems services, green infrastructures, etc.). These functions may mitigate critical issues; services and functions useful for promoting urban economic innovation (innovation hub, co-working initiatives, studio and research start-up, etc.) could be localised here, offering services useful for the urban population (green and community open spaces/public realm, social enterprises, circular economies, etc.) as well as for the agricultural system (innovation and research centres, training and services for agricultural management and innovation, etc.).

2 UNDERSTAND COMPLEXITY: BUILDING KNOWLEDGE

The main assumptions relating to the knowledge phase and survey activities are: a) the characterization of the context has to (spatially) integrate different spatial scales and b) dynamic (temporal) survey systems: mapping the phenomena, identifying c) practices and community initiatives as knowledge sources.

2.1 PERIURBAN IDENTIFICATION

Key concept 1. Understanding complexity (multiscales in space) and dynamics (multiscales in time)

The knowledge step was based on the overlapping of the main territorial data on a wide scale (landscape and environmental features, infrastructure and mobility system, urban patterns, water system, and agricultural landscape and production).

The first process was the identification of a periurban cluster based on the following phases:

- identifying open space fragments (all the non-built up areas based on the DUSAF, the regional land use database);
- identifying periurban fragments: the open/green surfaces included in the Urban textures were excluded): in this phase it was possible to recognise all the fragments of periurban open areas;
- identifying clusters: based on the DUSAF, aerial photos and the relationships with the wider context, it was possible to identify a number of clusters. Single fragments were aggregated into clusters which have physical continuity or share specific characteristics (e.g.: all the open areas identified in the previous step are included in a nature safeguard institution...);
- “cluster” surveys: for each cluster, a number of surveys were carried out to underline the main phenomena and data (land uses/landscape & ecological quality level, transformation trends, good practices & networking/governance).

The “clusters” were redefined on the basis of the surveys, and the “sub-systems” within the periurban area were identified (based on readings/analyses of the characteristics of the cluster: land use, functions, and context relationships).

In defining the periurban “sub-systems”, the areas surrounding the site of the EXPO development surfaces (and the connected development surfaces, i.e., the red circle in the map in figure 2 and figure 3) and the fragments connected to rural systems external to the Pilot boundaries were excluded.

To determine the characteristics of periurban “sub-systems”, different sets of territorial information were overlapped and compared in order to underline:

- existing characterisation of the single “periurban sub-system” (ecological complexity and value, fragmentation/continuity, agriculture production ...);
- existing characteristics of the context surrounding the periurban sub-system (urban patterns and functions, urban communities, the mobility and infrastructure system ...);
- the trends and future transformations defined by the planning system (at regional, metropolitan and municipal level). Territorial plans define four main kinds of guidelines: safeguarding and conserving the environment/landscape, agricultural landscape and production safeguards, infrastructures and mobility improvement/projects, urban development) ;
- community initiatives regarding the active protection of the local landscape (local green parks promoted and managed by local associations), urban-rural partnerships mostly connected with local agricultural production and the local food chain, specific local actions and initiatives connected with the use or valorisation of the cultural heritage (local associations or social enterprises).

In order to understand and recognize the whole range of resources, it is important to integrate the surveys on the periurban system with rural/natural patterns and urban patterns (both have to be involved in the design of strategic projects based on urban-rural partnerships) and include the dynamic trends of transformation and local community actions and initiatives acting on the rural-periurban-urban transition transects.

2.2 MAPPING AND COMPARING INITIATIVES AND PRACTICES

Key concept 2. Identify all the resources and opportunities

Projects, initiatives, and programs that promote urban-rural partnerships already exist. These projects are perhaps isolated and have a very different range of characteristics and specificities. Therefore, there is a need to improve the exchange of information between levels of regional and local planning, in order to ensure the right support and the transfer of good practices to other areas.

Different practices and initiatives were developed in the context of the URMA project as this was one of the key activities envisaged. One of the aims of the URMA project was in fact to share good practices and identify success factors.

The pilots and good practices of the European project have demonstrated that there is co-responsibility and regional solidarity among the actors involved (citizens' groups, NGOs, local and regional administrations, students). In particular, the good practices developed by the Netherlands partner (the Twente Region) were used as examples for the Lombardy Region Pilot, i.e., the Twente Green Knowledge Portal and the Fresh Route/Distribution and Experience Centre (Twente).

The identification of bottom-up initiatives (local level) and the good practices comparison (figure 4) are significant and crucial aspects in the knowledge phases (both in URMA and CIVES).

The initiatives of the local communities promoted by associations (or local institutions) are fundamental for different reasons:

- to understand the dynamics (specific bottom-up safeguard initiatives are related to specific places), it is important to understand the dynamics and the reasons of mobilization. This may make it possible to identify some possible success factors...);
- to identify all the resources (in terms of social and economical resources) and involve all the stakeholders in the design process of urban rural partnerships projects/strategies.

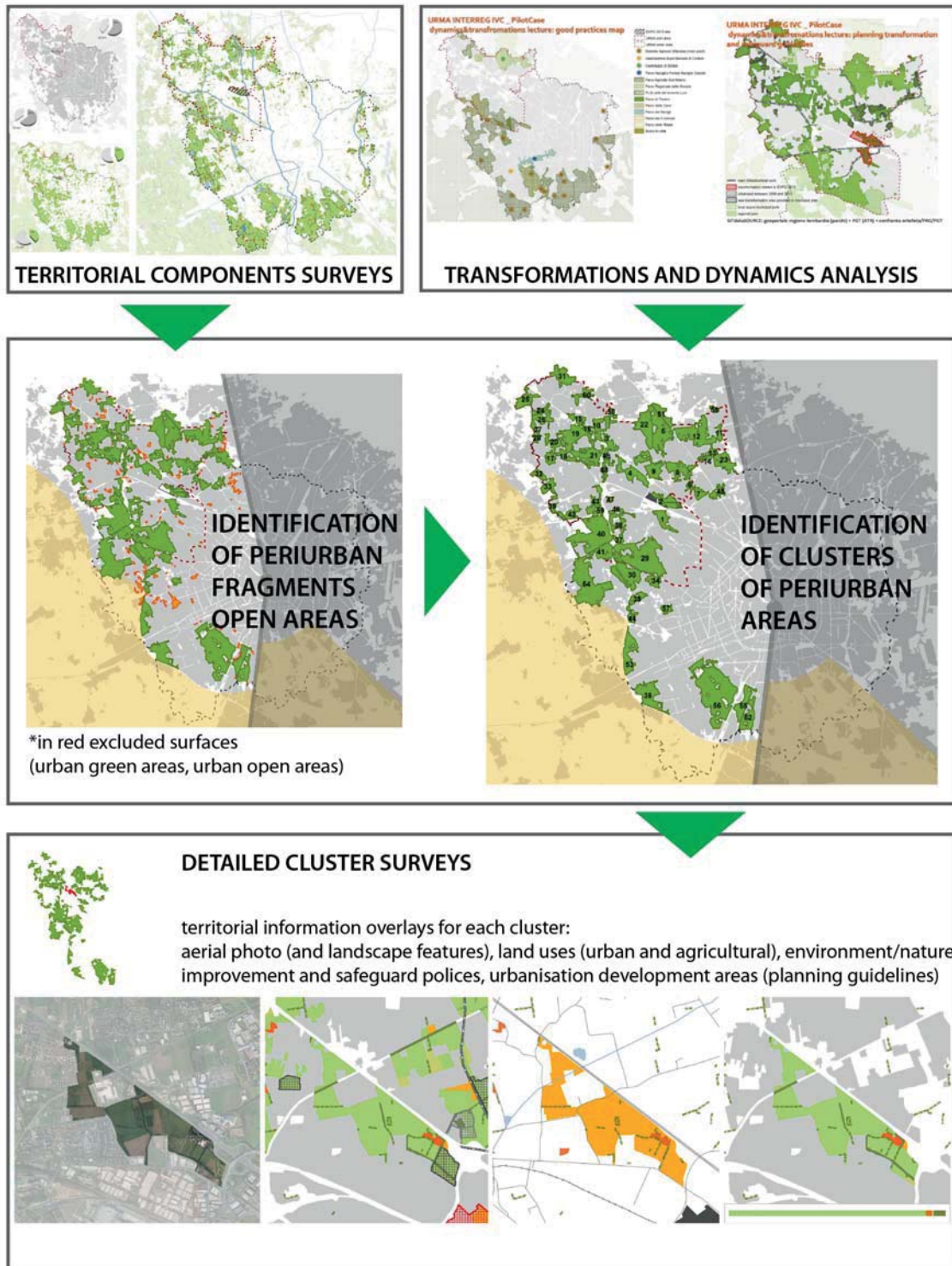


Fig. 2 The process of identification and characterization of Periurban subsystems in the Lombardy Region Pilot of the URMA projects.

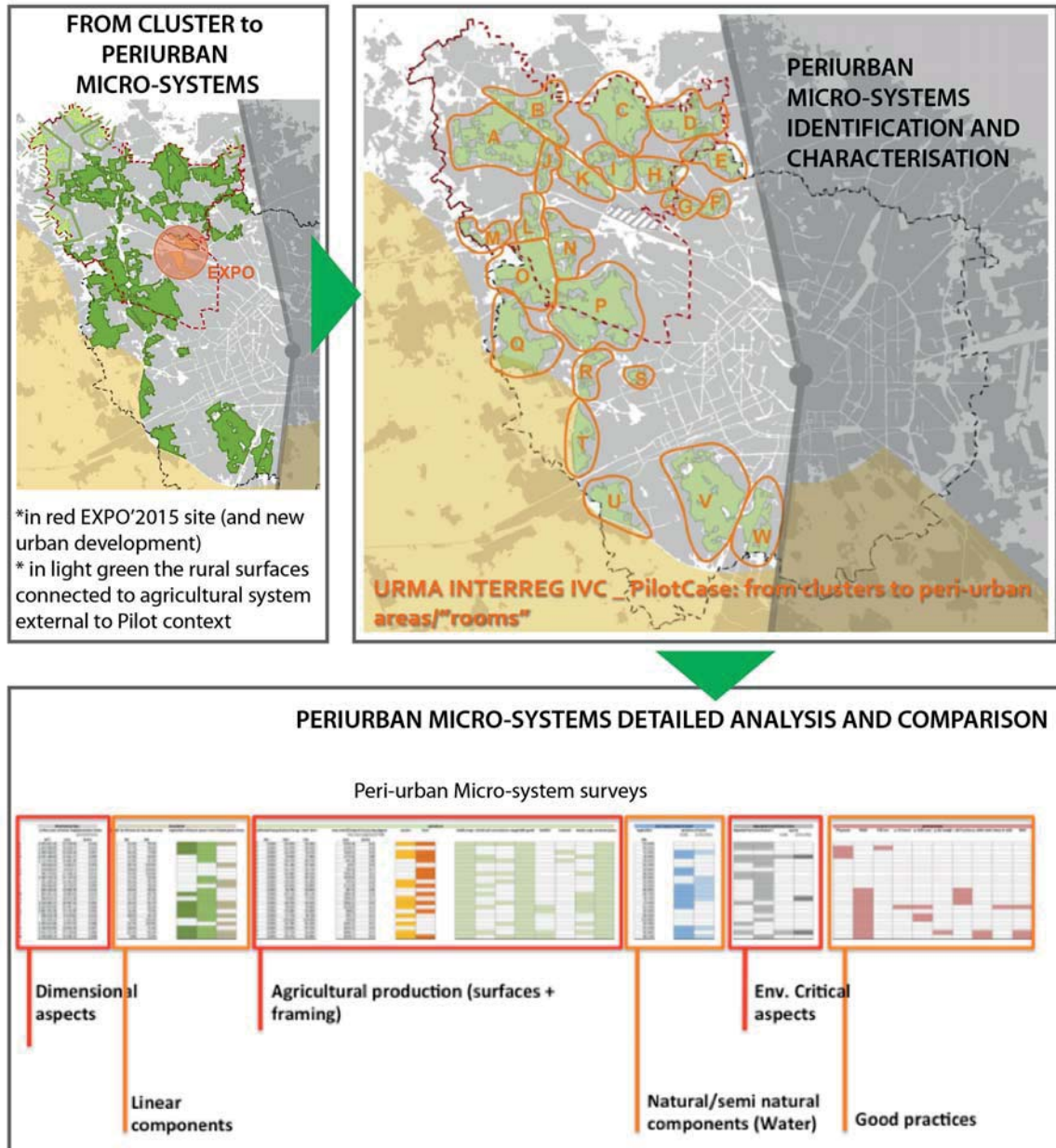


Fig. 3 The process of identification and characterization of Periurban subsystems in the Lombardy Region Pilot of the URMA projects.

During the research and consulting works, different kinds of local initiatives and local proposals/projects were developed.

The URMA Pilot focused on initiatives, research, coordination policies, strategic planning and administration engagement with specific characteristics:

- initiatives/practices that have activated a synergic and positive system of responses involving a complex governance process (multi-stakeholders, such as communities, academics, administration, private individuals, associations, etc.);
- multi-purpose initiatives: the aims of the initiatives have to include and integrate goals related to different elements in "resilience" for complex systems (such as environmental, social, governance networks, etc.);

- initiatives that have activated or proposed innovative solutions in relation to the connection between food, energy, and water (in the Milan case study in particular, “food” is identified as a “core/activator topic”, due to the role of EXPO’ 2015 as a “catalyst event”);

The aim was to identify a large range of “resilience” initiatives (e.g., small and local actions, metropolitan policies and/or applied research) in order to understand the complexity and richness of the Milan metropolitan panorama.

In the Milan metropolitan context there is a consolidated tradition of widespread locally-based actions relating to environmental/climatic topics. They focus particularly on food and environmental preservation/improvement issues.

Important local actors have promoted structured projects and programs fostering the diffusion of initiatives for local sustainability, resilience and adaptation (projects promoted not only by “institutional” actors, but also involving independent actors such as the CARIPLO Foundation and Universities and associations/NGOs of metropolitan importance).

It is possible to identify (figure 5) a rich panorama in terms of different typologies of initiatives and projects. The panorama could be characterized by:

- isolated but diffuse bottom–up initiatives relating to individual community gardens. These initiatives have different “histories”, and the initiatives involve different ranges of community sectors. They integrate different issues (sometime more closely related to social inclusion, environmental issues and the quality of urban landscape, adaptation, etc.);
- place-based initiatives where associations work to preserve and improve open spaces (urban, green, rural...). The “Parco delle Risaie”, one of the good practices of the URMA project, is an example of an initiative where farmers and citizens have set up an association to preserve and develop a strategic vision for a rural landscape within the urban patterns of the Milan Metropolitan area.

Some initiatives are place-based, but have developed a network of connections with other initiatives that act on a larger scale or in other contexts. The good practices of the Buonmercato are an example of such an initiative.

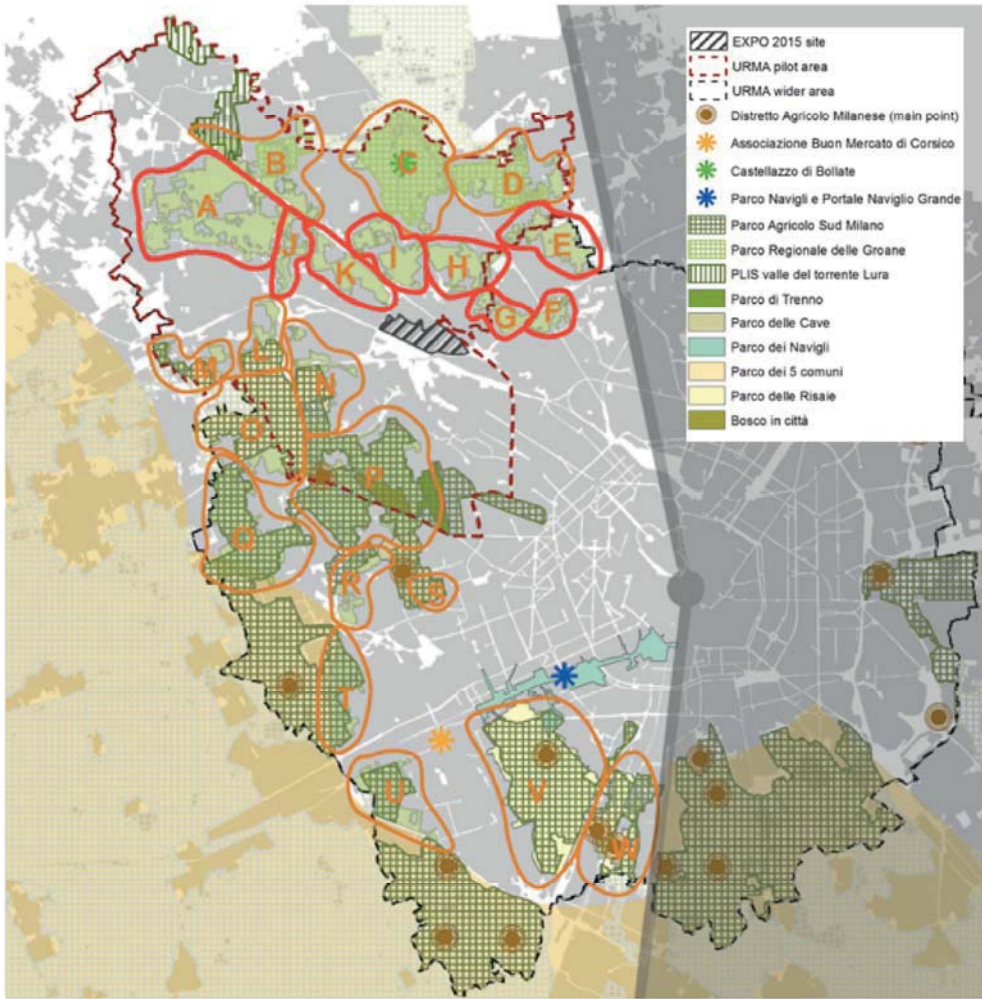
Over the last few years, much research work and many European projects have been set up focusing on food policies, rural-urban landscape and urban/rural partnerships.

With the recent institution of the Milan metropolitan area and the EXPO, the institutions have launched a different program to foster networking between the initiatives. One example is the food policy pact and the Milan food policy.

Good practices and initiatives germinate similar initiatives and it is important to underline the diffusion of integrated initiatives in the Milan metropolitan context.

The knowledge behind the URMA Pilot included the comparison and overlapping of local initiatives in the mapping process (the mapping process implies physical localization but also networking). It is essential to compare good practices (and also “not good” or “problematic” cases) from comparable territorial contexts.

PERIURBAN "MICROSYSTEMS" AND GOOD PRACTICES/DYNAMICS OVERLAY AND COMPARISON



GOOD PRACTICES AND PROJECTS COMPARISON MATRIX

	definition of the case	implementation	management	green infrastructures		assessment	blue/water infrastructures		assessment	food chain + agricultural multifunctionality		assessment
		realized/proposal	level and management proposals	vegetation improvement (formation/ trees lines/ vegetation belts)	green network + biodiversity	positive/negative + high/medium/low effect on the topics	improvement of water cycles	water courses improvement	positive/negative + high/medium/low effect on the topics	food system strategies	multifunctionality in agriculture areas	positive/negative + high/medium/low effect on the topics
Parco delle risaie	bottom up	realized			INDIRECT	positive/high effect		INDIRECT	positive/medium effect	DIRECT	DIRECT	positive/high effect
Consorzio DAM (distretto agricolo Milanese)	institutional supported	GRIP		DIRECT			DIRECT			DIRECT		
DESR - Distretto di economia solidaie rurale del parco agricolo Sud Milano	bottom up	realized								DIRECT	DIRECT	positive/high effect
Buon Mercato	bottom up/GRIP									DIRECT		
Associazione Cascine Milano	Non institutional			INDIRECT						DIRECT	INDIRECT	
Portale Naviglio Grande	bottom up	proposal			DIRECT	positive/high effect		DIRECT	positive/high effect	INDIRECT	DIRECT	positive/medium effect
parco lineare naviglio grande	bottom up	proposal		DIRECT	DIRECT	positive/high effect	DIRECT	DIRECT	INDIRECT (negative to blue water courses/high effect high impact on the topics)	DIRECT	DIRECT	positive/high effect
Progetto parco 5 comuni	Top-down / institutional			DIRECT						DIRECT		
Parco di Trenno	Top-down / institutional	realized		DIRECT	DIRECT	positive/high effect		INDIRECT	negative (tourists used as irrigation channels and not activation effect)		DIRECT	positive/high effect
PARCO DELLE CAVE	Top-down / institutional	realized		DIRECT	DIRECT	positive/high effect	DIRECT	DIRECT	positive/high effect		DIRECT	positive/high effect
BOSCONCITTÀ	Top-down / institutional	realized		DIRECT	DIRECT	positive/high effect	DIRECT	DIRECT	positive/high effect	INDIRECT	INDIRECT	positive/high effect
PARCO GROANE	Top-down / institutional	realized		INDIRECT	DIRECT	positive/high effect				INDIRECT	DIRECT	positive/low effect (Agriculture is not effect on the type of INTERACT)
progetto EXPO (general master plan)	Top-down / institutional											
Via l'acqua	Top-down / institutional							INDIRECT				
Darsena di Milano Project	Top-down / institutional							DIRECT				

Fig. 4 Comparison of the overlap and integration of the characteristics of the periurban areas and good practices/initiatives (map and comparison matrix).



Fig. 5 The graphical framework of the Milan metropolitan area “Panorama” showing resilience practices (focusing/moving on/from food polices).

2.3 GOVERNANCE AND PROCESS

Key concept 3. Crosscutting and multi-issues

In order to understand the dynamics of urban rural partnerships, the URMA Pilot carried out an analysis of drivers and barriers from a governance point of view.

The governance framework that was developed regarded the existing guidelines/competencies framework and an analysis of competencies and rules relating to potential functions and services (see paragraph Functions and services).

The analysis focused on the Lombardy regional context, but the same problems (concerning barriers to the activation and implementation of crosscutting policies) were evidenced also in the other European regions involved in the URMA project. Specifically speaking, most relevant barriers are related to the overlap and non-coordinated framework of competencies (administration/bodies/planning system etc.) connected with urban development policies, nature and ecosystems policies, and agricultural development policies. At European and regional level, there are no crosscutting policies focusing on urban rural partnerships, in terms of developing integrated projects involving urban and rural systems. For example: some critical neighborhoods in Milan (social housing, social inclusion problems, the ageing Italian component of the population...) are related to periurban open areas and to the rural system; policies able to integrate and find innovative solutions involving the urban and social components (urban housing, communities and social

services) and periurban and rural ones (local food chain, green infrastructure and related maintenance...) encounter serious barriers in the current governance and institutional framework (due to the planning system, land use laws, etc.).

LivLAB and games

Expert workshops and seminars were organized in connection with the URMA project; the URMA work team was also involved and integrated in a Crosscutting "workshops/workgroup" involving institutional (regional) representatives and experts on urban and rural areas (in the Strategic Environmental Assessment of Regional Economical Development Program and the Regional Agricultural Program - POR/PSR)

An instrument used in all the research and consulting activities, that turned out to be very effective, is the organization of interactive workshops using the LIVlab and/or games techniques. In particular, the periurban games were organized during the final steps of the URMA project in order to share the results from the Pilot and identify shared guidelines that could be given back to the regional decision-making process.

The Periurban games event involved experts from academic, professional, and regional institutions as well as the economic sectors from different disciplines and backgrounds. During the Periurban games, some statements and proactive questions were discussed in a "role-play" (the reference used was the Urban Games developed by Stockholm County Council and was also used during the METREX congress). The outcomes were used to complete the final guidelines of the URMA Pilot for the Lombardy Region.

3 FUNCTIONS AND SERVICES

Key concept 4. The periurban system (Ecotone) as strategic buffer for new metropolitan development

3.1 ECOSYSTEM SERVICES

Acting in accordance with the literature on ecosystem services (According to TEEB) an initial identification of potential ecosystem services offered by periurban areas in the URMA Pilot area was proposed.

Using the defined categories of ecosystem services, two different kinds of ecosystem services were identified: a first group of services offered by the periurban areas in their current condition and a second group of "potential" services that could be performed with the implementation of projects improving the capacity and quality of the ecosystem services. The first group includes functions already performed. These ecosystem services are not recognized in value terms (not necessarily economic or monetary) in the decision-making at the root of decision-making process for territorial planning. Explicit recognition of the values and advantages deriving from the ecosystem services performed could be the first step in ensuring their enhancement over time.

In the second group, the ecosystem services that periurban areas could potentially offer by implementing interventions or practices to improve the ecosystem quality of components (physical and natural) were identified. The services identified refer to the categories of classification established (MES, TEEB).

The category of "cultural" ecosystem services was not considered in relation to ecosystem classification. The main categories of "performed" and "potential" Ecosystem Services are shown in the table 1.

The ecosystem services listed in the category of "cultural" ecosystem services include: recreation, health, tourism, aesthetic, spiritual, etc. In the URMA Pilot context (and in general in periurban areas in Lombardy) these "services" are performed by the agricultural component (not by "ecosystems" or natural components) or landscape, or else by the historical and architectural heritage. For this reason, the "cultural" services were not considered in this first application of ecosystem services to the URMA Pilot.

ES cat.	Performed services	Improved or potential ES	
Provisioning services	Fresh water		
	Food		
	Raw material (wood)		
Regulating services	Drainage and water management	Improvement of drainage and water management	
	Microclimate regulation (urban hit island)	Improvement of Microclimate regulation (urban hit island): vegetation, green periurban and urban infrastructures	
	Air pollution mitigation	Improvement of Air pollution mitigation Noise pollution mitigation	
	CO2 cycle (incorporation and storage of CO2)	Improvement of the CO2 cycle	
	Pollination	Improvement of pollination and seed dispersion /diffusion	
	Biodiversity and (semi)natural habitats		Improvement of urban and periurban biodiversity and (semi-) natural habitats
			Agricultural biodiversity
			Extreme event mitigation (flood, storm, hit island)
			Waste Water treatment (wetland)
			Soil fertility preservation Soil erosion reduction
Supporting services		Habitat per species	
		Diversity (genetic diversity)	

Tab.1 The main categories of “performed” and “potential” Ecosystem Services offered by periurban areas in the URMA Pilot context.

In relation to “urban-rural” relationships, it is important to also underline the “negative aspects” or problems that rural and natural areas could cause to urban (social) components (Marino, Horse 2014). Some of these problems could be: trees and shrubs in cities emit volatile organic compounds, they obstruct the view (landscape and un-safety); allergies and allergic reactions, damage to infrastructure (roots and microbe activities), damaging materials, the presence of unwelcome animals and insects, etc.)

3.2 FROM ECOSYSTEM SERVICES TO “POTENTIAL FUNCTIONS”

While developing the URMA Pilot Case, it turned out to be difficult to refer only to a “consolidated” list of categories of ecosystem services that can be implemented in periurban areas as this does not encompass the complexity - in an organic and effective way - of the multiple services and activities that can be offered in periurban areas and that can be a driver for the implementation of urban-rural partnerships projects.

By only considering the ecosystem services categories, it is not possible to include all the present and potential resources in the periurban area considered to be the transition transect (e.g. the ecosystem services cannot include the functions of architectural heritage, rural landscape or agricultural activities).

In order to consider all the services, functions and activities that can be activated/performed in the periurban areas on the basis of all the components of the territorial system (ecosystems but also “human” in terms of rural, social, cultural elements, etc.) a first proposal of “potential functions” performed in the URMA Pilot was proposed. Shifting the focus onto “services” and functions (not only those arising from the ecosystem), it is possible to highlight the potential that the periurban areas can offer (in terms of an ecotonal transitional transect) in order to create innovative strategies for the development of metropolitan

areas. This approach relies on the recognition of the potential of the transition areas for the effective activation of innovative strategies for regional and metropolitan development.

The preliminary identification of the functions (or services) offered, or that can be activated (potential functions) in the periurban areas is summarized in the table (Table 2). The functions and services listed derive from case studies existing in the Milan metropolitan area or in the Lombardy region (the table also underlines the diffusion of cases and practices). In parallel to the identification of potential functions, for example, some cases and practices already active in the Pilot area (or in similar areas of Lombardy) have been identified. This first proposal (partial and not yet completed) clearly shows the potential of periurban areas when approached as transitional transects and their potential in terms of a strategic vision leading to an innovative development model for metropolitan systems.

Potential function or potential services	Case studies
<i>Provisioning services (ES)</i>	
Energy chain – wood	Existing: e.g. the short chain of wood in the Ticino park
Energy chain – biogas	Existing and diffuse: biogas and other solutions for energy production from secondary agricultural products
Food production	Existing: with different characteristics (e.g. short chain, specific local food production, new products, reintroduction of traditional seeds and species ...)
<i>Regulating functions and environmental functions</i>	
Improvement of Drainage and water management	Existing: e.g. Parco delle Risaie
	Renovation of urban/settled areas (reduction of water-proof surfaces)
Improving urban climate mitigation - green islands	Existing: Urban and periurban parks
Improving urban climate mitigation - green infrastructure /urban vegetation (shade, microclimate improvement)	Existing: diffuse cases of urban park and urban renovation (with green infrastructure and vegetation improvement)
Noise reduction (vegetation) - Retrofitting existing buildings	Existing: a few projects in the urban renovation project Existing
Improving CO2 absorption/storage services (carbon sequestration climate adjustment by urban vegetation) - Improved air purification services	Existing: diffuse cases of urban park and urban renovation + re-forestation of the periurban area (e.g. Metrobosco)
Improving pollination and seed dispersal services	Existing: beekeeping activities (e.g. Alvearu urbani initiative) and projects for the diffusion of vegetal species constituting the habitat for useful insect species (e.g. EUGEA)
Improving Biodiversity services - Natural	Existing: diffuse intervention for restoration and improvement of natural habitat (e.g. natural spring, ecological network...)
<i>Supporting functions (Habitat)</i>	
Diversity (agricultural biodiversity)	Existing: e.g. projects for agricultural biodiversity and ancient /traditional species cultivation (11 grani ...)
Moderation of extreme events Reduction of extreme events. Vegetation creates barriers against extreme events (floods)	existing (not in the Pilot area)
Water purification (wetlands) Waste treatment filtration of wastewater and nutrient fixation by urban wetlands	Existing: e.g. water waste treatment in wetland (phytopurification at the Nosedo water purifier)
Recovery of waste / waste	Existing: farms and plants for composting/reuse of organic urban waste and garden waste

Maintaining soil fertility - Reduced soil erosion	Existing: "good agriculture" project (including specific guidelines for soil conservation)
<i>Social functions and activity attractions (only few examples)</i>	
Leisure functions	Existing: large range of leisure activities in rural, periurban park...
Health /wellness (sport activities/functions)	Existing: e.g. the "ecological sports center"
Touristic / rural touristic functions	Existing: e.g. Parco delle Risaie info point, local restaurant, agritourism
Cultural and educational functions	Existing: e.g. the Connecting Culture initiative
<i>Economic functions and exchange (only few examples)</i>	
Market for the sale and promotion of local food products (food production and transformation - short chain)	Existing: e.g. Buonmercato, Genuinagente
Agricultural research and innovation	Existing: e.g. Nutrire la Città che Cambia (feed the changing city), new production chains and food processing
Horticulture associations (communities)	Existing: e.g. Associazione Parco Teramo
Educational function	Existing: e.g. Educational farms
Service sector innovation and research	Localization of research or tertiary activities (workshops, computer ...) possibly compatible with agricultural activities
Economies and social economic activities	Starting businesses and social enterprises (recovery of abandoned or under-used rural building)
"Health" Services and activities (rehabilitation, discomfort, disability recovery)	Starting businesses and social enterprises (recovery of abandoned or under-used rural buildings)

Tab.2 The "potential" of periurban areas: a selection of possible functions and services that could be performed or offered by or in periurban areas of the Lombardy Region Pilot area in the URMA project.

4 THE POTENTIAL OF PERIURBAN AREAS FOR THE RESILIENCE OF METROPOLITAN REGION

4.1 THE "ECOTONE" METAPHOR AND THE NEED OF STRATEGIC VISIONS FOR PERIURBAN SYSTEM RESILIENCE

In order to promote a strategic vision for a periurban system, it is necessary to redefine the "object": moving from "periurban" area (as the sum of the surfaces) to a vision able to recognize the role and potential of these complex system of transition between urban and rural/natural systems.

The map (figure 6) integrates the results of the characterization of periurban systems (URMA Pilot) and the characteristics of both "urban systems" (main neighborhoods or communities) and "rural systems" with different degrees of fragmentation and structuring of the agricultural system).

The first aspect that emerges from the study of the Pilot is lack of recognition of values, potential and resources of periurban systems. The absence of recognition of the strategic role that these systems play in the construction of innovative models of development of metropolitan areas implies a fragmented panorama of sectorial polices acting on "urban", rural or natural components and a lack of strategic visions and polices focusing and centered on the periurban systems.

The development of strategic visions and polices requires a redefinition (or an alignment / integration) of interpretative, design/planning and governance instruments.

An integrated and synergic renovation of instruments has to be based on a trans-disciplinary and crosscutting approach.

The metaphor of “ecotone” is proposed as a new “neutral” framework in which it will be possible to share, compare and renovate disciplinary instruments (but also institutional and governance instruments) connecting different disciplines and sectors.

Approaching to periurban areas as ecotonal zones of transition supports also the urgency/need to move the point of view from Urban/rural/natural to a renovated/new point of observation.

This leads not only to a new way of defining problems, but to give evidence to a set of problems that was not fully identified before. At the same time, this brings the opportunity of new integrated solutions.

The metaphor of “ecotone” is proposed to support this process of realignment of disciplines and governance sectors” in a “new” neutral framework

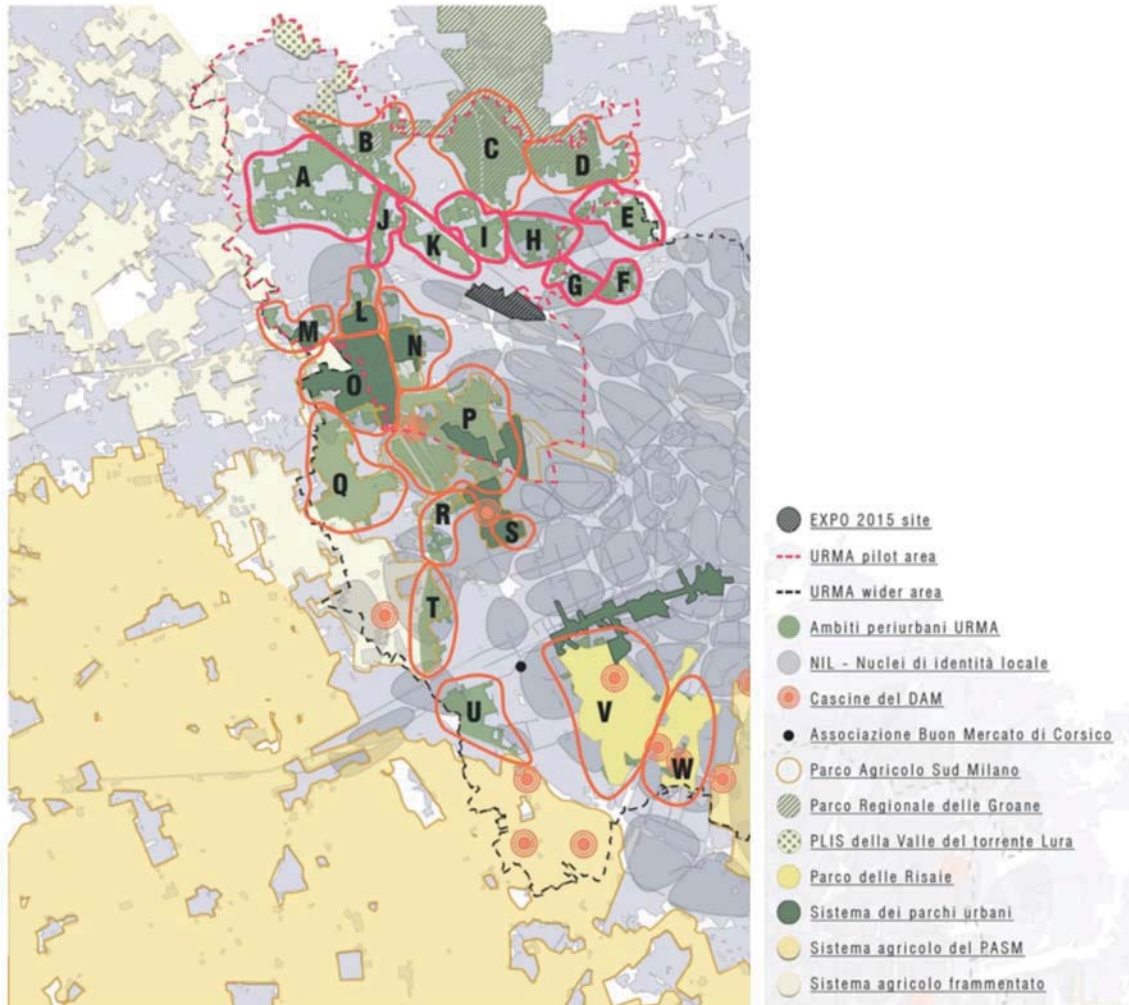


Fig. 6 Redefining the approach: the potential of the transition areas: the periurban sub-systems integrated to include the urban neighborhoods (urban communities and places) and agricultural systems.

The “ecotone” metaphor is proposed to support innovation in the approach to periurban areas. An ecotone is a transition area between two biomes. It is where two ecosystem communities meet and integrate. It may be narrow or wide, and it may be local or regional. It is a “zone of transition between adjacent ecological systems, having a set of characteristics uniquely defined by space and time scales and by the strength of the interactions between adjacent ecological systems” (Hansen et al, 1992).

In these terms, periurban areas may be assumed to be ecotonal zones of transition between urban and rural or natural systems. The ecotone or ecotone system are characterized by specific proprieties and assuming the "ecotone metaphor" it is possible to 1) connect needs and critical questions to an homogeneous framework and 2) include the topic of periurban areas in the general framework of the resilience approach. The proposal is a first suggestion that requires further research, the reframing of the framework in order to underline how the proposed ecotone metaphor could be able to be an effective common framework for the activation of mutual and discipline and germination of renovated instruments. The ecotonal metaphor is able to connect concepts, phenomena and principles related to "ecotone" proprieties and characteristics, resilience approach principles (Colucci, 2012) and the phenomena and needs emerging from the territories (presented in the first part of paper).

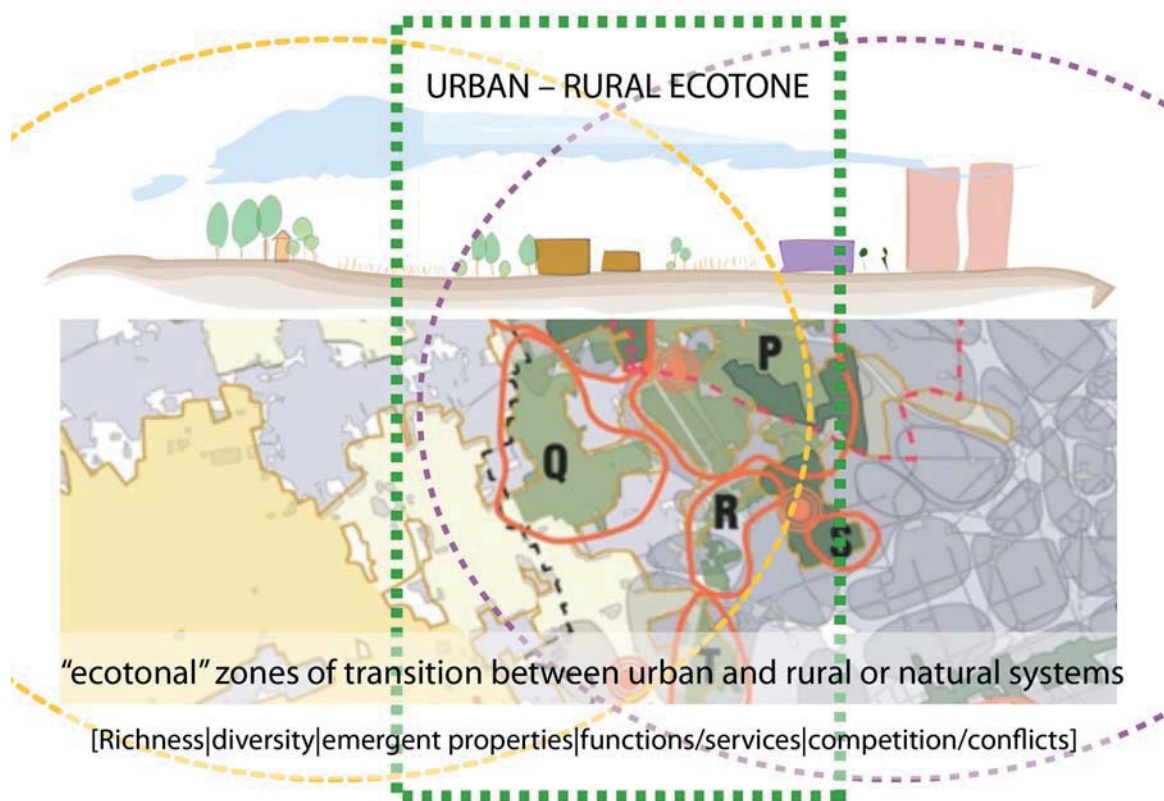


Fig. 7 Periurban areas may be assumed to be ecotonal zones of transition between urban and rural or natural systems

All the possible interconnections and conceptual reframing have to be developed but some connections could be synthetically underlined as examples.

The ecotone is local based (specific characteristic) but the ecotone components and characteristics are influenced and derive from the biomes.

The ecotones are characterized for different time-dynamics: there coexist rapid transformation and slow transformations related to the evolution of biomes and the habitat.

Both these characteristics have been underlined as relevant phenomena that characterize periurban systems. These concepts have been discussed in relation to the "Key concept 1. Understanding complexity (multi-scales in space) and dynamics (multi-scales in time)". Traditional methodological instruments for the territorial analysis and interpretation are not able to include and understand the coexistence of different temporalities of territorial phenomena.

At the same time these concepts are coherent with some of the main shared "resilience strategies" for the socio-ecosystems like dynamic conditions, modularity and multi-scale dimensions in time and space, Cycles of adaptation or the Ecosystem organisation (A. Colucci, 2012).

The ecotone are characterised by emergent proprieties. In these terms, a renovated approach could support the identification of all the resources and opportunities and the specific values of periurban systems (that can not be assimilated to urban or rural or natural systems). These can be more precisely identified as specific new phenomena that involve at the same time patterns and components of both urban and rural / natural systems.

The same, this approach can allow to grasp other specific characteristics of ecotones, such as richness and diversity: in this way this approach may lead to highlight all the functions performed and the services that could be improved both for urban and for rural/natural areas.

4.2 URBAN RURAL PARTNERSHIPS: GOVERNANCE TOOLS FOR RESILIENT METROPOLITAN AREAS

The principles and abilities related to the resilience approach can support a general framework and a strategic visioning able to move and activate different interests and stakeholders (citizen, institution private sector, professionals, academic and educational) towards integrated multi-issue projects. Existing trends and initiatives, and new policies and projects need to be integrated in a strategic vision (on a regional, metropolitan or territorial scale and at local level), to be supported by technical and methodological innovative instruments able to orient the decision-making process and lead to the implementation of innovative governance solutions. Flexibility and modularity are fundamental factors: the vision needs governance tools able to incorporate different and local solutions defining general strategic goals and priorities.

Multiscale but place-based

Urban-rural partnerships have to be built up on the basis of their different respective local/regional needs and potentials. Urban-rural partnerships should be acknowledged as a strategic approach at all levels of territorial cohesion policy and should be adequately supported. The respective functional areas should be reflected in national/regional spatial plans so that spatial planners can take account of the related development gaps and potentials from a joint development perspective, where disparities can be addressed. The instruments of governance (and government) must therefore ensure degrees of flexibility in defining the areas and geographies able to include the different possible forms of urban/rural partnerships.

At the same time, the rural urban partnerships and strategic vision related to these must have a territorial dimension. The urban-rural partnerships should be recognized also as "functional spatial entities". In particular, it is necessary for these forms of territorial cooperation between urban and rural areas to be recognized at all levels of strategic and territorial planning.

Governance of processes

The main barriers to the implementation of partnerships or projects that exist in integrated urban-rural periurban areas arise from the rigidity of the regulatory framework of the territorial government and the fragmented framework of regulations. The current instruments are the results of an industrial interpretation of the urban/rural relationship in terms of conflictual relationships between urban and agricultural systems. The rigid distinction within the instruments of territorial government between urban and agricultural areas is unable to identify the relationship between them and the opportunities that can arise from these. This view must be replaced by a new unitary vision of the city-region.

The multi-thematic character of urban-rural partnerships demands holistic and place-based approaches. Multi-level governance and cross-sectorial organizational models are the appropriate solution. The management of projects in periurban areas requires multi-level governance.

Functions and services

The strategic vision should be based on the identification of innovative "functions" as a strategic project that must involve urban and rural realities, and should be consistent and integrated at different spatial and time scales. It must be a renewed approach to enhance mutual synergies between the urban and socio-ecosystem, leading towards greater integration, able to recognize the value chains activating virtual processes of valorization of all the resources, and providing solutions to different needs and demands (from the rural and agricultural landscape, the cultural heritage, the environmental and ecosystems, from social and community scenarios, from the economy ...). The implementation of new functions must be supported by a review of the regional governance framework based on a vision able to define real coordination between most relevant territorial strategic decisions (e.g. mobility infrastructure / environmental infrastructure).

Periurban areas as potential for the innovative development of urban and rural regional systems

Urban-rural initiatives involve a wide range of stakeholders. A participative process, such as the Triple Helix approach (integrating academia, business and government in the decision-making and creative processes), the Quadruple Helix approach (the Triple Helix plus civil society), has to be promoted and supported in order to ensure the proper embeddedness of such projects in different thematic fields. The construction of the partnerships involves multiple stakeholders, encouraging local political leaders (mayors, councilors), NGOs and entrepreneurs to actively participate in urban-rural partnerships. Entrepreneurs, in particular, should take charge of ongoing projects (and be a driving force).

4.3 PERSPECTIVES

REsilienceLAB (www.resiliencelab.eu, Figure 7) was launched in 2014 as an interdisciplinary network supporting the diffusion of resilience, sustainability and the adaptation of knowledge, policies and practices. RE|LAB (that has been an instituted association since December 2014) is a network of people from the academic, institutional, and professional sectors and from different disciplinary backgrounds; the network is "open" to the "resilience" definition and approaches and it is operative-oriented (RE|LAB is an operative network supporting initiatives related to, and focused on, sharing practices and the dissemination of knowledge). RE|LAB is social-oriented and non-profit-making and it is key partner in European and international networks on resilience (RRMS thematic group of AESOP, European hub of UCCRN). The main activities and purposes of the network are the comparison of experiences and proposals (with a theory-practice-theory approach), the promotion and support of local initiatives for the reinforcement of the resilience properties of complex systems, training and capacity building (guidelines, design solutions etc.), and networking activities.

In collaboration with REsilienceLAB and DASTU at the Politecnico di Milano, DIST at the Politecnico di Torino and the CURSA Consortium, the Environmental sector of the Fondazione Cariplo is launching a National Observatory on resilience practices. The initiatives and practices have to be multi-objectives (integrating different components of complex systems and resilience approaches) and have to include environmental strategies.



Fig. 8 The REsilienceLAB timeline. A synthesis of the activities developed since 2014 by the RE|LAB network.

"Observation" refers to different aspects reflecting the different goals of the research:

- mapping resilience practices/initiatives (practices path). The "mapping" concept refers to understanding local factors that influence and characterise initiatives in relation to different keys of interpretation;
- the methodological path: scientific and methodological advancement is based on research applied to initiatives. Tools include both evaluation and interpretative method and design/actions to support resilience experience;
- the cultural path: the development of conceptual instruments for the dissemination of the resilience approach. The multiplicity of resilience definitions and approaches will be highlighted and addressed starting from practices rather than theories;
- the networking path: national and international networking.

The topic of "periurban" (approached as an "ecotonal" complex system of transition between urban and rural/natural systems) will be a specific area of research and debate that will be developed in the forthcoming activities of the REsilienceLAB, with a specific focus on governance and process solutions and on the development of assessment/design methods supporting the decision-making process and initiatives of activation and implementation.

If "mapping resilience practices" is the general focus and aim of the Observatory of Resilience Practices project, a specific focus of the Observatory could be the systematization of the Panorama of the Milan metropolitan areas and the Lombardy regional context. It could take as its starting point the initial overview of the metropolitan and regional panoramas proposed here and from the main methodological and design perspectives developed in the CIVES and URMA projects.

REFERENCES

- Acha, E. M., Piola, A., Iribarne O. & Mianzan, H. (2015). Comparisons of Fronts with Terrestrial Boundaries and the "Ecotone" Concept in Ecological Processes at Marine Fronts, *Environmental Science* 2015, 47-51.
- Colucci A. (2015). CIVES | Nuove alleanze tra urbano e rurale a Milano. in Treu M.C. (Ed.), *Per una città socievole. Le alterne fortune di Piani e Progetti*, Reggio Emilia, Italy: Palazzo Bonaretti Editore.
- Colucci, A. & Magoni, M. (2015). Protection of Peri-Urban Open Spaces and Food-System Strategies. The Case of Parco delle Risaie in Milan. *Planning Practice and Research Journal*, Published online 07 Aprile 2015, DOI 10.1080/02697459.2015.1028251.
- Colucci, A. (2012). Towards resilient cities. Comparing approaches/strategies. *Tema. Journal of Land Use, Mobility and Environment*, Vol 5 (Resilient city), No 2 (2012), pp 101-116.
- Galderisi, A., Ferrara, F.F. (2012). Enhancing urban resilience in face of climate change: a methodological approach. *Tema. Journal of Land Use, Mobility and Environment*, 5, (2), 69-88, DOI: <http://dx.doi.org/10.6092/1970-9870/936>
- Hansen, A. J., Risser, P. J. & di Castri, F. (1992). Landscape Boundaries. Epilogue: Biodiversity and Ecological Flows Across Ecotones. *Ecological Studies*, 92 (1992), pp 423-438.
- Longworth N. (2006). *Learning Cities, Learning Regions, Learning Communities: Lifelong Learning and Local Government*, NY: Routledge.
- Papa, R., Galderisi, A., Vigo Majello M.C., Saretta E. (2015). Smart and resilient cities. A systemic approach for developing cross-sectoral strategies in the face of climate change. *Tema. Journal of Land Use, Mobility and Environment*, 8 (1), 19-49. DOI: <http://dx.doi.org/10.6092/1970-9870/2883>.
- Salat, S., Bourdic, L. (2012). Systemic Resilience of Complex Urban Systems. *Tema. Journal of Land Use, Mobility and Environment*, 5 (2), 55-68, DOI: <http://dx.doi.org/10.6092/1970-9870/918>.
- Stockholm County Council (2015). *The Urban Game 2015 Implementation project 2014-2015*, Stockholm, October 2014, online report Urban Games, <http://www.trf.sll.se/urban/>.
- TEEB – The Economics of Ecosystems and Biodiversity (2014). *The Economics of Ecosystems and Biodiversity (TEEB) for Agriculture & Food – Concept Note*, www.teebweb.org.
- TEEB – The Economics of Ecosystems and Biodiversity (2011). *TEEB Manual for Cities: Ecosystem Services in Urban Management*. www.teebweb.org.
- Urban-Rural Partnerships in Metropolitan Areas (URMA) (2014). *Recommendations on the establishment and improvement of urban-rural cooperation as a tool for territorial cohesion*. <http://www.urma-project.eu/documents.html>.
- Urban-Rural Partnerships in Metropolitan Areas (URMA) (2014). *Final Pilot Implementation. Report*, <http://www.urma-project.eu/documents.html>.
- Urban-Rural Partnerships in Metropolitan Areas (URMA) (2014). *Final Publication*. <http://www.urma-project.eu/documents.html>

IMAGE SOURCES

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