

Antonio Leone Carmela Gargiulo
Editors

Environmental and territorial modelling for planning and design



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Smart City, Urban Planning for a Sustainable Future

4

Environmental and territorial modelling for planning and design

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This book collects the papers presented at the 10th International Conference INPUT 2018 which will take place in Viterbo from 5th to 8th September. The Conference pursues multiple objectives with a holistic, boundary-less character to face the complexity of today socio-ecological systems following a systemic approach aimed to problem solving. In particular, the Conference aims to present the state of art of modelling approaches employed in urban and territorial planning in national and international contexts.

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This book is the latest scientific contribution of the "Smart City, Urban Planning for a Sustainable Future" Book Series, dedicated to the collection of research e-books, published by FedOAPress - Federico II Open Access University Press. The volume contains the scientific contributions presented at the INPUT 2018 Conference and evaluated with a double peer review process by the Scientific Committee of the Conference. In detail, this publication, including 63 papers grouped in 11 sessions, for a total of 704 pages, has been edited by some members of the Editorial Staff of "TeMA Journal", here listed in alphabetical order:

- Rosaria Battarra;
- Gerardo Carpentieri;
- Federica Gaglione;
- Rosa Anna La Rocca;
- Rosa Morosini;
- Maria Rosa Tremiterra.

The most heartfelt thanks go to these young and more experienced colleagues for the hard work done in these months. A final word of thanks goes to Professor Roberto Delle Donne, Director of the CAB - Center for Libraries "Roberto Pettorino" of the University of Naples Federico II, for his active availability and the constant support also shown in this last publication.

Rocco Papa

Editor of the Smart City, Urban Planning for a Sustainable Future" Book Series
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LANDSCAPE URBANISM'S INTERPRETATIVE MODELS

A NEW VISION FOR THE TIBER RIVER

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ABSTRACT

Our proposal identifies the River Contract as a process to implement the urban public spaces through the redevelopment of the Tiber River as a natural infrastructure. The River Contract is a participatory process with operational implications for the redevelopment of river basins. The state of art of the River Contract in Italy has been analyzed. Our sample area is located in the Roma Province, along the Tiber River in the area from Fara Sabina to Castel Giubileo. This particular area is actually not covered by any Contract, although there are a lot of naturalistic elements and boundary conditions that could lead to a good success and unexpected implications of this new instrument, oriented not only to naturalistic engineering, but also to urban design. Values of this actually not covered area have been highlighted through some different landscapes urbanism's categories: Waterscapes that include the Tiber River and other tributaries; Naturalscapes that include some Regional Natural Reserves and the "Lagheti in Località Semblera" Natural Monument and finally the Regional Natural Park of Veio; Ruralscapes that involve all rural zones, including areas related to CREA (Consiglio per la ricerca in agricoltura e l'analisi dell'economia agraria) and CNR laboratories; Culturalscapes as archaeological areas, castles and ancient buildings, museums and ancient mills; Infrastructuralscapes that involve Salaria, Tiberina, Flaminia, Nomentana Roman Consular Roads and local railways. The aim of our investigation, supported by territorial georeferenced analyses, is the Regeneration Strategy for the Tiber River to connect all these Values, related to different "Scapes" for the new "urban" dimension.

KEYWORDS

Public Space; River Contract; Urban/Territorial Dimension

1 INTRODUCTION

Our dissertation investigates the relationship between the plurality of factors that insist on the river landscape. This approach can still be more significant in a context of Inner Areas, such as geographical areas subject to strong centrifugal forces, with demographic problems and unstable development, but endowed with resources that are lacking with the large centers of agglomeration, with strong attraction potential. Furthermore, Inner Areas can be the basis for the study of polycentric solutions aimed at improving the production quality. In order to optimize the relationship between cities and countryside, they can accept models of development linked to forms of valorization of the natural and cultural heritage and to the maintenance of their territorial identities. The River Contract tool (RC), voluntary negotiated and participatory programming agreement, may be an opportunity for achieving the landscape quality aims foreseen by our National Code for Cultural and Landscape Heritage of 2004, as amended and supplemented (Repubblica Italiana, 2004). River Contracts make the principles of protection of the landscaping plan their own, both under the profile of its naturalistic and environmental relevance, as well as artificial landscape, man's work (Cialdea 2017b; Cialdea & Cacucci, 2017), as it has been described in the National River Contracts Charter of 2010 and defined by the National River Contracts Table (Tavolo Nazionale dei Contratti di Fiume 2010). The River Contract presents itself, in the light of these considerations, as a new opportunity to affect the development potential of Inner Areas. It can become the driving element of a new vitality for these places, as a territorial management tool that starts from the bottom, and therefore from the needs and desires of people who live on the territory (Cialdea & Quercio, 2017; Corrado, 2014; Minervin, 2014). Many national and international studies address the matter of the relationship between planning tools and the river landscape (Bianchini, 2014; Esposito, 2014; Ingaramo & Voghera, 2016) and they are also more and more the subject of specific studies for graduate (Ciuffreda, 2017; Pompei, 2018) and PhD (Morri, 2017) thesis. Therefore, the RC potential lies precisely in its capacity to concretize operations destined to overcome the greatest challenges in the territorial and environmental field. It can become a catalyst to promote the implementation of district planning tools, in favour of better management of water resources and more efficient use of agriculture (Servadei, 2015) and, at the same time, to improve integrated actions related to the vast area planning. In several investigated cases, which are increasingly involving national and international territories, opportunities to promote practical actions for the development of the most disadvantaged territories through this tool are focused (Bastiani, 2011), with policies destined to Inner Areas and also to vulnerable environments as is the case of waterways enclosed in wetlands. Our project is related to the completion of the River Contract network of the Tiber River. The aim is to connect and make efficient the Tiber network from the point of view of the landscape management, from Umbertide to the river mouth, in order to create a "public use" network. To do this, it was elaborated the new proposal of the "Middle-Low Tiber River" Contract, in the stretch that goes from Fara Sabina to Castel Giubileo, in the Lazio Region in a part all included within the Province of Rome. This Inner Area is the only stretch uncovered by the River Contract of the Tiber River and that generates a break and a separation between the "Tevere umbro" (Tiber River along the Umbria Region) and the "Tevere romano" (Tiber River along the Rome area), thus losing the discourse of protection and valorization of river and landscape continuity. The project, in line with the current orientation of the territorial and landscape management, intends to remedy this separation. A reference RC planning model has only existed a few years, thanks to the push, the commitment and the researches carried out by the National River Contracts Table, born specifically in 2007 as working group of the Italian Local Coordination A21, with the objective to create a community able to exchange experiences

and promote river contracts in Italy. Because of this, in the legislative field, different laws aid to structure RC themes and process ensuring RCs planning status, from the European level to the regional one (in our case-study the Lazio Region). At European level there are several directives related to the water framework safety. The first one is the Habitats Directive 92/43/EEC, that means "Safeguarding biodiversity through the conservation of natural habitats and wildlife in the European territory of the Member States to which the treaty applies" (European Commission, 1992). Then the Water Framework Directive 2000/60/EC has been elaborated to prevent qualitative and quantitative deterioration, to improve water status and ensure sustainable use, based on the long-term protection of available water resources (European Parliament and Council, 2000). The Flood risk Directive 2007/60/EC references to the identification of flood and risk areas, in accordance with common criteria and for the assessment and management of flood risks (European Parliament and Council, 2007). At the national level, in Italy, we find the already mentioned Legislative Decree No. 42/2004 which defines the principal environmental safeguard measures, as well as the Law No. 14/2006 (Repubblica Italiana, 2006a). In order to attend the European directives, the D. Lgs 152/2006_art. 68bis establishes national reference measure in the field of environmental impact assessment, soil defence and water protection, waste management, reduction of air pollution and compensation for environmental damage (Repubblica Italiana, 2006b). With the same aim, according to the European Flood Risk Directive, the national D. Lgs 49/2010 pursues on the assessment and management of flood risks. In the last few years, after several Italian river flooding, the need of common rules to preside over the river basins lead to define the above mentioned National River Contracts Charter which describes the River Contracts as "a process of negotiated and participatory programming aimed at the containment of eco-landscape degradation and the redevelopment of the territories of basins and hydrographic sub-basins" (Repubblica Italiana, 2010). Furthermore, the Law No. 221 (Repubblica Italiana, 2015) identifies RCs as "voluntary instruments of strategic planning and negotiation that pursue the protection, the correct management of water resources and the valorization of the river territories, together with the safeguard from the hydraulic risk, contributing to the local development of these areas, which contribute to the definition and implementation of district planning tools at the basin and watershed level" (art.43bis). Finally, thanks to the basic quality definitions and requirements of the River Contracts (Tavolo Nazionale dei Contratti di fiume, 2015), the RCs has been defined as a support of the planning and/or action. At regional level the Resolution No. 42 (Regione Lazio, 2007) and the Resolution No. 787 (Regione Lazio, 2014) pursue the maintenance of the integrity of the water resource, compatibly with the uses of the resource itself and the socio-economic activities of Lazio people. They contain necessary measures for the qualitative and quantitative protection of river basins, in addition to the interventions aimed at ensuring the achievement and maintenance of the water system. Analyzing the current laws, River Contracts are intended, firstly, to help overcome the logic of the emergency to create, whereas, a synergy between urban, rural and natural context, integrating tangible and intangible actions for culture, quality of life, landscape and economy. The primary objective is to define environments related to water courses as 'living landscapes' (Jønch-Clausen & Fugl, 2001), so that they can be perceived and governed as such also into the urban dimension.

2 THE TERRITORIAL CONTEST

Our study area, of about 400 km², runs for 23 Km from Fara Sabina to Castel Giubileo, but the analyzed river section is long about 40 Km. It includes 10 municipalities in the Province of Rome. The most important element is the Tiber River, which is perceived only as a negative element, because of its floods at the expense of urban living. In this regard, the little town of Monterotondo turns out to be the most affected,

presenting many critical issues. The proposal of the Middle-Low Tiber RC takes start, as for other cases in Italy, from the need of hydraulic safety. In this particular case, there is the need to restore relations that existed in the past (former brick kilns) and to bring the river back to its role of public space and "Itinerary of water and communication" (Provincia di Roma, 2010), now completely lost, but living in remembrance. A role that crosses and continues the relationship "history, culture and nature". The elements most in view, such as the agricultural areas along the irrigated valley of the Tiber, are the predominant character of the area and they have an important role for the production, care and use of landscape, for the traditional social structures maintenance, as well as for a multifunctional basis for other economic sectors (Cialdea, 2000, 2012, 2017a, 2018; Cialdea & Badami, 2017; Cialdea & Maccarone, 2012; Cialdea & Mastronardi, 2014a and 2014b, 2017a and 2017b; Cialdea et al., 2006; Ducci et al., 2017; Pindozi et al., 2016).

Then there are the industrial areas that are located close to the Tiber, its valley and the highway (Riano, Fiano Romano, Capena, Monterotondo, Montelibretti villages) and several protected areas. Other elements that are not valued are the research institutes of CREA and CNR and the recreation areas-Tiber Extreme Park, Salaria Sport Village, Lago La Barcaccia, CONI-Riano Sport Centre - which would instead bring the decisive impetus to safeguard the environment and the health of populations, favouring its careful utilization, but also to create the possibility to recover old paths, that can be restored as greenways to slow mobility and historical buildings along them can be used by a sustainable tourism (Cialdea, 2018; Cialdea & Cacucci, 2017). The project is based on the valorization of all these values and this new network will be related to the other Tiber RCs stretches (Fig. 1) and recreational areas in terms of relapses on the urban environment:

- the section from Umbertide- Città di Castello is covered by the Alta Umbria RC (2008) and it is characterized by some attractive elements: the Corbara Lake and the Alviano Lake, 500 hectares of humid environment that is a naturalistic oasis. This final stretch of the Tiber River in the Umbria Region, of about 50 km, constitutes the Tiber River Park. Several interventions and bike tracks were made in safety of the embankments (Umbertide);
- the stretch from Città di Castello to Orte is characterized by the increase of the flow, after the confluence with the tributary Chiascio, the one with the Paglia River and especially after the confluence with the Nera River. Here we find the Paglia RC (2013), which at the height of Orvieto has allowed the creation of a river urban park and the Nera RC (2010), which aims to the valorization of the natural and historical environment;
- the section Orte-Fara Sabina is covered by the Medium Valley Tiber RC (2012). Here the Tiber River receives the abundant waters of the Nera-Velino watercourses and borders Tuscia and Sabina, where the Treja, Amella first and the Farfa then flow in, alternating with ravines and sheltered areas. There is the "Fiasco" that you can admire from the alluvial terraces. Here we find the Treja Valley Regional Park and The Nazzano Natural Regional Reserve;
- the stretch from Castel Giubileo to the Tiber mouth is covered by the proposal of the Tiber RC in the urban area of Rome (2017). In this area there are strong interaction between urban and natural textures. In addition, the river area is included as one of the strategic programming areas of the Rome Urban Master Plan. Tiber River receives the Aniene River for which the RC (2018) has been proposed.

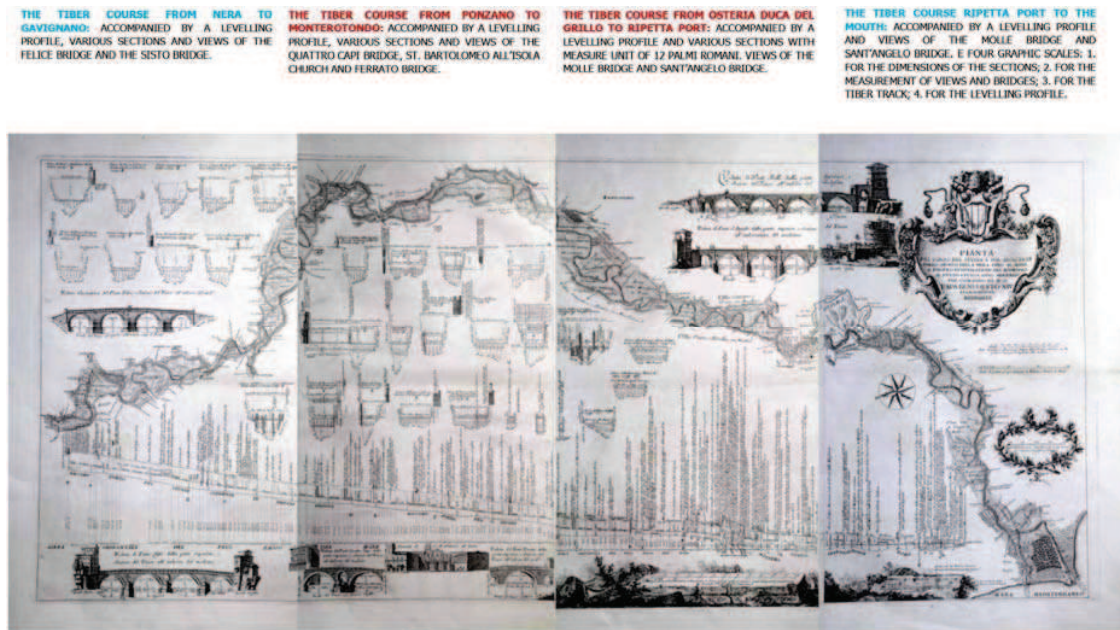


Fig. 1 The stretches of the Tiber River from Nera tributary to the mouth (Source: Pianta del corso del Fiume Tevere, e sue adiacenze, dall'influenza del Nera fino al mare e profilo di livellazione il tutto fatto l'anno MDCCXLIV per comando di N.S. Papa Benedetto XIV felicemente regnante. Chiesa A., Gambarini B., Nolli C., Piranesi G.B. Roma, 1744)

3 THE INTERPRETATIVE PROCESS MODEL

In order to create and develop a reference model (Fig. 2) and to define a project that fits perfectly in the RCs puzzle in continuity of analytical and design logic, able to enhance all the values identified, our proposal has highlighted common tools, characteristics and peculiarities, actions and results of Tiber RCs.

All the already implemented Tiber RCs have in common the training modalities of the process itself: which starts from the identification of the intervention area. Then there is the strategic agenda with the maps of actors, values, interests, projects, tools and resources. Then the process establishes aims and actions of the multidisciplinary relationships with actors. Everything is always discussed, spotted and shared on an active participation and dialogue of institutions, associations and citizens. The innovative feature of these processes is the choice to go in the direction of the horizontal subsidiarity because of the multi-sector, inter-scalar and multi-actor strategies that generate development, trying to take the environment and landscape as the basis on which to rebuild the quality of territory. Thus, the differentiation of territorial systems requires a system of flexible governance, capable of composing conflicts and interests at local level through negotiation processes, adhering to territorial vocations and able to make system by communicating the different programming tools of socio-economic interventions with those of territorial planning.

4 APPLICATION THE CASE STUDY AND RESULTS

Our project has been oriented to relate the cognitive analyses of the territorial context and the RCs common procedures, elaborating the maps of Values, Interests, Resources and Actors. The maps of Values, Interests and Resources (Fig. 3) have been articulated in the logic of the landscape urbanism networks, for which is always more evident that the new urban question is stronger and stronger related to the environmental safeguard and the re-signification of environmental elements for the urban project and its new urban

habitability to recycle the city through the water, the soil, the energy, blue and green networks (Gasparri, 2015).

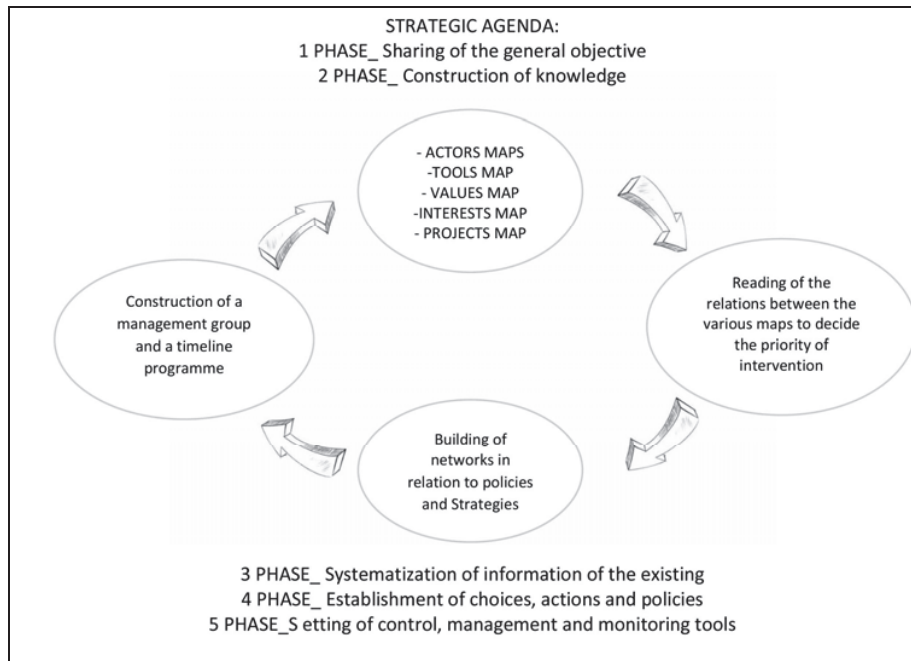


Fig. 2 The phases for the River Contracts development (Source: our elaboration, 2017)

They are:

- the Water Network. It provides the securing of the banks and embankments- especially in the section of Monterotondo Scalo-and the construction of docks for small boats, bridges connecting the two banks, works of re-naturalization, nature trails along the embankment. Moreover, it is hypothesized to restore the navigability of the Tiber River for this stretch, at least with small boats for the connection between the "Nazzano Tevere-Farfa" Regional Natural Reserve and the "Laghetti" Natural Monument in Monterotondo;
- the Protected Areas Network. It includes the connection through pedestrian and naturalistic paths of the various reserves of the area, as the "Macchia di Gattaceca e Macchia del Barco" Regional Natural Reserve, the "Marcigliana" Regional Natural Reserve, the "Nomentum" Regional Natural Reserve, the "Laghetti" Natural Monument, the "Nazzano Tevere-Farfa" Regional Natural Reserve and the "Veio" Regional Park;
- the Strategic Areas Network. All the research centres of CREA and CNR Laboratories and the industrial areas present in the territory are located. An internal connection to these centres is envisaged, almost to create a diffuse scientific park, as well as foresees the Provincial Plan of Rome in this area;
- the Culture and Recreation Areas Network. This one intends to relate historical and architectural buildings creating a territorial museum network (Museums of Riano, Fiano Romano, Monterotondo, Mentana, Montelibretti), through integrated pedestrian pathways to public and private transport. Moreover, it provides the connection of the territorial sport centres of Riano, of Monterotondo and of Castel Giubileo;

- *the Waste Areas Network*. The study area is characterized by disused and abandoned areas and former quarries. particularly the Monterotondo Scalo former brick kilns and the Riano quarries. These constitute a strong degradation element, but at the same time a great opportunity for retraining, thanks to their historical testimony- within the urban or in the midst of protected environmental systems;
- *the Agricultural Areas Network*. In the area, there are three predominant landscapes. The irrigated countryside landscape that is located in the Tiber Valley. The urbanized countryside landscape that is grafted in the municipal territory of Monterotondo, Mentana and Fontenuova and it presents a strong interaction between agrarian and urban matrix. This is a peculiarity of the place to be protected and valued. Then there is the rolling hills landscape which encloses ploughed fields, olive groves, orchards in large or medium sized meshes;
- *the Infrastructure Network*. In this case, it is necessary to strengthen the railway line, the stations and the consular routes. The railway assumes a very important character: being a public transport, it allows to relate quickly the various points of interest in a direct way with the possibility to be integrated with the public motor-transport.

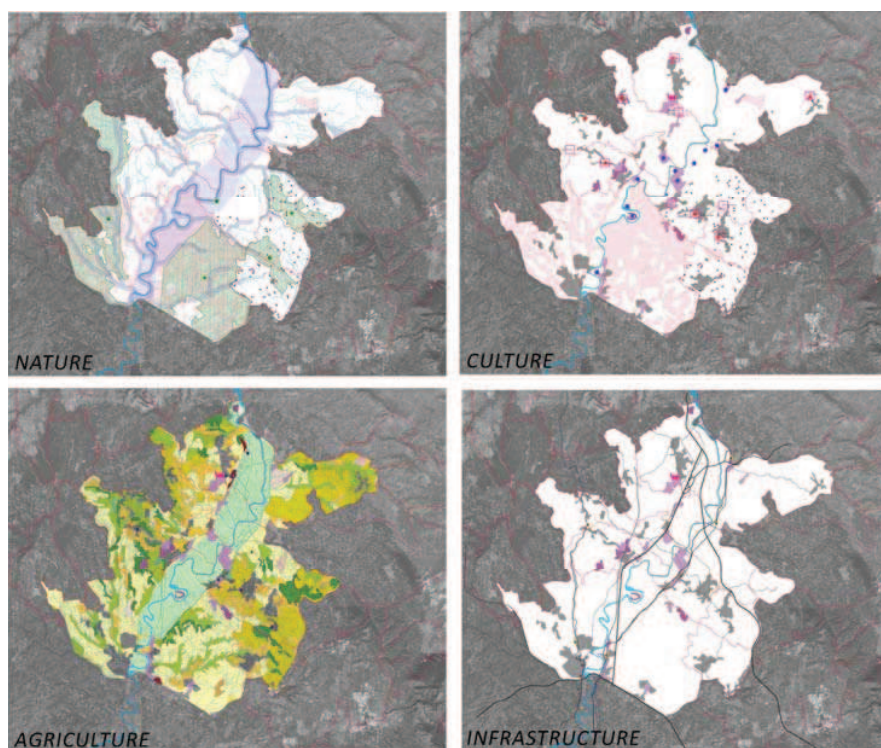


Fig. 3 The Nature, Culture, Agriculture and Infrastructure Categories (Source: our elaboration, 2017)

Thus, it had been possible to elaborate a map which represents the Masterplan of the Middle-Low Tiber River Contract (Fig. 4), where there are also our proposals for strategic local actions or suggestions for the projects to apply. The Actors' Map has been drawn up as a list of potentially involved subjects, to be questioned about their interest in the RC's implementation. They are the municipalities of Monterotondo, Fara Sabina, Riano, Fiano Romano, Castelnuovo di Porto, Montelibretti, Capena, Mentana, Fontenuova, III-

IV Municipi di Roma, the Tiber River Basin Authority, the Institute for Technologies Applied to Cultural Heritage (ITABC), MiBACT, the Archaeological Trust of Lazio and Southern Etruria, The Regional Natural Reserve of the Macchia di Gattaceca and Macchia del Barco, the Regional Natural Reserve of Marcigliana and the RomaNatura Regional Association, the Regional Natural Reserve of Nomentum, the Regional Natural Park of Veio, the Sabina by bike Association, the Tiber Extreme Park, the Monterotondo cultural associations, the Archeoclub d'Italia-section Mentana-Monterotondo. The Tools and Resources' Map establishes the RCs guidelines to be integrated with intervention programmes for local-scale projects. Consequently, the resources must be considered from time to time in relation to the local scale implication of public, private and entrepreneurial or community subjects.

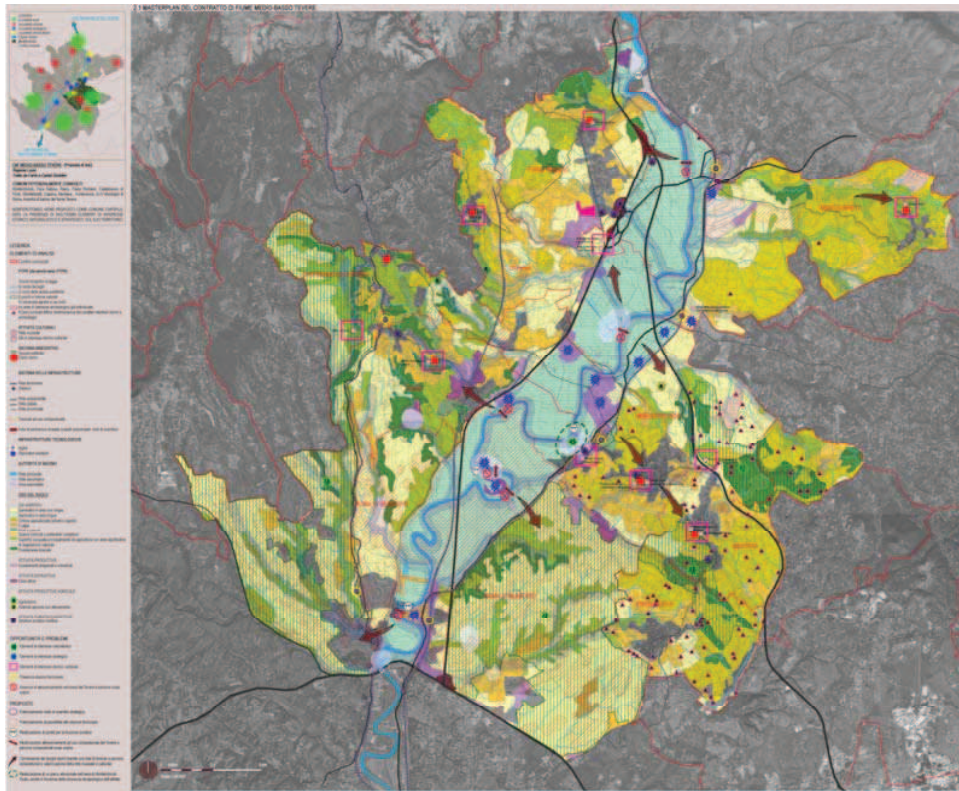


Fig. 4 The Masterplan of the proposed Middle-Low Tiber River Contract (Source: our elaboration, 2017)

5 CONCLUDING REMARKS

The strategy is to connect all the identified territorial values through the Tiber infrastructure, the Via Salaria and the railway. The Middle-Low Tiber River Contract assumes the dimension of Landscape Contract and that finds in each municipality its most complete and complex realization, that is the form of "urban" dimension. Actually, our proposal has defined the systematization of territorial data of values and interests (Tab. 1) elaborated through the territorial analyses. The data have been articulated by three macro-areas: Category, Network and Element, from the general group to the single point. Each one includes a classification of the environment through different level, according to the Italian legislative planning levels and the landscape set of features.

CATEGORY	NETWORK	ELEMENT	
NATURE	Water network	Tiber River	
		Tributaries	
	Protected areas network	Macchia di Gattaceca and Macchia del Barco Regional Natural Reserve	
		Marcigliana Regional Natural Reserve	
		Nomentum Regional Natural Reserve	
		Lagheti in località Semblera Natural Monument	
		Veio Regional Park	
		Valle del Treja Regional Park	
		Nazzano Tevere/Farfa Regional Natural Reserve	
HISTORY AND CULTURE	Culture network	Locus Feroniae archaeological area	
		Eretum archaeological area	
		Monterotondo old town	
		Mentana old town	
		Fiano Romano old town	
		Montelibretti old town	
		Riano old town	
		Monterotondo historical museum	
		Monterotondo multimedial museum	
		Mentana Garibaldian museum	
		Montelibretti museum	
		Ancient via Francigena	
		Mills and farmhouses	
		Castelli e palazzi storici	
		Strategic areas network	CNR Monterotondo Institute
			CNR Montelibretti Institute
			Riano civil protection
			Montelibretti Fireman school
			CREA Monterotondo Institute
	Railway station		
	Monterotondo Industrial area		
	Recreation areas network	Capena Industrial area	
		Extreme Tevere Park	
		Barcaccia lake	
	Waste areas network	CONI Riano	
		Salaria Sport Village	
		Monterotondo ex brick kilns	
		Santa Colomba ex brick kilns	
		Ficarone ex brick kilns	
	AGRICULTURE AND RURAL	Irrigated countryside landscape	Riano quarries
			Riano abandoned area
		Rolling hills landscape	Tiber valley
			Monterotondo area
Urbanized countryside landscape		Roma-Fonte Nuova area	
		Monterotondo countryside	
		Mentana countryside	
		Fonte Nuova countryside	
		Montelibretti countryside	
INFRASTRUCTURE		Railway network	Fiumicino Orte (FR1)
	Roma-Viterbo		
	Road network	Consular road Salaria	
		Consular road Nomentana	
		Consular road Tiberina	
		Consular road Flaminia	
		A1	
	Pedestrian network	Monterotondo	
		Riano	

Tab. 1 Systematization of the territorial data, by categories, networks and elements. (Source: our elaboration, 2017)

They are the basis for the realization of an evaluation system so to understand and identify the priorities of intervention. These are in development and they have as evaluation criterion a cross-reading of the interests of the stakeholders involved for each element.

The same evaluation can be further articulated, establishing for each element the possible scenarios, according to the existing regulations or the proposals made by the stakeholders themselves: each stakeholder can express his own degree of interest for each scenario. Finally, merging data we could define the optimal scenario.

This process can also be done by simulation in laboratory, with the role play, but it is obvious that it lends itself much better to the application in reality. It represents a full aid for the systematization of the data in the "Participatory Perspective" of the River Contracts. So, at the time it was built a cognitive framework both of the criticalities and the environmental and landscape-territorial values, and of the local policies founding the strategies of intervention.

The completion of the project requires to activate a working table with the participation of the involved actors to accomplish the next steps of the medium-term strategic scenarios definition, the evaluation protocol processing, the integrated management and action programmes proposal and the training, communication and education plans application.

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