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# Stop the growth of cities: the role of marginal agricultural areas between river and city as a territorial protection and in the reduction of hydro-geological risk

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## 1. River Plains and urban development

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In Umbria, since ancient time, action was taken on the natural perfluvial areas trying to regulate waters as much as possible and earn pastoralist, agriculture and breeding land (CAMERIERI, MANCONI 2008). The agriculture favored by the fertility of these soils has contributed to the development of competitive activities under the economic aspect. At the end of '800 major industrial cultures were represented by linen, from hemp and Silkworm breeding. In the first decade of the '900 as a result of a change in ownership structure, the agricultural belongings pass into the hands of farm managers, tenants or rich city middle class owners, which invest the incomes of their professional activities in agriculture soils. During this period, it should be noted that around 94-95% of the agricultural available land was farmed, as declared "Umbria, unlike many other Italian regions, has no uncultivated areas" (FAINA 1922). By the 50 's the number of employed in agriculture began gradually to decrease, passing by over 64% in 1951 to slightly more than 40% of 1961, at the same time with the growth of the cities there was a strong increase in employment in the building industry. The regional agricultural system in the transition from an extensive regime to an intensive one develops creating low ecosystem impacts, thanks also to the geomorphological conformation and ownership structure which sees on average extensions contained in 10 hectares of 1961, up to a maximum of 11.5 hectares of 1991 (AGENZIA UMBRIA RICERCHE 2008).

What deeply affected river plains structure near the Umbrian towns, were: the development of rail and road routes (made between the years '50 and '80 years) that follow the course of the Tiber; the presence of mining activities; the creation of dams for hydroelectric purposes; the urban expansions with the construction of new industrial and commercial settlements<sup>1</sup>. These transformations often close to rivers, resulted in the waterproofing of large portions of soil, the reduction of vegetation, excessive deforestation and the reduction/elimination

<sup>1</sup> In the middle of the last century Ludwig Hilberseimer stated that the city should have been integrated with the countryside and vice versa: "only if we consider the city as a whole and we plan it as a whole we can also reach partial troubleshooting [...] Our goal is to [...] to achieve integration of city and countryside, industry and agriculture"...(HILBERSEIMER 1963).

of natural retain of flood water expansion. All factors that can affect the hydro-geological balance, creating greater exposure to the risk of instability and in particular floods, with effects that are gradually amplified by climate change and by the occurrence of extreme meteoric events (ABHAS, BLOCH, LAMOND 2012).

The new urbanisations require an immediate securing, that is obtained almost exclusively by hydraulic structures such as embankments or retaining walls, resulting in a constant restriction of space dedicated to the river. The structural works follow the "zoning" rules and the conformation of the estate in the logic of expansion and dispersal of the city instead of the geomorphology and natural fluvial dynamics (GISOTTI 2007).

More specifically, we can say that, throughout Italy, the consolidation and maintenance of the urbanization of river plains in the modern era has set as a condition for its safety, the almost exclusive use of hydraulic engineering works. In this logic there has been a justification of oversizing in forecast the settlement and consumption of soil near the rivers.



**Figure 1.** Agricultural land developments between the years 1954 and 1975. Ponte Felcino (PG).

In Umbria, the agro-ecosystem still existing among the urban edge, infrastructures for mobility and the river, will have to assume a new role: that of an ecological protection in the continuum of the Tiber river plains to represent an insurmountable limit to further sprawl. The urban management of margin areas, the consumption of surfaces and the adoption of governance of instruments, appear, at present, the basic arguments for a debate on the future of cities. If we want the existing urban structures using less natural resources, in a harmonious relationship with the surrounding territory, we must give priority to the development of new settlement patterns or promote urban regeneration of existing ones, including the transfer and use of all the new technologies available.

The issue is getting to develop for the medium-and long-term, alternative scenarios, spatial patterns and urban forms, that indicate the new paths to take.

Indicating the vocational framework of territories means investigate the potential of transformation over time, taking into account the efficiency of land use systems, first of all the carrying capacity and consumption parameters. Protection and conservation of the territory is linked with the preservation of the economic role of the agriculture, answering to the local community urgent need in terms of open areas, accessible and rich of cultural values as well as in terms of new form of consumption (MAGNAGHI, FANFANI 2009).

This demand can only favour as first instance the reshaping of existing spaces starting from the peripheral areas. Strategies with this purpose and inspired to the urban metabolism, are currently developed in many Northern European cities such as Stockholm, Amsterdam, Berlin and Vienna (SUME 2011). Intervene on

the margin of cities, in order to reduce the consumption of soil, must not result into a "museumification" of the territory, but the development of alternative rural market dynamics (ALLEN 2008) in connection with the physical, natural and social environment. From a social-economic perspective, this involves promotion of multifunctional agriculture micro-enterprises which, in this context, could play a decisive role.

In the negotiations on the new PAC the aim of supporting agriculture not only as a producer of food, but also for the production of environmental goods and services. The local governance (BRUNORI, MARANGON, REHO 2007) will have the task to contribute to build a multifunctional agricultural model, providing incentives to the subjects that will give their services on behalf of the community. The exploitation of marginal urban areas is connected to the shutdown of land consumption. In Italy over the past 40 years an area equal to the extension of Lombardy, Liguria and Emilia has been taken from nature. "In Italy the useful surface destined to agricultural land has fallen from 18 to 13 million hectares" (ISPRA 2012). In 2020 the consumption of soil could reach 75 hectares per day.

The roadmap towards a Resource Efficient Europe (EUROPEAN COMMISSION 2011) has proposed that by 2020 the strategies have take into account the direct and indirect impacts on land use in the EU and globally, and that the increase in the net land consumption should tends to zero by 2050. It also recognized that the occupation of land, or the city and infrastructure expansion at the expense of agriculture, forestry or natural resources, usually related to soil sealing, dramatically increases the hydrogeological risk. In a later Communication the EU (EUROPEAN COMMISSION 2011) suggests that peri-urban agricultural areas should be classified in the cadastral register, taking into account initiatives for management and development of agriculture and supporting the multifunctional use of the soil.

Having taken note of the limits of imposing policies to achieve lasting results and promote a sudden change, it's good to have efficient instruments of governance, such as Contract of the Rivers (CdF)<sup>2</sup>. Such contracts arise in France in the early 80's and they are configured as a strategic agreement between public and private entities for the implementation of a multi-annual action programme defined through consultation (BASTIANI 2011). The river contract diction includes a legal figure, contained in the word contract and a term borrowed from the "milieu naturel" that invokes the description of moving water, a river. The actions carried out by a CdF do not act only at the macro-scale but define also detailed commitments, for example, for maintenance and routine management to create agreements on land use, water safety, for ease of use (BASTIANI 2013). In France since their introduction in 1981 and until 2002 the amount of investments enabled by CdF was 2,640 million euros against a global contribution by the Ministry of environment of 80.2 million. In Italy until November 2012 57 processes of CdF are enabled in 16 regions. In a CdF the local communities are considered a vital resource, active actors and partners and not passive elements made to seek consensus on already taken decisions.

<sup>2</sup> The theme of CdF as a tool for promoting rural development and investments to operate on agriculture, such as environmental protection, through Rural development programmes (PSR) is already present in the regional programming in certain regions such as Lombardy but even more Piedmont.

## 2. Integrated planning of neighboring territories of the river Tevere in upper Umbria

The Territorial Strategic Plan (DST) for the sustainable development of the region of Umbria with D.G.R approved No. 1903/2008 included 7 strategic projects, including the Tiber Project. In 2010 the Regional Environment Direction, Territory and Infrastructure, has launched a series of experimental projects on the Tiber linked to DST. In particular, the issue of the margin areas between river and urban areas, was deepened by an investigation aimed to be a pilot study intervention: "General Reconnaissance of the border with Tuscany and the Chiascio hub and ecological-landscape requalification of a site along the Tiber"<sup>3</sup>. From a general point of view, the study is a testing of a integrated planning process of neighboring territories of the river Tevere, aimed at finding new paths and preparatory to the activation of a CdF in the Umbrian Tevere stretch. The part of the project dedicated to experimentation focused on developing a Master Plan, that would include the construction of a development scenario at the local scale.

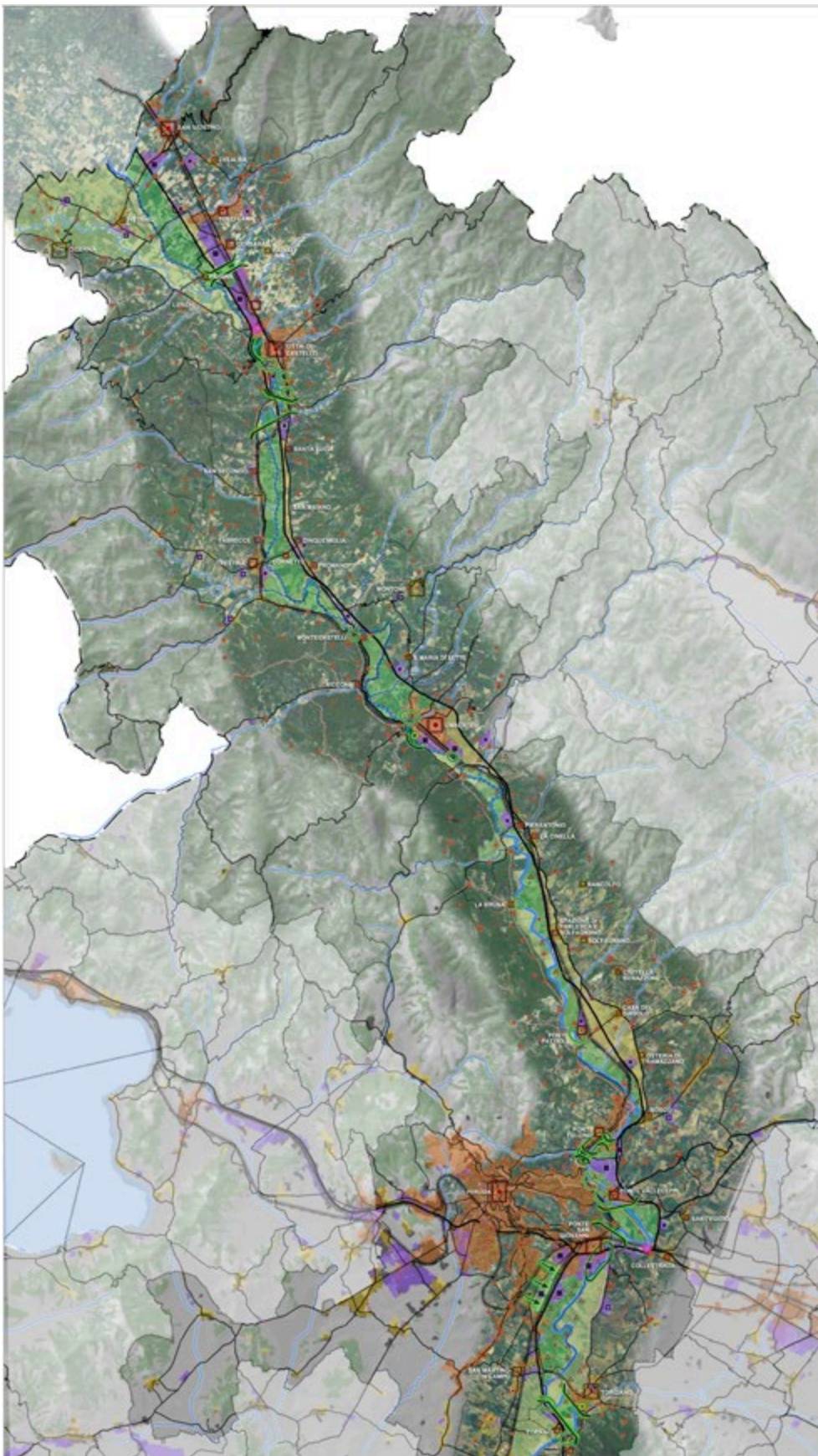
The Tiber and its neighboring territory, are for Umbria a territorial corridor with social-economic, environmental, cultural and landscape implications of great value, where most of the distinguishing heritage reside. It is also important to consider that the 49% of the total area of the Tiber basin lies in Umbria, and that 11 of the 14 sub-basins of the Tiber fall wholly or partly in the Umbrian territory (ADB DEL FIUME TEVERE 2005). The ratio Towns/River is very narrow, 96 are industrial areas and 55 that urban centers that are less than 1 km from the river whereas the average amplitude of the Tiber Valley till Todi is 4 Km. In a buffer of a 1 km from the main river reticulum over 991 hectares of productive surface and more than 3,300 Ha of urban surface are present.

Even the system of open spaces and protected natural areas is relevant. In correspondence to the river basin and the lakes there are 11 SIC and 5 ZPS. From the agricultural management point of view, the alluvial plain of the Tiber, which extends for a distance of over 100 Km, distinguishes itself today for the prevalence of sowable and sowable irrigated with mechanized agriculture forms with regular and open fields in the almost total absence of plants and shrub, and only sporadic appearances of vineyards.

In November 2011, by Decree of the President of the Regional Council of Umbria the Regional Observatory for the Quality of the Landscape was established, in accordance with art. 22, comma 1 of the regional law n. 13 June 26, 2009. The Observatory has among its tasks "to support local initiatives of valorisation and sustainable landscape management through innovative tools such as CdF and Landscape Contracts" (D.G.R. the 10.10.2011 1142). The study on neighboring areas of the Tiber was founded with the aim to create the basis for a CdF of the Tiber in Umbria, contributing in particularly to the environmental and social-economic characterization, which represents the first phase of such agreement. The Master Plan instrument has been chosen for the realization of the pilot project since in a CdF it is a hypothesis of development on which build strategies for the medium to long term periods.

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<sup>3</sup> The project has been drafted in 2011 by the Architects Massimo Bastiani, Francesco Nigro, Virna Venerucci with the collaboration of Arch. Roberto Parotto, Territorial Planner Vito Racioppi, Arch. Stefania Santostasi, Dr. Of Territory Sciences Sofia Gasperini, Arch. Valentina Raniolo; Project leader for the region of Umbria. Ambra Ciarapica, Responsible of Department Valorization of the Territory and Landscape Protection, with the contribution of Dr. Paolo Camerieri Responsible of Regional Observatory for the quality of the landscape.

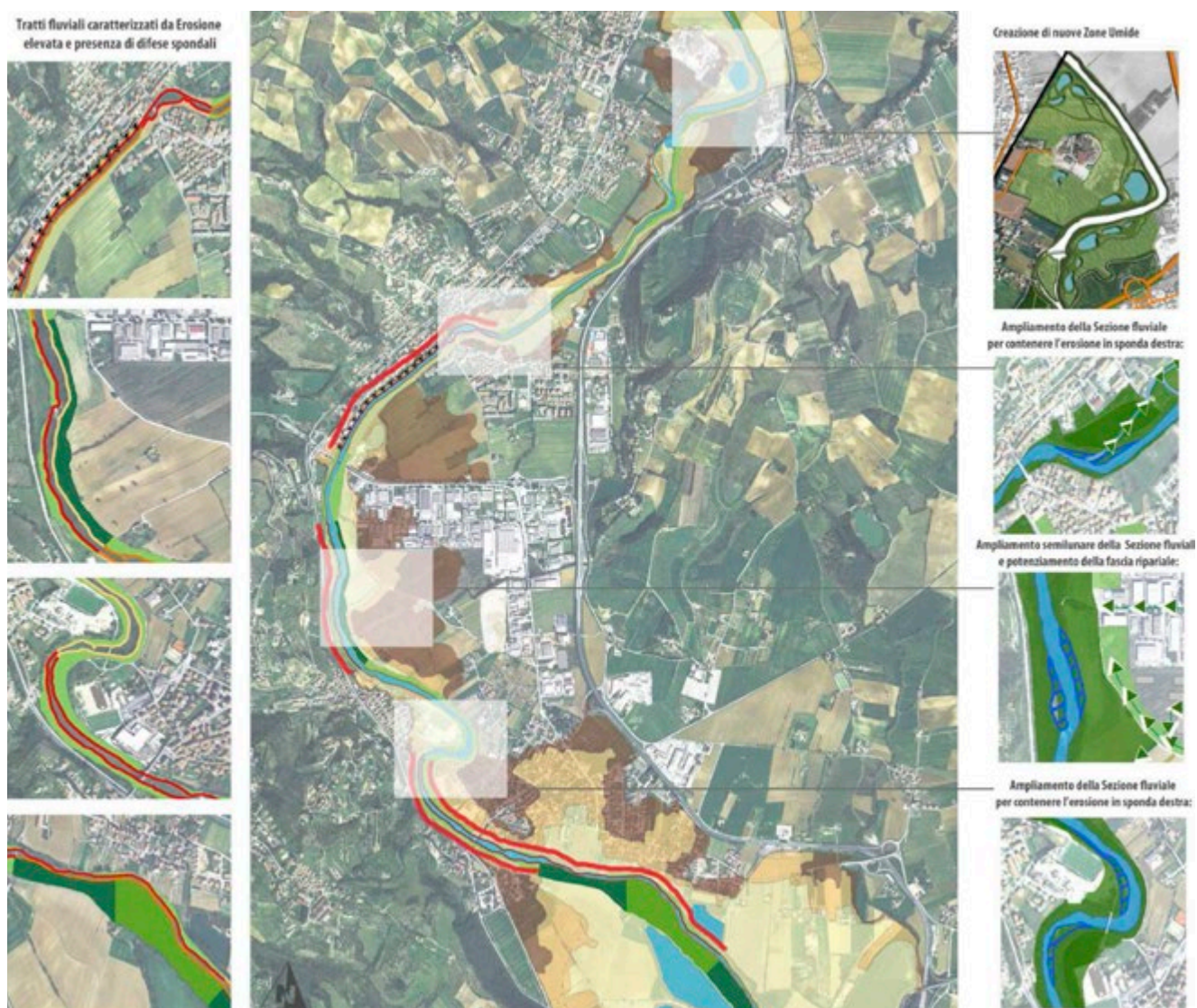


**Figure 2.** Neighboring territories to the River Tiber in Upper Umbria, analysis of the structural components.



### 3.The role of agriculture in the containment of building dispersion in hydraulic risk reduction

The progressive abandonment of traditional farming techniques that modeled the territory and landscape, as described in the readings of historical series of rural territory, transformed a ever more indistinct agricultural space, impoverishing it, trivialising it, and making it less and less able to compete in economic terms, and to defend itself from settlement pressure. All this has led to a progressive “degradation” of the natural landscape (SERENI 2010).



**Figure 3.** Measures and planning actions to improve fluvial functionality and define flood water expansion areas.

The Master Plan acts on the recovery of the memory traces, reading and integration of traditional uses of agriculture, restoration of fluvial morphology and naturalness, the consolidation of existing settlement areas by promoting greater ecological functionality and give a more sustainable image of rural areas.

From a methodological point of view, I believe that the choice of the urban plan tool used in the experimental planning of Ponte Felcino needs a brief deepening. The

Master Plan is a tool that is back in use with the new generation of complex urban<sup>4</sup> plan that, in our case, has been adapted to territorial redevelopment and used for the construction of local scenarios of CdF. Through the Master Plan it's possible to control and reduce the risks of transformations, acting in accordance of a systemic logic and integrating between them more themes<sup>5</sup>. This tool allows to lay the foundations to start a real participatory process and to consider more variables and potential contingencies, as for example those introduced by climate change or by the presence of conflicting interests. The territorial context of Ponte Felcino, chosen for the testing, owes it's origins and subsequent development for the presence of the Tiber river. The area of "Perugia's Bridges", already in Roman times, was an important step for merchants on their way to the shores of the Adriatic Sea. The territory interested by the Master Plan, is situated between two river loops that stop the continuum of settlement of Perugia, which is the river bend near Bosco village at North and the loop of Ornari on the South from Villa Pitignano and Ponte Valleceppi. The River in this stretch is included among the historical territorial connection road which follows it's route, the FCU railroad and E45 highway. The morphological-initial settlement of Ponte Felcino, after the making of such infrastructures that cut longitudinally the region, has undergone a gradual densification along the roads and has seen the development of productive areas.

For what concerns the naturality and the preservation of the ecosystem, the most significant aspect is residual presence of some meanders, which make important settlement discontinuity gates. In particular the loop of Ornari which hosts a site of Communitarian interest that stretches for about 220 hectares. The area is of particular importance for its rich fauna related to wetlands: the Tiber, especially near the capital Perugia, suffers a severe pressure from anthropogenic activities, nevertheless in the SIC many species of typical wetlands birds find shelter, both migratory and nesting species. Along the course between Ponte San Giovanni in Ponte Pattoli there's the Tiber River Park, which follows essentially the way of riparian.

#### **4. The Master Plan of Ponte Felcino (PG) in the strategic perspective of a CdF for the Umbrian Tevere River**

It should be pointed out that the aim of the Master Plan, is not to imagine a new urban structures for residential or productive areas of Perugia, but to consolidate the existing urbanized planning the form of margin areas, re-connecting them to the river and to a newly conceived agricultural territory. In this process the strong idea of the project is to attract, connect, rebuild and regenerate, using existing separation/transition elements and transforming them into project material and also an opportunity to integrate and connect settlements and territory. The project is organized on the two cornerstones of a naturalistic-environmental system, at south the SIC loop of Ornari and north the neo-ecosystem of Villa Pitigli-

<sup>4</sup>With regard to this aspect, is significant the Master Plan done by Alejandro Gutierrez, associated Arup's Planning Europe in China, near Beijing, for the birth of a ecoagrocitcity for 30,000 residents at Dongtan, 'a new city bearing the agricultural issue in the urban context, who works on the food chain, from production to waste disposal'; but also the construction of scenarios that are used to select the options of the stakeholders within the participating process of the Master Plan of the area of the colonies north of Cesenatico prepared by Mario Cucinella Architects (MCA), Associates and Ecoazioni Area.

<sup>5</sup>The Master Plan within a river can become a tool to deepen specific solutions/scenarios in complex environments.

ano, to link the different components of the territory, leaving more space for the natural dynamics of the river and to the free and spontaneous development of naturalness. The interventions on the two previously mentioned elements and other stretches of the River, were also aimed at securing the territory through the hydrogeological risk reduction. The Master Plan develops as a plan-program that interprets:

- the Tiber as the axis of the riverside Park, to use and experience, not only longitudinal connecting element, but also a transverse one in order to generate opportunities of relationship between the banks;
- regenerated urban settlements, enhanced through the creation of centrality, that will interface with the river and are again put into relation with each other by the river;
- the perfluvial areas and peri-urban agricultural areas no more “no-man’s land” between the settlements, but extension of riverside park and the connective tissue of the ecological network, within which quality and pluri-service agriculture plays a primary role;
- production areas, no longer autonomous and specialized and as a matter of fact sealed and isolated parts of the community, but contemporary places with integrated functions (economic-productive activities mixed with services and trade) open to all, and with a positive energy-environmental balance.

**Figure 4.** Master Plan: multi-functional agriculture and green infrastructures between river and city.



Concretely defining the natural expansion areas for flooding, retain of flood water expansion alternatives to hydraulic engineering interventions, control and reduction of vulnerability of settlements and infrastructure, the maintenance and the recovery of the river environment. The Master Plan requires approximately 40 actions divided into: intervention for the continuity of the ecological network connected to the river and to the creation of the river Park (16 ha of forestation and a 36% more than the current, green areas of strengthening of riparian and perfluvial areas); interventions of regeneration of the local agri-

cultural system; interventions for sustainable mobility (restriction of the crossings of goods, expansion of bike routes and pedestrian connection between the settlements and River Park); interventions for environmental sustainability of settlements and buildings (building productive solarization 29,000 MW of solar energy from roofs and facades); interventions in order to improve urban quality, social and cultural context of the settlement (consolidation of the main urban centralities); the reconstitution of a positive dialogue between the city and the river; interventions for the integration between urban centres and productive areas; interventions of sharing, participation and co-planning of the choices to be taken.

Master plan. Here: **Figure 5.** Multi-functional agriculture and green infrastructures between river and city. Below: **Figure 6.** Local agriculture regeneration to improve the local economy and to contain urban sprawl.



This systemic vision of the city and open spaces, to which the Master Plan was inspired by, gives to the natural areas and agriculture the role of collective richness and of historical and

landscape identity and at the same time puts a limit on the consumption of soil and environmental resources. In this sense, the process of governance of the agro-forest territory is an integral part of territorial planning. Land management and protection of river system, are intended as a primary common good (SETTIS 2012), whose care regards farmers, citizens, businesses, tour operators, river committee, etc., opening a strategic perspective to the CdF as an instrument of social management of the resource. To lead territorial planning for the next years will be not only the urban zones, but rather "la trame verte et bleue" (DREAL MIDI-PYRÉNÉES 2012): water, green spaces, agriculture and forestry.

In this context, the Umbrian Tiber river CdF will benefit of a scenario for the medium to long term that identifies a pattern of low-impact development and an example of multifunctional integrated planning capable of improving the agriculture and stopping consumption of soil.

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