

Workshop on Life Programme for Local Communities

10 November 2016 - Ljubljana



EU LIFE+ 2013 Programme

Project LIFE SAM4CP

“Soil Administration models for community profit”

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11/23/2016

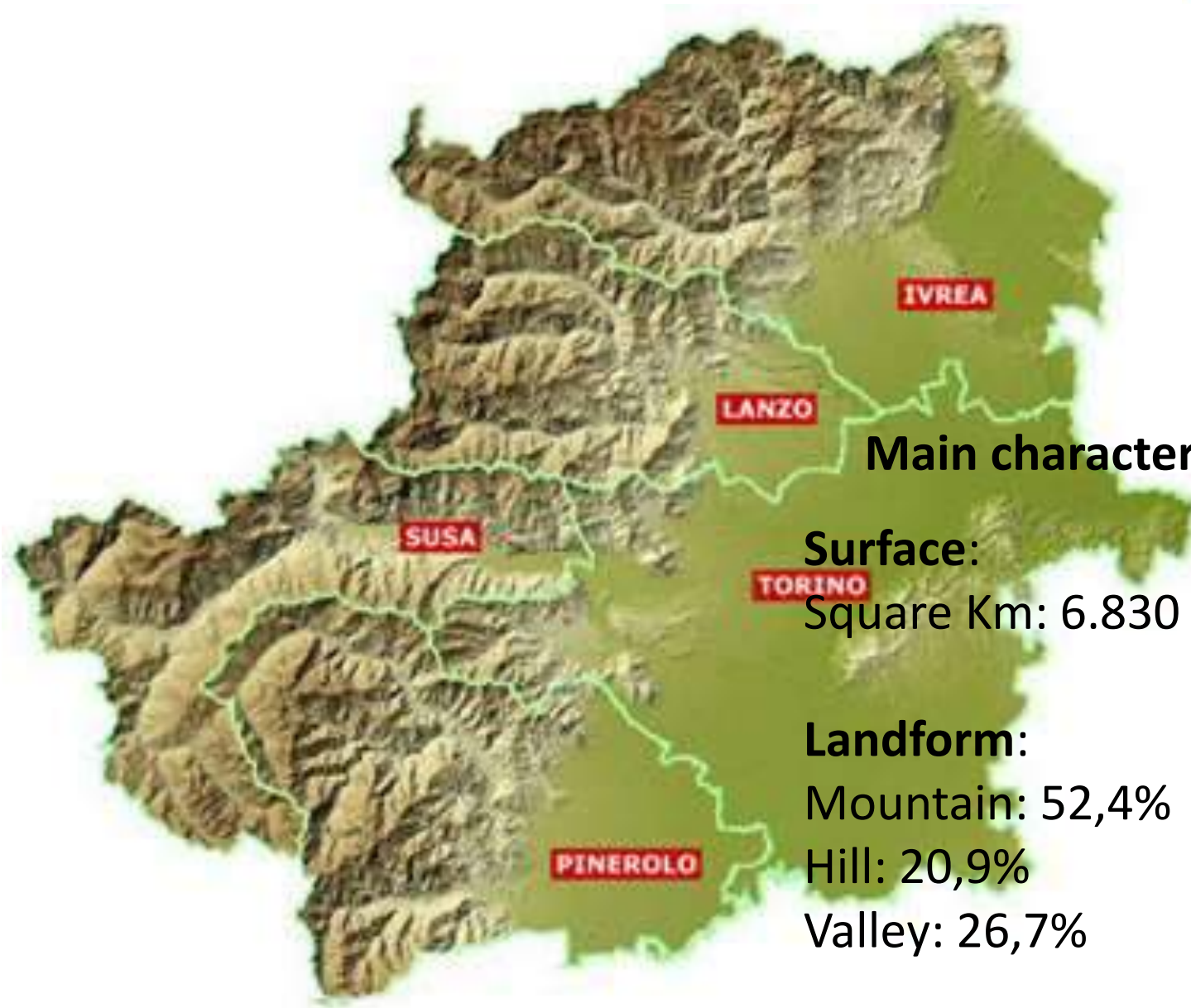




The Città Metropolitana di Torino (named Provincia di Torino before the law reform n. 56/2014) is located in the north-west of Italy and it borders with the south-east of France.



Morphology



Main characteristics:

Surface:

Square Km: 6.830

Landform:

Mountain: 52,4%

Hill: 20,9%

Valley: 26,7%

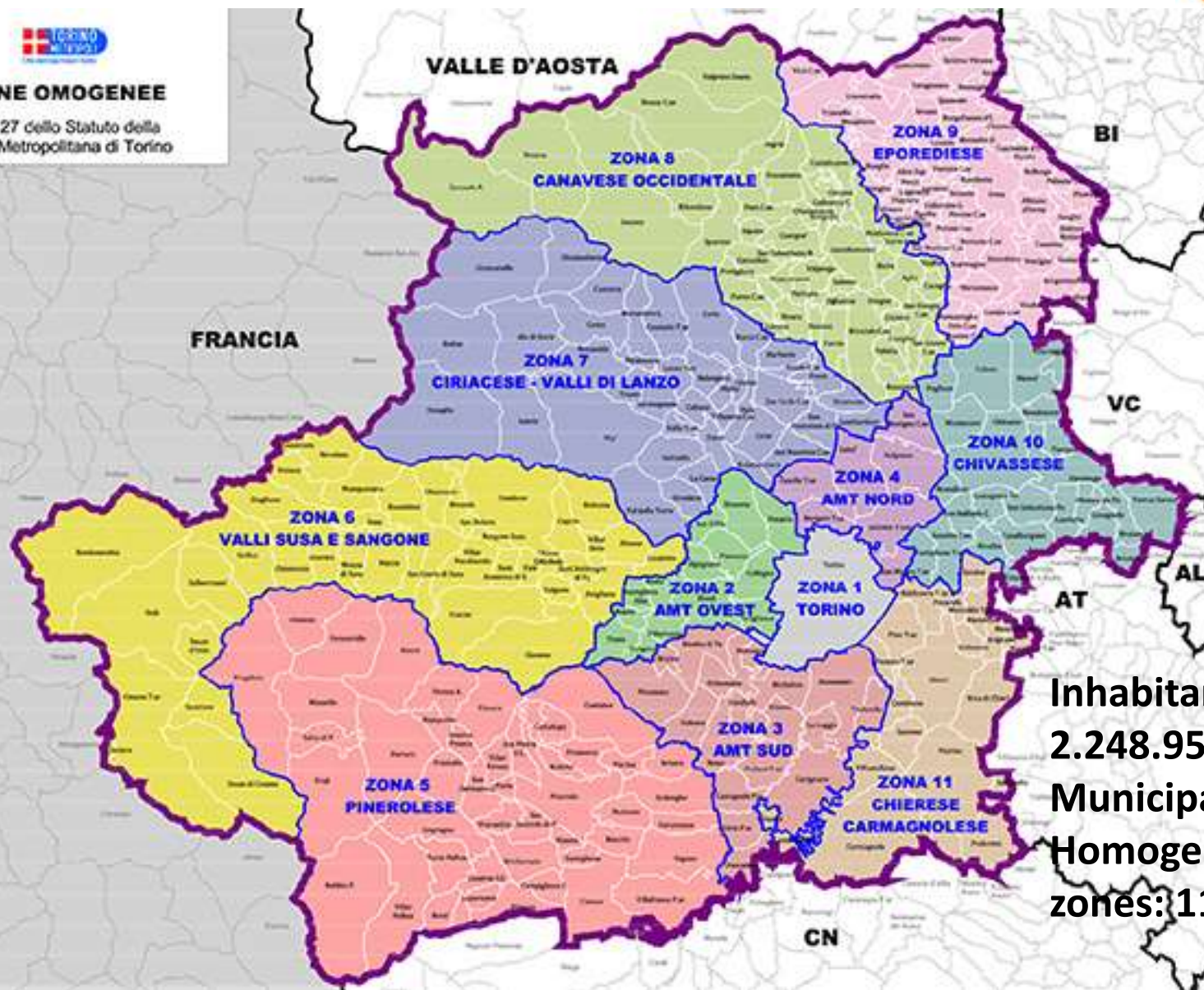


Administrative division



ZONE OMOGENEE

Art. 27 dello Statuto della Città Metropolitana di Torino



Inhabitants:
2.248.955
Municipalities: 315
Homogeneous zones: 11



Main tasks of the Città Metropolitana di Torino

- The Città Metropolitana di Torino is a public authority recognized under the Italian Constitution with specific powers and enjoys political and financial autonomy
- Its main tasks are related to environment, transport and communications, land planning and economic development, working policies and education



The Città Metropolitana di Torino and the EU

Città Metropolitana di Torino in the past few years took part in many European projects as Lead partner or as partner within the following programmes: Interreg Europe, Med, Alcotra Italy-France, Alpin Space, Central Europe, ESPON, Life, COSME, EaSI, Erasmus, Horizon2020.

Currently the Città Metropolitana di Torino is leading the LIFE+ SAM4CP project



LIFE SAM4CP - Soil Administration Models for Community Profit



- SAM4CP project aims at contributing to one of the objectives of LIFE+ 2013 Program, Axe 2 “Policy and Environmental Governance”, Spec. Ob. Soil: to contribute to the implementation of European environmental policy and development of innovative policy ideas, technologies, methods and instruments.
- Budget: 1.425.350 (700.474 EU contribution)
- Period: June 2014 – June 2018
- Partnership:
 - Città Metropolitana di Torino – Department of land use and spatial planning – Leadpartner
 - ISPRA – Institute for Protection and Environmental Research
 - POLITECNICO DI TORINO – DIST - Department of sciences, projects and territorial policies
 - CREA - Council for research in agriculture and agrarian economic analysis



The specific contribution from



- The Institute for Environmental Protection and Research, ISPRA, which is a member of the Ministry for the Environment, Land and Sea, has jurisdiction in scientific-technical sphere for the prevention and protection of the environment, water, nature and soil conservation.
- Particularly it provides scientific support to the action of government on sustainable development policies, with a view to integrating the environment into land and territorial policies.



The specific contribution from



- CREA is a public research institution of the Ministry of agriculture, food and forestry policies.
- It performs agricultural and forestry surveys and studies to promote the development of environmental policies, the sustainable management of natural resources and an increasing integration between agriculture and ecosystems.
- Particularly, in the last years, it has developed an “ecosystemic” vision of the relationship between agriculture and environment



The specific contribution from



Polytechnic participates in the LIFE SAM4CP project through the DIST, Joint Department of the Polytechnic and University of Turin in the study areas of the urban transformation processes and land planning government, in a perspective of environmental sustainability.

DIST worked and works actively with Città Metropolitana di Torino on issues of spatial planning and strategic environmental assessment. It also supports other public entities (Piedmont Region, municipalities, agencies) in the formulation and evaluation of policies and instruments of governance of territory.



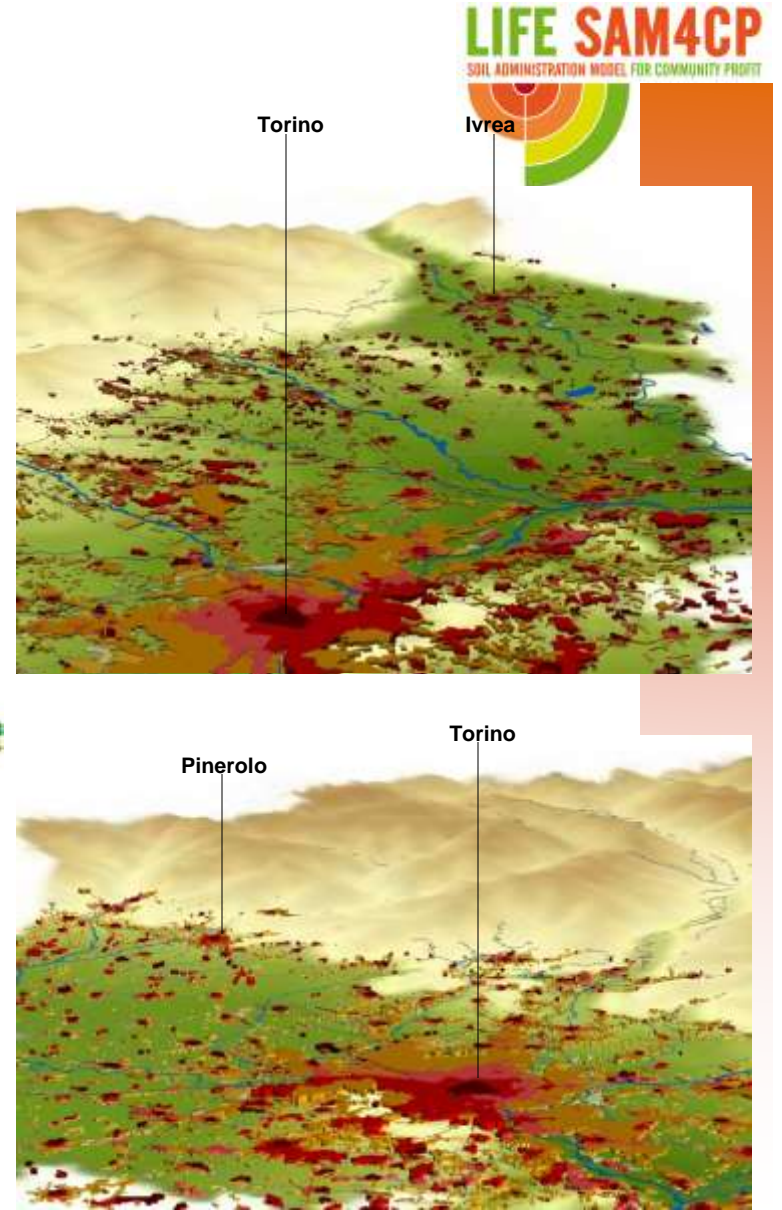
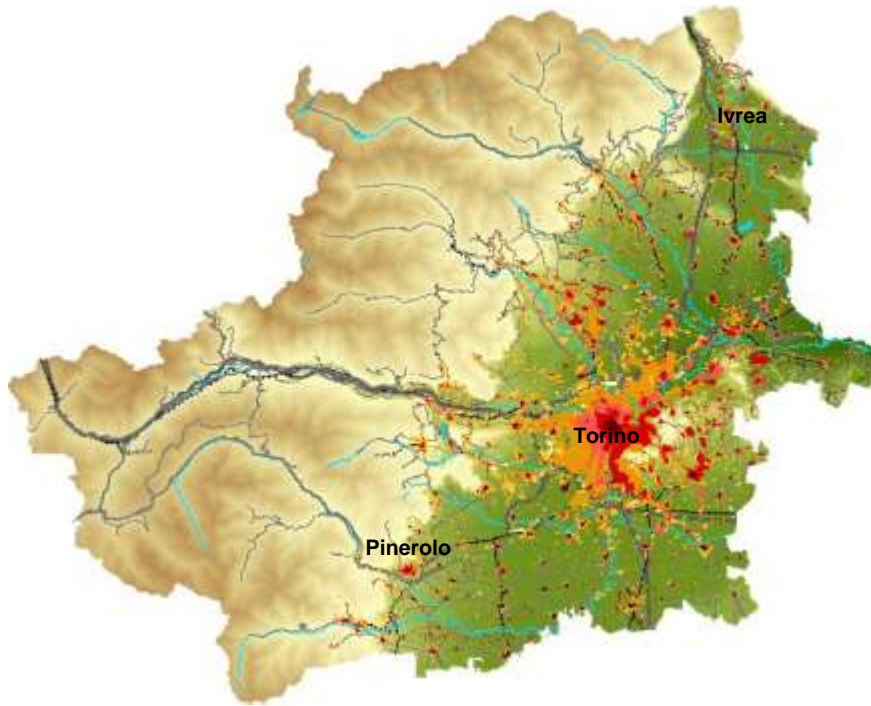
Background

- Soil provides a great variety of ecosystem services. Most, or almost all, of them are directly or indirectly useful for the mankind.
- In Italy, in the last 3 years, 720 kmq of soil have been sealed for urban use with an increasing of 8 mq/sec.
- In the only Metropolitan area of Turin, on a 6830 Km² of extension, 10% are urbanized zones
- If all internal forecasts to urban plans of the 315 municipalities in the metropolitan area were materialized, other 4,700 hectares of land would be sealed, with an increase of 15% in the actual consumption.



2000

The results





New urban installations in the Metropolitan area of Turin



New urban installations in the Metropolitan area of Turin



New urban installations in the Metropolitan area of Turin



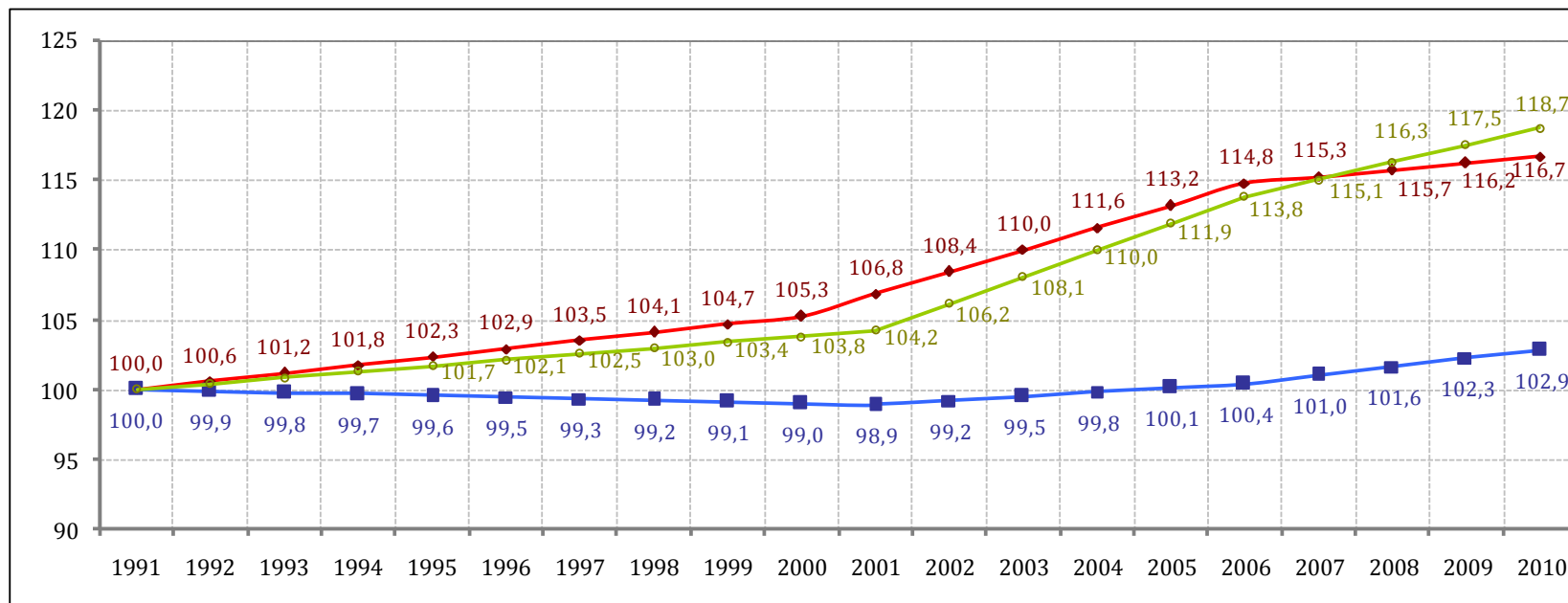


Observatory on soil consumption for urban use



In terms of land use Città Metropolitana di Torino has been very innovative creating an **Observatory on soil consumption for urban use** since 2002 and including rules for the protection of agricultural and natural land within its land management plan – PTC2 (Piano Territoriale di Coordinamento Provinciale - *Territorial Plan for Provincial Coordination*)

Soil sealed Inhabitants Households





PTC2 rules to limit soil consumption



VALUE

Municipality urban plan



Built-up areas

you can rebuild and increase the volume built

Transitional areas

urban expansion is allowed according to specific planning rules and high landscape quality

Blank areas

areas to be protected at all. The urban sprawl and soil consumption for urban use are prohibited

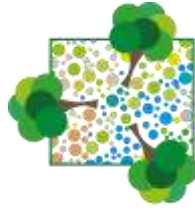


PTC2 urban density model

LIMIT



Project



OSDDT
OCCUPATION DES SOLS ET DÉVELOPPEMENT DURABLE
DU TERRITOIRE SUR L'ARC MÉDITERRANÉEN
SOL: ATTENTION, FRAGILE!



« Occupation des sols et développement durable du territoire sur l'arc méditerranéen »

- **European programme** : MED 2007 2013
- **Axe 2**: *Environment protection and the enhancement of a sustainable territorial development*
- **Objective 2.1**: *protection and enhancement of heritage and natural resources*
- **Period**: 1^o June 2010 – 31 Mai 2013
- **Value**: 1.354.771 euros
- **Objectives** :
 - to develop a common methodology inside the partnership for monitoring and evaluating soil consumption, for urban use
 - to increase municipalities capacity to manage spatial planning in order to promote sustainable development and preserve natural resources



PROGRAMME MED 2007-2013

Capitalization call 2012



Period: July 2013 – December 2014

Value: 1.082.592,00 euros

Capitalization of results from 13 projects implemented within the Programme MED by 14 institutions from 8 different countries: Spain, France, Italy, Slovenia, Greece, Portugal, Croatia, Albania

Objective: Design of a future Common integrated land management scheme to protect natural resources in synergy with social and economical valorisation





LIFE SAM4CP project's main target



- The project SAM4CP aims to demonstrate how a spatial and urban planning practice integrating the assessment of environmental and economic benefits associated to soil preservation can guarantee to the collectivity not only a reduction of soil sealing but also an overall economic saving thanks to the preservation of natural assets and public finances.



SAM4CP expected results



The SAM4CP project is elaborating an open source software - a “simulator” - that will allow different territorial transformation scenarios to be assessed according to the main ecological functions – **ecosystem services** - provided by soil in order to integrate these functions – and their potential gain or loss – into the decision-making process.

The tool :

- Will enable proper evaluation of the potential costs and benefits of specific measures aimed at reducing soil sealing.
- will help public institutions to draft municipal land-use plans able to preserve the ecosystem services provided by soils.

Ecosystem services: what nature provide us for free

The [Millennium Ecosystem Assessment](#) (2000) grouped E.S. into four broad categories:

- provisioning**, such as the production of food and water;
- regulating**, such as the control of climate and disease;
- supporting**, such as nutrient cycles and crop pollination;
- cultural**, such as spiritual and recreational benefits.





1° step: evaluation and quantification of ecosystem services provided by soil.



- This first step was to **quantify biophysical benefits produced by a range of** seven primary ecosystem services provided by soil:
 1. Habitat quality
 2. Carbon storage and sequestration
 3. Nutrient retention
 4. Sediment retention
 5. Pollinator abundance
 6. Managed timber production
 7. Crop production



1. Characterization, biophysic quantification and mapping at national level of the seven E. S.

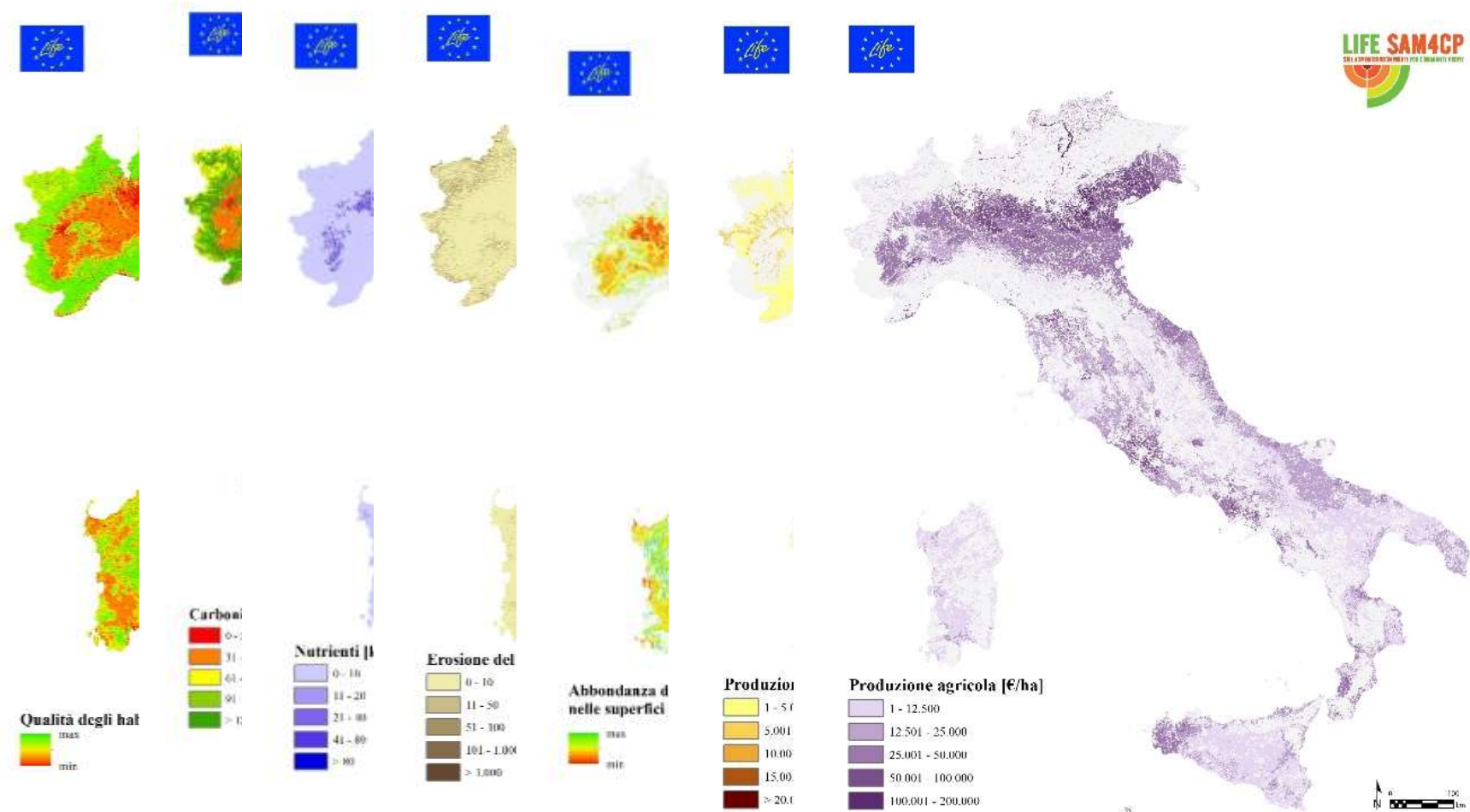


Fig. 1: Fig. 2: Fig. 3: Fig. 4: Fig. 5: Fig. 6: Fig. 7: Crop production



2° Step: Biophysical and economic evaluation of ecosystem services given by soil at the local scale



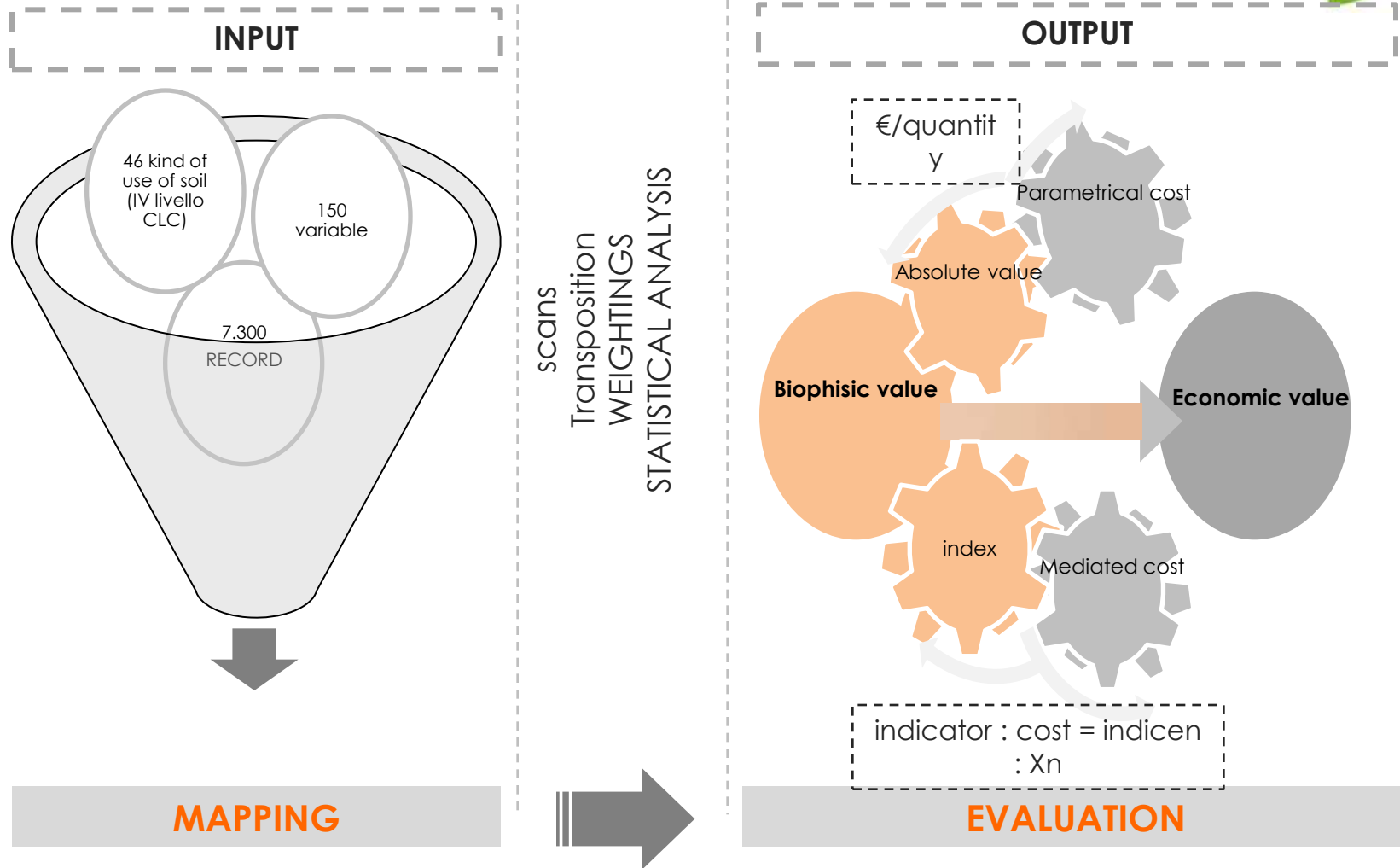
We also adopted the software InVEST to produce maps of individual E.S. Values direct "scalable" to the necessary "theme accuracy" and "precision" of local urban plan:

- To achieve the necessary precision required at the local scale we adopted the mapping chart Land Cover Piedmont (scale 1:10.000) merged with other local land use maps (scale 1:2.000) with 46 types of land use
- The output grid is a geotiff (pixel 5x5 meters)

InVEST has been adopted at local scale to have an economic estimation of ecological functions, too, but was integrated with the economic value of the E.S. in an exchange system offer/demand and with other prices and costs indicators of natural services



Methodology of data collection and biophysic and economic evaluation





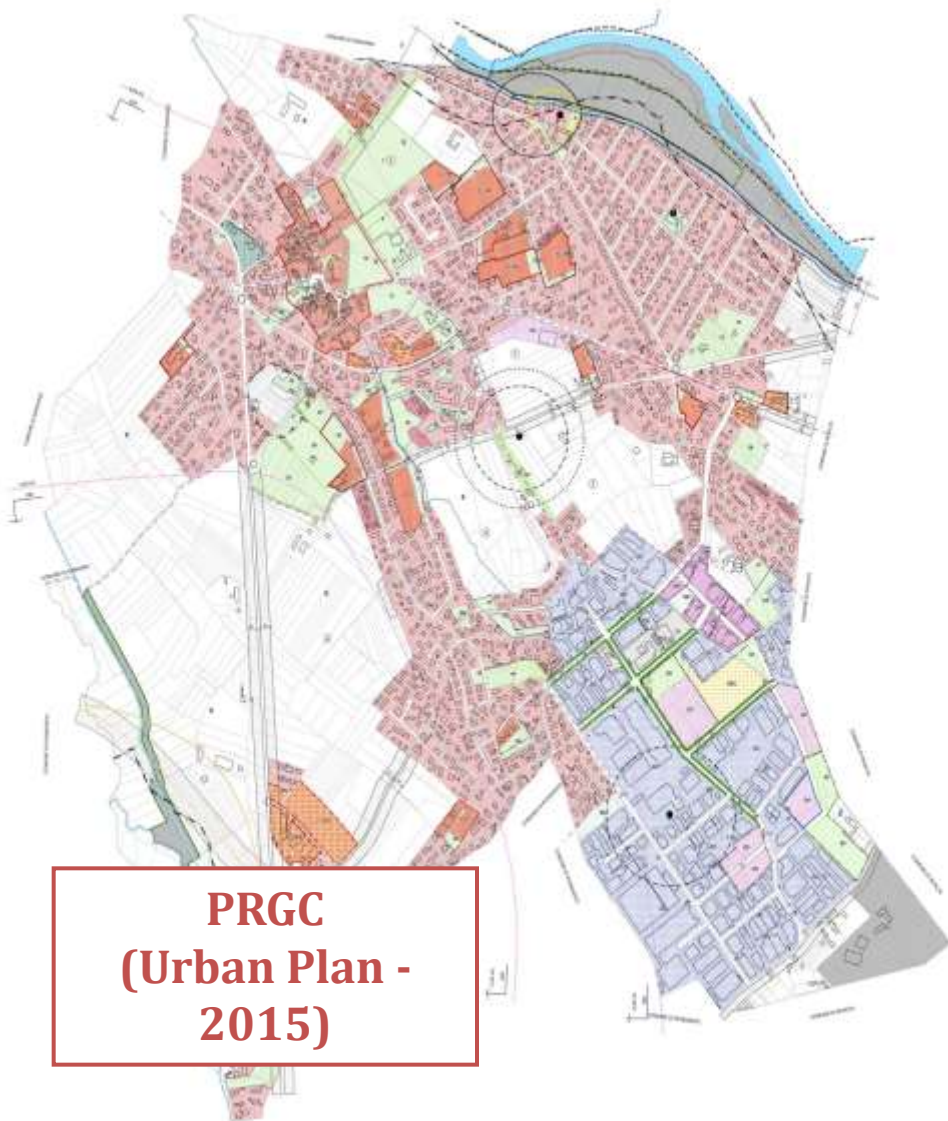
Biophysical and economic evaluation of ecosystem services at the local scale



Ecosystem Services	Output	Distribution	Indicator	Biophysic Value	Economic Value
Habitat Quality	Raster file with biophysic values distributed to the context of study. LULC map with precision of 1:2.000 scale and thematic accuracy at 4 level CLC has been use for input distribution in the municipalities of Bruino, Settimo Torinese, Chieri, None. Output is of 5 per 5 pixel meters cell	Entire territory	index 0 to 1	Weighted average of values for each LULC class Formula: $\sum \text{val bio} * \text{mq} / \text{mq tot}$ (LULC class)	Stated preferences contingent value using questionnaires to evaluate the willingness to pay for conserve/improve natural areas in the context of study. [€/mq]
Carbon Sequestration		Entire territory	stocked ton per pixel	Sum of values for each LULC class Formula: $\sum \text{val bio} * \text{mq}$ (LULC class) / 25 (mq pixel)	Market value for each tons of carbon sequestered it is associated the value of fiscal fees to compensate for CO ₂ emissions (LIFE VIMINE - LIFE12 NAT/IT/001122). [100 €/t]
Water Yield		Entire territory	evapotrenspered mm per pixel	Sum of values for each LULC class Formula: $\sum \text{val bio} * \text{mq}$ (LULC class) / 25 (mq pixel)	Sostitution cost artificial water control system of floodings (Piedmont price list) [12,6 €/mc]
Water Purification		Entire territory	Kg of Nitrogen per pixel	Sum of values for each LULC class Formula: $\sum \text{val bio} * \text{mq}$ (LULC class) / 25 (mq pixel)	Sostitution cost system of natural purification (LIFE VIMINE - LIFE12 NAT/IT/001122) [64 €/kg]
Sediment Retention		Entire territory	ton of erosion per pixel	Sum of values for each LULC class Formula: $\sum \text{val biofisico} * \text{mq}$ (classe d'uso) / 25 (mq pixel)	Avoided cost Soil fertility restoration costs (MGN – Making Good Natura) [22,8€/t]
Crop Pollination		Only agricultural areas	n. of pollinator species per pixel	Sum of values for each LULC class Formula: $\sum \text{val biofisico} * \text{mq}$ (classe d'uso) / 25 (mq pixel)	Market price: application of vulnerability index for agricultural productions (Gallai, Salles J.M., Settele J., Vaissière B.E., 2009) and estimation of economic value of pollinator dependent production. [€/mq]
Crop Production		Only agricultural areas	€ per mq	Weighted average of values for each LULC class Formula: $\sum \text{val bio} * \text{mq} / \text{mq tot}$ (LULC class)	Market price: standard production of each agricultural land use. [€/mq]

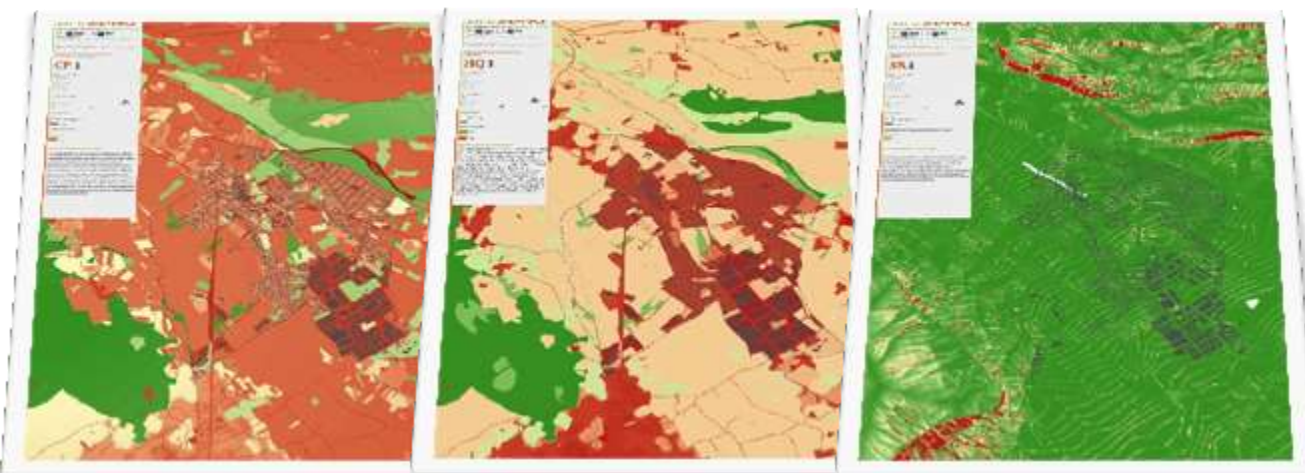
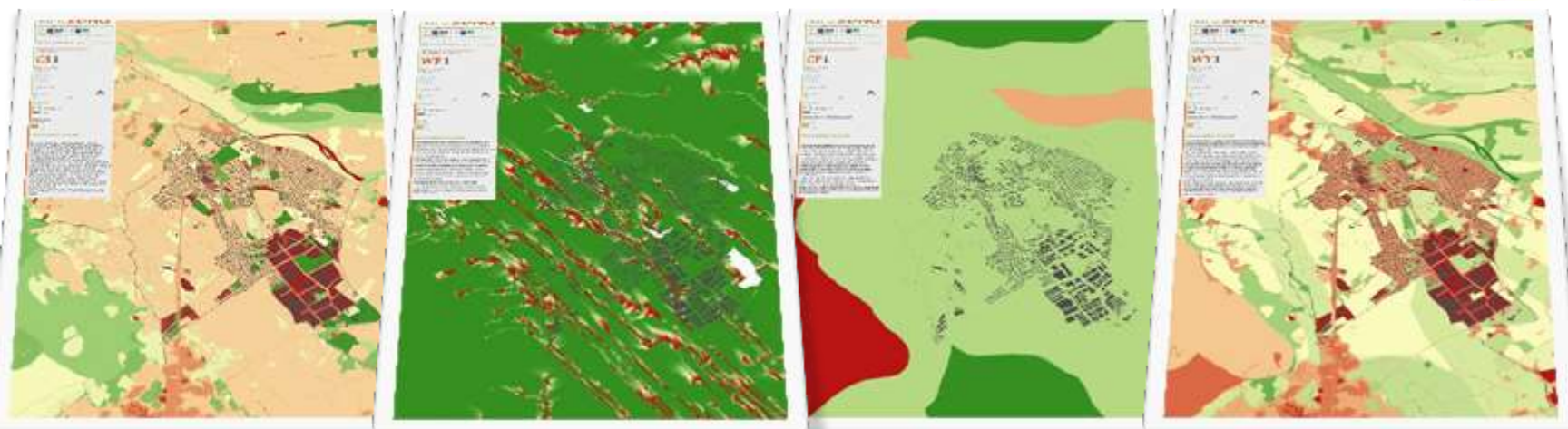


Testing of the evaluation model to 4 pilot cases: municipality of Bruino, Chieri, None and Settimo Torinese





Biophysical mapping of the 7 Ecosystem services at the local level

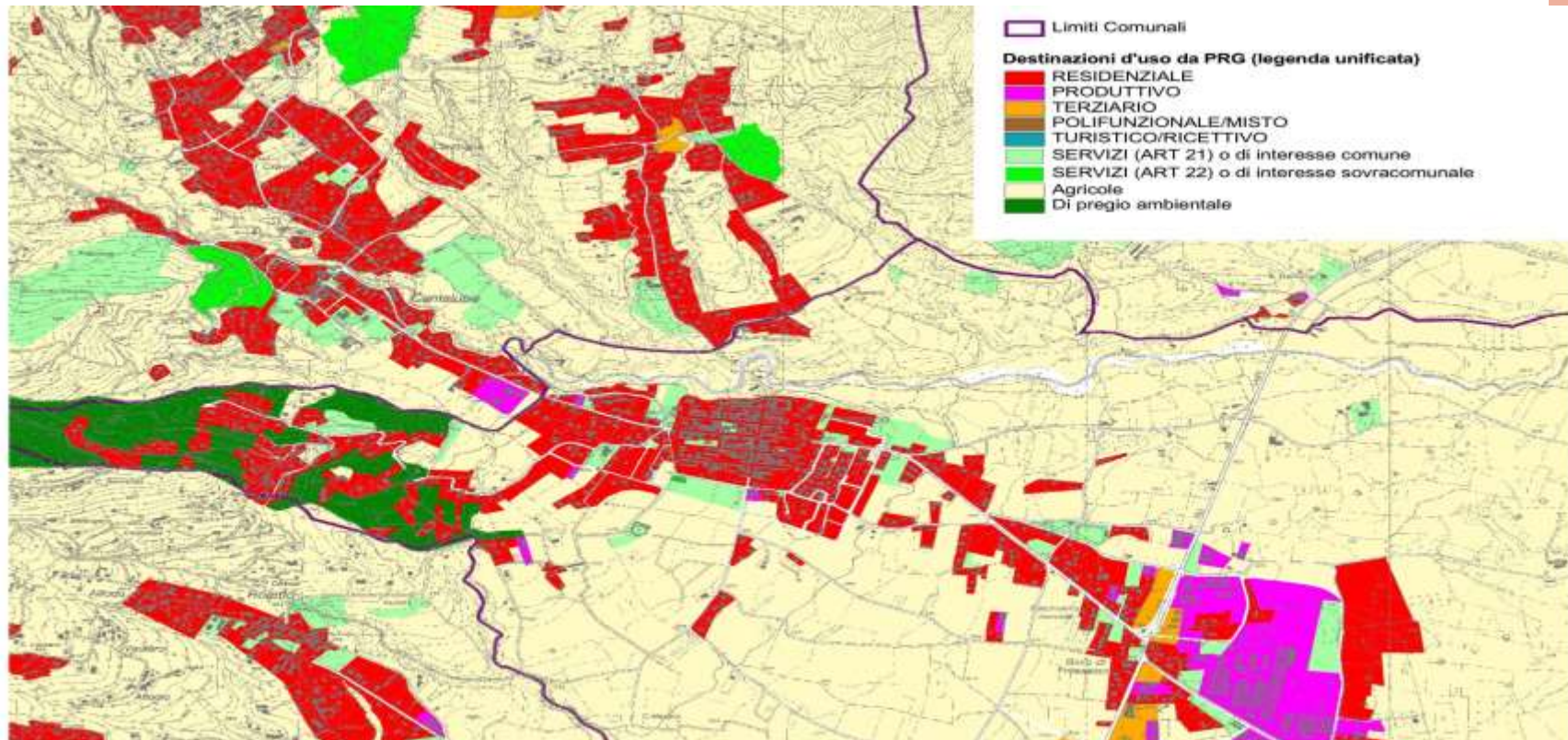




3° Step: quantification of the environmental and economic effects of the soil exploitation already “reserved” in the Metropolitan Area of Turin



Quantification of the environmental and economic effects of the previewed soil exploitation in the Metropolitan area evaluating the potential environmental cost in terms of lost E.S. dues to realization of urban transformations already planned.





Simulator input flow



By overlapping forecasted urban changes we will have a "direct" comparison between the mapping of existing services and the evaluation of future scenarios with their advantages and disadvantages in order to plan in a more sustainable way

Suoli che hanno una elevata biodiversità vegetazionale



Suoli che "assorbono" notevoli quantità d'acqua



Suoli che sono molto adatti all'agricoltura



Suoli che stoccano molto carbonio organico



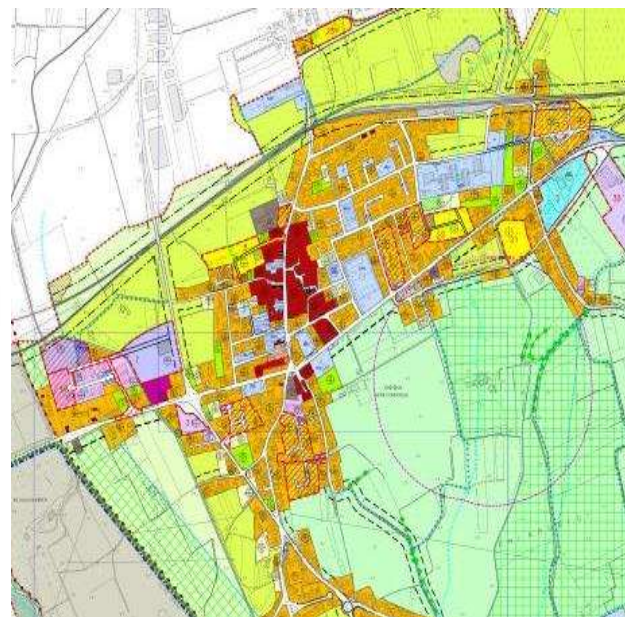
Suoli che possono ospitare specie pollinatrici



Qualità multifunzionale del suolo complessiva normalizzata [da 0 a 1]



Ecosystem services mapping
Economic value mapping



PRGC (urban plans)



Testing with 4 “pilot” Municipalities



Thanks to the mapping and analysis of E.S. the four municipalities:

- will draft a new urban plan reducing soil consumption and valorizing natural areas
- will include in the new plan specific rules aimed at safeguarding the free soils and ecosystem services they provide



Testing with 4 “pilot” Municipalities



Involvement and awareness of citizenship is foreseen by:

- Workshops with students from schools of the four pilot municipalities in order to reason with them on the issue of over soil consumption for urban use
- Forum-cafes to promote exchange of views between administrators, citizens, environmental associations and officials of the 4 pilot municipalities
- land reading walks to make citizens aware of the values and ecosystem services offered free of charge from the soil



Strength points of LIFE SAM4CP project



1. a complementary partnership:
 - each partner has to provide a real contribution to the project according to its specific skills
 - each partner has the responsibility of carrying out some activities
2. a target in line with the E.C. policies on environmental issues
3. a clear project proposal with a high degree of detail and suitability both from the technical and financial point of view
4. the practical testing of tools provided by the project
5. the inclusion of public awareness activities, dissemination of the results and training workshops for the use of the tools produced by the project
6. The replicability of the experience and the possibility for other municipalities, both Italian and European to have available free of charge the tools produced and to use them also after the end of the project



Main problems encountered:



- Difficulty in exactly detailing, inside the project proposal, all the activities and expenses foreseen in all project long
- high work needed for the administrative and financial management and for partners coordination
- difficulty in estimating and respecting a detailed time schedule
- difficulty in complying simultaneously European and national rules and procedures



www.sam4cp.eu



Thank you

