



# REWETLAND - Widespread introduction of constructed Wetlands for a wastewater treatment of Agro Pontino



## PROJECT TECHNICAL PRESENTATION

### STUDY VISIT TO ITALY FOR BULGARIAN LIFE PROGRAMME OFFICIALS

*(within the framework of LIFE CAPTA BG project - “CAPacity Building Technical Assistance to the BulGarian Ministry of Environment and Water for implementing the LIFE programme” - LIFE14 CAP/BG/000013*



<http://www.rewetland.eu>



The Pontine Plain is the result of the “**Great Land Reclamation**” of the **1920s** (mechanical draining of wetlands), which has deeply modified the hydrography, topography, biodiversity, urbanization, economy, and landscape of the area.

The management of the reclamation canals, based on hydraulic studies carried out before the land reclamation works, is **no longer compatible** with the different climate conditions and the transformations undergone by the area.

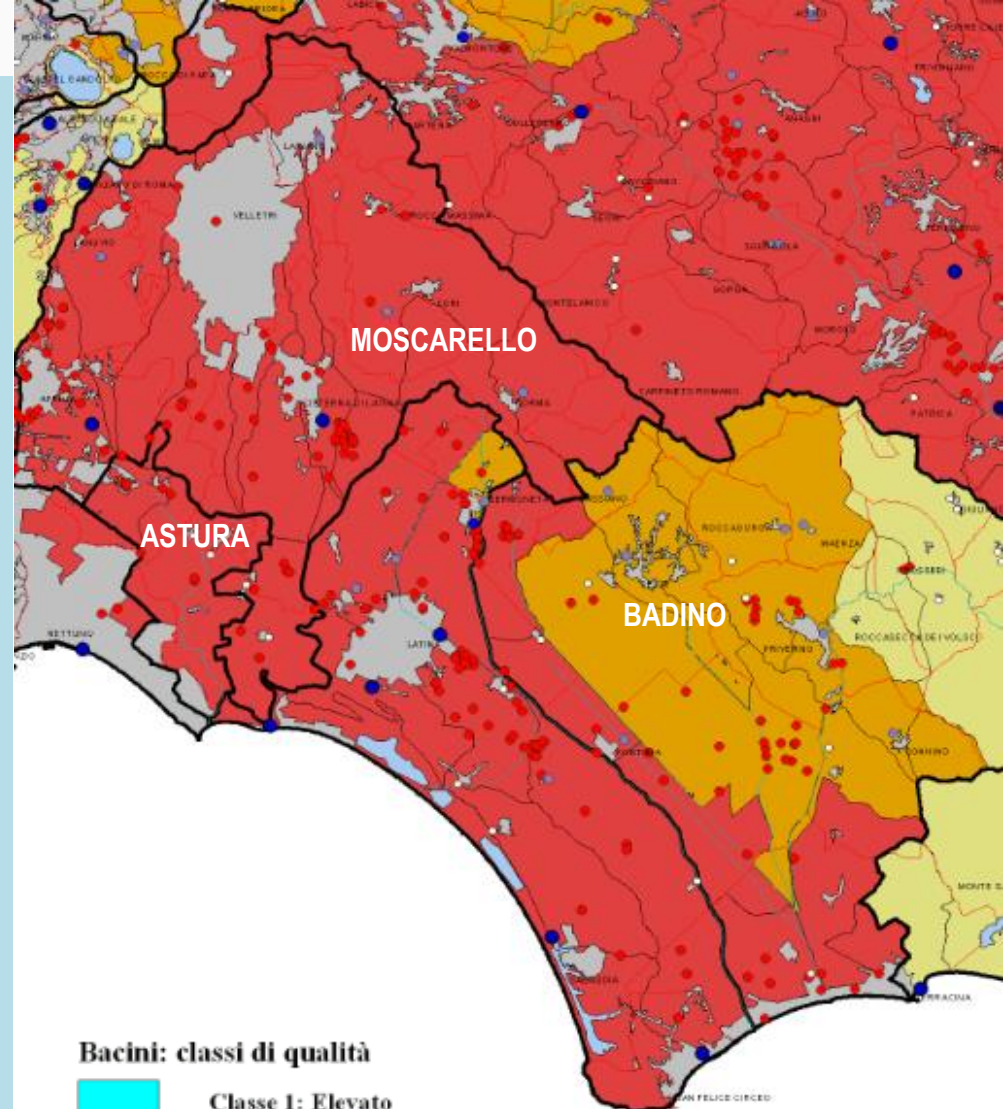
Due to the very **low quality of surface waters**, the irrigation water is drawn from the deep aquifers, giving rise, especially along the coast and around the mouths of the watercourses, to **salt wedge intrusion and alteration of soils**.



# WATER QUALITY IN THE PONTINE PLAIN

The Agro Pontino is a land of high agricultural productivity, strong industrial presence and significant settlements.

The wastewater of these activities spills along an extensive water network, seriously compromising the quality of surface water bodies.



## Bacini: classi di qualità

	Classe 1: Elevato
	Classe 2: Buono
	Classe 3: Sufficiente
	Classe 4: Scadente
	Classe 5: Pessimo
	Non classificato

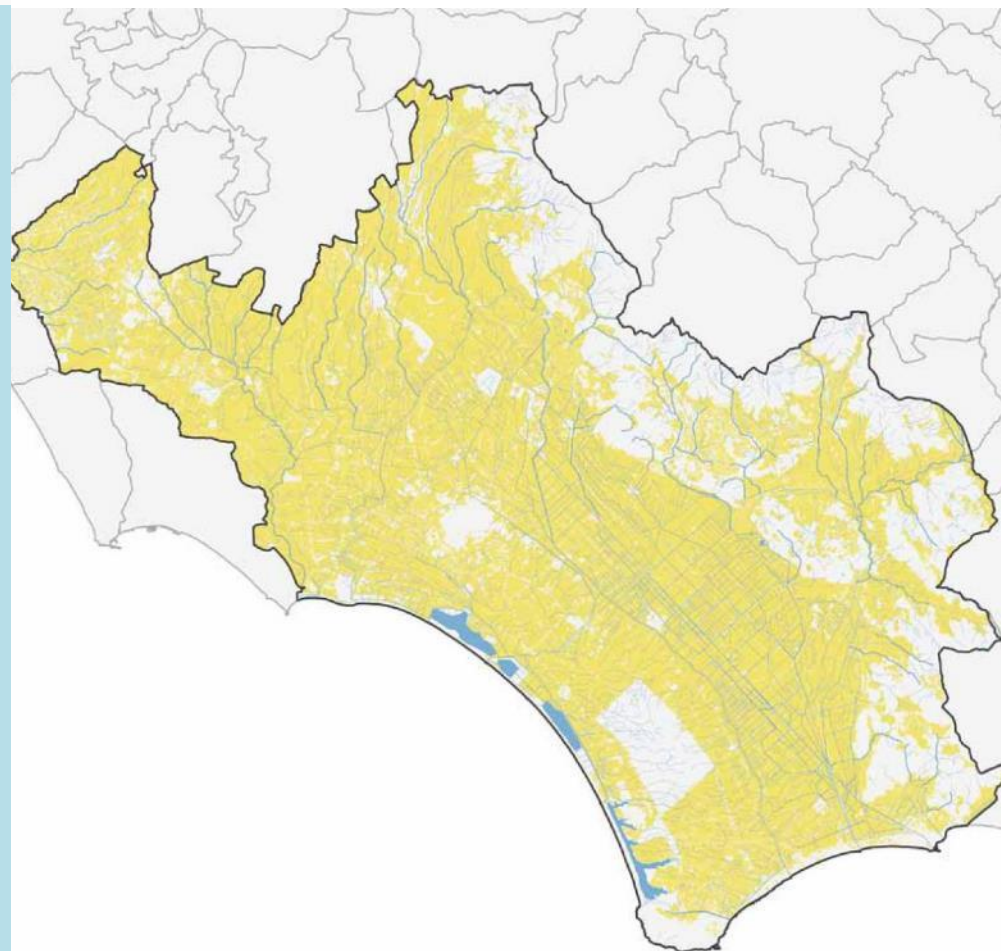


## Regulatory framework:

- Legislative Decree 152/99
- Directive 2000/60/EC
- Regional Law 14/99

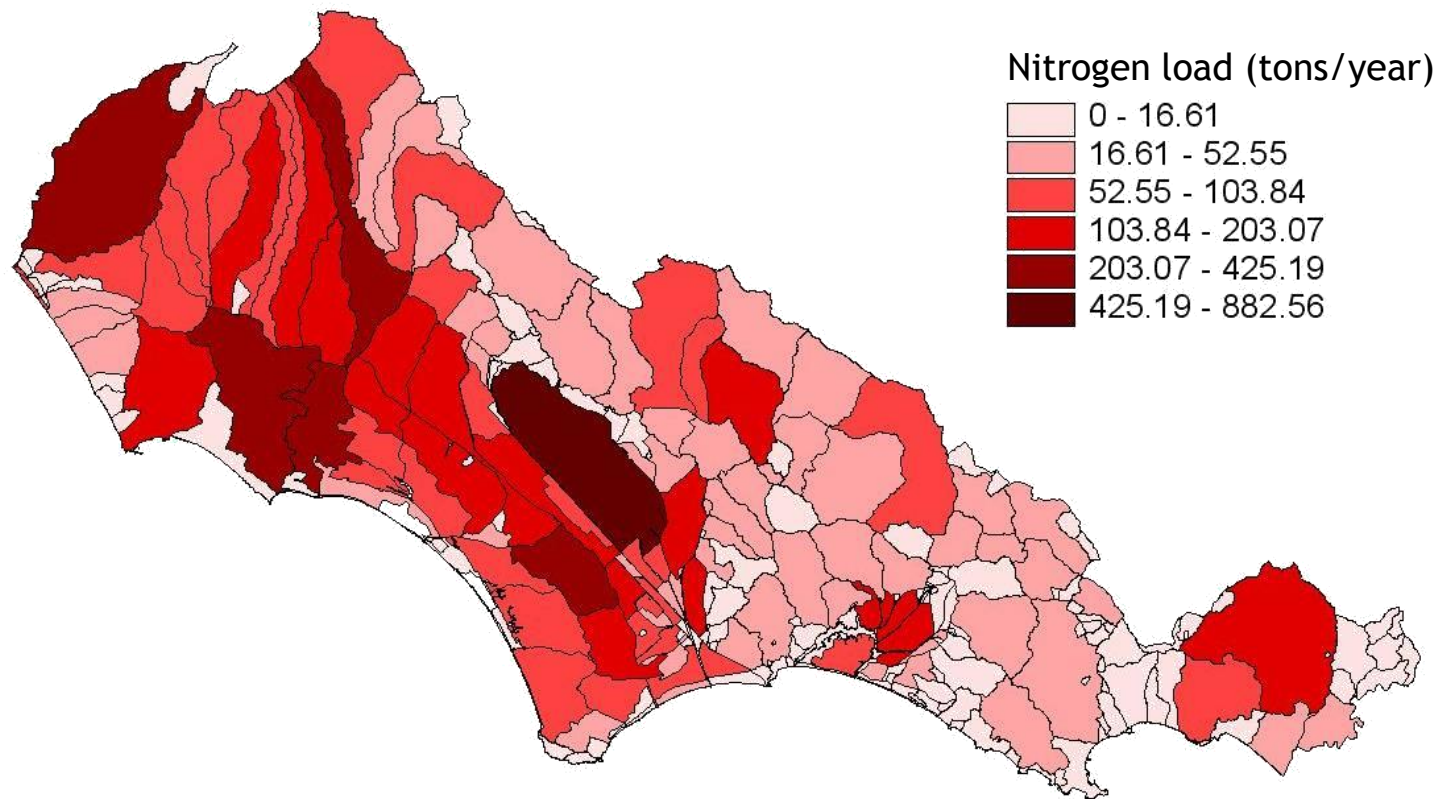
Since 1999, the Province of Latina has dedicated a growing attention to the quantity and quality of the water resource in its territory, working on:

- the project “Monitoring of waters”, studying the characteristics of springs and the origin of pollutant loads
- a provincial Database aimed to collect and compare hydrologic information
- an estimation of potential pollutant emissions by land use and sewage treatment (published in 2010)



- ▭ Confine area Rewetland
- ▧ Reticolo idrografico
- Aree agricole





**Diffuse pollution** deriving from farming activities and minor residential settlements has been observed.

**Phytoremediation techniques** have been recognized as the most appropriate and environmentally friendly for the Pontine Plain.

The Province decided to **test the replicability and sustainability** of these techniques in the area.

A proposal was submitted to the **2008 call of LIFE+ Programme** and funded in **2009**.



**REWETLAND** - *Widespread introduction of constructed wetlands for a wastewater treatment of Agro Pontino*

## **PARTNERS**

Province of Latina

Municipality of Latina

Circeo National Park

Land Reclamation Authority of the Pontine Plain

U-Space s.r.l.

## **BUDGET**

Total 3.706.632 €

EU contribution 1.450.566 €

## **DURATION**

January 2010 - June 2013

(extended until June 2014)



## Objective

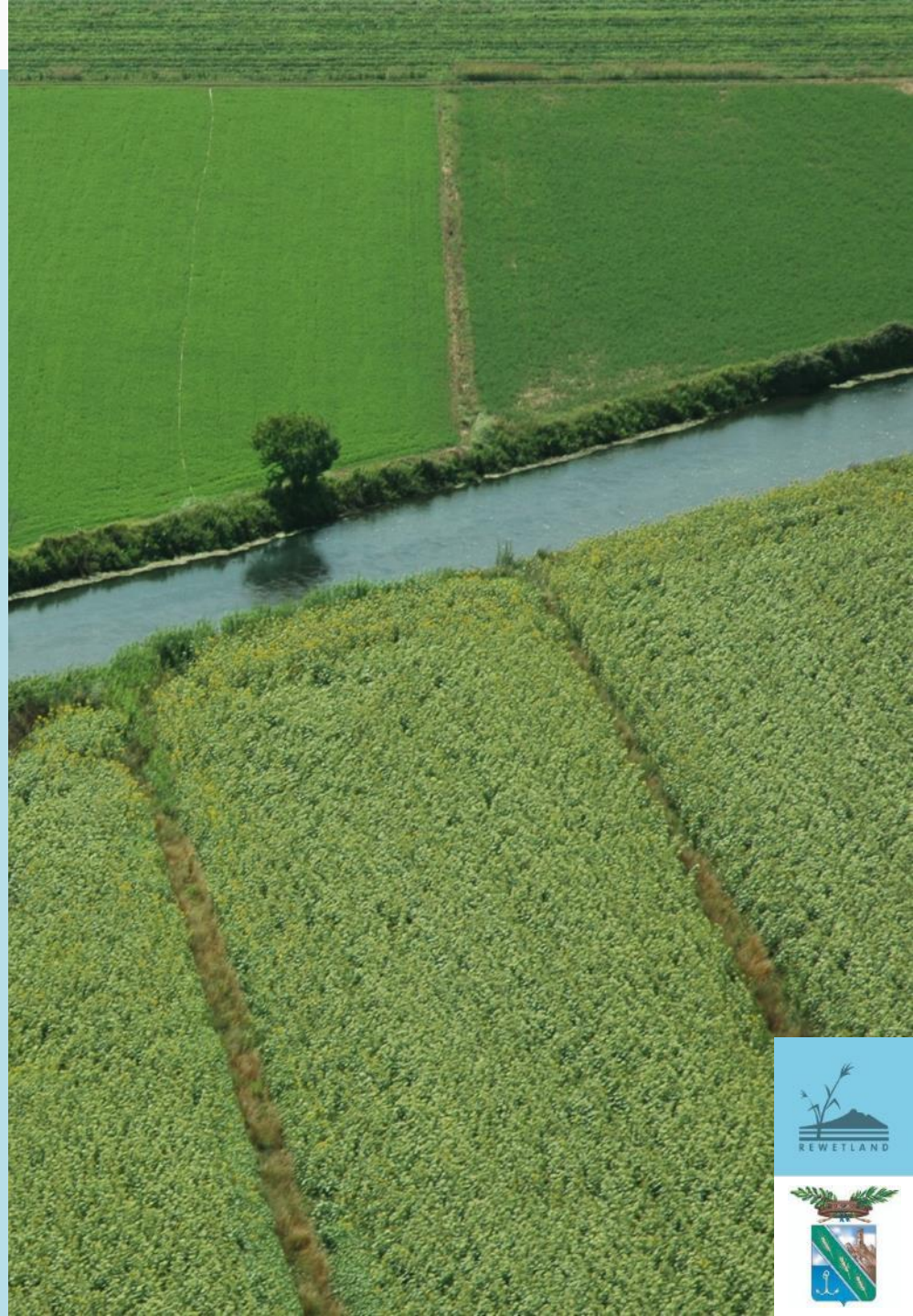
Contributing to the improvement of water quality in the Agro Pontino through the introduction of constructed wetlands and other natural purification systems

## Benefits

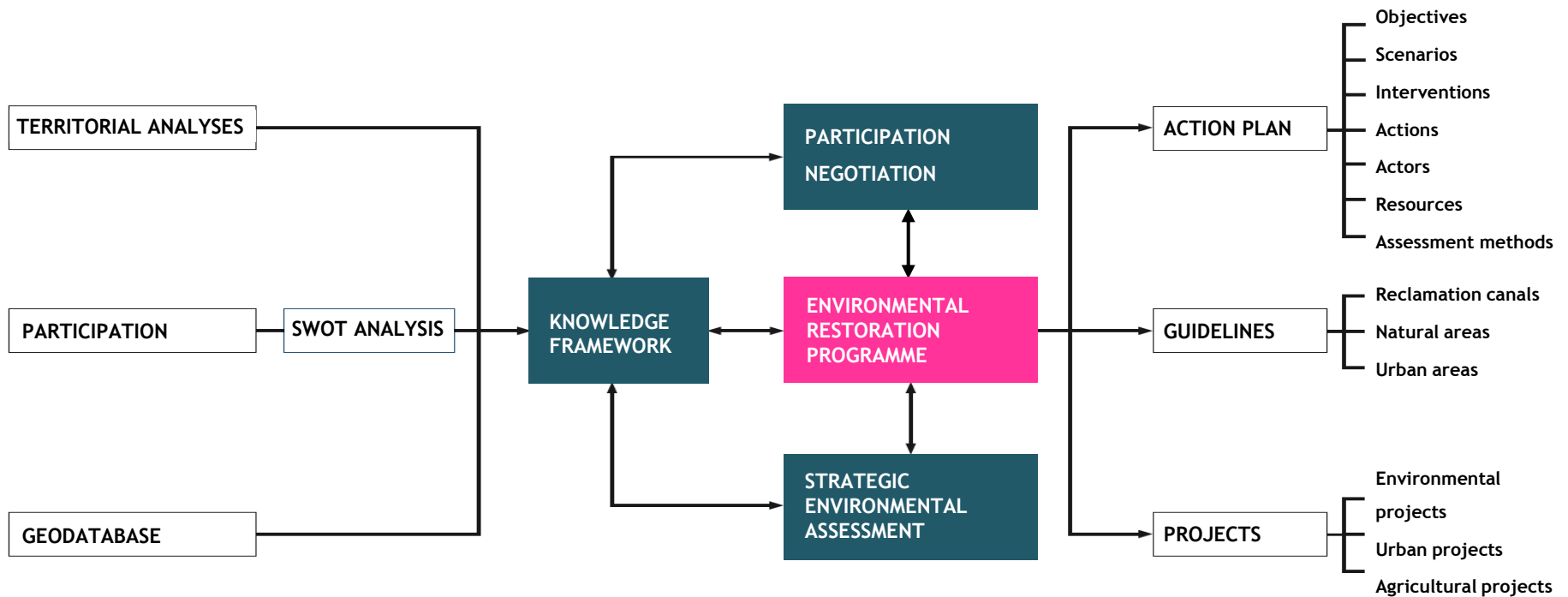
- Water pollution reduction
- Flood/erosion prevention
- Biodiversity protection
- Landscape upgrade

## Methods

Involvement of citizens and local social realities through a **participatory planning** process.



The project has entailed the drafting of an innovative, wide-area planning tool: the Environmental Restoration Programme (ERP).



The Programme will be the strategic and technical reference for the actions that the subjects involved in the use and management of the water resource will have to implement, with a view to environmental sustainability.



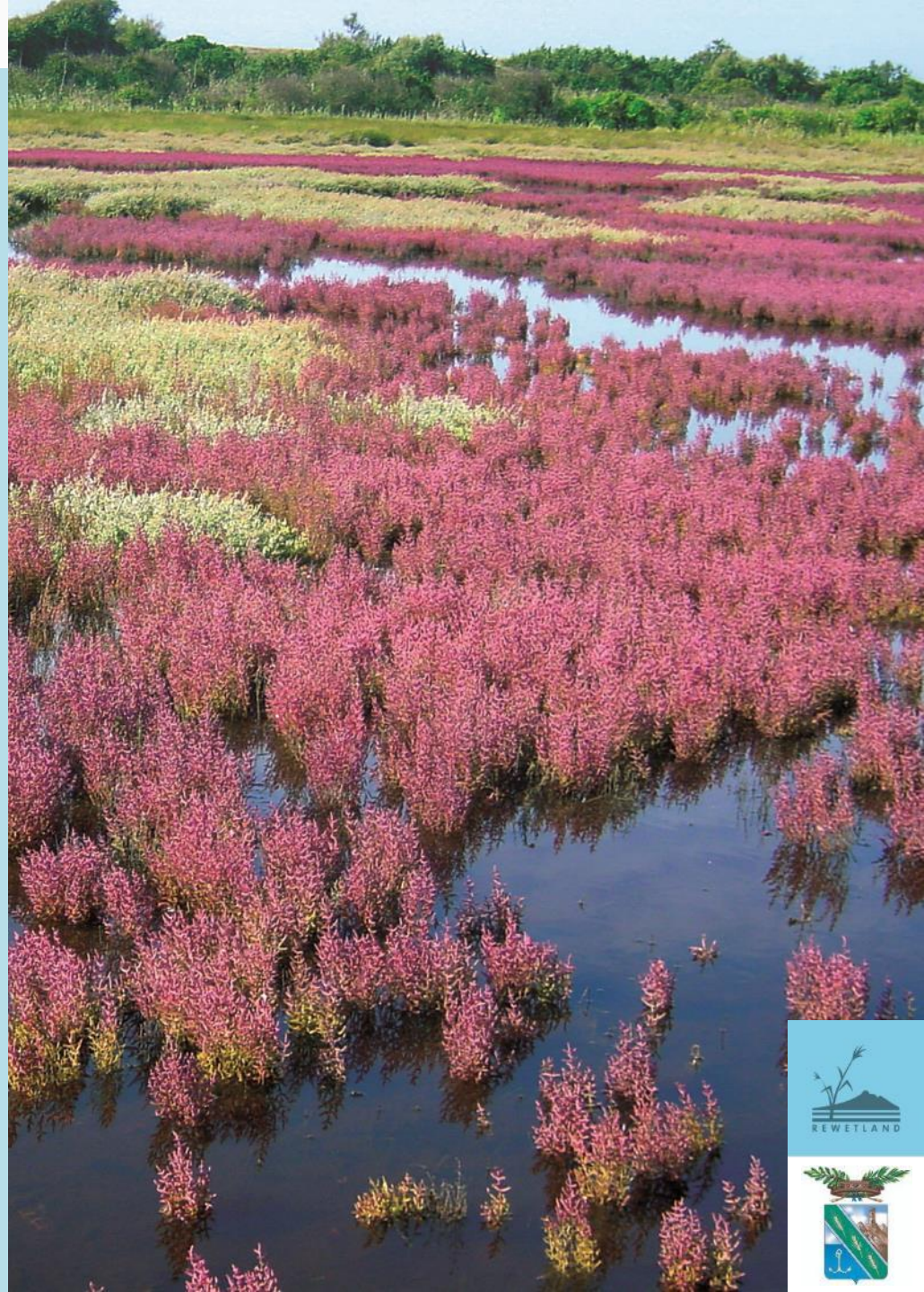


1. **Environmental studies** on the status of natural resources and on the feasibility of pilot projects
2. **Definition of tools for programming** the necessary actions for the replication of phytoremediation interventions in the Agro Pontino
3. **Implementation of 4 pilot projects** that directly experience the introduction of phyto-purification techniques
4. **Realization of awareness campaigns and participatory processes**



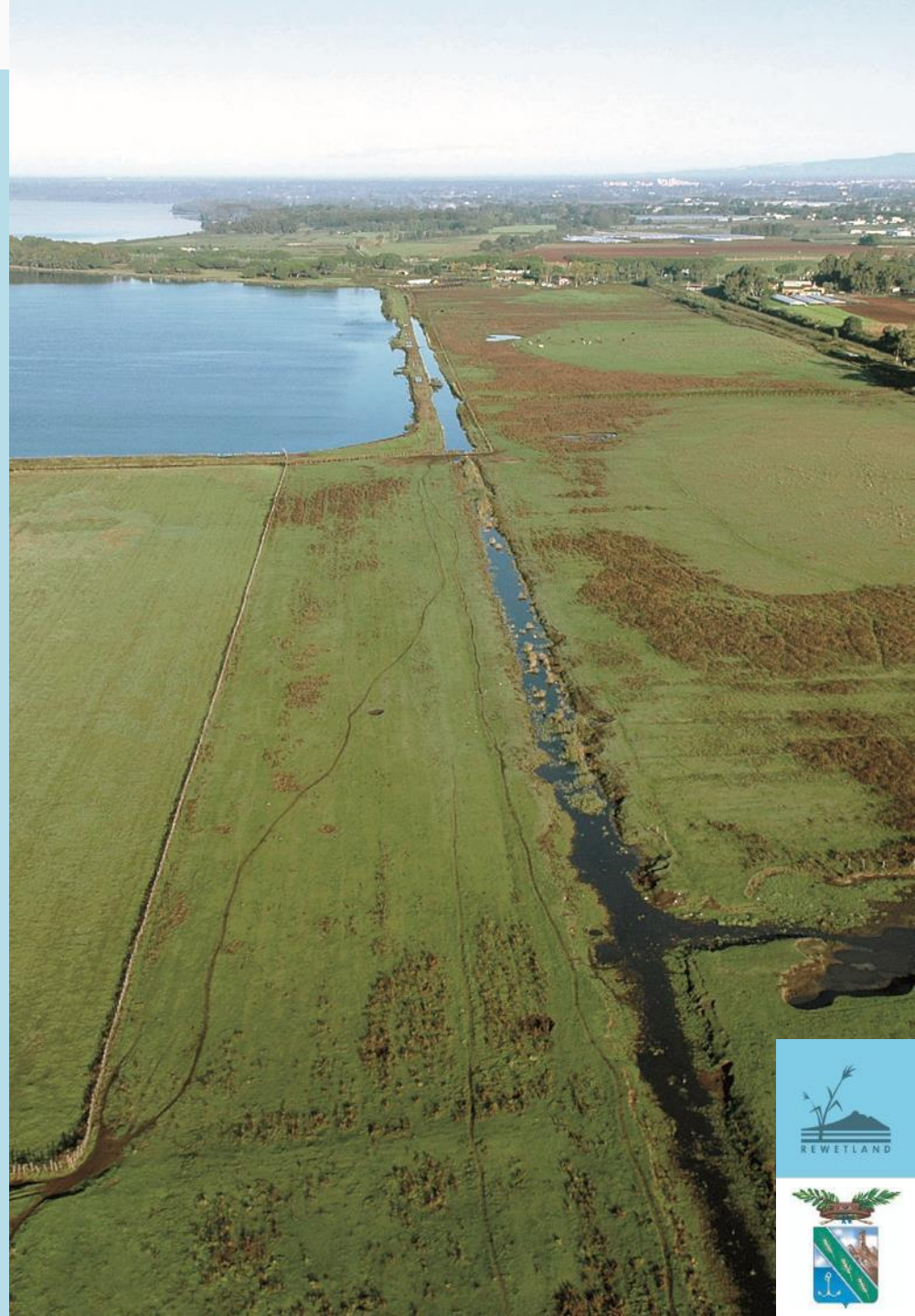
## 13 environmental and feasibility studies:

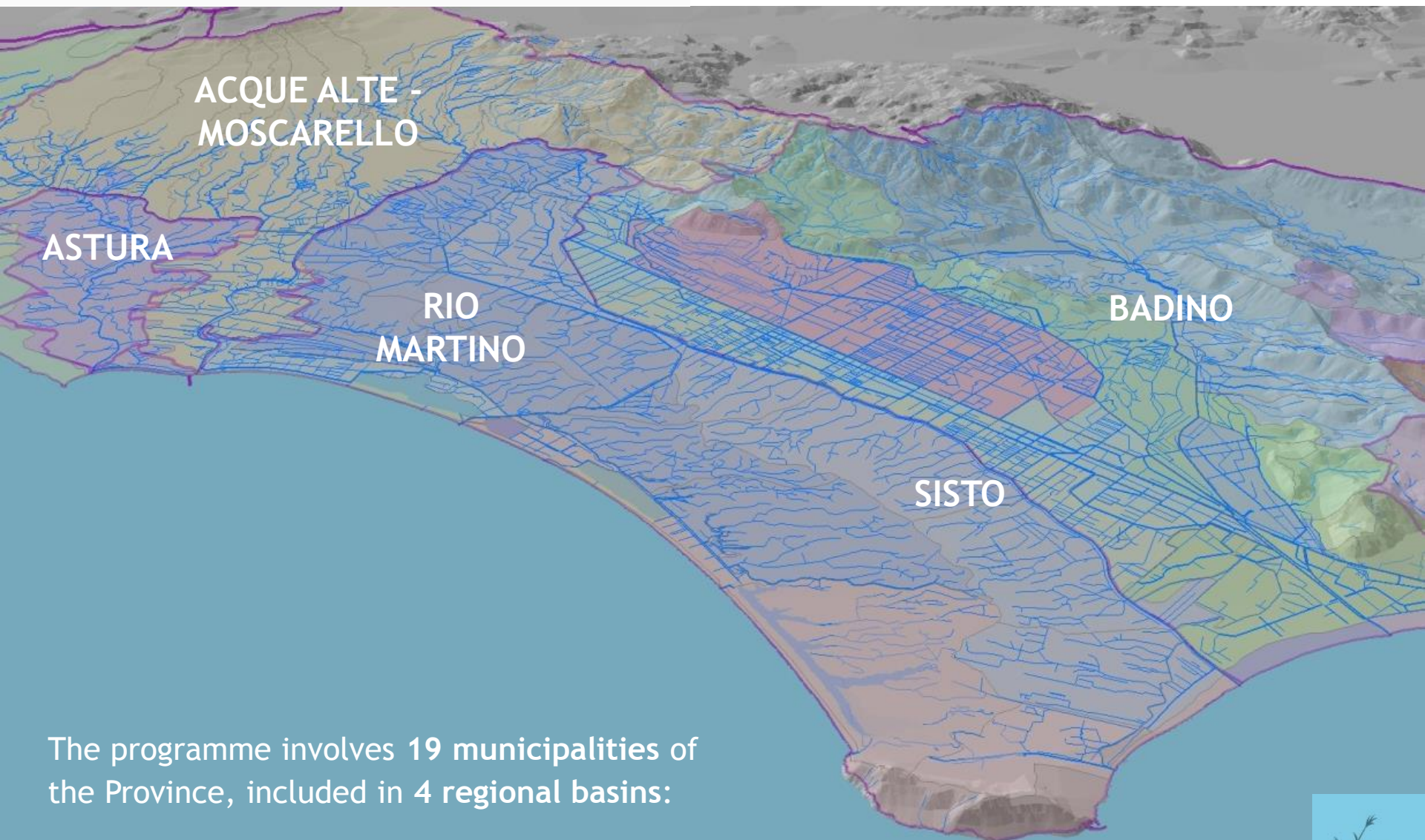
- Report on the use of the water resource for agriculture
- Report on the state of coastal wetlands
- Report on water quality
- Spatial planning framework
- Report on the state of the environment in the Pontine Plain
- Feasibility Study of Pilot Project 1
- Feasibility Study of Pilot Project 2
- Feasibility Study of Pilot Project 3
- Implementation of the Geographic database
- Identification of landscape features
- Analysis of hydrographic network
- Hydrological analysis of the Fogliano lake
- SWOT analysis and matrix of pressure factors



- Aims at improving the surface water quality of the Agro Pontino, in order to achieve the quality levels required by the **European Water Framework Directive (2000/60/EC)**.
- Based on the **collection of environmental data**
- Drafted **in parallel** with the implementation of pilot projects
- Composed of **3 THEMATIC GUIDELINES** (addressed to agricultural areas, urban and industrial areas, and natural protected areas) containing **20 PROJECT SHEETS** for the implementation of the interventions

Directly connected to the Programme, an **ACTION PLAN** will be the basis for programming future strategic choices according to coordinated lines of intervention.





The programme involves 19 municipalities of the Province, included in 4 regional basins:

24 - ASTURA

26 - ACQUE ALTE - MOSCARELLO

27 - RIO MARTINO - SISTO

28 - BADINO

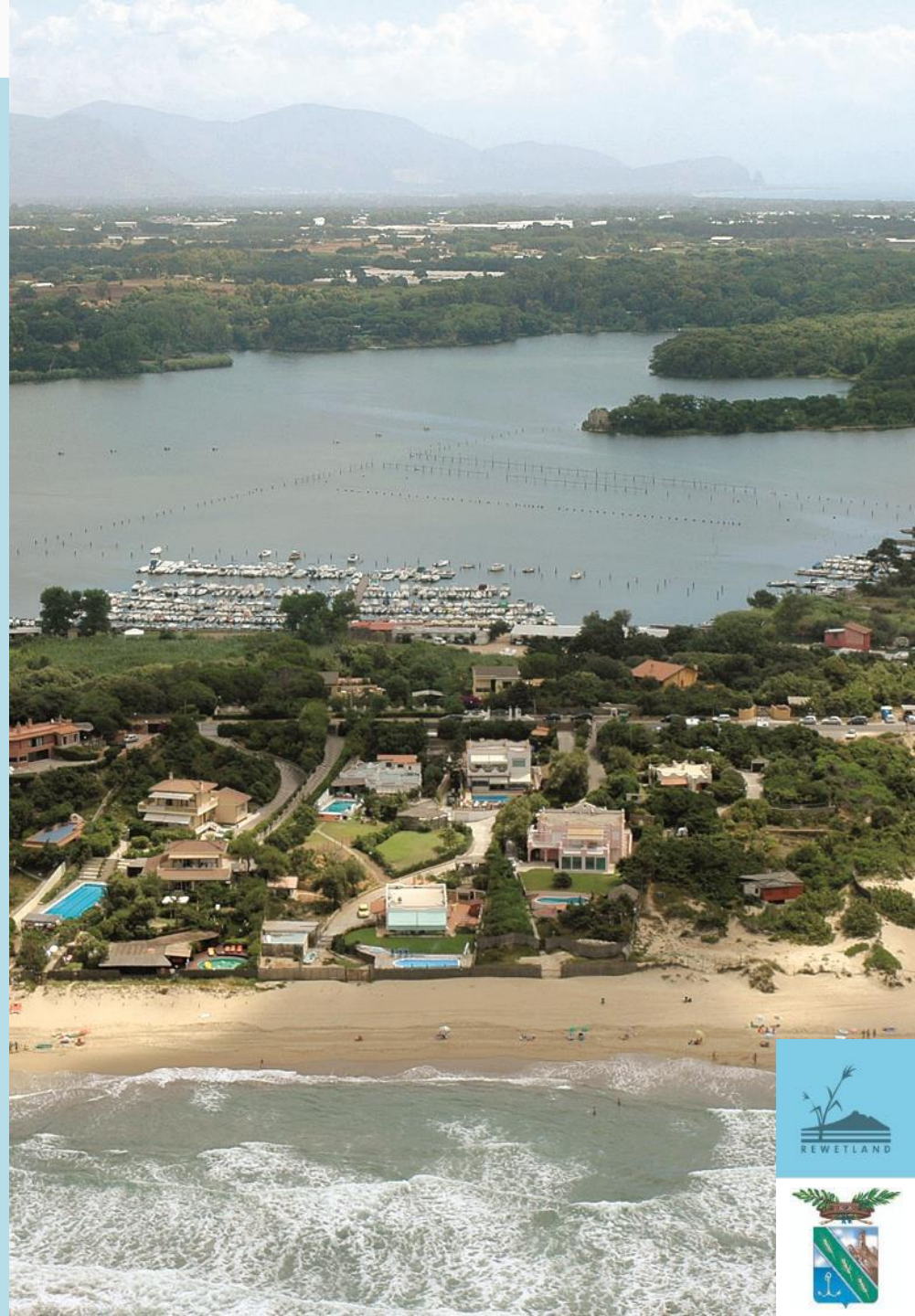


### AXIS 1 - REDUCTION OF POLLUTANT LOADS OF SETTLEMENT AND INDUSTRIAL ORIGIN

This axis is divided into **4 types of measures**, which in turn contain 14 types of possible actions.

The types of measures are:

1. Reduction of pollutant loads from point sources coming from **wastewater treatment plants** in urban & industrial areas
2. Reduction of pollutant loads from diffuse sources coming from **low-density residential areas**
3. **Restoration and re-naturalization of banks** in urban areas
4. Promotion of more attentive citizens' and enterprises' **behaviors** concerning water protection.



### AXIS 2 - REDUCING POLLUTANT LOADS OF AGRICULTURAL AND ZOOTECHNICAL SOURCES

This axis aims at reducing pollutant loads in wastewater from farming activities, diffusely discharged along the reclamation canal network, generated by livestock farming and the agro-food industry.

#### 4 types of measures:

1. Direct promotion of good practices and environmentally friendly farming management methods
2. Creation of buffer strips and constructed wetland systems in farms
3. Creation of buffer strips and constructed wetland systems along the main water network (canals, rivers)
4. Promotion of greater awareness towards the protection of water by the agricultural sector.



### AXIS 3 - INCREASE OF PURIFICATION CAPACITY IN NATURAL AREAS

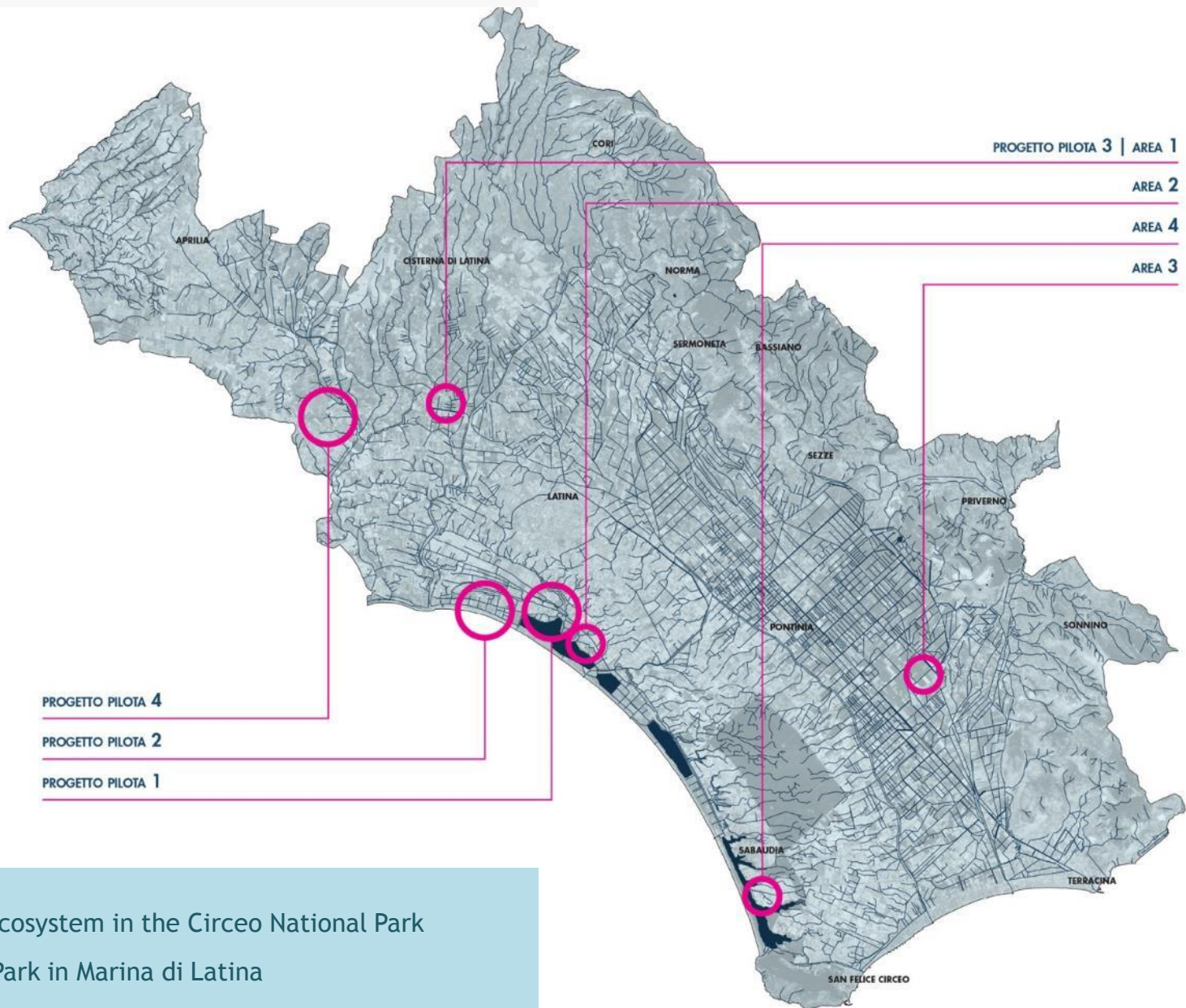
Axis 3 aims at **restoring the environment** and increasing the self-purification capacity of watercourses in natural protected areas and other similar areas.

#### 4 types of measures:

1. Increase of the quality of aquatic ecosystems and the functionality of the **ecological network**
2. Improvement of the specific composition and the physical and chemical characteristics of the above **ecosystems**
3. Strengthening of the multi-functionality of protected areas through the promotion of **sustainable development projects**
4. Creation of **research and communication centres and activities** focused on environmental values and criticalities.



# 3 - PILOT PROJECTS



PP1 - Filter ecosystem in the Circeo National Park

PP2 - Urban Park in Marina di Latina

PP3 - Buffer strips along the reclamation canals

PP4 - Good practices of water management in a farm

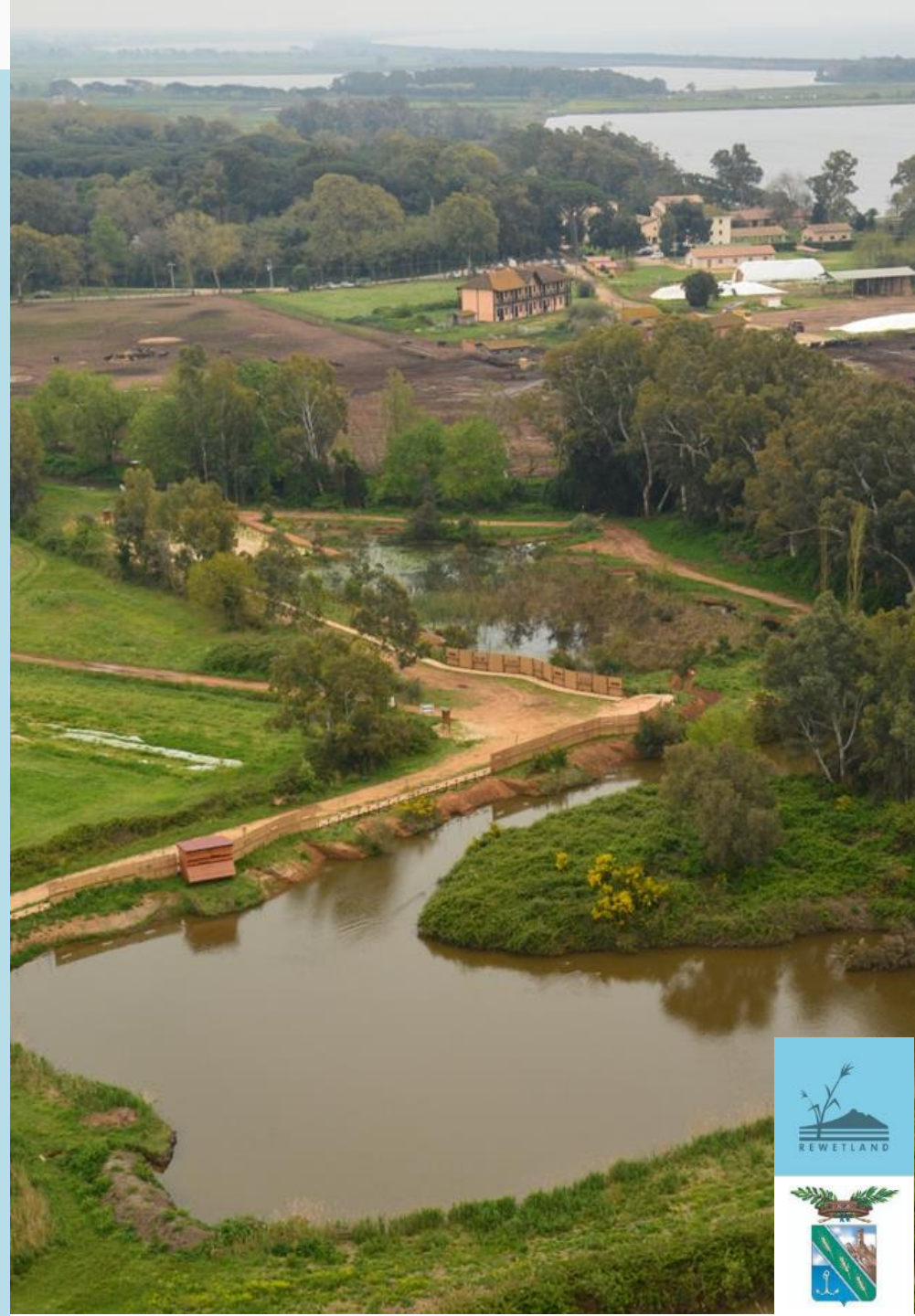




The interventions have been carried out in the Circeo National Park, along the coast between the Lake of Fogliano and Canale Cicerchia.

The objective was to increase the local biodiversity through the creation of wetlands reproducing marsh ecosystems, once very common in the Pontine Plain.

An educational path has been designed, in order to foster the presence of visitors and the observation of the abundant resident and migratory bird fauna.



Pilot Project 2 is an experimental plant aimed at **integrating water purification functions with leisure facilities**, adopting systems, techniques and materials having the lowest environmental impact.

The result is a **peri-urban park with walking and cycle dirt paths and green areas with trees and shrubs of native species**.

The constructed wetland covers an area of about 3,200 square meters.

All basins have been waterproofed in order to avoid contamination of soils and superficial groundwater. Once treated, the waters are discharged into Canale Mastropietro.



Pilot project 3 has been carried out along the banks of some of the canals of the Land Reclamation Consortium of Agro Pontino.

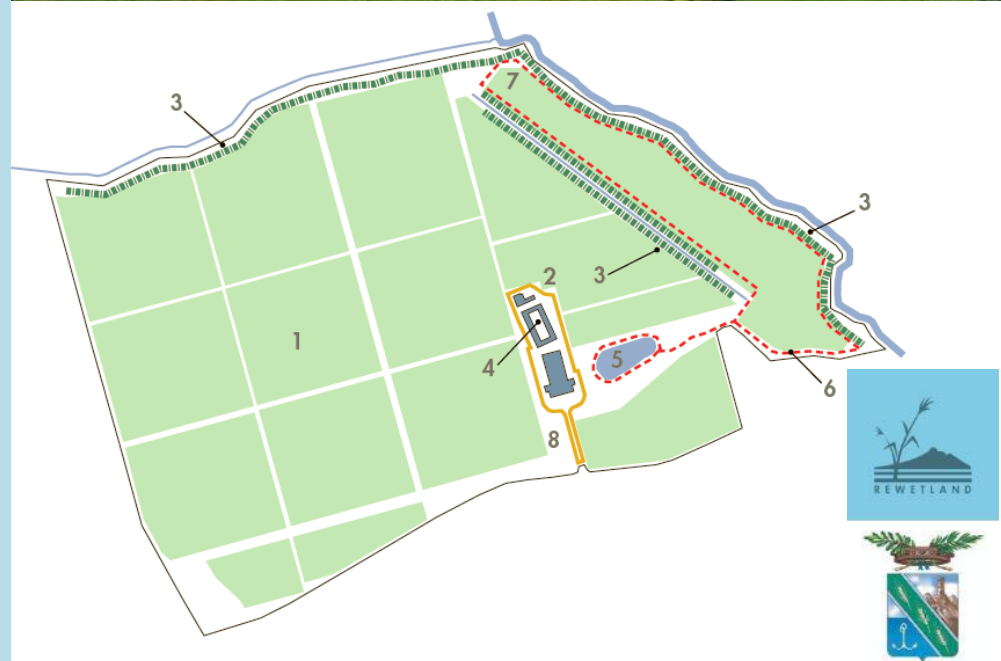
The buffer strips are linear vegetated areas able to absorb the polluting substances contained in runoff waters draining from the fields, especially where there is a heavy use of fertilizers and pesticides.



Pilot Project 4 has been conceived to promote good water management practices in a farm.

The experimentation has been carried out in “Casale del Giglio”, a 150-hectare farm located between Aprilia and Latina.

Starting from the analysis of the management processes, and the climatic, geological and hydrological aspects, project activities have led to identify all the actions necessary for a sustainable management of the resource, in order to **limit the use of water and chemical products**.



Activities implemented within the project:

- **6 Workshops** to accompany ERP
- **1 itinerant awareness campaign** in the Municipalities of the Agro Pontino
- **1 specific information campaign** for the agricultural sector
- **1 awareness campaign in schools**

The project was presented in **more than 20 events**, of which 5 national:

- Forum PA, Rome 2010
- International Conference Wetlands, Venice 2011
- Conference University of Camerino, 2012
- II CIRF Conference, Bolzano 2012
- VIII Table on River Contracts, Florence 2013



# SCENARIOS

In order to evaluate the effectiveness of the ERP actions, specific scenarios have been elaborated based on the estimate of pollutant loads present in surface waters.

Some modelling of the results obtained with the implementation of the proposed actions in the PRA have been produced, according to different scenarios of intervention.

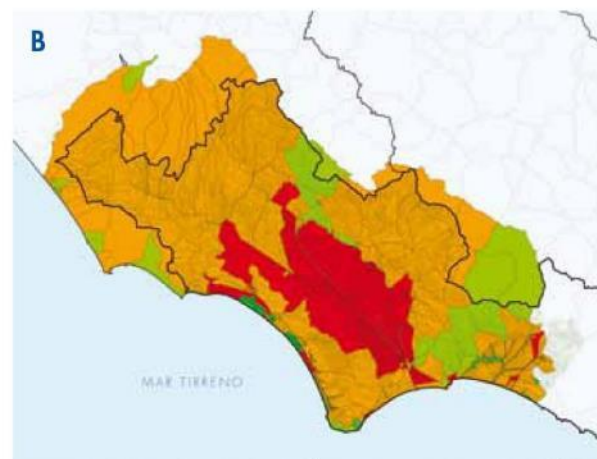
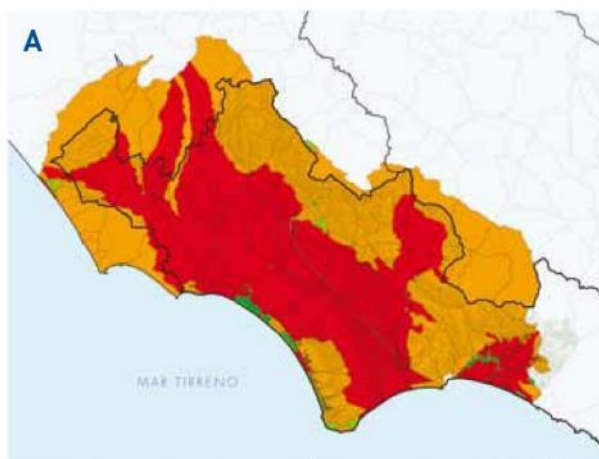
**A:** distribuzione del BOD nello scenario attuale. **B:** distribuzione del BOD nello scenario 5. **C:** distribuzione del COD nello scenario attuale. **D:** distribuzione del COD nello scenario 5. ■ Ottimale - limite di autodepurazione. ■ Sostenibile - LIM 2 - Stato Buono. ■ Critico - LIM 3 - Stato Sufficiente. ■ Pessimo - LIM 4/5 - Stato Scadente o Pessimo



# SCENARIOS

The analysis of the scenarios has shown that, in the case that all ERP actions are implemented in the whole Agro Pontino, a **substantial improvement** would take place: 52% reduction of the load of COD, 63% of BOD, 50% of P tot and 13% of N.

**A:** distribuzione di N totale nello scenario attuale. **B:** distribuzione di N totale nello scenario 5. **C:** distribuzione di P totale nello scenario attuale. **D:** distribuzione di P totale nello scenario 5. 



ERP is a provincial instrument for the protection of the quality of surface water resources, pursuant to Articles 5 and 29 of the technical standards of the Lazio Region Water Protection Plan (DCR Lazio no. 42/07)

**DCP 16 of  
26/07/2013**

Adoption of  
the ERP  
preliminary  
document  
by the  
Provincial  
Council

**DCP 14 of  
28/04/2014**

Adoption of  
the ERP  
definitive  
document  
by the  
Provincial  
Council

**May 2016**

Approval  
of SEA by  
Regione Lazio

**December  
2016**

Definitive  
approval of  
ERP -  
Incorporation  
in the regional  
planning

**September  
2017**

Submission  
of new LIFE+  
proposal  
GREENCHANGE





**FINANCIAL INSTRUMENTS**

- EAFRD - RDP Lazio
- ERDF
- Regional budget
- LIFE Programmes
- Private Funds

**REGULATORY INSTRUMENTS**

- Legislative Decree 152/2006
- Regional Plan for Water Protection
- River Basin District Management Plan
- Regional Law 5/2014 on Water Management

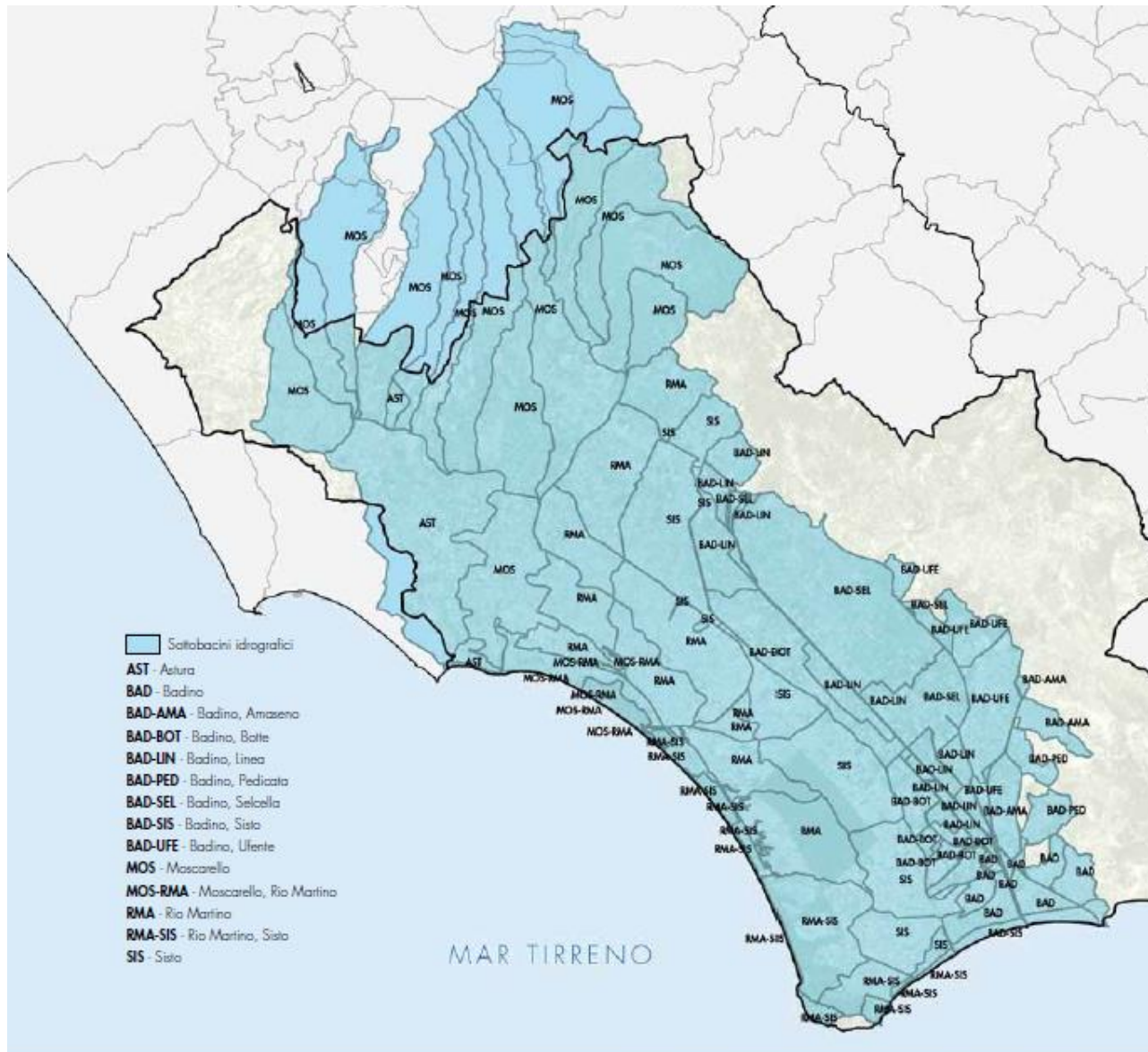


**Environmental  
Restoration Programme  
of the Pontine Plain**



Quality objectives required by the  
Water Framework Directive 2000/60/CE





# GEODATABASE: BASIC MAPS

CTR 1:5.000

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CTR 1:10.000

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IGM 1:25.000

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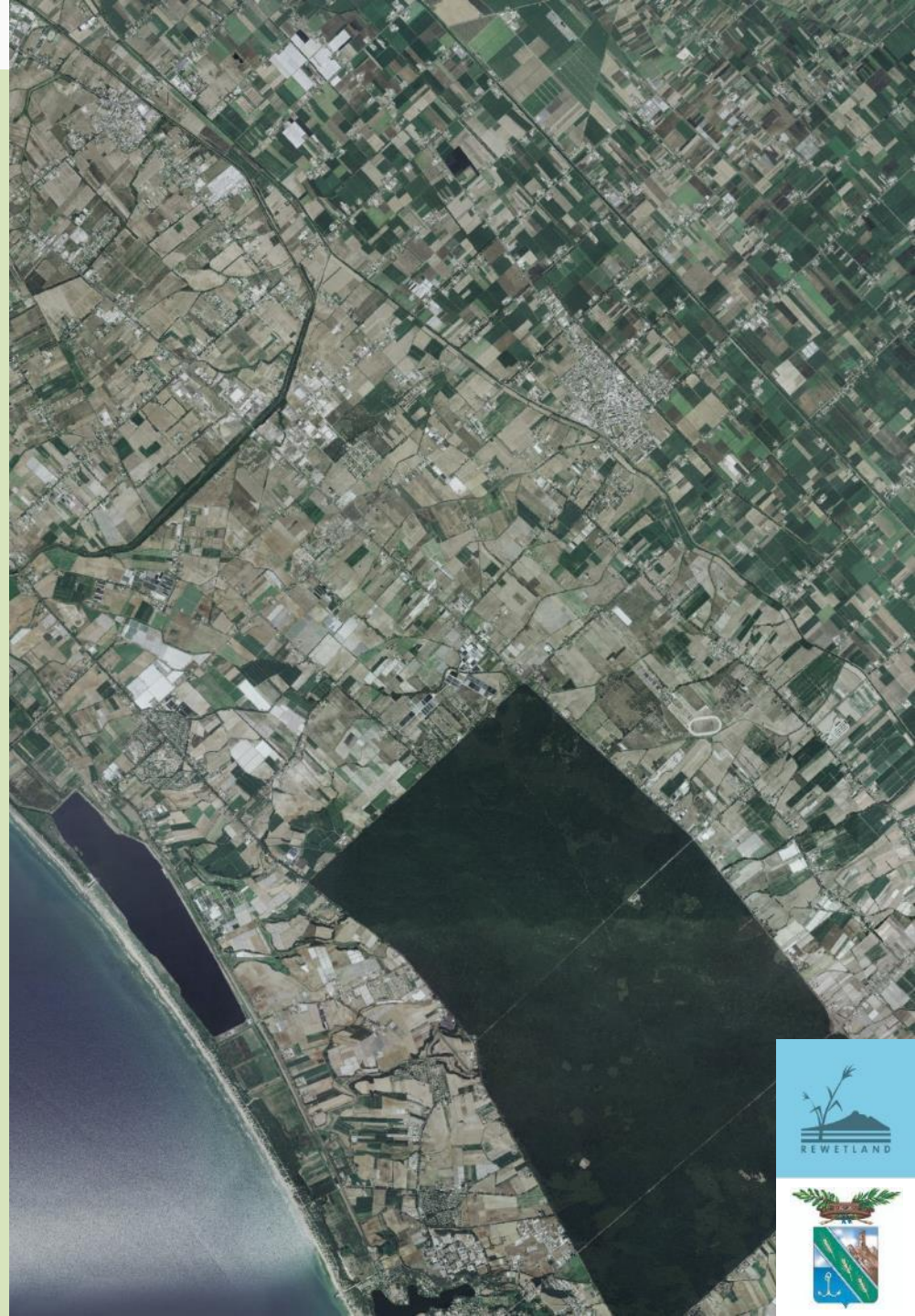
IGM 1:100.000

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ORTHOPHOTO

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CADASTRAL MAP



# GEODATABASE: LAND COVER

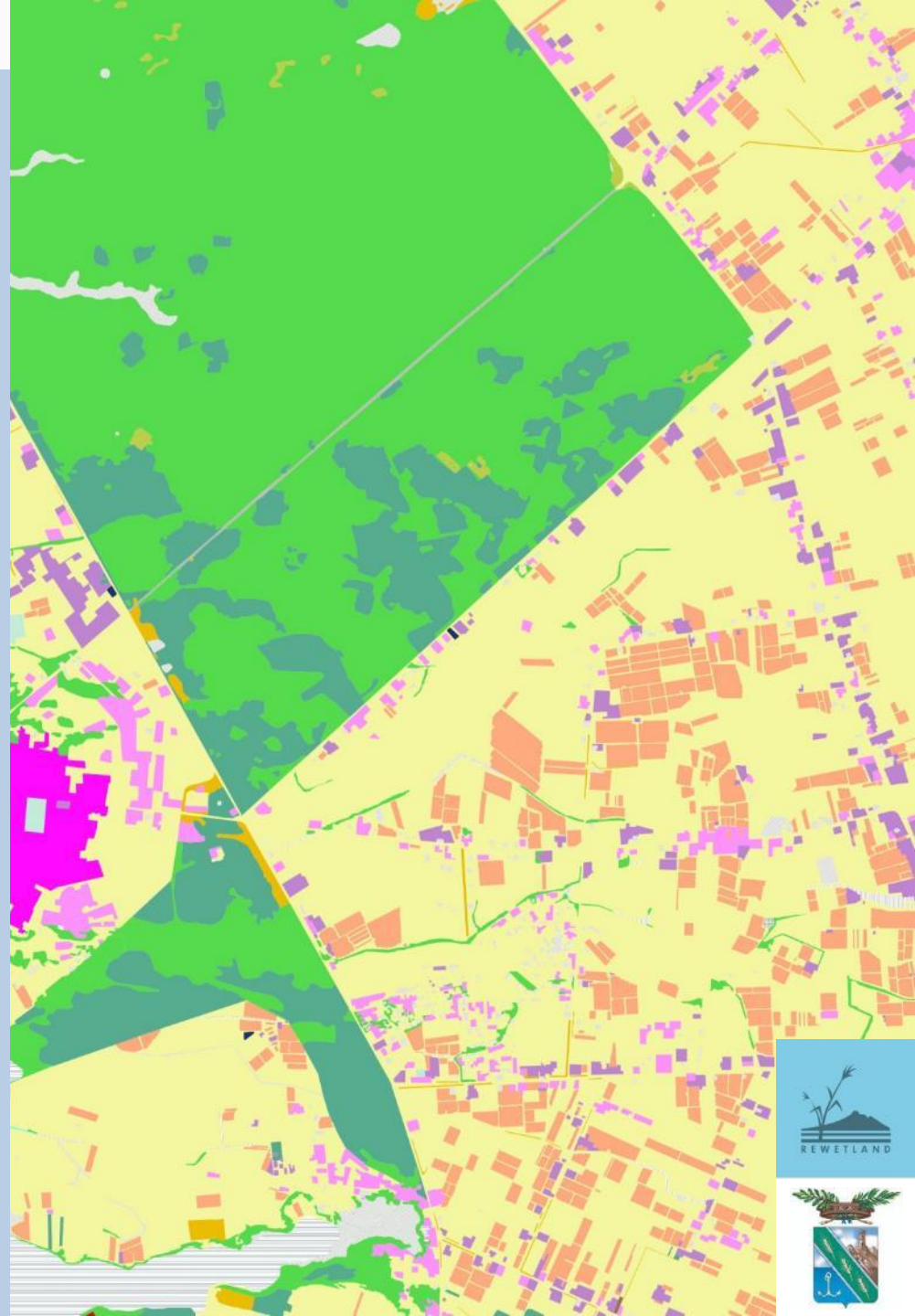
LAND COVER MAP 1978

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LAND COVER MAP 1999

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LAND COVER MAP 2007



# GEODATABASE: LAND USE

MOSAIC OF TOWN PLANS

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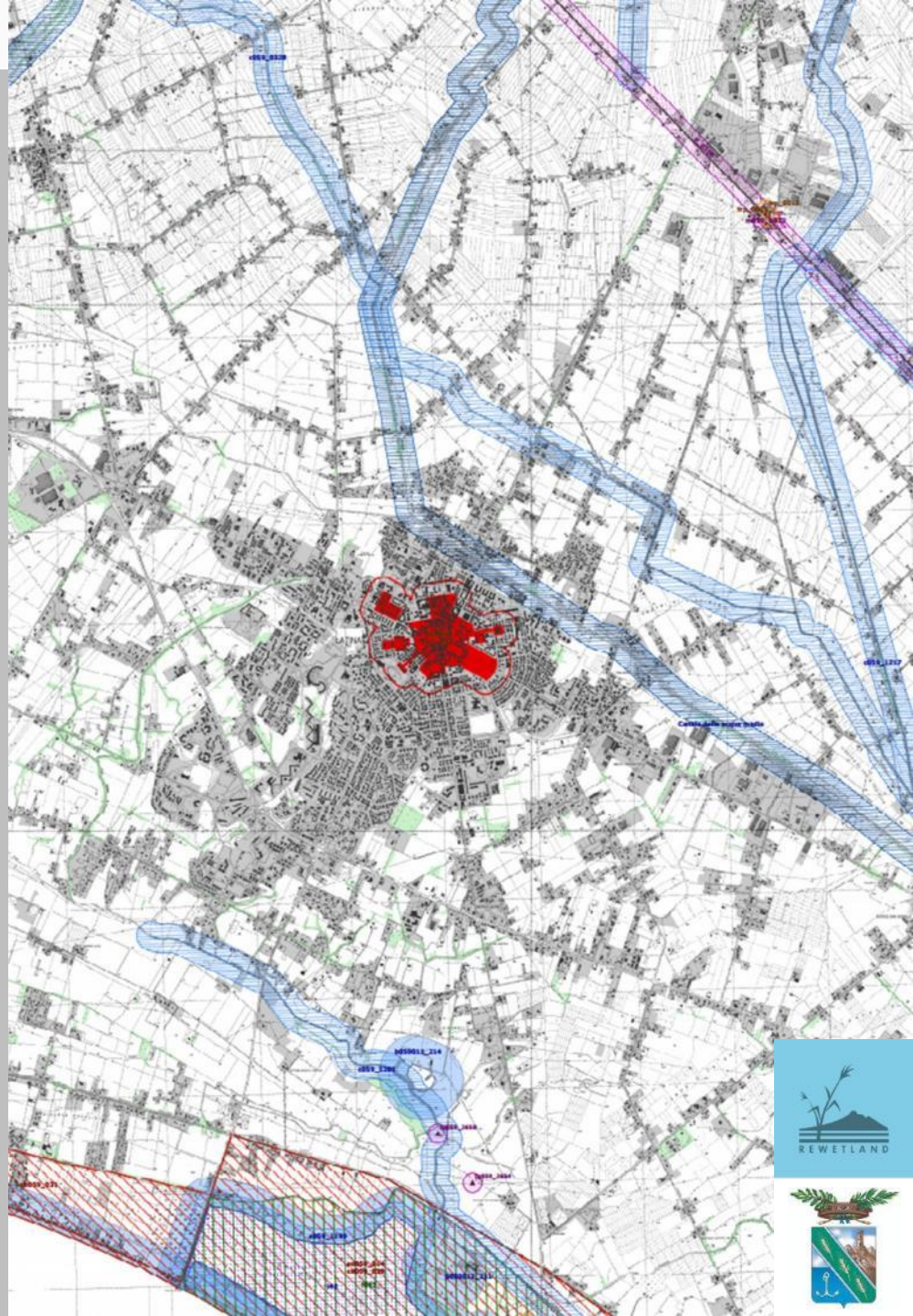
PTPR

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PAI

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PROTECTED AREAS



# GEODATABASE: WATERS

HYDROGRAPHIC BASINS

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HYDROGRAPHIC NETWORK

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SPRINGS

---

EXPANSION TANKS

---

IRRIGATION NETWORK

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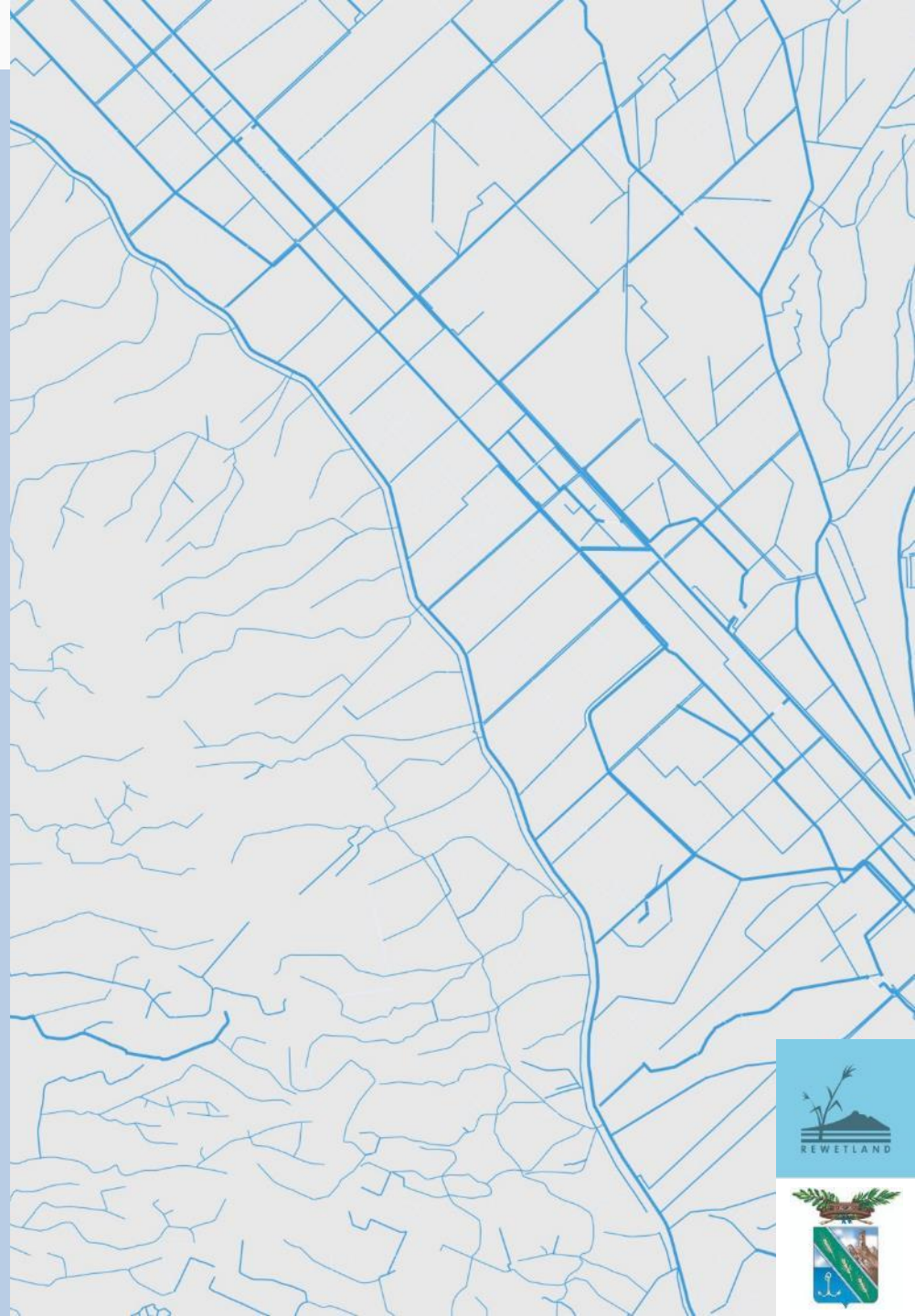
IRRIGATION PLANTS

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HYGROMETRIC STATIONS

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ECOTOXICOLOGICAL TESTS



# GEODATABASE: OTHER INFORMATION LAYERS

PEDOLOGY MAP

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LITHOLOGY MAP

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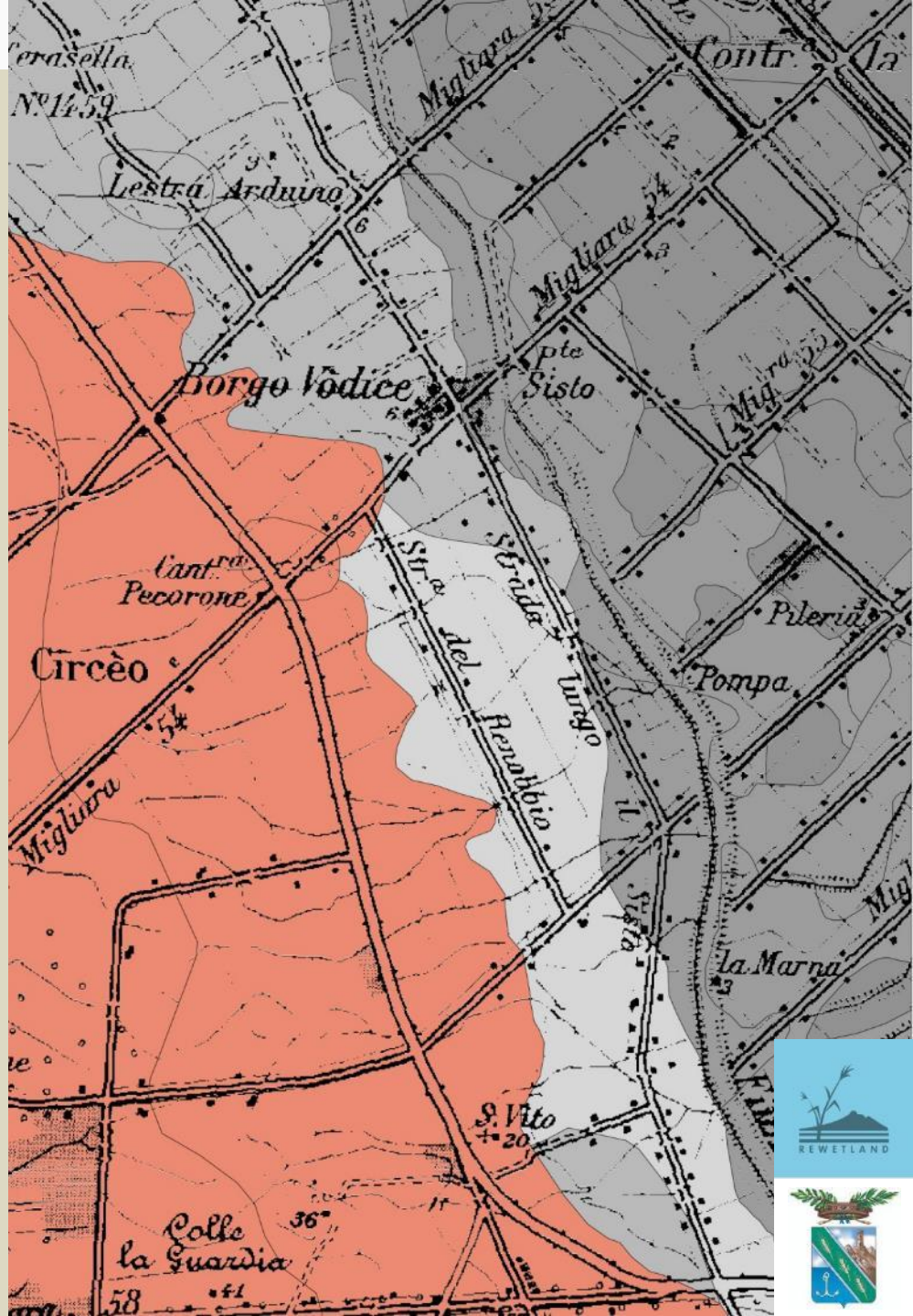
CLIMATE

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FORESTS

---

ECOLOGICAL NETWORK



# GEODATABASE: HYDROGRAPHIC NETWORK

SIRA CODE

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LAND RECLAMATION AUTHORITY CODE

---

PROVINCIAL CODE

---

ABR CODE

---

ASTA CODE

---

MAINTENANCE BATCH CODE

---

SUB-BASIN CODE

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SIRA DENOMINATION

---

CADASTRAL NAME

---

IGM NAME

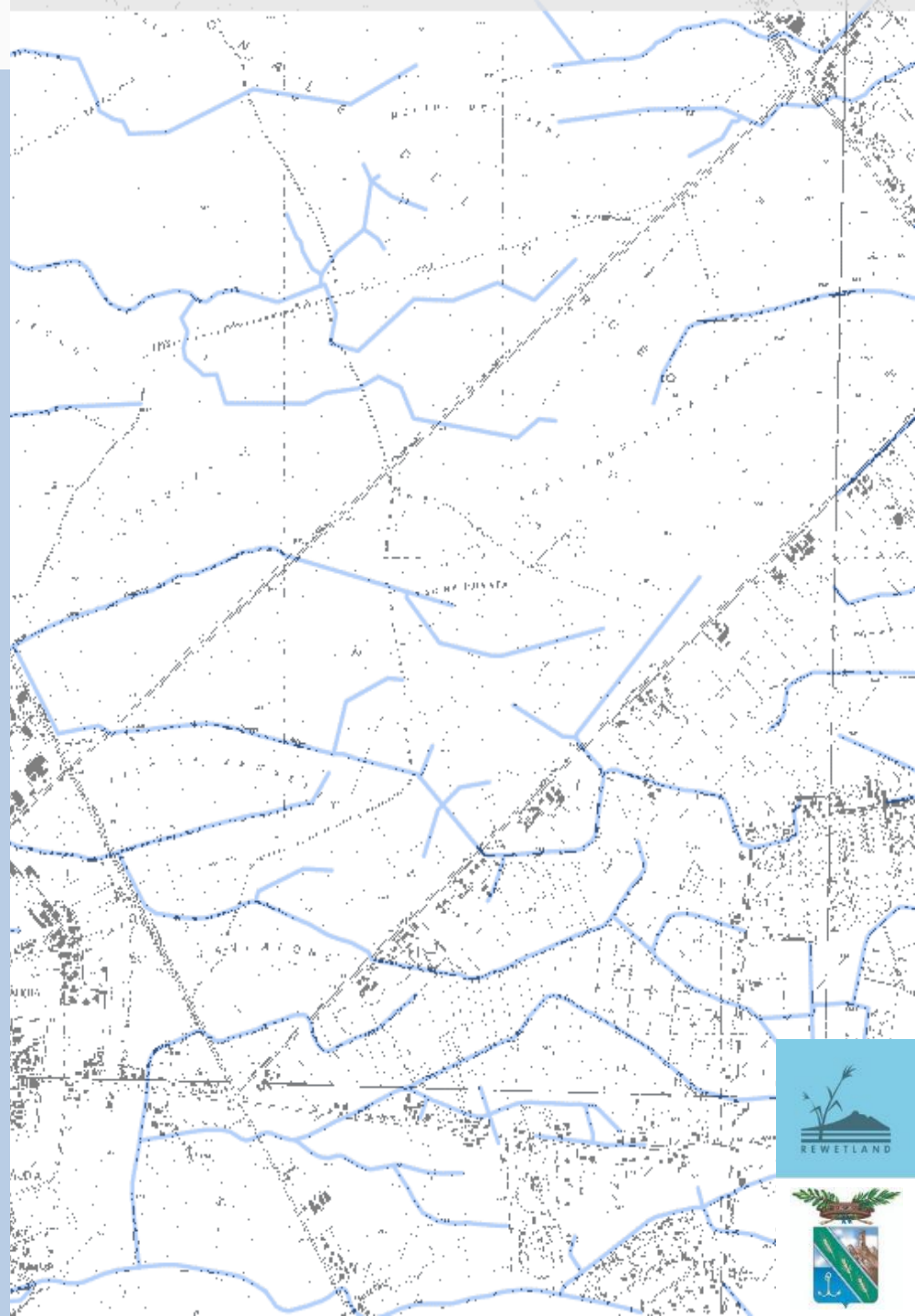
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RIVERBANKS TOTAL DEVELOPMENT

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RIVERBED TOTAL DEVELOPMENT

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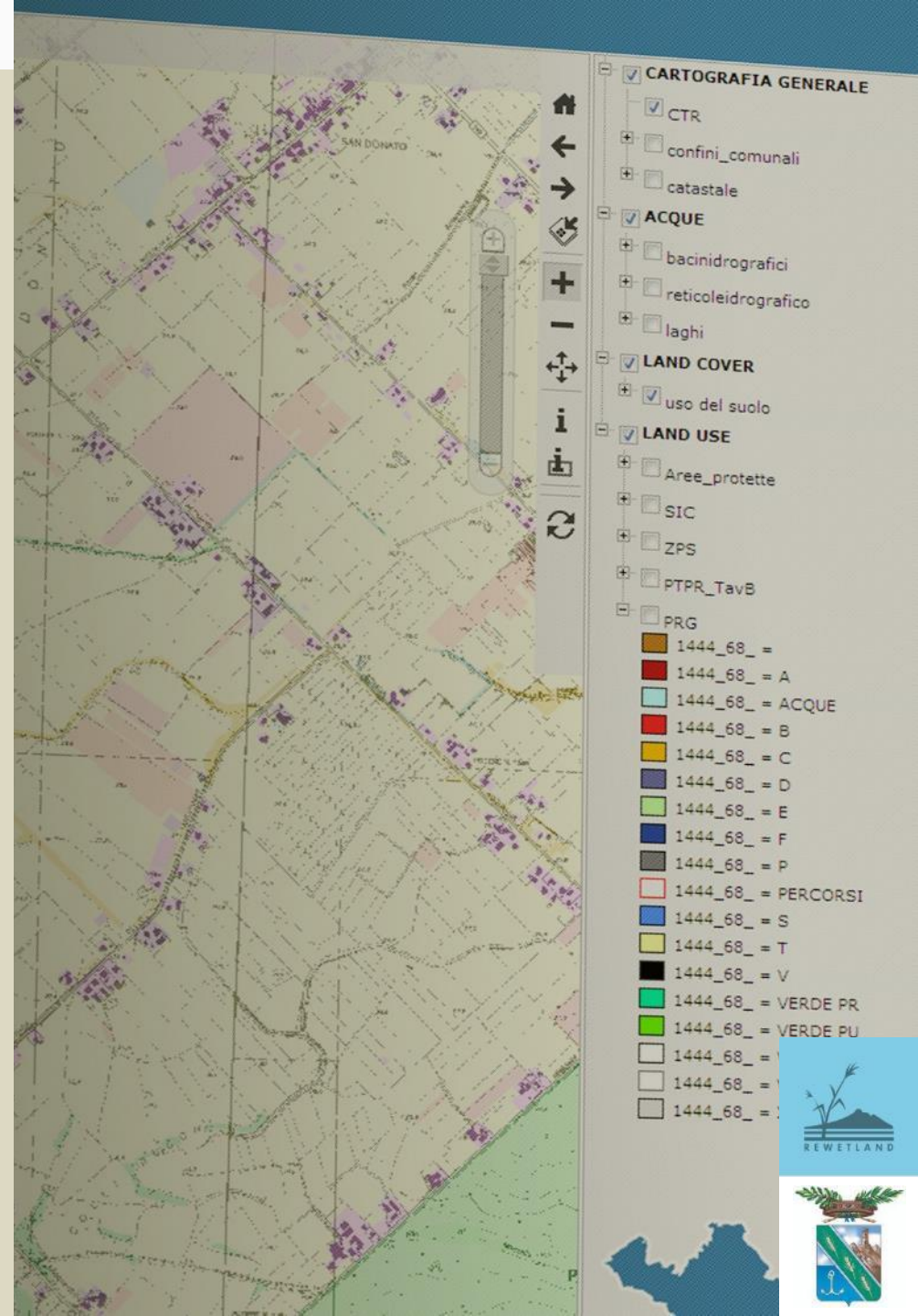


- Aims at **disseminating** in an easy and understandable way the nature and contents of the project
- Provides users with **updated information** on the results and the state of advancement of the works
- Contains documentation **both in Italian and English**, in order to reach also international users
- Provides **access to the Webgis and the Geoblog** for the active participation of citizens and stakeholders.

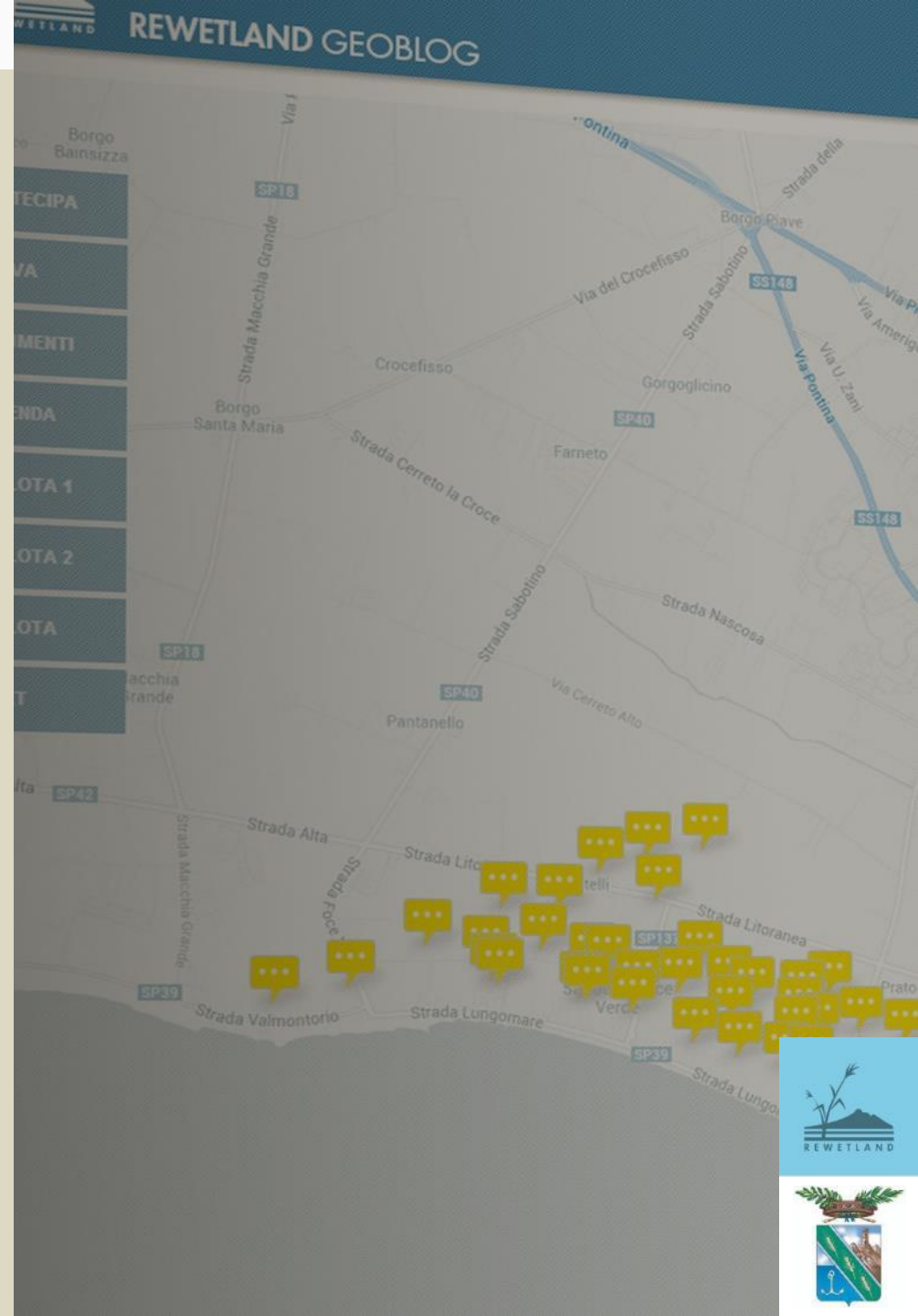
[www.rewetland.eu](http://www.rewetland.eu)

The image shows a screenshot of the REWETLAND website. At the top, there is a logo featuring a stylized plant and the text 'REWETLAND'. Below the logo is a search bar with the placeholder text 'cerca...' and a magnifying glass icon, followed by a 'home' link. A vertical navigation menu on the left side contains the following items: HOME, PROGETTO, GALLERY, PARTNER, RISULTATI, COMUNICAZIONE, GEOBLOG, WEBGIS, FORUM, and CONTATTI. Below this menu is an 'AREA RISERVATA' section with a login form containing fields for 'username' and a password field (represented by dots), and a right-pointing arrow button. Below the login form, there is a statistics section: 'Date since: 2010-09-01', '54.9% Italy (6312)', and '11497 visits from 57 countries'. The main content area features a large banner image of a wetland landscape with the text 'REWETLAND' and 'Widespread introduction of constructed Wetlands for a wastewater treatment'. Below the banner is a 'LATEST NEWS' section with a sub-header 'Approvazione del Programma di Ri Ambientale dell'Agro Pontino', a date 'Mercoledì 28 Agosto 2013', and a snippet of text: 'Con delibera n. 16 del 26 luglio 2013 è stato approvato dal Consiglio Provinciale di... d'indirizzo del... Leggi tutto...'. At the bottom right, there is a small logo for 'REWETLAND' and a larger logo for the 'Agro Pontino' region.

- Provides **geospatial data on the Internet**, using the analytical potentials of GIS software, and web-based functionalities such as visualization, querying and interpretation of georeferenced data
- Created with **OS products and solutions**
- Directly linked to the **geodatabase** (Postgress SQL)



- Is an **interactive communication tool** enabling users to insert comments, photos and videos linked to an exact geographical location, highlighting criticalities, environmental problems, unsustainable uses of resources, strengths, potentials, and proposals for environmental restoration
- Displays environmental restoration projects, on which citizens can express ideas, proposals and suggestions by **inserting comments directly on the map.**



- ARTECIPA
- PROVA
- COMMENTI
- LEGENDA
- P.PILOTA 1
- P.PILOTA 2
- P.PILOTA
- RESET



Nel mese di gennaio 2013, attraverso una convenzione tra l'Ente Parco Nazionale del Circeo e il Corpo Forestale dello Stato (CFS), e' stata affidata l'esecuzione delle opere all'Ufficio Territoriale per la Biodiversita' di Fogliano del CFS. Nel mese di gennaio sono stati effettuati i lavori di pulizia delle aree da destinare a cantiere rimuovendo la vegetazione spontanea infestante (rovetti, eucalitti, ... quattro pannelli informativi nei punti



It is a virtual exploration of the location of **Pilot Project 1** in the Circeo National Park, intending to show new perspectives for the **observation of the watercourses** crossing the Park's wetlands, from the most natural ones - memory of the original landscape - to the ones created during the REWETLAND project.

The visit concerns in particular the areas upstream of the Fogliano lake, among the canals and watercourses of the Great Land Reclamation of the Twenties.

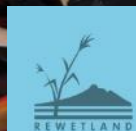


Workshops were organized to involve territorial actors in SWOT analysis and in the definition of the ERP objectives and actions.

### 3 Thematic Groups:

1. Ecological network, protected areas, water quality & protection of coastal areas
2. Management of urban areas - Marina di Latina project
3. Agricultural activities and good practices for water protection

Workshops involved around 200 people - Associations, Citizens, Professionals, Public bodies, Enterprises, University and Schools.



The REWETLAND tour reached **7 Municipalities** between February 2013 and March 2014.

The aim was to **actively involve citizens**, raising awareness, disseminating information and communication on the REWETLAND Project, the Environmental Reconstruction Programme and Pilot Projects in the Municipalities of the Agro Pontino.

In the different locations, a dedicated area was set up with **illustrative panels/totems**, an **information desk** and, if possible, a **demonstration phyto-depuration plant**, reproducing in scale the constructed wetlands.

A hostess provided information to visitors, distributed **information material** and **gadgets** and supported the compilation of **questionnaires**.





Promotional materials were prepared for the REWETLAND tour:

- Press releases on newspapers & magazines
- Project flyer
- Custom gadgets



A REWETLAND Facebook page was created in February 2013 and now has 735 FOLLOWERS and 743 LIKE.



Progetto LIFE+  
2008 - Rewetland  
@LifeRewetland

Home

Informazioni

Foto

Recensioni

Eventi

Post

Comunità

Crea una Pagina



👍 Mi piace    📡 Segui    ➦ Condividi    ⋮

Invia messaggio

✍️ Stato    📷 Foto/video

Scrivi qualcosa su questa Pagina...

Recensioni

5,0 ★★★★★ 2 recensioni

Organizzazione comunitaria a Latina

5,0 ★★★★★

Comunità

Mostra tutto

👤 Invita i tuoi amici a mettere "Mi piace" a questa Pagina

👍 Piace a 743 persone

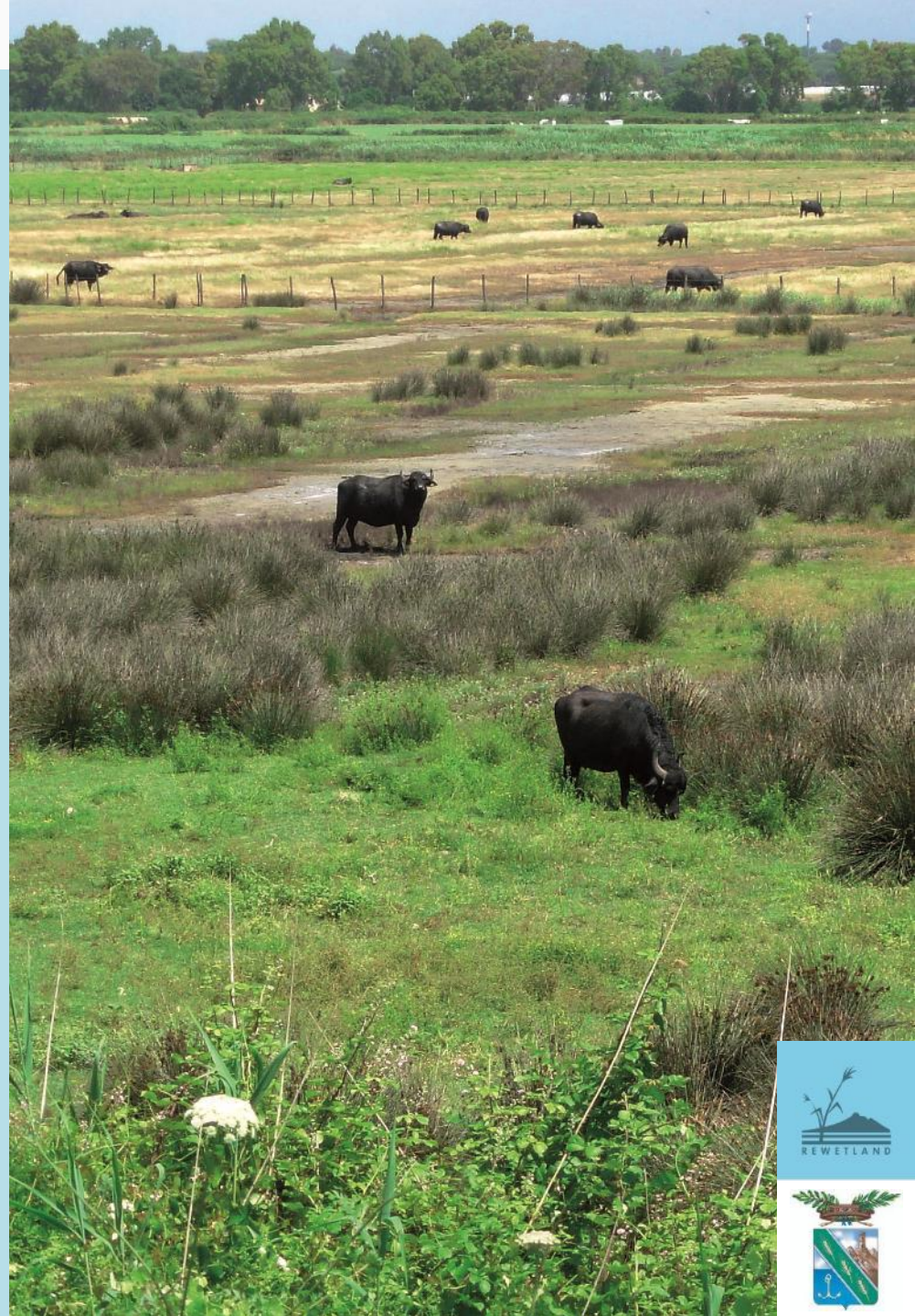
📡 Seguito da 735 persone



REWETLAND has been awarded "Best of the best" and "People's Choice" - LIFE Environment 2015



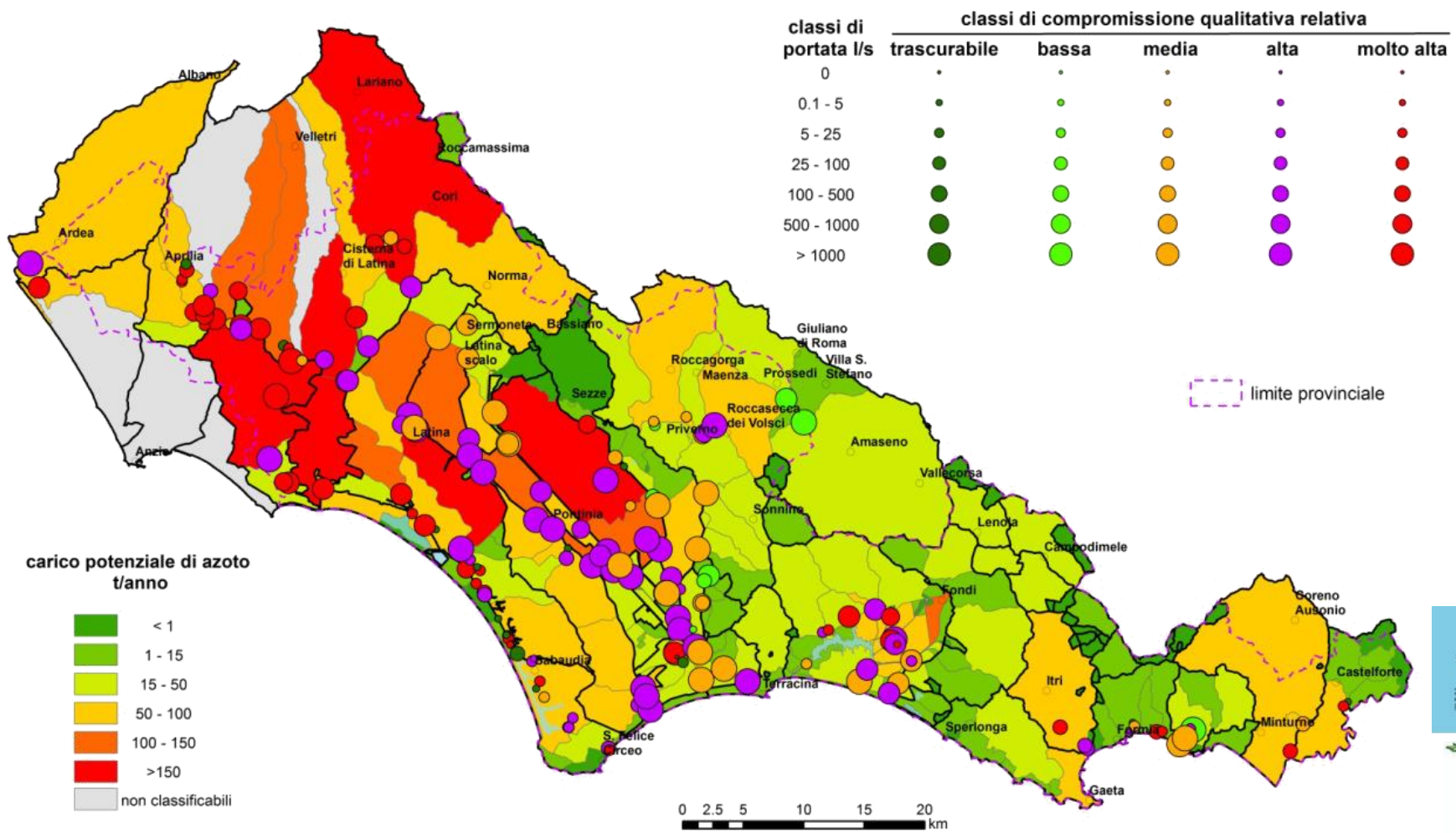
- **Creation of a shared strategy** for a wide-area environmental restoration, combining the demands of stakeholders - public administrators, professionals, researchers, farmers, entrepreneurs, students, citizens
- **Mainstreaming of the issues targeted** (water quality, ecosystem services...) into day-to-day lives and ordinary administrative practices
- **Greater collaboration** between public and private actors, diffusion of good practices and implementation of natural water purification interventions, which require little economic resources while ensuring considerable environmental benefits



# AFTER LIFE - WATER MONITORING

REWETLAND monitored the basic environmental parameters in the pilot projects sites, before and after the implementation of the projects.

The monitoring activity included continuous monitoring through 12 multi-parameter stations and 1 weather and climate station, along with manual sampling.



## List of environmental parameters measured

### CHEMICAL PARAMETERS

Total nitrogen  
Nitrogen dioxide (NO<sub>2</sub>)  
Nitrate (NO<sub>2</sub>)  
Ammonium (NH<sub>4</sub>)  
Total phosphorus  
Soluble phosphorus  
COD  
BOD  
Chlorides  
Sulphates  
SAR index: Na, Ca, Mg

### MICROBIOLOGICAL PARAMETERS

Escherichia coli  
Faecal streptococci

### CHEMICO-PHYSICAL PARAMETERS

Dissolved oxygen (mg/l and  
percentage of saturation)  
Temperature (°C)  
pH  
Turbidity  
Alkalinity  
Electrical conductivity

### BIOLOGICAL PARAMETERS

Macrophytes (IBMR)  
Diatoms (ICMi)  
Macroinvertebrates  
Ichthyofauna (ISECI)  
Amphibians - Reptiles  
Alien species (flora/fauna)  
Lists of flora

### PARAMETERS FOR SPECIFIC POLLUTANTS

Pb, Cr tot, Cu, Zn  
Hexachlorohexane  
Hexachlorobenzene  
Isodrin

### HYDROLOGICAL PARAMETERS

Water flow

### CHEMICAL PARAMETERS ON MOWED VEGETATION

Dry biomass  
Carbon  
Nitrogen  
Phosphorus

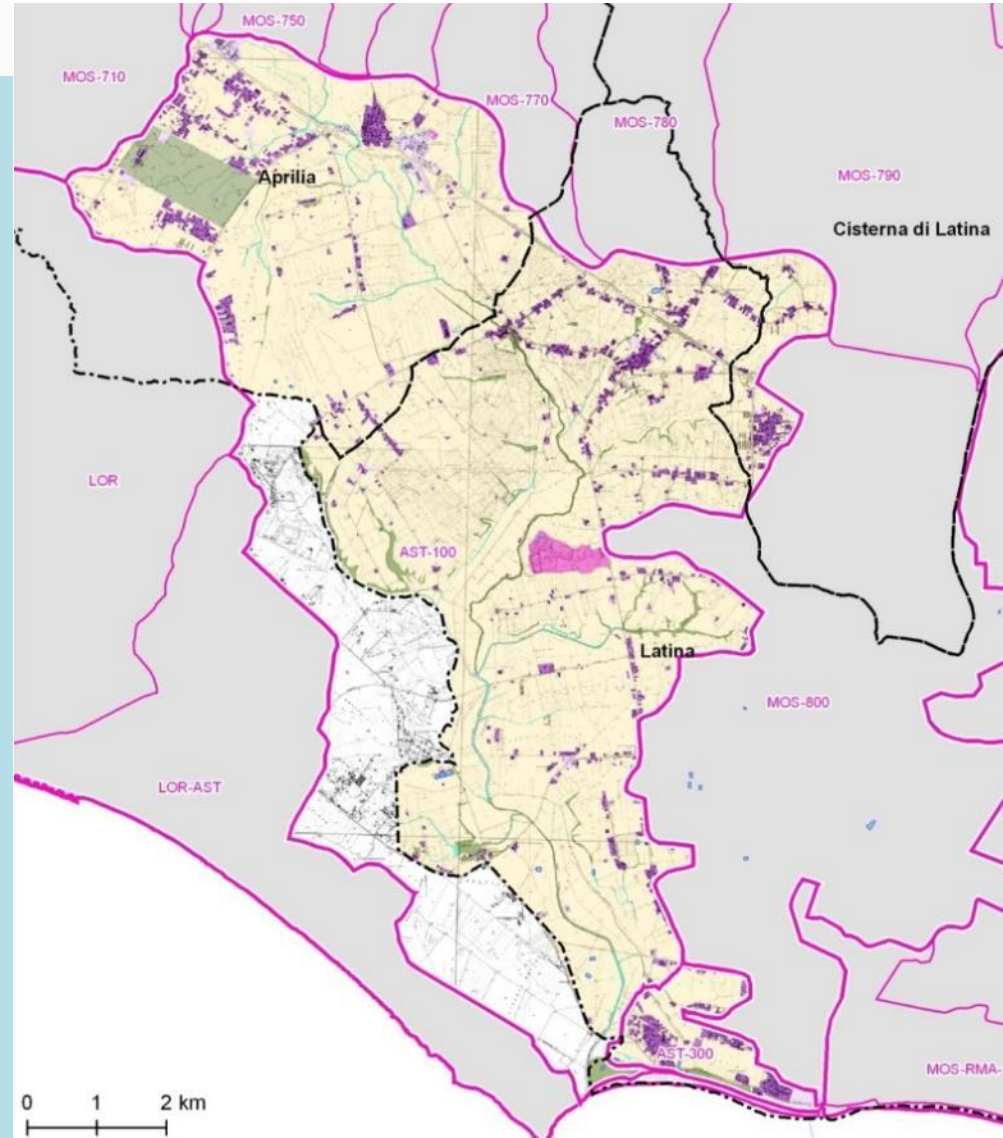
### CHEMICAL PARAMETERS OF SOILS AND SEDIMENTS

Ammonium  
Nitrogen dioxide (NO<sub>2</sub>)  
Nitrate (NO<sub>2</sub>)  
Total nitrogen  
Total phosphorus  
Organic carbon  
Texture  
Active carbon  
Cation exchange capacity  
pH  
Total carbonates  
Calcium  
Magnesium  
Potassium  
Iron  
Total suspended solids  
Organic nitrogen  
Total carbon  
Heavy hydrocarbons (C>12)  
Light hydrocarbons (C<12)  
Polychlorobiphenyls

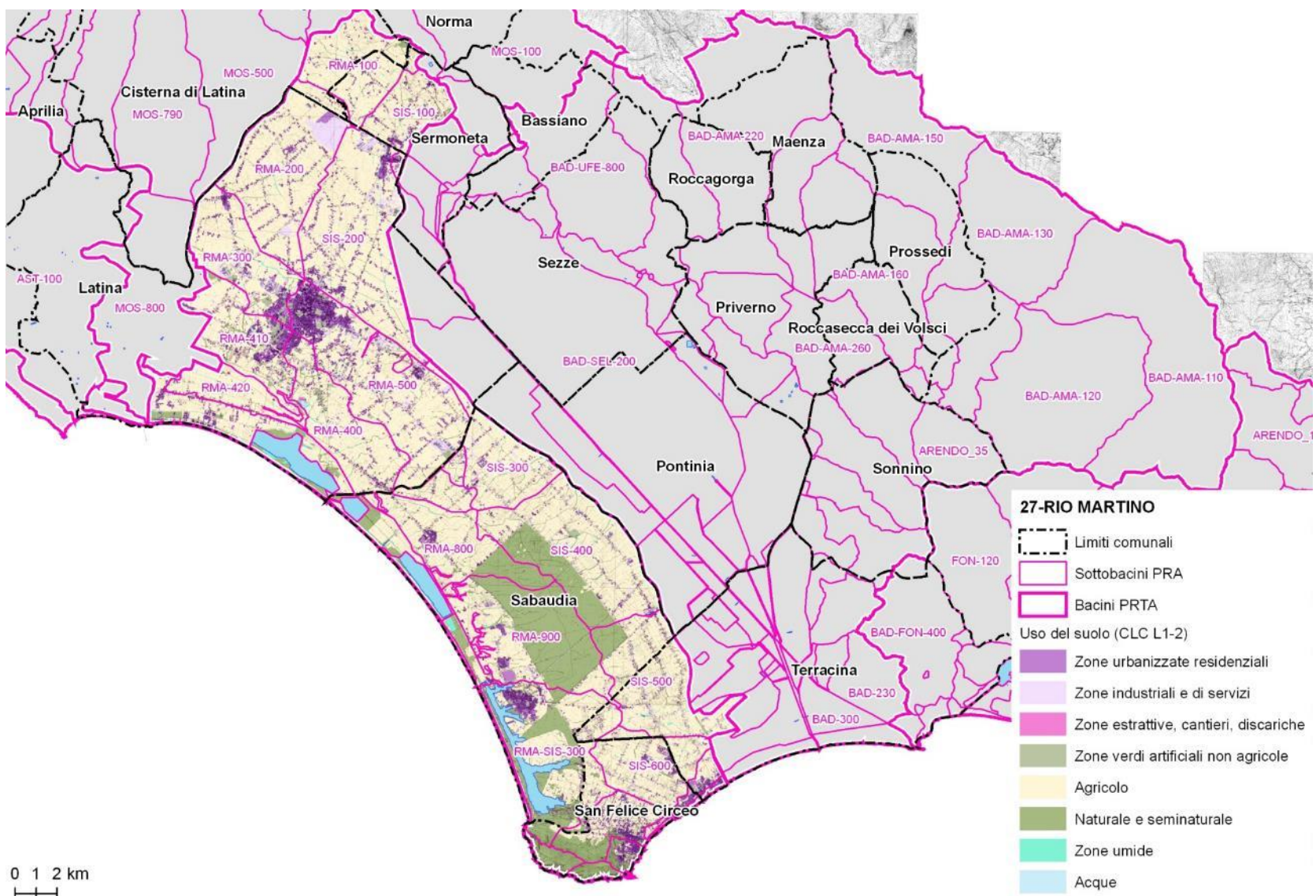


## AFTER LIFE: PROJECT FOLLOW-UP

- Starting from the results of the project, the Province of Latina will promote the **RIVER CONTRACT OF THE AGRO PONTINO** - a modern negotiated programming tool for the environmental restoration of river basins.
- According to the prescription of the Water Framework Directive, the Province will also be engaged in a continuous **MONITORING OF POLLUTANT LOADS**, allowing the identification of the most suitable actions among those defined by the ERP.
- Other actions will concern the **RECONVERSION OF THE FARMING SECTOR**, according to EU targets (20% reduction of pollutant emissions by 2020).



# RIVER CONTRACT CANALE ACQUE MEDIE-RIO MARTINO



**27-RIO MARTINO**

- Limiti comunali
- Sottobacini PRA
- Bacini PRTA

Usi del suolo (CLC L1-2)

- Zone urbanizzate residenziali
- Zone industriali e di servizi
- Zone estrattive, cantieri, discariche
- Zone verdi artificiali non agricole
- Agricolo
- Naturale e seminaturale
- Zone umide
- Acque

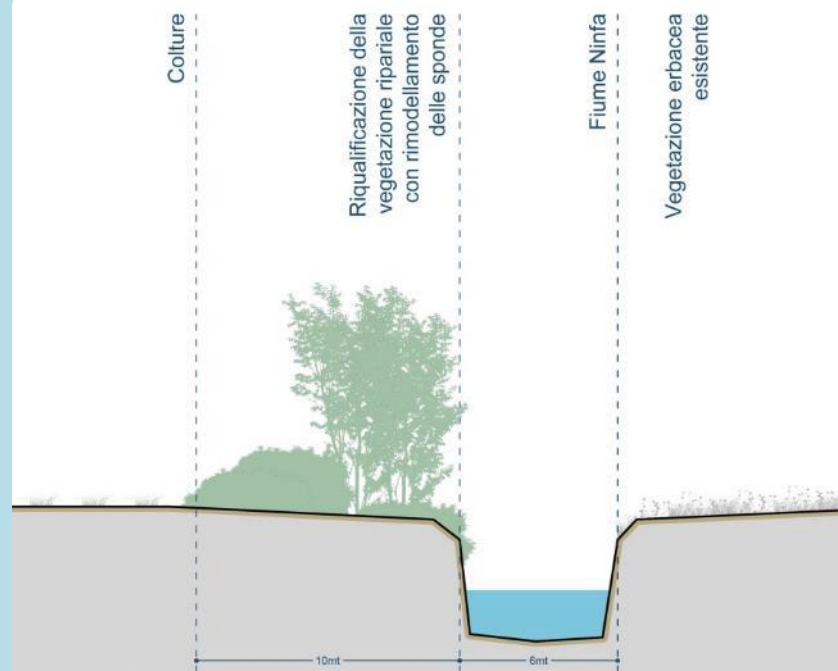
0 1 2 km



The Province of Latina is currently preparing the project proposal “**LIFE GREENCHANGE - Green infrastructures for increasing biodiversity in Agro Pontino and Maltese rural areas**”, which will be submitted to the current LIFE Biodiversity call for proposals, in September 2017.

GREENCHANGE intends to contribute to Objective 2 of the EU 2020 Biodiversity Strategy, by improving the **ecological network in the Province of Latina and in the Maltese island**, through the **restoration of natural and semi-natural areas** currently in a bad state of conservation, and the **development of an innovative approach to farming activities**, able to enhance their contribution to the maintenance of biodiversity.

The project actions aim at establishing a **system of Green Infrastructures**, starting from the mapping and assessment of **ecosystem services** in the Agro Pontino and in the Maltese rural areas.







# REWETLAND - Widespread introduction of constructed Wetlands for a wastewater treatment of Agro Pontino



***THANK YOU FOR YOUR ATTENTION***

<http://www.rewetland.eu>

