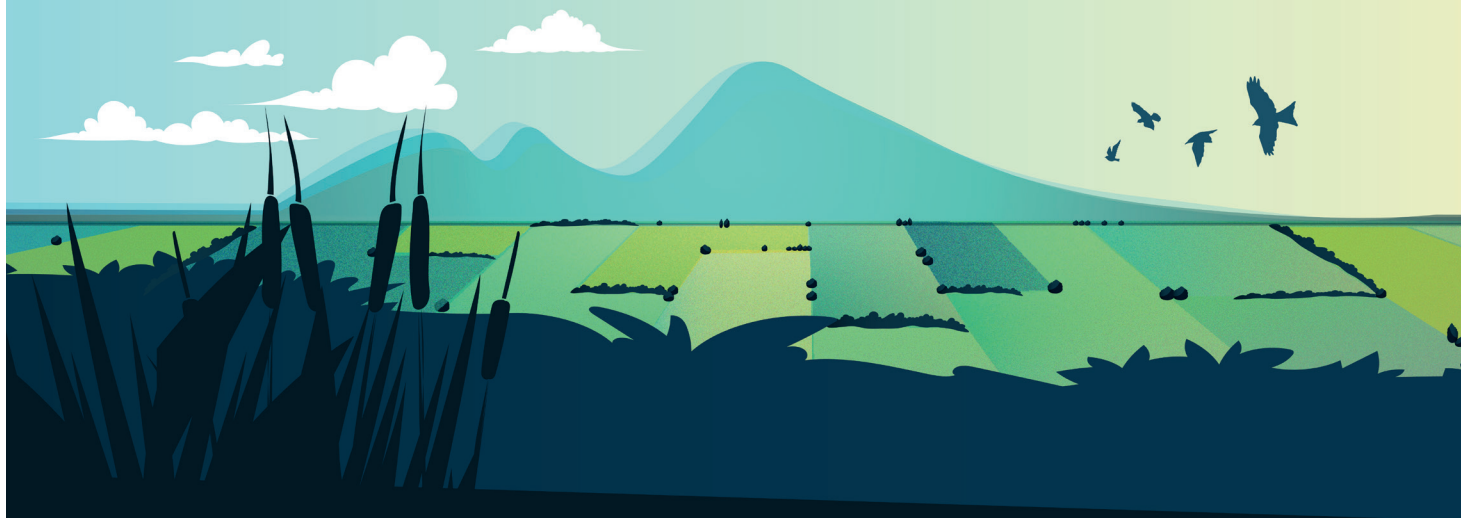




greenchange



LAYMAN'S REPORT

LIFE GREENCHANGE – GREEN INFRASTRUCTURE FOR INCREASING
BIODIVERSITY IN AGRO PONTINO AND MALTESE RURAL AREAS
(LIFE17 NAT/IT/000619)



The LIFE GREENCHANGE wetland
area in Gelasio Caetani farm
Photo: Giovanni Mastrobuoni

Cover design: Martina Zanuzzi

In line with the EU Biodiversity Strategy to 2030 and with the Communication from the Commission on Green Infrastructure, GREENCHANGE aims to counteract the loss of biodiversity and to enhance the ecological value of the agro-ecosystems in the Agro Pontino and in the Maltese Islands, by planning and implementing green infrastructure and multi-functional interventions in rural, semi-natural and natural areas.

Graphic design: Matteo Prati



Localisation of LIFE GREENCHANGE target areas.

Launched in 2018 and co-funded by the European Union, the LIFE GREENCHANGE project carried out demonstration and governance actions for a total amount of more than 3 million euros, which mainly resulted in the implementation of green infrastructure and multi-functional interventions in rural, semi-natural and natural areas. The aim was to contribute to halting the loss of biodiversity and to enhance the ecological value of the agricultural systems. To this extent, the project partnership worked to restore the typical elements of the target rural landscapes: canals and windbreaks

in the Pontine plain, rubble walls in the Maltese Islands.

LIFE GREENCHANGE also worked to integrate ecological functionality and connectivity goals into the management of agro-ecosystems, by involving public entities and farmers through the adoption of governance tools such as the land stewardship agreements and the Pact for Biodiversity.

The enhancement of the functionality and ecological connectivity in pilot agricultural areas allowed for the creation of green infrastructure, of

new core and buffer areas, and of ecological corridors between them, thus contributing to the implementation of the EU Directives 'Habitat' and 'Birds'.

LIFE GREENCHANGE also allowed to mitigating the environmental impact of agricultural activities, especially in areas of high natural value, increasing their contribution to the maintenance and enhancement of ecosystem services through dissemination, education, participatory and awareness-raising actions targeting farmers and the general public.

Green infrastructure

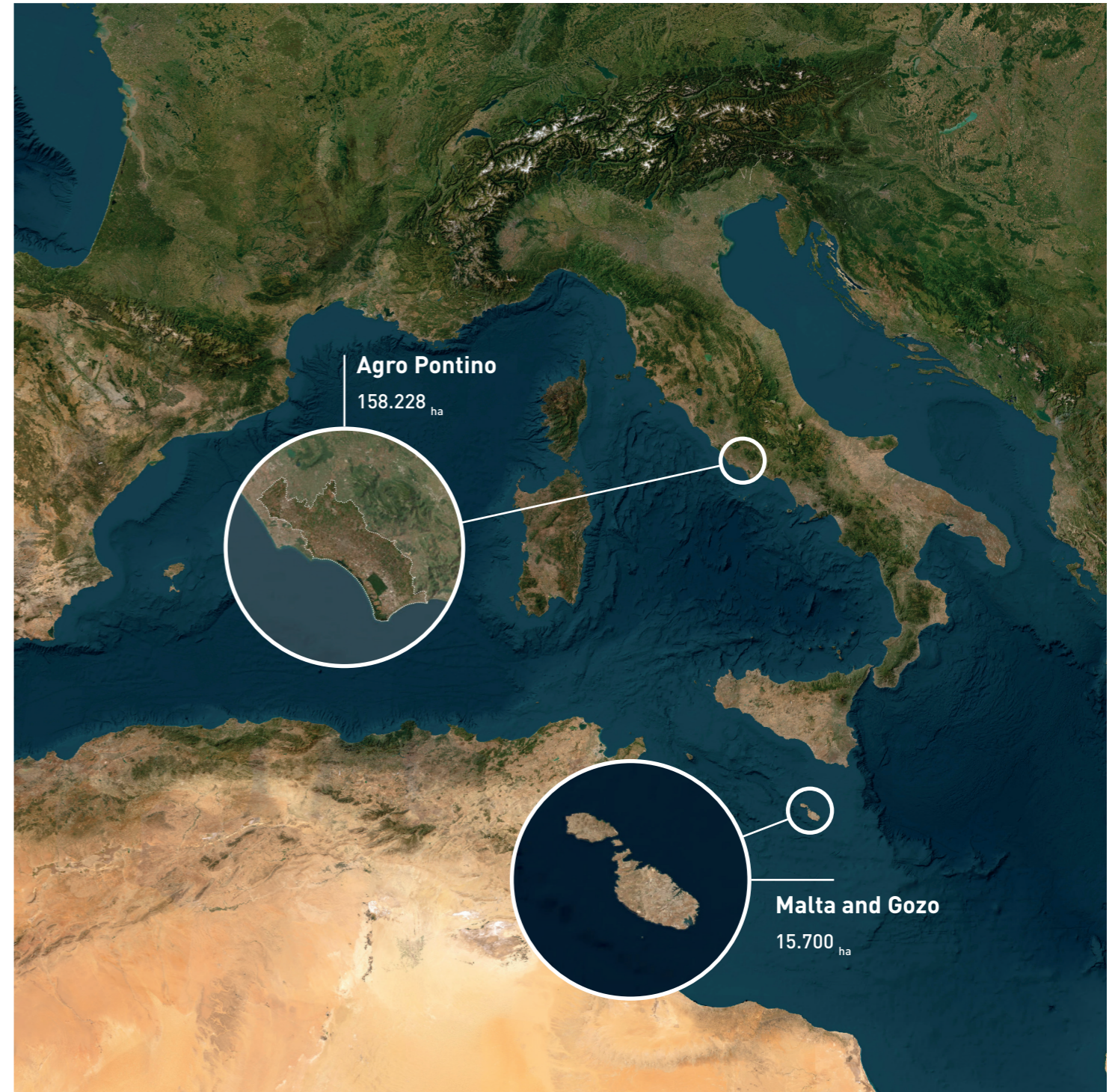
Green infrastructure: a strategically planned network of natural and semi-natural areas with other environmental features designed and managed to deliver a wide range of ecosystem services. It incorporates green spaces (or blue if aquatic ecosystems are concerned) and other physical features in terrestrial (including coastal) and marine areas. On land, GI is present in rural and urban settings.

[from COMMUNICATION FROM THE CE Green Infrastructure, Enhancing Europe's Natural Capital - COM/2013/0249]

Ecosystem services

Ecosystem services are the benefits people obtain from ecosystems. These include provisioning services such as food, water, timber, and fiber; regulating services that affect climate, floods, disease, wastes, and water quality; cultural services that provide recreational, aesthetic, and spiritual benefits; and supporting services such as soil formation, photosynthesis, and nutrient cycling.

[from Millenium ecosystem assesment, 2005]



Agro Pontino, Italy

The Agro Pontino, located in the Lazio Region in Italy, is a fertile coastal plain once marshy and insalubrious, which is today an agricultural landscape rich in biodiversity. LIFE GREENCHANGE's pilot interventions have generated here a significant enrichment of the agricultural mosaic, and an important regeneration of the linear components of the rural landscape.

Interventions have been based on the principles of restoration ecology. In particular, the project focused on improving the ecological functionality of the minor hydrographic network, by re-designing the banks of the canals and restoring the riverine vegetation. New lentic, arboreal and shrub-like habitats have been created, and windbreak strips have been enhanced, thus improving an essential feature of the Pontine natural heritage.

- **Municipality of Pontinia**
Hydraulic diversion of the Ufente River (C3)
- **Municipality of Cisterna di Latina**
'Garden of Ninfa' Natural Monument – Pantanello area (C4)
- **Municipality of Sezze**
'Roana' livestock farm (C7)
- **Municipality of Latina**
'Gelasio Caetani' farm (C5)
'Ganci' farm (C6)
'Agrilatina' farm (C6)
Windbreak strips (C8)

1. View of the Circeo Promontory, Watercolour by Jessica Brighenti

2. Location of LIFE GREENCHANGE pilot sites in the Agro Pontino



1. Ghajn Tuffieha, Malta.
Photo: Ferenc Horvath

2. Location of the pilot sites
in the Northern area of Malta
and in Gozo Island



Malta and Gozo

LIFE GREENCHANGE involves the northern region of Malta (9,025.96 ha) and the island of Gozo (6,700 ha), two regions with a strong agricultural vocation. In particular, the north of Malta is covered 58% by agricultural land, mainly annual crops. The presence of agricultural ecosystems in Gozo is even greater: these in fact cover 61% of the island's total area of which 80% is represented by annual crops; here it is possible to find the few arboreal belts present, as well as agricultural areas afforested with eucalyptus and acacias. Areas hosting interventions are:

- **Ta' Mena Estate.** An area of 7.3 hectares on the island of Gozo, cultivated mainly with olive trees, vineyards and barley, and partly used as a farmhouse and event venue.
- **Ta' Fardala.** A small agricultural area in Gozo, with a total area of 0.6 hectares, mostly cultivated with olive trees, barley and vegetables. The rest of the area is partly covered by surface water and partly used for beekeeping.
- **Ta' Canti.** An agricultural area of 1.7 hectares in Gozo, completely cultivated with vines and barley.
- **Ghajn Damma.** An area of 0.79 hectares in Gozo, cultivated with lemons and olives and partly used for agro-tourism.
- **Xlendi.** 0.7 hectares within the Natura 2000 site L-Inħawi tax-Xlendi u tal-Wied tal-Kantra in Gozo, which is home to both vegetable crops and an agro-tourism business.
- **Manikata.** A small area of organic farming in northern Malta, with a total area of 0.67 hectares, cultivated mainly with vegetables. Part of the area is managed by the local cooperative 'Koperattiva Rurali Manikata', which regularly organizes education and awareness-raising activities on environmental issues.



The Agro Pontino pilot sites

Foto 1, 2, 4: Giovanni Mastrobuoni
Foto 3, 5: Mattia Azzella



Environmental Restoration of wetland ecosystem along the Ufente River

The intervention in the Municipality of Pontinia regards an area of around 20 ha, corresponding to the hydraulic diversion of the Ufente River, situated inside the SPA IT6030043 'Lepini Mountains' and bordering the SCI IT6040003 'Gricilli Lakes'. The planar environment has been reshaped through shallow excavations aimed at creating wetlands, hygrophilous and mesophilous woods, stable meadows and equipment for the fruition of the site.



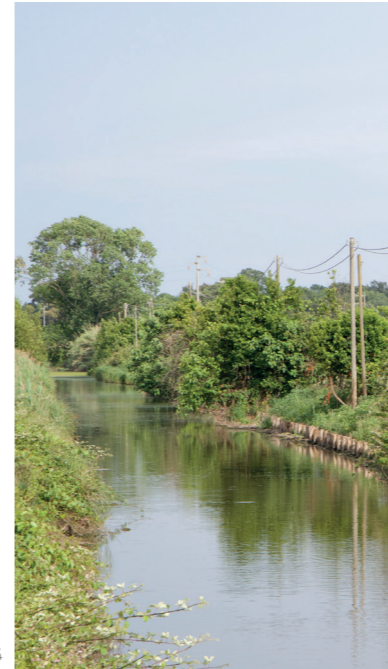
Improvement of ecological functionality and increase of biodiversity in the 'Garden of Ninfa' Natural Monument – Pantanello area

The intervention is hosted by the 'Roffredo Caetani' Foundation, in the Municipality of Cisterna di Latina. In order to enrich the ecosystems mosaic within the Pantanello wetland (a former agricultural area re-naturalized between 2003 and 2009 and now annexed to the 'Garden of Ninfa' Natural Monument), the project has developed arboreal and shrub-like structures, both linear and areal, and has created a didactic pond, basking sites, floating islets and refuges for amphibians.



Construction of green infrastructures in the 'Gelasio Caetani' farm

The intervention is hosted by the 'Gelasio Caetani' farm in the Municipality of Latina, and involves the restoration of the Epitaffio canal and of some minor drainage canals, for a total length of more than 3 km. The existing poplar grove has been thinned out by planting hygrophilous species, thus creating a wetland working as a nesting site for egrets, and a windbreak strip of about 400 m has been planted.



Restoration of the Cicerchia and Allacciante canals

The intervention, hosted by the farms 'Ganci' and 'Agrilatina' in the Municipality of Latina, resulted in the planting of new hygrophilous woodland around the existing basin, and in the restoration of the Allacciante canal, by reshaping the banks through the application of bioengineering techniques and the planting of hygrophilous vegetation. Hedges for pollinators have been installed as well.



Environmental requalification in livestock farms

The intervention involves an area of 115 ha, entirely cultivated and privately owned by the 'Roana' farm holding. Within the site, located in the Municipality of Sezze, around 2 km of minor drainage canals have been restored.



Lake Pani

At the headwaters of the Ufente river, which flow into Lake Pani, located in the Municipality of Sezze, the project has recovered some natural hygrophilous and hydrophilous habitats, increasing the environmental heterogeneity and ecological functionality of the area.

1. Western marsh harrier (*Circus aeruginosus*).
2. Black-winged stilt (*Himantopus himantopus*).
3. Green frog (*Pelophylax esculentus*).
4. European pond turtle (*Emys orbicularis*).

Photos: Giovanni Mastrobuoni

Benefits for the conservation of species and habitat

Greenchange has implemented environmental improvement interventions aimed at increasing the ecological quality of the Agro Pontino, of Northern Malta and of Gozo, increasing the availability of sites of naturalistic value in the rural matrix to help mitigate the effects of the fragmentation due to infrastructure, urban sprawl and intensive agriculture. Wetlands and temporary flooded areas were created, restoring strips of hygrophilous vegetation and habitats of conservation interest such as temporary Mediterranean ponds (habitat 3170*) and mixed riparian forests (habitat 91F0), in order to recreate ecological systems once widespread and then disappeared due to land reclamation and intensive agriculture. In the Agro Pontino, the new sites contribute to improving the territorial connectivity, favouring functional exchanges between the large natural areas along the littoral - the Circeo promontory and the coastal lakes - and

the Lepini Mountains in the hinterland. Many fauna species have quickly demonstrated their appreciation of the environmental improvements generated by the interventions. In the area of the Ufente river diversion, the project has created a highly heterogeneous system to be used for reproduction, resting, refuge and feeding. More than 90 species of birds have been observed - compared to the 57 contacted before the intervention - some of which are of community interest or in an unfavourable state of conservation at a national level, such as the African stonechat *Saxicola torquatus*, the Woodchat shrike *Lanius senator* and the Moustached warbler *Acrocephalus melanopogon*. The area is regularly frequented by eight species of Ardeidae, including the Purple heron *Ardea purpurea* and the Little bittern *Ixobrychus minutus*. The environmental improvements have also had a very positive effect on bats, for which both the

number of species and the abundance indices have more than doubled. Within the Caetani farm, the rehabilitation of the Epitaffio canal and the creation of a new wetland have greatly enriched the environmental heterogeneity and ecological value. This rural area is now frequented by 12 species of Odonata and 47 species of birds, including species of aquatic environments such as the Kingfisher *Alcedo atthis*, and birds of prey such as the Eurasian hobby *Falco subbuteo* and the Peregrine falcon *Falco peregrinus*. In the Pantanello Park, the implemented interventions aimed at increasing the environmental suitability for the European pond turtle *Emys orbicularis*. The ex post monitoring confirmed the importance of this site for the conservation of one of the most threatened species of our fauna. New wooded areas have significantly increased the suitability for bats, as demonstrated by the observation of no less than 11 species.



1



2



3



4

Guidelines for the management of irrigation canals in the agro-environmental systems

LIFE GREENCHANGE has produced the 'Guidelines for the environmental management of the drainage canals and of the small and medium-sized rivers and streams', within the framework of a governance tool called 'Pact for Biodiversity', aimed at creating the conditions (in terms of partnership, sharing of intents and co-responsibility) for increasing the functionality and ecological connectivity of the rural territory. This technical manual provides practical suggestions to farmers and bodies in charge of canals maintenance, enabling them to take action against the loss of biodiversity and for increasing the ecological

value of agricultural systems in the Agro Pontino. In particular, based on a multi-purpose and integrated approach, the Guidelines define possible measures to manage the canals network in such a way as to protect biodiversity whilst tackling different problems such as flood risk, low water quality and banks instability. Proposed measures include the widening of the watercourses sections, the creation of floodable basins, the consolidation of banks through bioengineering techniques, the installation of arboreal buffer strips, the creation of wetlands, and the sustainable management of water plants. All these measures

aim at increasing the space available for artificial canals and natural watercourses, and at maintaining and increasing their ecological functionality. This approach acknowledges a long-time EU priority in water management, namely the implementation of every possible synergy between the ecological quality targets of watercourses and the reduction of risks.

The Epitaffio canal.
Photo: Giovanni Mastrobuoni



LIFE GREENCHANGE has carried out some of the most extensive restoration ecology interventions completed so far in Italy, increasing the ecological quality of agricultural areas and reconstituting habitats rich in biodiversity but highly threatened throughout the Country, such as wetlands. It is a very interesting result and in line with the most recent EU policies which strongly push - for example with the Nature Restoration Law - towards the restoration of ecosystems, as an essential element to guarantee lasting well-being of populations of Member States.

Giuseppe Dodaro, CIRF - LIFE GREENCHANGE partner

The Pact for Biodiversity for the Agro Pontino

The Pact for Biodiversity represents, along with the demonstration interventions, the core of the LIFE GREENCHANGE conservation actions.

The Pact is intended as a collaborative governance tool, aimed to promote the activation of decision-making processes based on the identification and evaluation of ecosystem services. It has been conceived as an open and permanent working table to share and optimize rural areas management practices, with the purpose to increase their level of functionality and of ecological connectivity.

This working table involves all the signatories of the Memorandum of Understanding of the Pact: the Province of Latina, the Lazio Region (with the departments in charge of

Agriculture, Environment, Public Property, and Programming), and the bodies in charge of territorial maintenance, such as the Reclamation Consortium of Southwest Lazio, the managing body of the Circeo National Park, the Municipalities, and the farmers associations (mainly Confagricoltura, CIA, and Coldiretti).

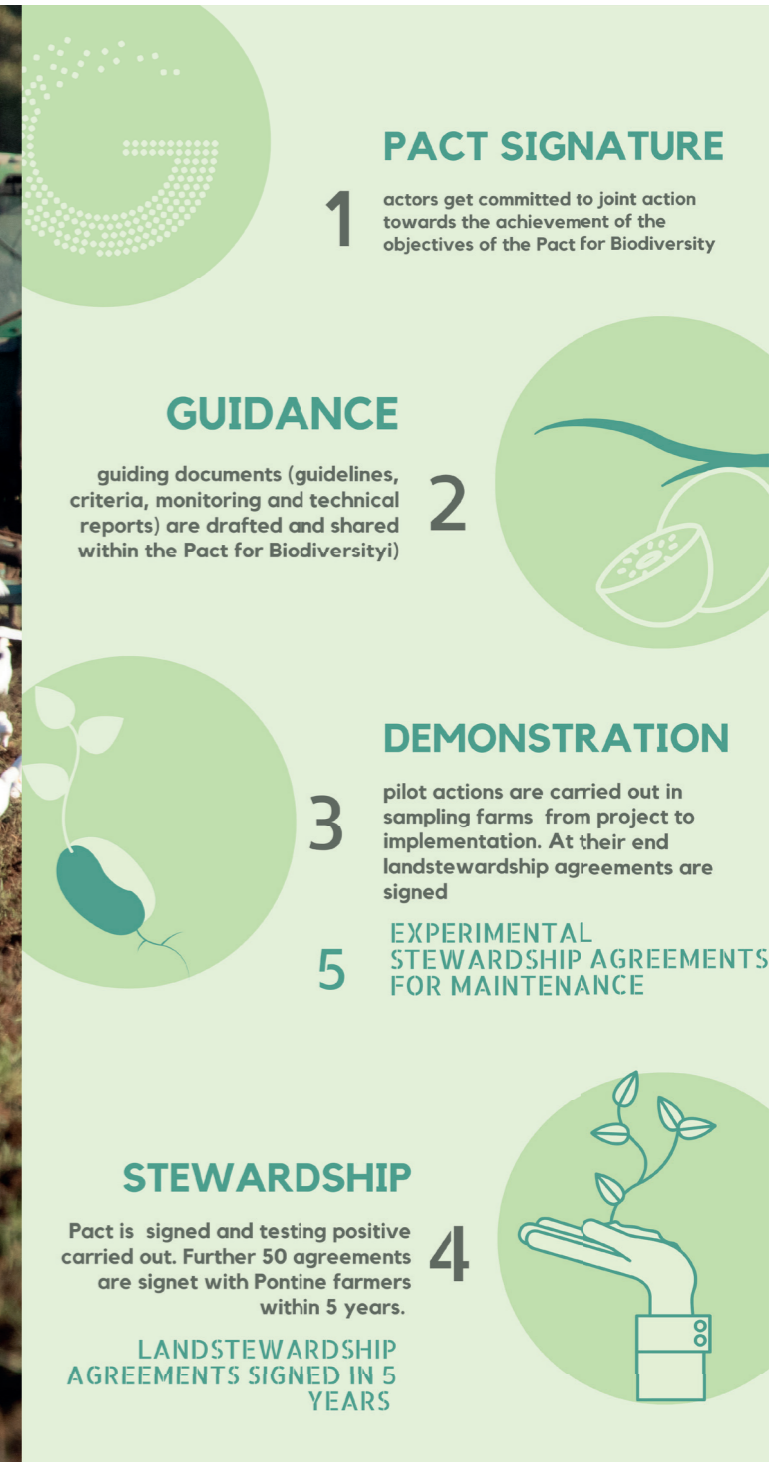
The Pact aims to promote an effective use of the CAP's agro-environmental resources for the implementation of green infrastructure, by testing innovative contractual forms oriented to land stewardship and, in general, to foster more sustainable agricultural practices.

To do so, it is necessary to work together, in order to:

1. Cattle egrets following a tractor.
Photo: Giovanni Mastrobuoni

2. Layout of the implementation process of the Pact for Biodiversity in the Agro Pontino

- align the existing planning and programming instruments and build a common vision that plans, programs and initiatives may converge on;
- update territorial maintenance criteria and techniques, orienting them towards the conservation and restoration of ecosystem services;
- develop shared rules for the environmental management of actions involving irrigation canals and windbreak strips;
- create the conditions to maximize the actions' effectiveness in a wider perspective, and contribute to the establishment of the ecological network;
- stimulate the active participation of farmers through tools to facilitate access to finance.



The Land stewardship agreements in LIFE GREENCHANGE

Land Stewardship (LS) is a strategy for the conservation of nature and territory that aims to benefit both landowners/farmers, and the community as a whole. The strategy is centred on voluntary agreements between landowners/users and land stewardship organizations, which take the form of contracts to be adapted to local legislation and to the types of subjects involved. LIFE GREENCHANGE has applied the LS concept to involve farmers in the maintenance and ecological management of the secondary network of irrigation canals and of the publicly owned windbreak strips in the Agro Pontino, and in the restoration and maintenance of the valuable landscape elements represented by rubble walls in the Maltese islands. After having developed replicable agreement models, specific agreements for the maintenance of

demonstration interventions were signed, where each farm holding involved commits to manage the green infrastructure implemented by LIFE GREENCHANGE according to shared rules. The aim was to demonstrate that implementing and maintaining ecological connections in active and productive farm holdings is economically feasible and sustainable. Promoted within the framework of the Pacts for Biodiversity, Land stewardship agreements result from a negotiation and collaboration process between public and private bodies, bringing benefits to all involved subjects. In particular, the mechanism that was tested in the Italian target area establishes that the Lazio Region transfers to farmers parts of publicly owned watercourse banks or windbreak strips on loan for use. By transferring to private subjects the secondary hydro-

graphic network's maintenance obligation, the public administration can save economic resources that can be used to maintain and restore the primary network and implement higher priority actions. Thanks to this mechanism, the Province of Latina can promote the implementation of its own planning and programming instruments, channelling resources towards governance, monitoring and control activities, as well as towards the implementation of strategic interventions. Lastly, farmers get the opportunity to use the transferred land (which concurs to widen the total area of their parcels) to comply with the CAP eligibility criteria on greening and get easier access to agro-environmental measures.

Graphic layout of the operation of Land stewardship agreements in LIFE GREENCHANGE

The rural territory of the Agro Pontino, watercolour by Jessica Brighenti



Guidance and training for farmers

In order to promote the implementation of the Pact for Biodiversity and the dissemination of Land stewardship agreements, various training and orientation tools have been activated: an information desk at Confagricoltura Latina, an IT tool in a GIS environment to support the identification of interventions, guidelines and technical documents, laboratory modules dedicated to farmers.

The latter were developed through a cycle of 5 meetings at the headquarters of Confagricoltura Latina.

Each 4-hours' workshop involved about 10/15 farmers, sharing the same sector of intervention: in fact, participants included the young farmers of ANGA Latina, as well as holdings working in the livestock sector, in extensive agriculture and olive growing, arboreal and kiwi ag-

riculture, horticulture.

The contents of the training focused on the importance of the ecosystem functionality of agricultural areas, on the role of ecosystem services and on the possibility of enhancing them by creating green infrastructure. The potential of green infrastructure for corporate economic sustainability and the opportunities deriving from agro-environmental and climate payments and from greening were illustrated as well.

Finally, the available sources of funding to support and implement the proposed agricultural practices were presented, and the functioning of the new Common Agricultural Policy (CAP) and of the new Rural Development Complement was explained.

The training activities implemented by LIFE GREENCHANGE at Confagricoltura's headquarters



Education and awareness-raising in the schools of the Agro Pontino

Part of the educational activities of LIFE GREENCHANGE were addressed to the younger generation, and involved 46 students of the VET Institute 'San Benedetto', belonging to three classes of agrarian studies. The training was implemented as an integrative activity, combined with the disciplines 'Management and enhancement of productive activities, territorial development and rural sociology' and 'Vegetal produces'. The activity lasted 2 years, covering the school years 2020-2021 and 2021-2022. Training modules were structured around two macro-themes: the first module illustrated the concept of ecosystem services and the relationship between agriculture and biodiversity in the Pontine plain; the second one re-

garded the design, implementation and integration of new green infrastructure at the Institute's premises.



Classes of VET Institute 'San Benedetto' (Latina) visiting the pilot sites of LIFE GREENCHANGE

The spring of the Ufente River.
Photo: Giovanni Mastrobuoni

Contributors to the implementation of the LIFE GREENCHANGE project are listed below, in alphabetical order per partner:

For the Province of Latina:

Rita Calabresi, Mariana Chiota, Roberta Sesta De Benedetto, Armando Di Biasio, Claudia Di Troia, Elena Ganelli, Matteo Lovato, Luigi Matteoli, Massimo Monacelli, Antonio Nardone, Alberto Russo, Enrico Sorabella, Nicoletta Valle, Fabio Zaccarelli.

For CIRF:

Elena Dan, Giuseppe Dodaro, Alessandro Errico, Laura Leone, Andrea Goltara, Bruno Golfieri, Giancarlo Gusmaroli, Marco Monaci, Gianna Pacini, Alexander Palummo, Linda Pareschi, Giuliano Trentini.

For Poliedra:

Gabriella Atzeni, Federica Benelli, Alberto Colorni, Selene Cremonesi, Mara Cossu, Elena Girola, Laura Guadagnini, Federica Lamberti, Eliot Laniado, Valerio Mazzeschi, Camilla Munno, Silvia Pezzoli, Carlotta Sigismondi, Nicola Taverniti, Enrica Zucca.

For Confagricoltura:

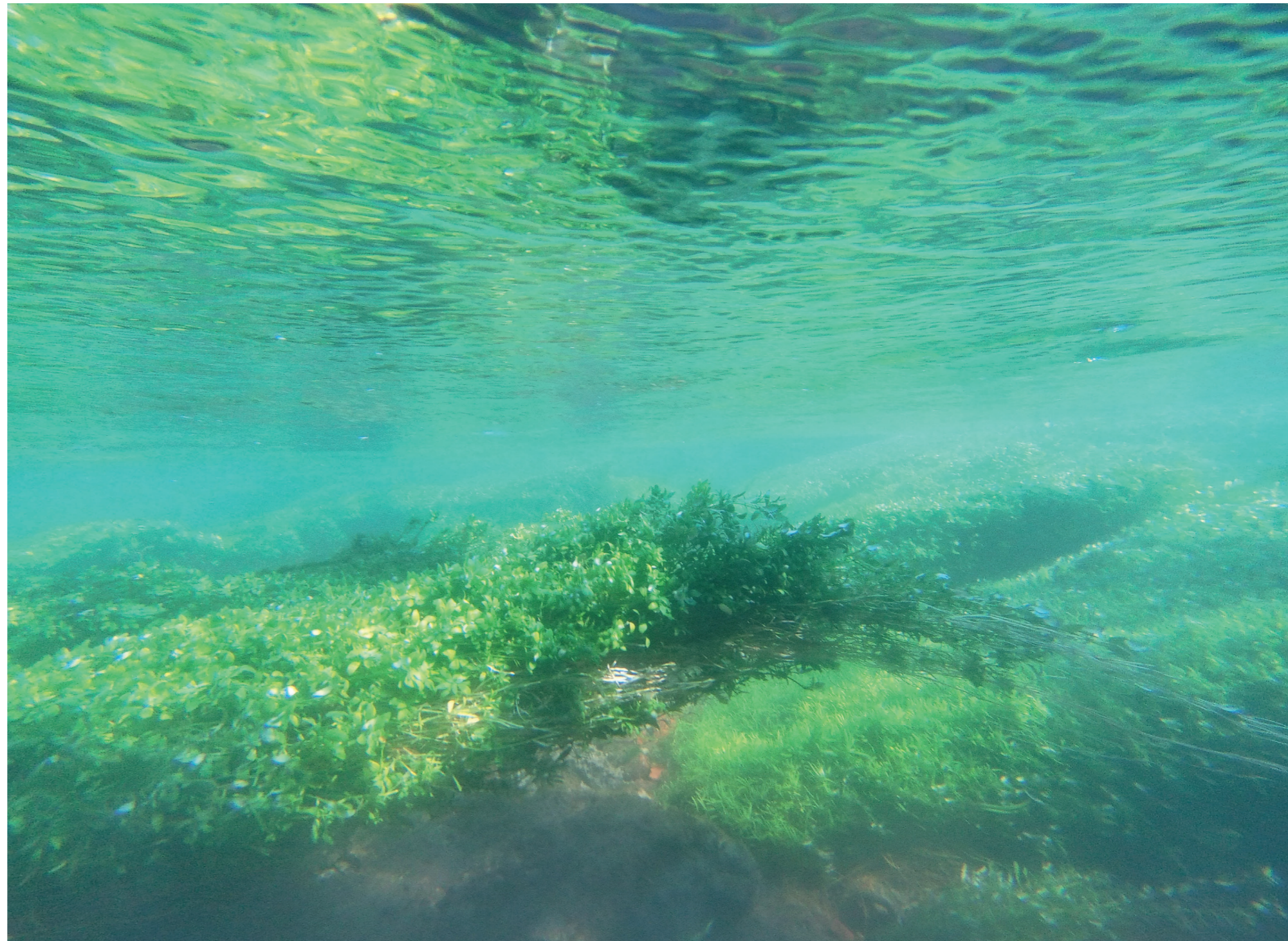
Catia Antonietti, Claudio Carpineti, Gabriele Cotesta, Simonetta Dario, Mauro D'Arcangeli, Emilio Giovangrossi.

For MIEMA:

Aimee Borg, Diane Cassar, Federica Di Pietrantonio, Jason Masini, Stephen Micallef, Stephen Mifsud, Carolina Pozzi, Matteo Prati, Daria Quaresima, Jesmond Xuereb.

For U-Space:

Giacomo Aleffi, Mattia Azzella, Lorenzo Barbieri, Jessica Brighenti, Flavio Camerata, Maddalena Cardarelli, Silvia Cataldo, Giuseppe De Marco, Anna Paola Di Risio, Raul Enzo Fedeli, Ilaria Fondi, Stefano Magaudda, Giovanni Manco, Giovanni Mastrobuoni, Serena Muccitelli, Stefano Mugnoz, Sandra Peluso, Giovanni Salerno, Serena Sapio.





greenchange



LIFE GREENCHANGE project,
started in July 2018 and
ended in June 2023
co-financed by the European
Commission within the framework
of the LIFE Programme

Partners

Province of Latina
Poliedra
CIRF
U-Space srl
Miema
Confagricoltura Latina



lifegreenchange.eu