This wetland is one of the different typical parts of prehistoric Po Valley, that was recreated in 1996 in the renaturalized areas of the project – photo: NeoruraleHub

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GRÜNE LIGA Netzwerk Ökologischer Bewegungen

REDUCTION OF DIFFUSE NUTRIENT INPUTS

Environmental Field Margins: this is the used agronomic system of ecosystems put alongside the crop fields. It is place for biodiversity's growth and helps cultivations to be protected against parasites. Moreover, it was redesigned according prehistorical Po Valley and it can be enjoyed by runners or cyclists. – photo: NeoruraleHub

Restoration of Aquatic Ecosystems, Wetlands and Buffer Zones within an Intensive Farming Area in the Po Valley

Since 1996, the farms of the 'NeoruraleHub' in Northern Italy are designating part of the productive areas to the restoration of wetlands, woodlands and meadows while carrying on their agricultural activities. The project locates the environmental restoration function to the rice field margins. They are about 15 to 30 meters wide. The rice field margin system provides both environmental services and benefits to the agricultural production by allowing a better management of the pests and weeds without the use of external inputs. In few years, local biodiversity has increased consistently.

- **keywords: Agri-environmental measures, Ecological Focus Areas, rice field margins, biodiversity conservation, sustainable weed and pest control, buffer strips, nutrient reduction, wetlands**

Pressures / Drivers

The industrialization of agriculture since the second half of the 20th century led to the pollution of soil and water and to the expansion of the agriculture land with consequent loss of natural ecosystems. In the Po valley floodplains, the paddy fields became intensive monocultures relying on the use of chemical inputs. In addition to these pressures, the area is currently suffering from the progressive loss of agricultural land due to the high degree of urbanization of the Lombardian region.

Quality elements

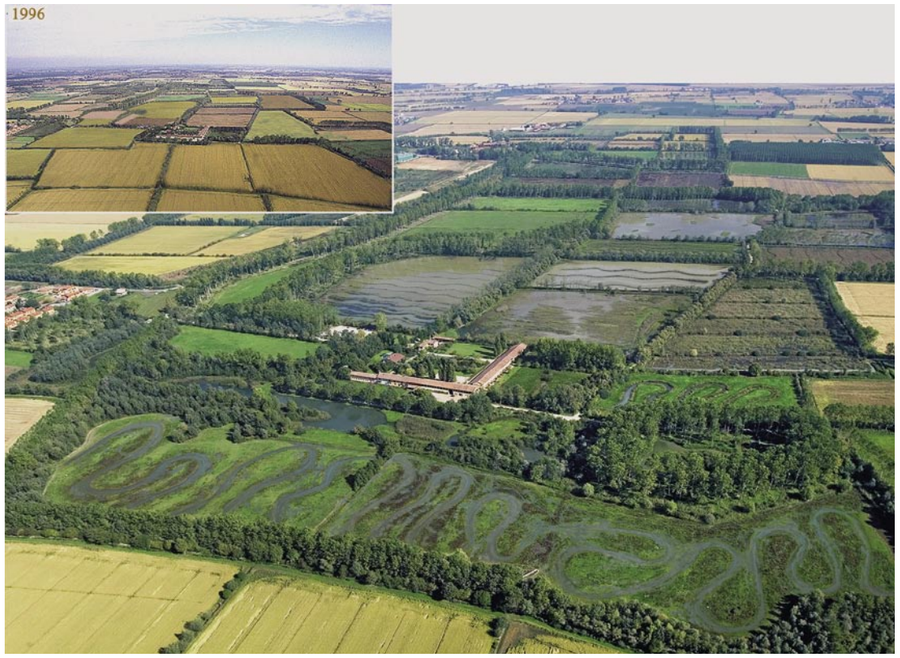
A sign of improvement of the ecosystem quality is the return of the black-winged stilt *(Himantopus himantopus)* a long-legged wader, which breeds in marshes, lakes and ponds. Overall, the activities have achieved an increase of ornithological, fish and amphibious biodiversity, and a consequent collapse of problematic insects and weeds.
The chemical analysis of the water from irrigation of 'NeoruraleHub' paddies detect very low level of nitrates (< 1 mg/L) and total N (< 1,5 mg/L), and close to zero content of pesticide residues from the organic paddies. Biodiversity analysis of soil detects improved populations of micro-invertebrates, as a result of the increase of organic matter content.

MS/region/ locality/location/ river basin

The 'NeoruraleHub' district is located within the Po floodplain, between the cities of Milan and Pavia. The Navigli (historical channels in and around Milan) system connects the water of Lake Maggiore, lake Como and the lower part of the Ticino river. For centuries, the Po floodplains have been used for rice cultivation and are still today one of the major European rice production areas including over 200,000 hectares of rice fields, representing over 50 % of the European production of this cereal.
Overall, the enterprises of the project extend over 1,400 hectares and include 107 hectares of wetlands, 78 hectares of forests, 65 hectares of woods, 50 hectares of grasslands and 110 kilometers of hedges.

Motivation – What are the problems?

The agricultural intensification results of the past agricultural policies led to the disappearance of field margins fragmentation of the agricultural landscape, and loss of biodiversity and of natural pest controls. The project has reconstructed ecological focus areas by diverting part of the cultivated land to nature.



The area of Cassinazza before (1996) and after (2014) realizing measures of renaturalisation. The difference is obvious! – photo: NeoruraleHub

Relevance for Water Framework Directive (WFD)

The 'NeoruraleHub' project can serve as a good example of water protection and wetland management in agriculture that is clearly supporting the objectives of the water framework directive (WFD). It directly contributes to the purpose of enhancing the wetlands directly depending on the aquatic ecosystems (article 1) in that it promotes the creation of wetlands and their improvement, in the field margins.
As stipulated per article 4 of the WFD the areas in the Po Valley support the achievement of a good ecological status and good surface water chemical status.

Objectives & measures adopted

One of the main measures introduced are the rice field margins. They correspond to an area of about 10 to 15 % of the total agricultural land, which is set aside and assigned to the provision of environmental services.
The rice field margins are located at the edges of the fields and have a width variable between 15 and 30 meters. They work as buffers, provide wildlife habitat and act as ecological corridors.

Herons and other animals can find habitats between the rice fields. The rice field margins act like an ecological corridor – photo: NeoruraleHub

Another important change is the shift from intensive to extensive cultivation following the principles of the conservation agriculture. This cultivation concept prioritizes soil management practises aimed at enhancing minimal soil disturbance, permanent soil cover and crop rotations. The fertilizers utilized come from the compost and the organic matter from nearby urban area, which are appropriately treated in the 'NeoruraleHub' waste management facility (anaerobic digestion of sludges and other organic wastes, stripping and recovery of biogenic ammonia). A circular approach about the nearby wastewater treatment plants. This system has almost replaced the use of chemical fertilizer. Moreover, this technique of fertilization has reduced the greenhouse gas emission by 35 %.

Innovation Centre Giulio Natta: NeoruraleHub's headquarter. A natural lab for open innovations and start-up redesigned according traditional farmhouses. – photo: NeoruraleHub

Actors/ Procedure

Nowadays, the 'NeoruraleHub' includes seven neighboring farmhouses. The original project was initiated in the estate owned by the Natta family. The financial means and the large estate of the Natta family proved crucial for gathering the funds for realizing the plan. Important for the success were also the European subsidies in the context of the rural development measures, which contributed cutting the costs of conversion from intensive extensive farming system.

Results/ Assessments

The greatest successes of the project are the increased biodiversity and the provision of ecosystem services in the area. The recreation of the wetland has consistently improved the quality of the agricultural landscape. No official assessment stating the changes in the quality of the waters has been conducted yet. The consistent decrease of problematic insects, which proliferate in areas of intensive cultivation, and the rapid increase of the diversity of the animal and plant species indicate an improvement of the health of the aquatic ecosystem. The ecosystem is also considering more resilient and does not require consistent management costs. It provides benefits to the agricultural production by enhancing a better management of weeds and pests.
Nevertheless, the activity was also financed with private contributions and implemented on a large estate. Projects of these dimensions might not be easily replicated on smaller estates with lower financial resources.

Costs and benefits

Gathering the funds for starting the conversion of the agricultural landscape was an important cost factor. Important financial sources were the rural development funds, which covered part of the costs. Additional benefits derive from the ‚biodiversity alliance' certification and the traceability of the product, which allows the farm to sell the products at higher prices.
Besides the increase of biodiversity and the benefits to the water quality, the activities have also proved beneficial as flood risk management instrument whereby the rice field margins were used as a basin to collect the storm-water and consequently prevented a flooding in a nearby village.

Lessos learned

In a short timeframe, the 'NeoruraleHub' district has made significant steps forward in the renaturation of the area while proving the feasibility and effectiveness of financial tools focused on promoting environmental measures. The project is committed to continuing the conversion to organic production, which will further improve the conditions of soil and water.
The practices tested at 'NeoruraleHub' are good examples of renaturation in peri-urban areas with clear benefits for the state of waters and can be replicated in similar contexts.