

Proceeding

BURANA LAND-RECLAMATION BOARD: a history tells between two rivers, Secchia and Panaro, to ensure safeguard of the territory and preservation of water resources for irrigation[†]

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Abstract: The Burana Land-Reclamation Board is an interregional water board operating in three regions and five provinces. The Burana Land-Reclamation Board, whose most important goal in these years has been to promote the competitiveness of the agricultural sector, strictly related to the protection and the development of rural areas, has designed a new innovative and technologically advanced irrigation system to save more than 40% of total annual water volume needs for the irrigation into an area of about 8.000 hectares, characterized by a high agronomic value, in which there are some of the most precious crops such as pears, vineyards and melons.

Keywords: Water, irrigation efficiency, innovation, competitiveness of the agricultural sector, development of rural areas, environmental sustainability.

1. Introduction

Directive 2000/60/EC – Water Framework Directive (WFD) establishes a framework for Community action in the field of water, pursuing ambitious objectives, namely preventing qualitative and quantitative deterioration, improving water status and ensuring sustainable use, based on the protection of long-term water resources available. Concerning the prevention of qualitative and quantitative deterioration of water resources and concerning the improvement of water status ensuring a sustainable use, based on long-term protection, in 2000 the European Parliament established a framework for Community action in the field of water policy: The Directive 2000/60/EC. From the first article of Directive we can read: “The purpose of this Directive is to establish a framework for the protection of inland surface waters, transitional waters, coastal waters and groundwater which:

- (a) prevents further deterioration and protects and enhances the status of aquatic ecosystems and, with regard to their water needs, terrestrial ecosystems and wetlands directly depending on the aquatic ecosystems;
- (b) promotes sustainable water use based on a long-term protection of available water resources;

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(e) contributes to mitigating the effects of floods and droughts.”

The European Union identifies among its objectives a smart, sustainable and inclusive growth that can be pursued through the use of structural monetary funds, coordinated by the Common Strategic Framework (CSF): a general guideline document that the member states have taken into account in planning activities for the 2014-2020s.

Within this program the European legislator promotes the competitiveness of the agricultural sector, strictly related to the protection and development of rural areas, playing the improvement of competitiveness for holdings in agriculture, agri-food, forestry, fisheries and aquaculture: all this is make possible under the mindfulness of environmental sustainability, adaptation and mitigation of climate change, well-being animal, production quality, innovation and job security.

2. Sustainable Use of Water

In ancient times the plain area was almost entirely marshland. During the centuries, its people worked hard to reclaim and reshape the land in order to achieve a better standard of living. Nowadays the threat of water has been transformed into opportunities by the action of all the Land-Reclamation Boardes. At present Emilia-Romagna is considered one of the richest European regions, with an important balance between agriculture and industry. Burana Land-Reclamation Board contributes to the improvement of social, economic and environmental standards.

Burana Board is an interregional water board acting in three regions and five provinces; it operates over a land district of about 250.000 hectares between Secchia and Panaro rivers, coinciding

with the drainage basin of Panaro River, from the Tuscan-Emilian Apennines to Po River (Figure 1). This area is one of the most fertile zone of all Po Plain, which is characterised by technologically advanced farming practices and strategic industrial districts. Furthermore, several environmentally important wetlands are located in this district, where many rare species of plants, birds and animals can be found; water supply of these protected areas is guaranteed by the Board. Burana main activities regard the conservation and safeguard of the territory, with particular attention to water resources and their use, ensuring water drainage from urban centres and farming areas and water supply throughout the area under its management to ensure irrigation and to fight drought.

Since the beginning of the last century Burana Land-Reclamation Board has planed and designed modern hydraulics works, using innovative techniques, to improve water resources management and to be more mindful of the environment.

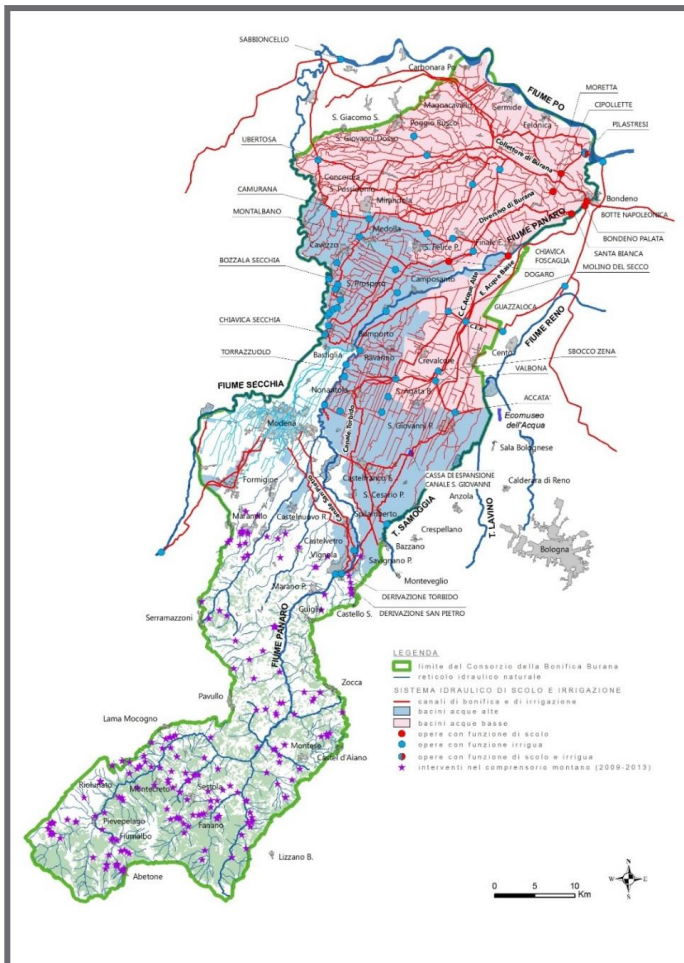


Figure 1 - Burana Board's District

In this article, two advanced irrigation systems, designed by Burana Board for water saving, are showed off. The first one is in used, besides the second one is waiting for structural monetary funds, coordinated by the Common Strategic Framework (CSF) within the European Network for Rural Development.

2.1 Water efficiency for irrigation – project carried out

In 2009 Burana Land-Reclamation Board received funds from the Ministry of Agricultural, Food and Forestry Policies and built a pilot pressurized irrigation system among agricultural holdings on the Diamante canal, within the Protected Designation of Origin (POD) area called Basse di Vignola (Figure 2). The project is in keeping with the Water Protection Plan and with the European guidelines about water resources preservation.

Basse di Vignola irrigation sub-district is characterized by a high agronomic value in the Modena province and Emilia-Romagna region, thanks to a huge production of the typical Vignola-cherries and plums.

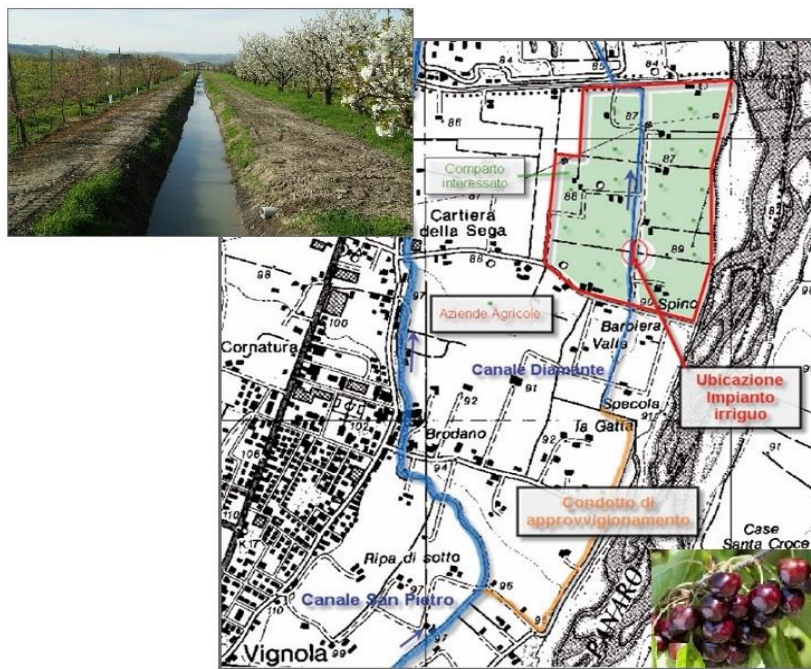


Figure 2 - Diamante Plant

This system serves an area of 35 hectares, using water from Diamante canal; the pumping station (Figure 3-a) has a maximum discharge of 60 l/sec. and a pressure of 4 bars. It's built on a linear storage basin where a mesh filter has been annexed to reduce particulate matter suspended in water stream. Water is pumped into pipe lines and using lot of equidistance nozzels, fixed on fruit trees, it is dropped on the top of leaves (Figure 3-b). Micro-irrigation systems, compared with traditional irrigation techniques, ensure **water volume saving of about 60%**.

As a matter of fact all the 13 agricultural holdings involved into the sperimental project and the others which have been joined to this plant at a later date, have replaced the traditional surface irrigation with this innovative and advanced system in order to save money and increase productions.

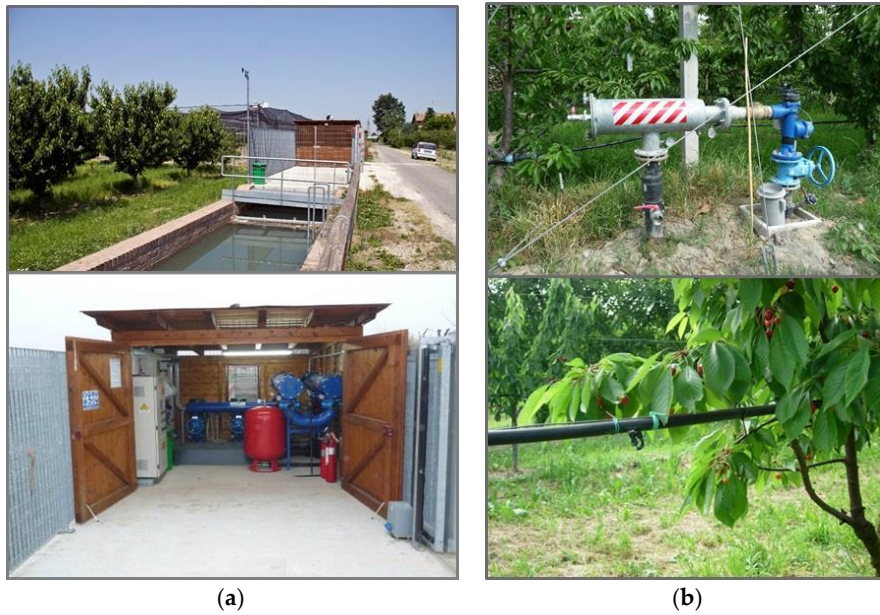


Figure 3 - Diamante Plant – (a) pumping station and (b) pipe lines

2.2 Water efficiency for irrigation – project carried out

In 2016-2017 years Burana Land-Reclamation Board took part in an european open call to receive funds within the European Network for Rural Development. Into Burana’s Plain sub-District, of about 70.000 hectares, it was detected an area of 8.407 hectares, characterized by a high agronomic value, where some of the most precious crops such as pears, peaches, vineyards and melons are cultivating (Figure 4).

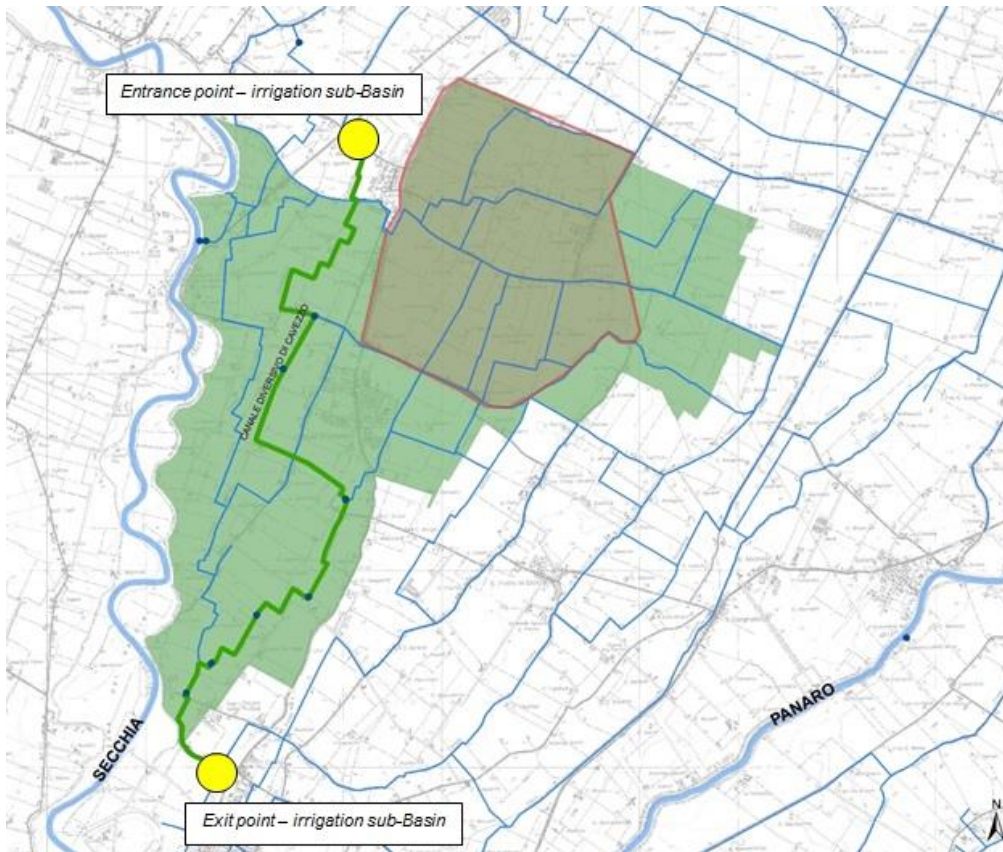


Figure 4 - Irrigation system renewal into Burana's Plain sub-District

The project is a new innovative and technologically advanced irrigation system that enable to **save a medium annual water volume need for irrigation of about 40%**. It is made of two parts:

1. The reshaping and waterproofing of the Diversivo di Cavezzo canal embankments (Figure 5): the project includes impermeabilization of the embankments of Diversivo di Cavezzo canal for a 7 km length. The canal is a two fold system for irrigation and drainage, so that at first it is necessary to reshape and to improve the stability of the embankments; these works are realized using:

- limestone and wooden piles where there are “hot areas”, such as streets and houses, close to the canal;
- reinforced concrete along other parts, where there is a low embankments slope.

Then the embankments are waterproofed with geotextile and bituminous geocomposite under the limestone and using waterproof chemical additive on the top of concrete surface. Sealing makes possible to save 36% of annual water volume for irrigation and about 100.000 kW of energy consumed by irrigation plants.

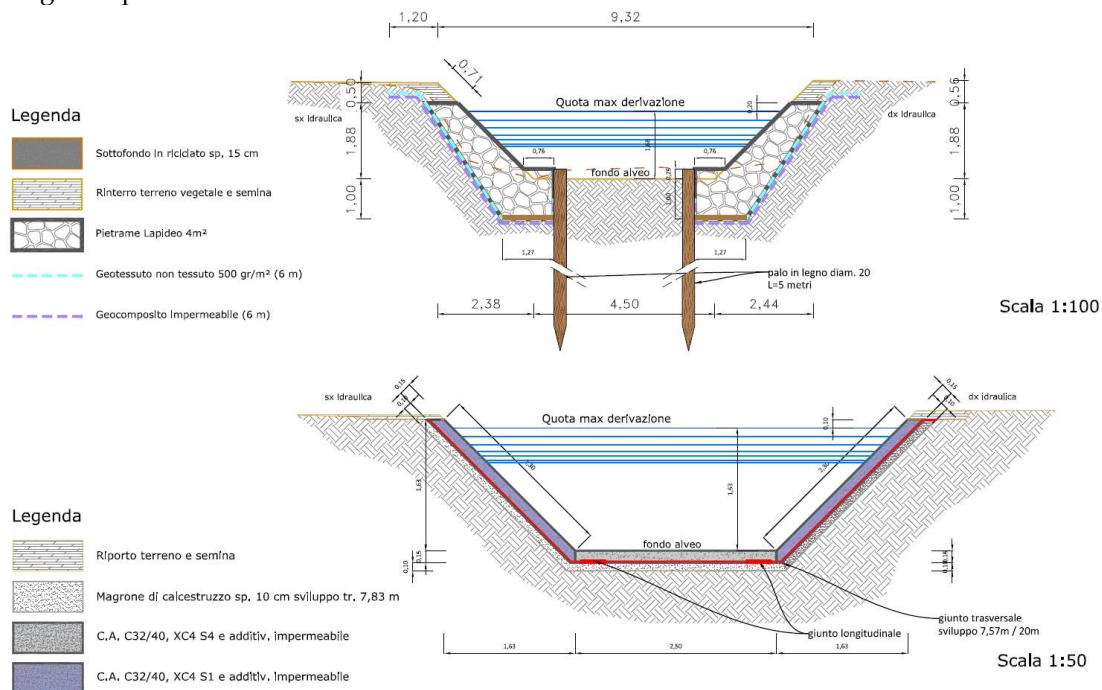


Figure 5 – reshaping and waterproofing of the embankments of Diversivo di Cavezzo canal

2. Staggia Plant (Figure 6): the project includes the built of a new advanced irrigation plant to deliver pressurized irrigation water over an area of 670 hectares. The plant is made of:

- a pumping station with a maximum discharge of 700 l/sec. and a pressure of 7,5 bars. There are 6 vertical axes centrifugal pumps: 4 pumps of 175 l/sec., 1 pump of 100 l/sec. to control water stream and 1 pilot pump of 20 l/sec.. Energy consumption is about 800 kW at all;
- an undergorund irrigation network made of about 26 km of pipes (7.620 meters are made of cast iron and 17.90 meters are made of PVC) with a diameter from 160 mm to 800 mm and 124 irrigation hydrants.

Staggia Plant uplifts water from Diversivo di Cavezzo canal so it is necessary to reshape and to improve the stability of embankments surrounded the pumping station, using limestone. This advanced pressurized irrigation system makes possible to save 42,2% of annual water volume for irrigation and about 38.800 kW of energy consumed by irrigation plants.

