

*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<sup>†</sup>**

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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.

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## **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;



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.

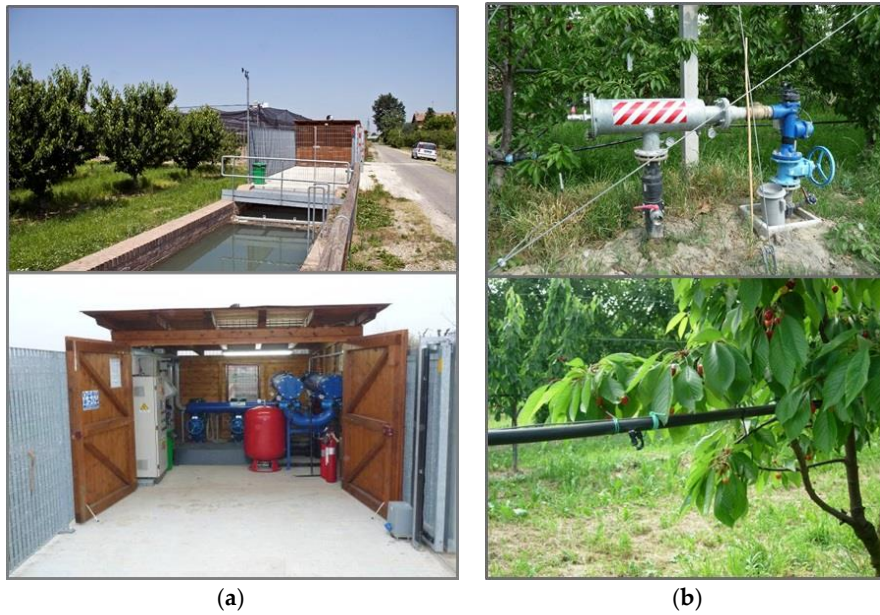


Figure 3 - Diamante Plant – (a) pumping station and (b) pipe lines

### 2.2 Water efficiency for irrigation – project to be 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).

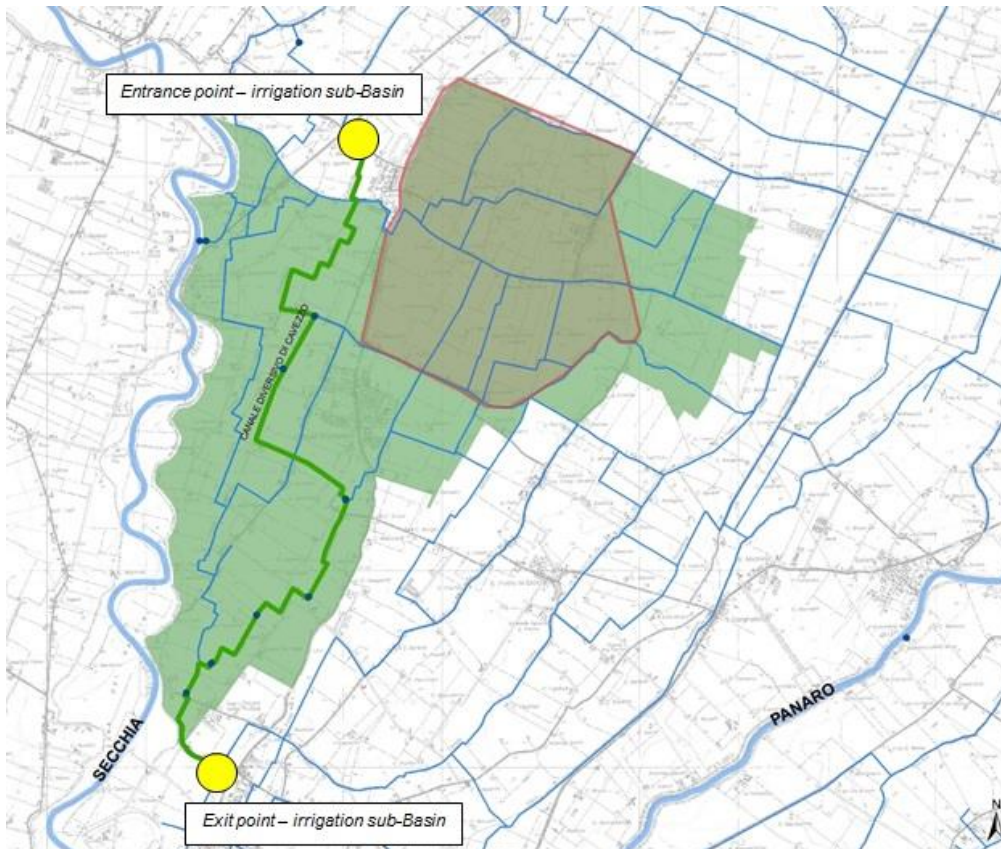


Figure 4 - Irrigation system renewal into Burana's Plain sub-District

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.

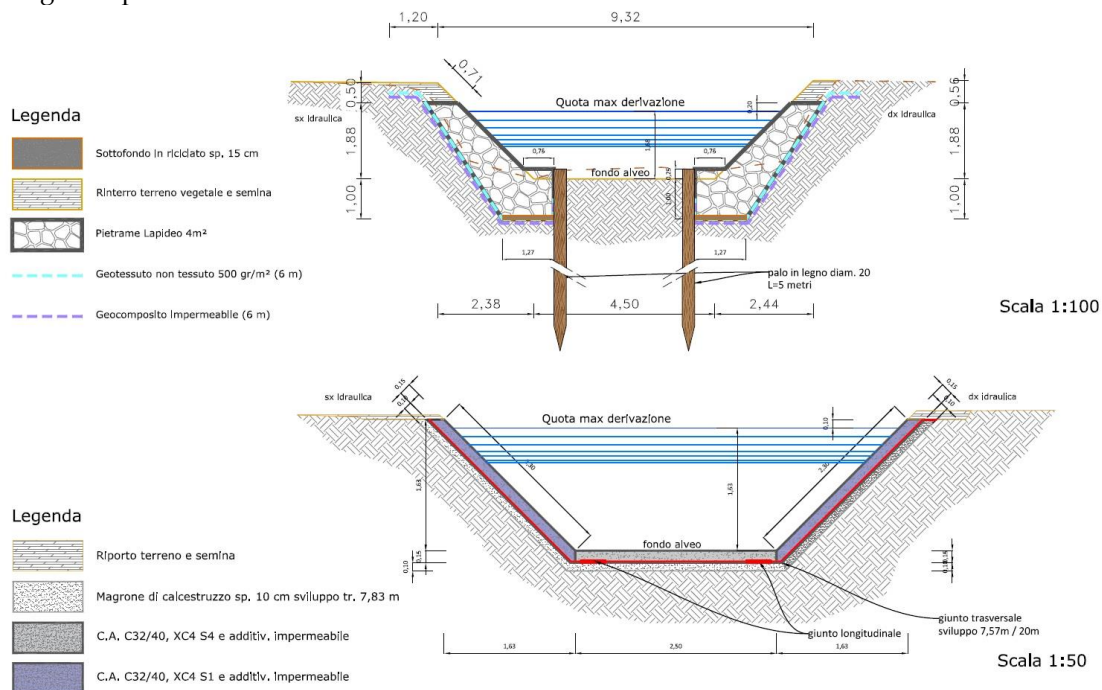


Figure 5 – reshaping and waterproofing of the embankments of Diversivo di Cavezzo canal

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.



Figure 6 - Staggia Plant - irrigation pipe network

### 3. CONCLUSION

The projects showed off in this article, which use modern irrigation technologies and materials, are the clear proof of the reduction of water consumption in irrigation and the optimization of the surface water resources for “top grade specialization” farms gathered together.

All the projects are repeatable in other territories, so it will be useful to encourage them in that areas lacking in available surface water resources are scarce and where a huge use of surface water and groundwater can get ecosystem qualitative status worse.

**Supplementary Materials:** More information about Burana Land-Reclamation Board are available online at <http://www.consorzioburana.it>.

**Author Contributions:** Eng. Cinalberto Bertozzi supervises all projects and show the way for the achievement of new goals concerning the protection and the development of urban centres and rural areas against floods and drought. Eng. Fabio Paglione works as planner, designer and works supervisor with other colleagues, into the technical area of Burana Land-Reclamation Board.

**Conflicts of Interest:** “The authors declare no conflict of interest.”



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