Layman report – non-technical report
LIFE NATURA project LIFE02NAT/IT/8523

(English version)

Environmental Rescue of the Natural Reserve
"Saltworks of Tarquinia "

Contents

Introduction to the project

Tarquinia Saltworks are a semi-natural environment, the sole of the Lazio Region and one of the remaining along the Tyrrhenian coast. Despite of their low extension (nearly 150 hectares of whom 100 occupied by the coastal lagoon -ponds), they are fundamental for the survive of many migratory birds.

The Salt works are SAC and SPA site proposed for the Natura 2000 network. Their institution is due to 5 habitats, out of them, the coastal lagoon, is prioritising (1150). The others are characterised by *Salicornia* and annuals colonising mud and sands, 1310; halophilous scrubs (*Sarcocorneta fruticosi)* vegetation, 1420; dune grassland and annuals with *Brachypodium*, 2240, and Mediterranean and salt meadows vegetation (*juncetalia maritimi)*, 1410. Moreover the Saltworks have a relevant importance for the nearby presence of historical and archaeological assets of the "Nineteenth District", making part of the SAC perimeter.

As regards birds, the Saltworks have an important role for the resting of migratory birds both in summer and fall, while it is less important as nesting place, probably due to their limited extension. More than 50 species of birds, accounting for 3-4000 individuals every year have been counted up. Out of them we may mention the Black-winged Stilt (*Himantopus himantopus,* Linneo, 1758), the Little Egret (*Egretta garzetta,* Linnaeus, 1766), the Avocet (*Recurvirostra avosetta,* Linnaeus, 1758), the Sandwich Tern (*Sterna sandvincensis,* Latham, 1878), the Little Tern (*Sterna albifrons,* Pallas, 1764), the Caspian Tern (*Sterna caspia,* Pallas, 1770), and the Black Tern (*Chlidonias niger,* Linnaeus, 1758); There is also a consistent group of Phenicopters (*Phoenicopterus ruber,* Linnaeus, 1758*),* for whom Tarquinia saltworks are an important place where to pass the winter season.

This synthetic report contains a non-technical description of the tasks of the project, especially those directly related to the non-recurrent and recurrent management activities. Preliminary and administrative activities, such as those falling in the A and F tasks of the project application form are not considered here. Aim is to provide a brief introduction of the result obtained by the Life financial support. This non-technical report is structured as it follows. Before a summary of the objectives is presented; follows the methodology and the activities carried out, and finally a description of the results both in terms of financial and environmental achievement is presented.

Summary of project scope and objectives

In 2002 the Beneficiary, the Municipality of Tarquinia, located in the Province of Viterbo, Italy, and the University of Tuscia, located in Viterbo, Italy, proposed a Life-Natura project for the ecological rescue of the Tarquinia Salt works.

The main project objective has been the ecological rescue of the SAC and SPA Saltworks, located in Tarquinia, proposed for the Natura 2000 Network. The Salt-works have an extension of 150 ha and 96 tanks and are a remarkable example of a sustainable land-use. Two recent events have seriously compromised the ecological stability of the area: the 1987 flood and the end of the salt production in 1997. Both impacted on the main ecological process of the area, the water circulation, which is presently too scarce to ensure the conservation of the site. As a consequence, ordinary and extraordinary maintenance is necessary to the ecological restoration of 16 hectares of humid zone, dried up in 1987, and to avoid the loss of the remaining humid habitat because of the degradation of the equipments and other structures such as ponds, canals, mouths, etc. All these problems have had a high impact on the migratory birds that usually rest in the area. Fifty-six species of migratory and non-migratory birds were recorded in the area but recent studies, before the start of the project, have evidenced a decline in the number of either species and specimens per species resting in the site.

The achievement of the main project objective, the restoration and conservation of the Tarquinia Salt works site, will therefore bring also a better conservation of many bird species by warranting the ecological preservation of a highly used resting site.

Objectives of the project were the rescue of the structural facilities, necessary to manage the site and to warrant water circulation in the salt works. They include:

- removal of the exceeding sediment in the tanks; substitution of wooden dykes in the tanks and canals; restoration of the stone banks; substitution of hydraulic pumps; canals restoration for allowing water to way in from and way out to the sea;
- sensitisation of the local public opinion on the relevance of humid zones for maintenance of biodiversity;
- research and monitoring activities to define status of the ecosystem and define sound management criteria;
- formulation of a plan for management of Nature 2000 site.

Description of the approach methodology implemented and results achieved

The aim of the project is to conserve the priority habitat, the "coastal lagoon", according to the Habitat Directive, which occupies the majority of the surface of the natural reserve (percentage of surface covered by this habitat 70% at the moment of the compilation of the Natura 2000 Card, but at the beginning of the project, 2003, just 50%). The majority of tasks are in the category of non-recurrent management (tasks C), according to the Life-Natura project application form, while the remaining consisted of monitoring activities (tasks D). All of these are briefly described as follows. The actions to recover the salt works environment, has been realised in 42 months and consisted mainly of restoration of damaged or degraded ponds and canals to establish a correct hydraulic regime inside the ex productive plants.

1.Digging of sediment from ponds and canals localised in the north zone of the Salt works.

This task removed the exceeding sediment laying down ponds and canals, the latter used for water circulation. From the ponds, sediment has been removed by using a hydraulic pump mounted on a dredger. More than 56000 cubic metres of sediment were removed and brought to a landfill.

Another portion of the salt works has been interested by the mechanical removal of the exceeding sediment which in the past, during two flooding events, impounded 16 hectares of ponds. The task removed 45000 cubic metres of sediment in order to realise, using other funds, in the near future, a fresh water pond of 4 hectares, which is going to provide environmental benefits in terms of birds biodiversity.

Other excavation activities regarded the canals, dug by a mechanical dredger. By and large 4000 cubic metres of sediment has been dug from the Salt works canals.

2. Substitutions and restoration of wooden banks.

Some banks are made of spruce wood that is easily subject to weather deterioration. Some of them are damaged and require restoration works, consisting of positing wooden planks where they are missing with the aim to contain the soil contained into the bank. This action has been carried out on a limited portion of the bank and not during the nesting time in order not to damage the potential nesting areas. The restoration work was done on 1500 metres length banks.

3. Substitutions and restoration of stone banks.

This action is similar to the previous one, but consisted of restoring the stone banks. These banks are made of sedimentary rocks tied by mortar. Where rocks are not present the soil of the bank fell down the ponds, causing a reliable increase of the sediment and consequently of the water turbidity. This task aimed not to alter the original architecture both for aesthetic and functional reasons. The works done consisted of positing in their space the missing rocks. This task was carried out on a limited portion of the rocky bank in order not to remove a potential nesting area and not to disturb birds during the nesting time. Nearly 600 hundred metres of rocky banks were restored.

4. Substitution of wooden dams.

Dams are structures, made of wood, which are used to regulate water throughput among canals and ponds. Dams are composed of wooden planks and metallic railways to move it up and down. Out of them, 7 were damaged and have been completely substituted, while 63 were repaired.

5. Restoration of west and east mouths.

Mouths are channels connecting Salt works ponds to the sea. The western mouth is the canal in which the sea water ways in the plant, while the eastern where salt production water exits. These channels, made of concrete, were obstructed, not allowing for the sea water exchange. This task removed excessive sediment obstructing them and recovered part of the breakdown jetties.

6. Restoration of the pumps building

This task consisted of building restoration, where hydraulic pumps are located. This building is part of the reserve and is located in its perimeter. Main restoration works consisted of making safe the building, revising the ceiling, the floor, the hydraulic and electric circuits.

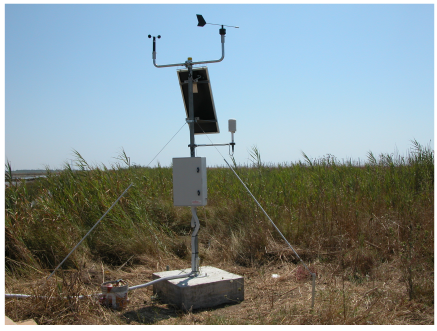
7. Substitution of four pumps and maintenance of the fifth

The two big pumps, localised in the pumping building, were completely damaged, so they needed to be substituted. Other two pumps localised outside the building have been changed too. The last one needed just maintenance works.

8. Rise of the water column in the ponds localised in the Salt works southern part.

This task proposed the rise of the water level in certain ponds, localised in the Salt works southern zone, to improve the environment conditions. This part of the plant comprehends ponds having different salinity, ranging from 90 per thousand to 135 per thousand, where salt (sodium chloride) plunges down. This section of the plant comprehends ponds named "Vasi grandi", "Vasca Passoni", "Giochi di Mare", "Riserve", "III Sezione", and "Partite Alte". Sea water level is set out taking into account birds necessity during different periods of the year, in particular to support breeding and migratory birds. The water afflux into these ponds and the hydraulic management practices has been concerted with the reserve manager, the National Corps of Forestry – NCF.

In order to verify the efficacy of the works carried out, the University of Tuscia, partner of the project, made a monitoring activity during and after the completion of the restoration works. This consisted of monitoring chemical and physical parameters of the water and weather using a fixed electronic devise, in order to control constantly the water status during the works and to verify environmental improvements of the project.



Moreover a chemical and biological monitoring of the water has been done sampling every month 16 descriptors in 12 stations (ponds) of the Salt works, such as temperature, oxygen, pH, conductibility, nitrogen, phosphorus, chlorophyll, etc. The biological monitoring analysed both in quality and quantity terms phytoplankton, zooplankton and benthos communities. Finally the habitat monitoring consisted of verifying the status of the *Aphanius fasciatus* fish population (included in the II Annex of the Habitat Directive), the census of S*alicornia*, S*arcocornia* and *Brachypodium* vegetation, and the number and species of birds as well.

Assessment of the conservation benefits of the project

Project life gave a succession of benefits out of them the most relevant are the rise of the wet area by about 20% and the maintenance of the equilibrium among the habitats, guaranteeing the conservation of S*alicornia* species, which have been reducing since the 1997, year of the plant production ending, in favour of S*arcocornia* vegetation. The best benefit is however for birds which have been rising since the beginning of the year by and large 4000 units.

The prioritising habitat "coastal lagoon" is constituted by ponds where, until a few years ago (1997), the salt was produced. The overall land is occupied by ponds having an extension of nearly 109.5 hectares, more than 70% of the reserve. After natural events occurred, such as flooding, and the end of salt production, the percentage of humid area (wetland), compared to the Natura 2000 Card description, dropped about 18%. The Life Natura rescue works allowed wetland to get better about 20%, nearly 20 hectares. In ecological terms the project has realised the ecological improvement of the site, as shown by the rise of the number of birds species during the winter 2006. Another benefit for the site has been the formulation of the management plan defining the guidelines for the management of habitats, flora and fauna of European interest. Moreover the sensitization activities carried out, allowed the Tarquinia citizens and those of the border Municipalities to know and appreciate the value of the Salt works as a wetland of European importance as well as the European policy instruments taking care of the nature conservation.

Issues having implication for Natura 2000 policy.

As regards the main implication that Natura 2000 policy has on coastal wetland conservation is the limited consideration of the ecosystem dynamics. Many sites especially where there are not many conflicting stakes can be managed by allowing for their natural evolution considering also the possibility to relocate them, as in case the of coastal erosion (*managed realignment*). Even though this is translated in a net loss of land (and this is a infringement of the *no-net loss* Natura 2000 policy), many sites, especially marshland, in some countries such as the UK, are going to be land-ward relocated. However this consideration is not going to affect the Tarquinia Salt works where social, economic and conservationist interests are not conflicting. On the contrary, the loss economic activities seem to have influenced negatively the Tarquinia Salt works ecosystem conservation.

In general terms, Salt works are an inter-face ecosystem and, although managed by the terrestrial planning system, cannot be "untied" from the resolution of problems influencing the sea. In Italy an help in managing the Salt works may come from the administrative devolution that since 1998 has accorded the management of the coastal zone to the Regions, the same territorial unit that takes care of the Natura 2000 Network management.

However, a real problem in Italy, contrasting the favourable management of the protected areas, is the high division of the administrative competencies regarding nature conservation, worsened after the institution of the Natura 2000 Network. For instance the Tarquinia Salt works are managed by numerous bodies (Ministry of Forestry, by means of NCF, Ministry of Environment, Domain Agency, Lazio Region), and others have interest in it (Municipality of Tarquinia, University of Tuscia), all of these overlapping their interest and managerial capacity, but contrasting on the strategy to conserve and valorise the site. There are many doubts if the conservation practices be sustainable in such a site, especially considering the limited financial measures available, and if they are not linked to the economic valorisation of the site. Natura 2000 policy wants to valorise multi-objective sites, whose managerial activities seem achievable if conservationists and socio-economic aspects are not conflicting, as it seems possible in the case of the Tarquinia Salt works.

Considering the scarce managerial capacity in the conservation of water-transition ecosystems, such as the Saltworks, auspicious is now for granting other public financial funds, in order to experiment several forms of management of these critique wetlands and apply the principles of a good governance.

Transferability of project results

As regards the demonstration issue, the rescue works carried out in the Tarquinia Salt works are not new, being realised for other lagoons or Salt works in other Life projects, such as that referring to the Trapani Salt works, in Sicily. However, rather than using mechanical dredging, here the innovation consists of using an hydraulic dredger usually adopted for mouths, canals and ports dredging, but not for deepening the bottom of the Salt works ponds, where the water depth is too low. Moreover in terms of research methodology, the project aimed at analysing the status of the ecosystem, considering not only physical and chemical parameters of the lagoon, but also the benthic community and the genetic erosion of the most relevant fish of the lagoon, the *Aphanius fasciatus*, in order to define the most appropriate habitat management conservation strategies, as described in the management plan.

The life project results may be transferred to other similar sites, and there are not limitations. The methodology used is applicable in every lagoon ecosystem (considering that in our case the dredger has operated on a limited water depth of just 50 centimetres), and in particular way this technique is already used in other European countries where it is more convenient than in the Mediterranean. It is recommended the use of this technique in the northern countries, being achieved the economical convenience requirement.

Cost benefit discussion on the results (economic and conservation benefit).

In terms of costs and benefits issues, three points are relevant to be mentioned:

1. the positive impact the project has had on the local community attitude about the site;

2. the jobs created during the project implementation and those susceptible to be created in the future;
3. the cash flow variation due to the future implementation of further projects valorising the Nineteenth District.

The Salt works restoration and the will to change the legislative framework, opening the site to a wider community, in order to create sustainable bird-watching tourism, rose the consideration that people has upon this site. In economic terms this has been estimated by the relevant willingness to pay to visit it and watch birds, being quantified in € 3,30. Considering the demand for eco-tourism in the nearby natural areas, it is forecasted an increase of visitors from 3-5 thousands to more than 10 thousands units in a 10 years horizon time.

As regards the occupational impact this has not been very impressive during the works realization. In fact the ponds restoration works saw the presences of three companies, each of them in action with 3-4 workers, but none is stably operating on the area. So these restoration works had a marginal impact on the local economy, if any null, in terms of full time equivalent jobs.

Conversely during the research activity held by the University of Tuscia, there was a more reliable effort, consisting of waters lagoon, habitats, birds and fish monitoring, which in terms of full time equivalent job occupied three researchers for 42 months. The future jobs creation perspective seems much more interesting considering that a few projects valorising the Nineteenth District, making part of the reserve, are in phase of implementation.

These projects are going to accompanying the opening of the reserve to the eco-tourists with the aim to promote research activities, public information and diffusion of nature conservation culture, as well as the social valorisation of the site by means of the maintenance of historical traditions and activities which have been disappearing today.

These activities will consists of realising:

1. a museum of the salt;
2. a small fresh water wetland (3-4 hectares) inside the Salt works, with the aim of increasing birds biodiversity;
3. a visit centre and an hotel for hosting tourists and researchers;
4. laboratories for lagoon ecosystem and fauna monitoring;
5. a lab for the genetic analysis of population, especially fishes populating the coastal waters of Lazio Region;
6. a pilot hatchery and aquaculture plant oriented to the restocking of demersal fishes.

All these projects will be realised in the housing structures of the Nineteenth District, and do not contrast with the conservation strategies of the reserve. They have already received financial aids from regional, national, and European funds, and all of these are self maintaining with the contribution of the Municipality of Tarquinia and the financial help of the University of Tuscia. Part of the income generated by the above project activities are going to subsidize the conservation nature, in order to diversify the financial aid coming from public administration not ever sufficient to finance and support the nature conservation.

Moreover, it is forecasted the creation of 2/3 additional jobs for the hatchery management; 2/3 jobs will come from the ecosystem management and research activities; and further 2/3 jobs from the administration of the hotel, the latter being managed also by means of the Municipality of Tarquinia. The University of Tuscia will run and assist the financial viability of the research-related structures.

Finally, other projects, sounding well with nature conservation, are the re-starting of salt production for social aim, but not for alimentary scope, the production of mud and salt water for the care of skin ills, and the production of the crustacean *Artemia Salina,* finalised at self- sustaining the

hatchery and aquaculture plant. However, these projects, although are not contrasting with the conservation management procedure, and are addressed to achieve a better economic sustainability of the site, are not yet well investigated in their economic issues. So they do not constitute a priority if not in a medium-long terms, interesting the next 5-10 years future of the natural reserve.