ENTE GESTORE AZIENDA FORESTE DEMANIALI REGIONE SICILIA

RISERVA NATURALE ORIENTATA VENDICARI

REGIONE SICILIANA

LIFE – NATURE

A management and conservation project of coastal dunes and wetlands in Vendicari

(LIFE02NAT/IT/8533)

By Aldo Pisano
Translation by
Maria Stella Di bella
GATE s.c.r.l.
(Agenzia per la promozione del Mediterraneo in Europa)

Introduction

The present brochure was foreseen within the popularization actions of the project, n°LIFE02NAT/IT/8533, titled: "*Conservation and management of habitats in the SPA of Vendicari"*, financed with the contribution of the "Life nature" program of the European Union.

The object of the European Commission is to divulge, as much as possible, all initiatives and experiences matured in the European territory within its nature program. This last represents, in fact, its main financial instrument for conservation of habitats, animal species and vegetation rich of interest for the EU.

Therefore, the exclusive aim of the present volume is of educational-didactic nature, it will allow divulging of the objectives and of the results obtained within this Life project.

The purpose is to contribute in transferring information and experiences concerning techniques and methodologies applied in active management measures of habitats. These experiences may consequently find application in similar territorial contexts if suggested and found useful.

The text also presents a short description concerning strictly naturalistic features of the area. It also gives some information about the ecological role of the eco-systems in the conservation of species considered of international interest.

The Azienda Foreste Demaniali of the Sicilian Region, managing body of the Vendicari reserve, was beneficiary of a 50% co-financing fund on behalf of the European Union, necessary to cover costs for the enforcement of Life actions. The total sum of the project cost was of € 831.180, 29; therefore, the Azienda Foreste contributed for the remaining 50% of costs with its own financial funds.

Actions and measures of the project were planned by "Gate società coop. s.c.r,l, - Agency for the promotion of Mediterranean areas in Europe" , whilst the direction of the project was carried out by the Azienda Foreste Demaniali.

What is LIFE Nature?

The European Council of Ministry adopted two fundamental directives denominated “Habitat 92/43 and “Birds 79/409, which provide for the enforcement of a common politic concerning protection and conservation of habitats, animal species and vegetation, present the European territory.

The strategy of these two directives is the creation of a European sites network, called “Nature 2000 network”. The members are bodies who manage special sites or reserves characterized by habitats and species belonging to the European flora and fauna in need of protection, on which to apply a common politic, therefore maintaining or bettering their conservation state and their biodiversity.

Often, these sites, or the species living in them, are threatened by danger caused by human activity, as (i.e.) urban and industrial expansion, intensive agriculture, water and soil pollution, fires, introduction of exotic species, poaching, ect. In addition, these dangers usually translate into the lost of habitats and/or animal population and vegetation linked to those environments.

Hence, member states may need to invest large sums of money necessary for the reduction of those threats or simply to maintain these environments in a sufficient conservation state.

For this reason, the European Commission approved a Life Nature program favouring such actions. It usually finances 50% of all those projects aiming at the improvement of the natural conditions of sites belonging to the “Nature 2000” Network.

Members of the European Nature 2000 network are S.E.I (Sites of European importance) and S.P.A. (Special Protected areas).

The first are defined S.E.I. if characterized by the presence of habitats, animal and vegetation species found in annex I and II of the Habitat Directive 92/43.

Instead, the seconds are so denominated if the site is of a special importance for the safeguard and the conservation of birds, with particular attention to migratory or disappearing species, listed in annex I of the E.U. Directive 79/409.

THE INTERNATIONAL IMPORTANCE OF VENDICARI

The geographical position of the Natural Oriented Reserve of Vendicari is at the extreme south of Sicily, at the latitude of Tunis; it is part of an extended wetland system, which is among the biggest and most important in Sicily.

Confined in a long and narrow territory, which extends for 1512 hectares, the reserve develops along 8 kilometres of coast and its main characteristic is that of possessing a succession of very different environments.

In fact, the range of environments varies from sweet water wetlands, present in the northern area, to coastal lagoons, confined towards the sea by another particular habitat that nowadays is rare: coastal dunes.

In the internal and most elevated areas, the garrigue environment is also present, substituted in its most evolved forms by the Mediterranean maquis. This variety of habitats and landscapes clearly influence the diversity among animal and vegetation species present in the reserve.

For this peculiarity, Vendicari has been, during the last twenty years, beneficiary of many protection measures.

Among these measures, the most important was applied in 1984, year in which the Natural Oriented Reserve was established and denominated: “Oasi Faunistica di Vendicari” (Faunistic oasis of Vendicari), in appliance of the Regional Law 98/81.

It has recently become member of the Nature 2000 Network as S.P.A. (Special protected area) according to the European Union “Birds” Directive 79/409. Moreover it was also suggested to the Environment Ministry as S.E.I. (Site of European importance – code ITA090002) according to the Union “Habitat” Directive 92/43, for the presence of important habitats and priority species which have become, nowadays, rare in the entire European territory.

Among the different motivations, which have brought to the enforcement of these protection measures, the most important was certainly the high presence of water bird species. Vendicari has been, in fact, defined by environmentalists as a “Birds’ Hotel”. Such definition originates from the fact that there are over 233 different species of birds, almost constantly present, and divided into 53 families. Of these last, 57 build nests in the area. The interest risen among Union members is mainly linked to the presence of over 20.000 limicolous, as well as to the regular seasonal presence of the “*Platalea leucorodia*” (spoonbill) and of the “*Plegadis falcinellus*” (Glossy ibis) in a quantity superior to 1% of the entire geographical population (C. Japichino 1999).
These criteria have justified the recognition of the area of Vendicari as a Ramsar site. Thus meaning that Vendicari is a wetland area of international importance, and that, also in conformity with to the IWRB criteria (International Waterfowl Research Bureau) which only indicates wetlands areas judged as strategic habitats for water birds.

Glossy ibis (*Plegadis falcinellus)* (Ph. F. Cilea)

Spoonbill (*Platalea leucorodia)* (Ph. F. Cilea)

Recent data indicate that the presence of certain species has now risen over 1%; among them, we remind: the Stilt-plover, (*Himantopus himantopus),* the egret (*Egretta garzetta*) (west Mediterranean populations) and the pink sea cob (*Larus genei*) (Mediterranean population) -referral : Rose & Scott , Waterfowl population estimates, IWRB 1994.-

Vendicari is also an area of national importance because the Sheldrake *(Tadorna tadorna),* the pintail *(Anas acuta),* the shoveller *(Anas clipeata)* and the pochard *(Aythyta ferina)* all winter in this areas – ref. Serra, Magnani, Dall’Antona & Baccetti, (Risultati dei censimenti degli uccelli acquatici svernanti in Italia, Istituto Nazionale per la Fauna Selvatica, 1997).

MOST REPRESENTATIVE AND IMPORTANT HABITATS PRESENT IN VENDICARI

The S.P.A. of Vendicari, also hosts, besides the numerous bird populations, a variety of environments that are of great importance and interest, and listed in the Annex I of the Habitat Directive 92/43.

Even though Vendicari is of restrained dimensions, it hosts a concentration of habitat and biodiversity rare in other parts of Sicily. The following are the sites of recognized of European importance present in Vendicari:

Mediterranean intermittent flux rivers with Paspalo-Agrostidion (cod. Habitat 3290)

- **Reefs with Mediterranean coastal vegetation with Endemic Limonium spp. (cod. Habitat 1240)**
- **Endemic Phrygane of the Euphorbio-Verbascion (cod. Habitat 5430)**
- **Thermo-mediterranean shrubbery and pre-steppe (cod. Habitat 5330)**
- **Motile embryonic dunes (cod. Habitat 2110)**
- **Motile dunes of the littoral sandbar with presence of Ammophila arenaria ("white dunes") (cod. Habitat 2120)**
- **Coastal dunes with Juniperus spp. (cod. Habitat 2250*)**
- **Coastal lagoons (cod. Habitat 1150*).**
- **Mediterranean prairies, Sarcocornetea fruticosi and thermo-Atlantic (cod. Habitat 1420)**
- **Annual pioneer vegetation of Salicornia and other muddy and sandy areas' species (cod. Habitat 1310)**
- **Juncetalia maritimi (cod. Habitat 1410)**

Of the above described species, those indicated with the asterisk * are classified as priority species. Whereas bodies of the European Commission classify as priority those animal or vegetation species presenting factors of rarity and of ecological importance for the natural environment in which they live.

Hereafter follows a description of those habitats, which were object of Life actions.

HABITAT N°1

Name of the habitat: **"Motile embryonic dunes"**

Nature 2000 code: **2110**

Priority Habitat: **no**

The dunes found in Vendicari now represent one of the last coastal sandy ecosystems present in Sicily. They were saved from the anthropic pressure and especially from the expansion of the building industry, which was, in this area, one of the main causes of the disappearance of kilometres of this habitat.

All over the world, human activity has historically taken place intensively along all coastal territory; therefore, the reduction of these areas and of these natural systems took place on a world scale.

For this reason, coastal dune systems represent, nowadays, priority habitats and ecosystems among the most vulnerable and seriously threatened on planetary level.

The dunes in Vendicari develop on about 3 kilometres of coast, with a variable width that ranges from 25 to 40 metres and which reach a maximum height of 6-8 metres a.s.l.

(qui c'è una foto)

Integral dune ecosystem along the shore of Vendicari (Ph. A. Pisano)

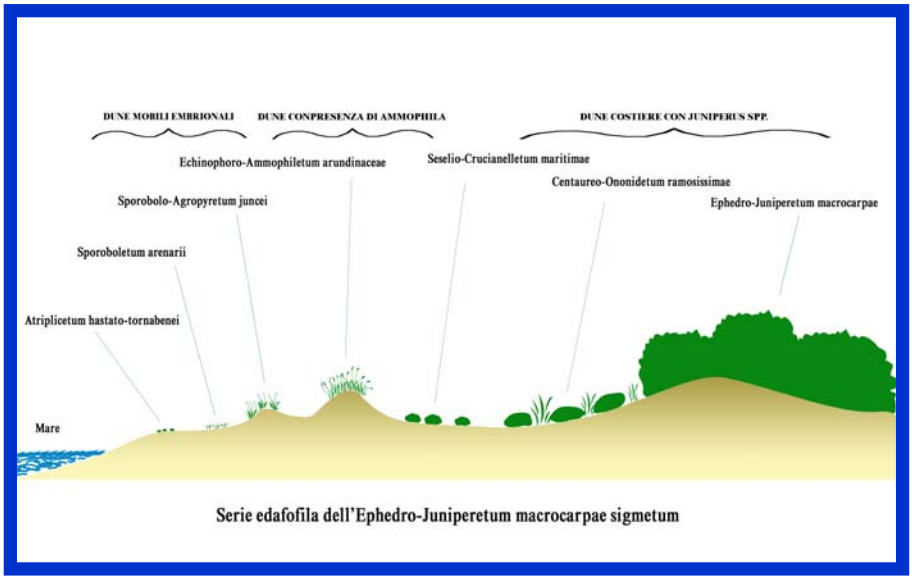
The presence of a dune system is the coexistence result of factors, which determine the morphology of a sandy coast: abundant detritus depositing of fluvial or marine origin and presence of strong dominant winds.

Moreover, the vegetation present in the area most also be considered determining, since it has, due to its radical apparatus, a fundamental role in the consolidation and in the growth of the dune's height.

(qui c'è una figura)

Schematic geomorphologic description of the dune system– pond in Vendicari

Analysing the transversal profile of a dune, starting from the shoreline, where the waves break, and continuing towards the inner part of the shore, one can observe a sequence of vegetation clusters which determine various habitats and various stages of growth of the dune's sandbar.



The first vegetation clusters, found along the shore, find location at a distance from the sea, which safeguards them from the action of the wave-motion, and where sea storms may reach them, only in rare cases.

(FOTO)

Colonization of motile dunes by pioneer plants (Ph. A. Pisano)

Pioneer plants are so called because they are the first plants capable of colonizing this type of hostile environment.

The hostility is caused by strong thermal changes, poorness of water and finally, because of the variable saline content. It is represented in Vendicari by the *Atriplicetum hastato-tornabenii* cluster formed by ephemeral psammophilous. The most representative plants among them are ***Cakile marittima, Salsola kali*** and ***Atriplex tornabenei***.

The permanent psammophilous cluster *Sporobolo-Agropyretum juncei*, which is the cluster that gives origin to the dune formation, determines the habitat of the **"Motile embryonic dunes",** characterized by the presence of the Sporoboletum *arenarii* that here substitutes the *Sporobolo-Agropyretum juncei* present instead on more mature dunes.

HABITAT N°2

Name of the habitat: **"Motile dunes of the littoral sandbar with presence of Ammophila arenaria"**

Nature 2000 code: **2120**

Priority habitat: **no**

Moving towards the inner part of the shore there is a first morphological step, which is of a few centimetres of height and that represent the limit reached by the sea storms during the worst weather- marine conditions.

In correspondence of this thick step, there is an organic deposit. It is made of Filiform remains of marine plants like the posidonia, then transformed into small spheres by the alternate wave movement present on the shore. These spheres are later transported towards the internal areas of the coast by winds and sea storms. These deposits have a stabilizing action on the sand and contribute to the reduction of the motility of sandy grains.

By observing the succession of the dunes near Case Cittadella, one can notice a first dune sandbar over this morphological step.

(FOTO)

Ammophila arenaria (Ph. A. Pisano)

In this part of the area the *Echinophoro-Ammophiletum arundinaceae* cluster is dominant.

It is a species found on more mature dunes and it characterizes this habitat where the *Ammophila arenaria ssp.arundinacea* is present together with the *Echinophora spinosa*, the *Eryngium maritimum*, the *Cutandia marittima* ,the *Medicago marina* and the *Launea resedifolia*.

This last specie, typically found among the flora of the Sahara desert, finds here, one of the few exclusive growth stations, present in Sicily as well as in Italy.

Finally, these dunes have a relevant importance since they are proof of the consolidation process "*in fieri*" that will bring to the formation of new dune sandbars.

HABITAT N°3

Name of the habitat: **Coastal dunes with Juniperus spp.**

Nature 2000 code: **2250***

Priority habitat: **yes**

Morphologically, this habitat represents the most elevated and structured part of the dune. The *Ephedro-Juniperetum macrocarpae* cluster, usually found in more mature dunes and representing the most evolved stage of a dune colonizing system, is also present in Vendicari with *Juniperus oxycedrus subsp. Macrocarpa* .

This last specie in fact, colonized the superior parts of the dune. Its vegetation, almost completely covered the dune, especially in those better-preserved parts.

(FOTO)

Juniperus oxycedrus subsp. Macrocarpa (Ph. A. Pisano)

(FOTO)

Juniperus oxycedrus subsp. Macrocarpa (Ph. A. Pisano)

Typical vegetation species : *Juniperus oxycedrus subsp. Macrocarpa, Ephedra fragilis, , Pistacia lentiscus,* ***Phyllirea angustifolia, Clematis cirrhosa*** **.** Finally, the *Centaureo-Ononidetum ramosissimae* populates the stable retro dune tracts.

SCHEDA HABITAT N°4

Name of the habitat: **Coastal lagoons***

Nature 2000 code: **1150**

Priority habitat: **yes**

The probable origin of this habitat in Vendicari, is due to the evolution of the dune's sandbar or the sandy "*tombolo*".

(FIGURA)

Schematic reconstruction of the coastal lagoon's formation in Vendicari

The formation of the dune's sandbar determined, apart from the interruption of water exchange with open sea, the blockage of the normal rain water flow of the Saia Scirbia impluvium, therefore creating the conditions for the formation of three wetland areas: The Pantano Piccolo, the Pantano Grande and the Pantano Rovereto.

These marshes, fed by rainy water and by small marine water exchanges, receive their water supply at ground water table penetrating under the sandbar.

These salty marshes are not very deep and they are subjected to high variability of water, which may change their deepness and their salinity. Generally, there is a higher presence of sweet water during winter months, whilst during

summer months the salinity rises and the water level decreases to a total drying up, with the only exception of Pantano Piccolo that has other small feeding sources of sweet water.

(FOTO)

Stilt-plover Himantopus himantopus (Ph. F. Cilea)

(FOTO)

Flamingo birds building nests in the Pantano Rovreto (Ph. F. Cilea)

The internal part of these marshes usually reaches a deepness of 30-40 ctms. with the exception of some tracts where it isn't over 1,5 mts. high. These most depressed area, which are covered with water for longer periods, are characterized by the presence of some monophytous clusters with halophic hydrophilic as (i.e.) the *Ruppietum spiralis*, the *Lamprothamnietum papulosi* and the *Potamogenetum pectinati*.

Never the less the real importance of this habitat is linked to the high presence of water birds which find, in these environments, the ideal stopping, nesting and feeding place.

The habitats above described are of strategic importance for migratory avifauna, since they are located in correspondence of one of the most important migration routes between Africa and the Balkans.

Even though the general conservation state of Vendicari's habitats appear in very good shape , there are some locally degraded areas whose conditions were created prior to its the declaration as natural reserve.
In particular, during the 70s, about three hectares of dunes, sited near the Punta d'Isola, disappeared because of sand exploitation. Thirty years have not been yet sufficient to heal this wound, which erased part of the dune's landscape with its vegetation clusters and animals linked to this particular habitat.
FOTO
Sight of Vendicari

A new threat has arrived, in recent years, over this habitat, caused by the anthropic pressure that increases considerably during summer periods. In fact, tourist and visitors invade the beach of Vendicari, obviously taking "advantage" of its beauty and of its clean waters.
However, the presence of tourists has began a degradation process of the dune's habitat, favoured by the absence of necessary footbridges and pathways and because access should be completely denied to the public in some of these areas.
The erosive phenomenon, triggered by the effect of pattering, causes the removal of the incoherent sand, consequently bringing the radical apparatus to surface, damaging it, thus interrupting its consolidation and retaining action.
As said before, these three marshes completely dry out during summer because of the important evaporation process.
Nevertheless, this natural event takes place with the arrival of thousand of water birds coming from Africa in search of wetlands in which to rest and find nourishment.

Foto
Pattering effect, surfacing of the radical apparatus

The consequence of the described phenomenon is a slow but inevitable regression of the vegetation that is not any longer able to retain sandy particles therefore exposing the dune to the winds' erosion.
Foto
The Pantano Grande in summertime completely dried out.

Vendicari is along one of the most important migratory routes between Africa and Europe and wetland areas are in regression almost everywhere.
Therefore keeping Vendicari a wetland area during summer, would guarantee a shelter and a nourishment place for the migratory population. This would represent a small contribution that would assure the annual presence of thousand of birds, now considered as a natural patrimony all over the world.
The Life project therefore aimed, in spite of the few resources, at carrying out some actions so to reduce the threats on habitats and to better their conservation state and their ecological functionality. These actions were carried out also through a direct management of the habitats, as (i.e.) by means of artificial control of water levels in the marshes as indicated hereafter.

STRUCTURAL MEASURES AND ACTIONS

Protection measures and environmental recuperation of dunes

a) Wooden fence

The first necessary thing to do was to find a way to discourage the uncontrolled pattering of the dune's sandbar exercised by tourists. Therefore, a wooden fence was located along the dune's perimeter. The fence surrounding the entire habitat, measured at completion of works , 6 kmts.

(FOTO)

Wooden fence surrounding the habitat (Ph. M. Spatafora)

This measure intended to represent a physical bounding of the territory, which acts, mostly on visitors' sight, it being easily passable. The planned choice was that of discouraging visitors without disturbing the territory with an invasive structure. Dissuasive work will be mostly carried out by giving visitors all necessary information, and by putting forward a strong informational campaign by means of didactic material among which there is the present publication.

b) footbridges

In order to resolve the **pattering** problem although ensuring, to visitors/tourists, the possibility to enjoy the beauty of this coast, wooden footbridges were installed, in correspondence of those areas of the dune's sandbar where pattering mostly took place. Moreover, they were positioned at a certain height from the ground's level that would allow movement of sandy particles and of local fauna as well.

(FOTO)

Wooden footbridges over the dunes.(Ph. A. Pisano)

Shoots put at the extremities of these footbridges allow access to people with reduced or forbidden moving ability.

c) Morphological-environmental recuperation of sand exploitation sites.

As far as the morphological recuperation of the dune is concerned, the choice was that of installing wind-breaking barriers so to favour the accumulation process of sandy sediments, leaving to nature the duty to rebuild the missing tract of the dune.

(FOTO)

Positioning of wind-breaking barriers (Ph. M. Spatafora)

An alveolar honeycombed structure was built with interlaced rods of willow put on stakes of chestnut, and it was duly oriented so to orthogonally intersect dominant wind, therefore favouring sedimentation of sandy particles inside the cells.

In time, the presence of this structure, created a microclimate inside the cells, facilitating a better persistence of humidity, thus accelerating the colonizing process of pioneer vegetation. This indirectly favours the accumulation of sandy deposits brought by winds.

(FOTO)

Changes of the dune's structue.(Ph. A. Pisano)

The pictures show the first positive effects of the adopted measure: the first barrier line, on the shore, shows after almost nine months, the sandy accumulation that has almost over passed the barrier.

Wetlands' actions

a) Management of water levels

As in all wetland areas subject to strong hydric level changes, the number of species and the quantity of individuals present in the area, show considerable changes from one year to another.
To avoid the risk for the marshes of not having sufficient water levels necessary for the avifauna, an artificial water levelling system was a most. This measure would guarantee a constant incoming (in case of rare precipitations) or out coming of water (in opposite conditions).
The presence of canalization could represent a solution to the problem. In fact, it had been already used in the past to bring seawater into the Pantano Grande that fed the nearby tanks of a saltpan.
The first action was that of recuperating the structure and the function of the canal, whose bottom was completely buried and whose banks had had partial structural damages.

(FOTO)
Previous conditions of the canal (Ph. A. Pisano)

(FOTO)
After the project (Ph. A. Pisano)

(FOTO)
Tract of the canal before the water recuperation (Ph. M. Spatafora)

Furthermore the initial part of the canal, which brought to the sea, had collapsed because of sea storms, and its remains, made of big pieces in sandstone, commonly called " Tufo" (tuff), lied under the sea water level.
(FOTO)
Re-building of the canal's tract (Ph. A. Pisano)

It has to be underlined that, given the experimental characteristic of these measures, work was carried out only on one of the three marshes present in Vendicari and in specific on Pantano Grande.
Since they are all coastal marshes whose waters, during dry seasons, have chemical characteristics similar to sea waters, the inflow of sea water would not have caused substantial changes on the chemical characteristic of the marshes' water, as demonstrated by studies carried out by researcher of the Geochemical institute of the University of Palermo. (G. Dongarrà, E. Azzaro, A. Bellanca, A.Macaluso, F. Parello 1985).

(FOTO)
Opening of the canal which allows reflux of waters (Ph. A. Pisano)

Finally, exploiting the difference of levels created by high and low tide and also by locating the canal in the due sluice, it was possible to manually regulate water supply in the Pantano Grande.
(FOTO)
incoming of waters in the Pantano Grande (Ph. A. Pisano)

b) Artificial islets for nesting

The action on the Pantano Grande was completed with the introduction of artificial islets facilitating nesting for some birds' species as: the Avocet, the Stilt-plover and the Shear water, that have always had in Vendicari great difficulty in finding ideal and secure sites for nesting.

Four small islands were introduced with a rectangular form and of 12 m^2 each, positioned almost at the centre of the Pantano Grande at a distance of 25 metres one from the other and with a height of about 50 metres from the bottom of the marsh, and at 30 cm. from medium water level.

(FOTO)

Artificial islets in Pantano Grande (Ph. A. Pisano)

These small islands are built with detrital material, of sandy nature, coming from the excavation of the nearby saltpan, which took place according to action c) hereafter described.

(FOTO)

Detail of the access way to the islands (Ph. A. Pisano)

a) Creation of new wetland areas

The presence of an old and abandoned saltpan, suggested the use of the tanks to build a mosaic of new wetland areas therefore creating salty and muddy environments, scarcely present in the reserve.

The bottom of these tanks was duly cleaned and modelled, therefore originating marshy environments which facilitate the limicolous presence.

(FOTO)

Marshy areas obtained by excavation of the old salt works. (Ph. A. Pisano)

SURVAILANCE IN THE AREAS OF THE PROJECT.

Given the characteristic of the applied measures and because of the high presence of tourists (disturbance of nesting sites, non-observation of dune fruition rules) it was necessary to organize a surveillance system for the sites in question consequently reducing the failure risk of the Life project's attended results.

Surveillance posts were installed to preserve all the work carried out according to the specifics of the project, its attended results, and the habitats involved.

These posts were located in strategic points of the reserve's area: Punta d'Isola and Torre Vendicari, which allow a vast control of the territory.

(FOTO)

Survaillance post of Pantano Grande (Ph. A. Pisano)

COMPLEMENTARY ACTIONS

In Completion to structural actions, complementary actions were also planned within the project, aiming at divulging the objectives and the results of the Life project. Making local population aware was also part of the aim.

These actions have great importance within Life projects, because a strong informational campaign, carried out in schools, public administrations and local population, assure the final success of a project like this one.

- **Workshop for the presentation of the project;**
- **Web site creation;**
- **Publication of illustrative and informative material concerning the project;**
- **Informational-didactic visits in schools.**

As far as this last action is concerned, the Life project of Vendicari carried out a didactic and educational program mainly involving schools. This program was mostly based on environmental themes and its main objective was to initiate and divulge, especially among students and youngsters, a campaign to increase the sense of territorial belonging and to enhance awareness about the cultural and natural value of their territory and of its environments.

(FOTO)

One of the school moments (Ph. A. Pisano)

The schools of the following towns participated to the initiative: **Noto, Pachino, Ispica, Rosolini, Palazzolo Acreide, Avola.**

Texts :

Aldo Pisano

Scientific coordination

Aldo Pisano

Technical and administrative coordination

Antonino Pisano

Graphic and printing

Anteprima …

Planning and coordination of Life actions

GATE – Agenzia per la Promozione del Mediterraneo in Europa

Direction

Azienda Regionale Foreste Demaniali

Translation

Maria Stella Di Bella

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Contacts:

Azienda Foreste Demaniali della Regione Siciliana
Ing. M. Spatafora
Via Libertà, 97 - Palermo
Tel 091-6274111
e-mail: azforsi@regione.Sicilia.it
sito web: www.regione.sicilia.it/agricolturaeforeste/azforeste

GATE s.c.r.l.

aldo.pisano@libero.it ;

antoninopisano59@virgilio.it

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