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Committee for the activities of the Council of Europe in the field of biological and landscape diversity

(CO-DBP)

Group of specialists – European Diploma for Protected Areas

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THE REGIONAL PARK OF MIGLIARINO, SAN ROSSORE AND MASSACIUCCOLI (Italy)

APPLICATION for the European Diploma for Protected Areas

presented by
the Ministry for the Environment
and Territory

Document established by
the Directorate of Culture
and Cultural and Natural Heritage

ABSTRACT

The Park is situated in the centre of a highly urbanized area and close to areas of considerable human intervention, which was especially notable during the 1800's and the first half of the 1900's. Despite this, however, the territory has managed to maintain its distinctive natural character, according to its institutional aim "the protection of the natural, environmental and historical characteristics of the Pisa and Lucca coast, to increase the social function of the territory and to promote scientific research and environmental education".

The Park contains an enormous wealth of biodiversity comprising natural and semi-natural plain habitats, with some extremely rare species which have disappeared from most of Italy and the Mediterranean. Some species live here on the borders of their natural geographical distribution; others are the remains of species typical to other bio-geographical areas. Others again are authentic endemisms.

Plain woods, which are quite rare in Italy, are present here in one of the largest single areas of extension.

Dune environments are still well preserved for kilometers from bathing activities and touristic settlements, especially in reserves and in both San Rossore and Migliarino estates. In other coastal areas, the Park controls the intense touristic activity.

The wetlands can extend for several hundred hectares (the Massaciuccoli marsh, Lame di fuori), thus allowing both nesting and passage of numerous rare bird species.

Finally, the different environments (xerophyllous woods, mesohygrophytic woods, wetlands, agricultural areas) often overlap. At the biological level this results in a huge diversity of species, with a population richer in species than would be the case if each environment were taken separately (mosaic effect and marginal effect).

The environment is characterized by the presence of different habitats, above mentioned: (a) typical eco-systems of sandy beaches and dunes, (b) scrublands (*Myrtus communis*, *Pistacia lentiscus*, *Viburnum tinus*, *Phyllirea latifolia*) and schlerophyle woods dominated by *Quercus ilex*, often associated with *Fraxinus ornus;* (c) mixed mesohygrophylous woods of *Quercus robur*, *Populus alba*, *Fraxinus oxycarpa, Alnus glutinosa*, *Carpinus betulus, Ulmus minor* and *Acer campestre*. There wood are present in – or at the border of - inter-dunal sites characterised by water permanence during winter (due to a very superficial water stream). (d) Conifer woods grow near to the mesophytic and thermophilic woods and in some cases are mixed in with them. They are largely made up of *Pinus pinea* and *Pinus pinaster*, and are artificial or semi-natural in origin. Despite its origin, *Pinus pinea* pinewoods have a great aesthetic and cultural (historical and economic) value, being also an appreciated habitat for several animal species. Finally, the territory is characterised by (e) vast and diverse wetland environments, such as the marsh area to the north of the Massaciuccoli Lake, the Lame di fuori at San Rossore and the places where salt water emerges from the Ulivo. The flora in these areas is quite unique and forms a backdrop to this territory; an environment out of which man has carved both fields for cultivation and areas for manufacturing activity. These are the best habitats for numerous ornithic species, so it is the richest environment, and the more fragile.

From a phytogeographic and ecological point of view, the presence of boreal elements typical of Nordic or high mountain flora, such as sphagnums (*Sphagnum sp.*), and more thermophilic elements, which could be defined as Atlantic or Ocean elements (*Hibiscus palustris*, *Hypericum elodes*) is extremely important. Alongside these are sub-tropical elements (*Osmunda regalis*) and oriental elements from areas close to the Black Sea, such as *Periploca graeca,* a liana which is found in Italy only in Puglia and Tuscany.

The research activity and scientific monitoring is conducted with the help of the major Tuscan Universities. Research and monitoring activities are primarily concentrated both in the Tombolo Estate, managed from University of Pisa, and in San Rossore estate, directly managed by the Regional Park. Research is aimed to manage the territory on a scientific basis. In San Rossore Estate, a ringing station is also planned which will serve as a base for research and experiments on birds.

Environmental education has at last got underway with a multi-year program involving schools and the various co-operatives offering guides and accompanied visits. At the moment there are two environmental education centres and two visitor centres. Guided visits start from the centres, and they also provide teaching materials and reception facilities for visitors (La Sterpaia offers board and lodging for which a charge is made).

INFORMATION FORM FOR NEW APPLICATION FOR EUROPEAN DIPLOMA OF PROTECTED AREAS

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European Diploma

Information form for Candidate Sites

This form is also available on diskette

Site Code (to be given by the Council of Europe)								

1. SITE IDENTIFICATION

1.1. SITE NAME

Ente-Parco Regionale Migliarino, San Rossore e Massaciuccoli.

1.2. COUNTRY	ITALIA							
1.3. DATE CANDIDATURE								
1.4. SITE INFORMATION COMPILATION DATE	2	0	0	2	1	0	0	9
	Y	**Y**	**Y**	**Y**	**M**	**M**	**D**	**D**

1.5. ADDRESSES: Administrative Authorities

National Authority	Regional Authority	Local Authority
Name: Ministero dell'Ambiente – Direzione Conservazione della Natura Address: via Capitan Bavastro, 174 00154 ROMA Tel. +390657228509 Fax. +390657228577 E-mail scn-dg@minambiente.it	Name :Regione Toscana – Dipartimento Politiche Territoriali e Ambientali. Area: Tutela e valorizzazione delle risorse ambientali Adress : via di Novoli, 26 50127 FIRENZE Tél. +390554383062 Fax.+390554383898 E-mail e.fornaciari@mail.regione.toscana.it	Name: Ente Parco Migliarino, San Rossore e Massaciuccoli Adress : via Aurelia Nord, 4 56122 PISA Tel. +390525500 Fax. +39050533650 E-mail: parco@sanrossore.toscana.it

1.6. ADDRESSES: Site Authorities

Site Manager	Site Information Centre	Council of Europe Contact
Name : Sergio PAGLIALUNGA Adress : Ente Parco Migliarino, San Rossore e Massaciuccoli via Aurelia Nord, 4 56122 PISA Tel. +390525500 Fax. +39050533650 E-mail: s.paglialunga@sanrossore.toscana.it	Name : Francesca LOGLI Adress : Ente Parco Migliarino, San Rossore e Massaciuccoli via Aurelia Nord, 4 56122 PISA Tel. +390525500 Fax. +39050533650 E-mail: foreste@sanrossore.toscana.it	Name : Giancarlo LUNARDI Adress : Ente Parco Migliarino, San Rossore e Massaciuccoli Via Aurelia Nord, 4 56122 PISA Tel. +390525500 Fax. +39050533650 E-mail: parco@sanrossore.toscana.it

1.7 SUMMARY DESCRIPTION

The Park main characteristics are listed below:

1. geographical situation: on Thyrrenian coast, close to highly urbanized plain (among Pisa, Viareggio and Livorno);
2. biodiversity: presence of (1) rare and endemic animal and vegetal species (2) different habitats, often interconnected and overlapped (i.e.: wetlands, sandy dunes, meso-hygrophilous and xerophilous woodlands and agricultural lands).
3. landscapes and human history: agricultural and forest lanscapes shaped by the human activities during the past 5 centuries; historical sites and buildings.
4. 16 natural reserves (total protection) located in the most sensitive areas of the park.

1.8. EUROPEAN INTEREST JUSTIFYING THE CANDIDATURE

1. dunal ecosystems: extremely unstable priority habitat (*sensu* EEC Directive "Habitat", see section 1.9) exposed to coastal erosion and threatened by intense touristic activity;
2. plain woods, which are quite rare in Italy, are present here in one of the largest single areas of extension;
3. in the Mediterranean bio-geographical region, occurrence of boreal elements typical of Northern regions and high mountain flora, such as sphagnums (*Sphagnum sp.*), and more thermophilic elements, which could be defined as Atlantic or Oceanic elements (*Hibiscus palustris*, *Hypericum elodes*);
4. marginal-marshland of Massaciuccoli lake, the only marshland between Camargue and Orbetello (South Tuscany). We underline following important points (a) occurrence of both migratory and nest-building bird species, often rare and endangered; (b) high scientific and educational interest, and (c) danger of eutrophication and silting up (filling up with sediments).

1.9. SELECTION METHODOLOGY

- Natura 2000 network (Directive 92/42/EEC "Habitat" and Directive 79/409/EEC "Wild birds") named "Macchia Lucchese" (388 ha, code IT 5120016), "Coastal dunes of Torre del Lago" (116 ha, code IT 5170001), "Massaciuccoli lake" (1837 ha, code IT 5120021); "Selva Pisana", (9284 ha, code IT 5170002).
- The marsh area of Massaciuccoli Lake is under judgement in order to obtain the designation of "marsh area of international interest" according to trhe Ramsar Convention rules.

1.10. MAIN AIM OR MOTIVATION

Aim of the Park was defined since its institution in 1979.

We report the first article of Regional Law of Migliarino San Rossore Massaciuccoli Park institution: "Aim of the Park is the protection of the natural, environmental and historical characteristics of the Pisa and Lucca coast, to increase the social function of the territory and to promote scientific research and environmental education."

1.11. DATES *(to be filled in by the Council of Europe)*

DATE OF FIRST EXAMINATION	DATE OF EXPERT VISIT
Y Y Y Y M M D D	Y Y Y Y M M D D
DATE OF SECOND EXAMINATION	**DATE OF AWARD**
Y Y Y Y M M D D	Y Y Y Y M M D D

2. SITE LOCATION

2.1. SITE CENTRE LOCATION

LONGITUDE										LATITUDE									
E		1	0	°	1	7	‘	3	8	“	N	4	3	°	4	3	‘	0	0	“

W/E (Greenwich)

2.2. AREA (ha)

Total Area	2	3	1	1	4	,	4	4
Core	1	4	2	4	4	,	5	5
Buffer		8	8	6	9	,	8	9
Transition						,		

2.3. SITE LENGTH (km)

			,			
			,			

2.4. ALTITUDE (m)

MINIMUM				MAXIMUM				MEAN			
			0			1	6				2

2.5. ADMINISTRATIVE REGION

REGION NAME	% COVER		
TOSCANA	1	0	0
Marine area not covered by the terrestrial part			

3. NATURAL HERITAGE

3.1 GENERAL ABIOTIC DESCRIPTION (Geomorphology, geology and hydrogeology)

The Park area includes both Serchio and Arno estuaries. The rivers sedimental drift together with sea coastal erosion phenomena give a geomorphological system, now higly instable due to (a) the lack of sedimental drift and (b) ports of Livorno (South) and Viareggio (North).
From the geological point of view the plain formation is dated back to Pleistocene, the first layer being done by lake and marine detritus. The most recent coastal advancement, dated back from Quaternary and historical age, is due to alluvial drifts considered as the determining factor of dune alternation with back dunal ponds (winter outcrop of water table). Agricultural flat lands result from land reclamation of the last two centuries.
Massaciuccoli lake, once a vaste marsh brackish water, after the reclamation of 1930s became a lake 2 meters deep, fringed by marshland extended to the north, agricultural lands in the south side, and several reclamation channels.

3.2. HABITATS

We report the habitats as listed in Annex I of Council Directive 92/43/EEC with the Natura 2000 Code and (*) if it is a priority habitat type.

- 2250 * - Coastal dunes with *Juniperus* spp. (particularly Juniperus oxycedrus ssp. Macrocarpa) – function of stabilisation and consolidation of the dunes from sea erosion; other species are Ammophila arenaria, Solidago litoralis, Centaurea subciliata. Associations are:
  - *Cakilo Xanthietum italici*
  - *Sporobolo-Agropyretum juncei*
  - *Echinoporo spinosae-Ammophiletum arenariae*
  - *Helycryso stoechadis-Cistetum eriocephali*
  - *Spartio-juncei-Juniperetum macrocarpae, Spartio-juncei-Phylliretum angustifoliae*
- 2270 * - Wooded dunes with *Pinus pinea* and/or *Pinus pinaster. These high forest of Umbrella pine (Pinus pinea) or - closer to the coastline - Pinus pinaster,* represent today the main forest lanscape of the Park. They have been planted since XVII century.
- 91F0 - Riparian mixed forests of *Quercus robur*, *Ulmus laevis* and *Ulmus minor*, *Fraxinus angustifolia*. Association *Fraxino angustifoliae-Quercetum roboris* and subassociation *carpinetosum betuli.*
- 9340 - *Quercus ilex* and *Quercus rotundifolia* forests. Floristic association is *Viburno-quercetum illicis*, more rarely *quercetosum roboris*.
- 91B0 - Thermophilous *Fraxinus angustifolia* woods; associations: *Carici remotae-Fraxinetum oxycarpae* and *Alno-glutinosae- Fraxinetum oxycarpae.*
- *Hydrocotylo-alnetum glutinosae;*
- *Periploco graecae-Ulmetum minoris*
- 1420 Mediterranean and thermo-Atlantic halophilous scrubs (Salicornia *fruticosa*)

3.3. FLORA

Vegetation of "Macchia Lucchese" (dunes and forest located at the extreme north side of the Park) give evidence of the importance of the entire protected area. In fact it is the only site where both boreal and xerophilous-mediterranean species are present, thus a total of 538 vegetal species.
Dunal endemic species are *Solidago litoralis* Savi (or *Solidago virgaurea* Moretti ssp. *litoralis* (DC)), *Centaurea aplolepa* subsp. *subciliata, Stachis recta* L. *var psammophila.* Also, rare species are *Polygonum maritimum* L., *Stachys maritima* Gouan, *Trifolium squarrosum* L., *Vicia pseudocracca* Bertol.
Othes more recent studies on the San Rossore and Tombolo Estates recorded 609 and 394 species respectively.
In Woodlands, endemic and rare species are: *Ruscus aculeatus* L., *Hottonia palustris* L., *Periploca graeca* L., *Fraxinus angustifolia* Vahl.
Hydrophites, which are plant submerged or partially emerged from water, are characterised by *Potamogeton pectinatus* L. and *Ceratophyllum demersus*. Main Helophytes, plants from marshes, are *Phragmites australis* (Cav.) Trin. ex Steud (Common Reed) et *Claudium mariscus* (L) Pohl (Sedge). Other rare or endemic marshland species are *Utricolaria australis* R.Br. (Southern Bladderwort), a floating aquatic carnivorous plant, *Hibiscus palustris* L. (Rose mallow), *Thelypteris palustris* Schott (Marsh Fern), *Hydrocharis morsus-ranae* L. (Frogbit), the carnivore *Drosera rotundifolia* L. (Roundleaf sundew) and *Anagallis tenella* L. (Bog Pimpernel).
Mushrooms are also well represented, especially in forest, between forest and cultivated areas, and on the dunes. A study of experts mycologists from Pisa University (in collaboration with the Park) recorded 156 species, divided into 76 genus belonging to classes Ascomycota, Basidiomycota et Myxomicota.
Concerning main species of each habitat, we refer to point 3.2. (Habitat).

3.4. FAUNA

The Park has a great diversity of environments, then there is a great number and variety of animal species.
Mammals predominate the macrofaune, often in the more dense forestry areas. We note Porcupine (*Hystrix cristata),* Hedgehog (*Erinaceus europaeus)*, Fox (*Vulpes vulpes)*, Dormouse (*Glis glis)*, … (*Mustela nivalis*), and Domestic Ferret (*Mustela putorius*). Among the Ungulates are Deers *(Dama dama)* and Wild-pigs *(Sus scrofa)*. Deer is very frequent so that yearly captures are necessary, particularly in fenced areas, as to contain the proliferation of the species, lacking natural predators.
Within **Reptiles** we mention European Pond Turtle (*Emys orbicolaris*), Western green lizard (*Lacerta bilineata)*, wall lizard (*Podarcis muraiola) and* ruin lizard (*P. siculus)*, Slow worm (*Anguis fragilis*).
Mashlands has the richest variety of animal species. **Amphibians** are Italia Treefrog (*Hyla intermedia*), Agile Frog (*Rana dalmatina*), Green Toad (*Bufo viridis*) and Italian Crested Newt (*Triturus carniflex);* in the Massaciouccoli Lake, **Fishes** are Eel (*Anguilla anguilla*), Pike (*Esox lucius)* and the very rare Three-spined stickleback (*Gasterosteus aculeatus).*
Birds are the most significant in all environments and want a separate description. Within Ardeides (migratory birds) we underline Bittern (*Botaurus stellaris*), subject to several studies and programs of conservation of its habitat, the wetland; the Purple Heron (*Ardea purpurea*), the Cattle egret (*Bubulcus ibis*) and the Great Egret (*Casmerodius albus*).
Furthermore, in Marshlands nesting birds are Black winged stilt (*Himantopus himantopus*), Great Reed Warbler (*Acrocephalus scirpaceus*), Garganey (*Anas querquedula*), Sanderling (*Calidris alba*), Whimbrel (*Numenius phaeopus*), and Little Bittern (*Ixobricus minutus*).
Woodlands are frequented by Nigtingale (*Luscinia megarthyncos*), Stonechat (*Saxicola torquata*), Wryneck (*Jynx torquilla*), Sordinian Warbler (*Sylvia melanocephala*), Bee-eater (*Merops apiaster*), Wood pigeon (*Columba palumbus*), and Woodpeckers, which one, Lesser Spotted Woodpecker *(Picoides minor)*, is very specialised.
Most of the above mentioned species are protected by Annexes II and IV of Directive 92/43/EEC and recorded every year.

3.5. LANDSCAPE

The landscape is characterised by the close proximity of highly different environments. Starting from the sea, there is a dune environment (with first herbaceous plants and shrubs) followed by woodlands, both pinewoods – of great landscaping effect due to their height and umbrella like canopies – and, in the infradunal marshland depressions, broad leaf woods (the ancient plain woods) with a great variety of tree and shrub species. Then, we have vast wetlands of enormous ornithological importance including Massaciuccoli Lake and Lame di fuori at San Rossore estate. Finally, the agricultural lands settled in the reclaimed areas, characterised by hedges, ditches and canals network are very attractive.

4. CULTURAL HERITAGE AND SOCIO-ECONOMIC CONTEXT

4.1 CULTURAL HERITAGE

The Park area contains a lot of historical evidences. The landscape transformation itself (see section 3.5) reminds the human activity. Before the primary activity economic decline, the park population was employied in hunting, fishing, pine-seed collecting, forestry, charcoal production, peat extraction, silkworm breeding and agriculture.
The official history reminds of the main landowner such as, the Duchy of Lucca at Massaciuccoli, the Republic of Pisa, the Grand Duchy of Tuscany at San Rossore estate, and Borboni, Medici and Salviati families, and Clergy hunting reserves and properties. At present only two Medici villas in Coltano and Cascine Vecchie, and a Borboni Villa near Torre del Lago are still existing, beside there are some hunting houses dated back to 16° and 18° century.
San Piero a Grado main attraction is the Romanic Church, dated back to XI century and declared UNESCO World Heritage Site. The recent discovery of ancient roman ships is an interesting evidence of the ancient lagoon where Pisa settled.
Inside the Coltano estate Paleolithic remains were discovered.
The Park Management Plan takes into account seven different areas, each one corresponding to an ancient estate and to the main farms, characterized by a geomorphological homogeinity: : Tombolo, Coltano, San Rossore, Migliarino, Massaciuccoli lake and marshland, Borbone Villa and Macchia Lucchese.

4.2 SOCIO-ECONOMIC CONTEXT

Regarding to the park economic activity only the 3% of the population is employied in the primary sector, both in forestry (pine collecting and timber) and in agriculture, with regards to organic agriculture and authocthonal breeding, as "Mucco pisano" bovine breed, beach vegetation honey, pecorino cheese, orticultural production.
Organic agriculture is widely promoted inside the park. Horse breeding and horse racing activity are developed since two centuries. Farm holiday activity is emerging.
The Tertiary activity concerns the 74% of the active population, mainly in the bathing estabilishments on the coast. Naturalistic tourism is also increasing, with guided visits and excursions.
We underline the proximity to urban centres like Pisa, with its University and art buildings, Livorno with its harbour, Viareggio with its bathing estabilishments. These towns attract a remarquable human activity –being both an advantage and a disadvantage. Particularly, University of Pisa develops many research activities concerning Veterinary science, Agriculture and Ethology, main of these in the Park itself.

5. EDUCATIONAL AND SCIENTIFIC INTEREST

Park pedagogical activities concern mainly three sectors: (i) scientific- naturalistic, (ii) hystorical-archeological and (iii) socio-economic. Beside environmental education and scientific research are included among the Park institutional purposes. Visitor centres have been organized, as provided in the Piano di Gestione, one at Coltano in the Medici Villa, the others at San Rossore estate (Cascine Vecchie e Casale della Sterpaia), and at Massarosa closed to the Massaciuccoli Lake. Environmental education activities are carried out by co-operatives and environmental associations, in both cases skilled touristic guides are involved. The guided visits are planned both for children (starting from the elementary school), and for adults. The touristic proposal is very interesting: equipped auditoria are available, paths planned for ornithological observation have been arranged. Guided visits can be made on foot, on horseback, by carriage and by boat. Study temporary stay and stages are also planned, in order to investigate the territorial characteristics, both the park staff and the University researchers are involved. The large and wide bibliography testify the intense research activity carried out, scientific laboratory are settled inside the Park area.

6. SITE DESCRIPTION

6.1. VULNERABILITY

While the residents in the Park are only 4.000, its adjacent municipalities (mainly Livorno, Pisa and Viareggio) count nearly 400.000 inhabitants, more than regional averages. The second type of anthropic pressure, not external to the Park site but more direct, is the tourism. We estimate a yearly presence of about 5 millions people, mainly distributed in bathing areas on the coast (Marina di Pisa, Tirrenia, Torre del Lago). In the San Rossore Estate, where visitors access is controlled, 26.000 presences were recorded in the year 2000.
Human presence is certainly a chance for the Park, but lead to some problems, concerning (a) dunes stamping (linked to bathing and sport activities), (b) collecting (harvesting) of mushrooms, dead wood, Butcher's Broom (*Ruscus aculeatus* L.*)*, etc from forests understory, activities always submitted to Park authorisation, if they are not forbidden by its Regulation.
Others direct and indirect consequences of human activities are the following:

- strong coast erosion, particularly in San Rossore estate;
- pinewoods of *Pinus pinaster* and/or *Pinus pinea*:
    - stands located near the coastline: damages (both physical and chemical) caused by seawind (aerosol).
    - Stand aged up to 100 years: physiological instability due to senescence and occasionally to water ground permanence.
- Both pinewoods and mixed deciduous forest stands: excessive pressure of Ungulates (Deers) leading to absence of both herbaceous and shrubs understory, and to lack of forest renewal. In the San Rossore estate we recorded 60 deers per 100 ha– the optimum beeing of 10 per 100 ha. In the fenced areas (military zones, Tombolo Estate), data of year 2000 show 117 individual every 100 ha!
- Massaciuccoli Lake (ZPS):
    - eutrophication
    - silting up (filling up with sediments) – at the current trend we estimate a complete filling up with sediments in 120 years.
    - salification (due to water level decrease in summer)
    - lack of water recharge (due to water captation for irrigation and urban uses)

- hunting and poaching
- illicit fire utilisation to make clearing (for hunting)

More particularly, we underline a progressive entry of sea water in the interdunal zones. This is due to (a) the above mentioned erosion and (b) the absence of maintenance of hydraulic network by cataracts. Consequently, we have gradually a loss of marshy habitats (priority habitats) and its transformation to wet salty areas with alophilous vegetation.
Another danger linked to water regime is the variations of the water layer level leading to dry periods in hygrophilous forest stands when water is necessary and periods with water permanence in xerophilous forests. Consequently, we could have a contraction of species like *Quercus ilex* or *Pinus pinea, Carpinus betulus* and *Quercus robur*, and of flora living on the borders of their natural geographical distribution like *Osmunda regalis*, *Hibiscus palustris, Periploca graeca, Hypericum helodes*. From the fauna point of view, the first consequence would be the loss of the very specialised *Picoides minor*, and of very exclusives populations of Coleoptera coprofages like *Heptaulacus rasettii* or the rare *Ceratophius rossii*.

6.2. PROTECTION STATUS

Zone (denomination)	type of protection	% protected surface	date of designation
Parco Regionale (Regional Park)	L. 394/91; Regional Laws (RL) 61/79 and 24/94	100	1979, 1994
Parco Regionale – "aree interne" (core areas)	Territorial Plan of the Park (Deliberation of Regional Council nr. 515/89), modified by Del. nr 223/91)	61,6	1989, 1991
Parco Regionale – "aree contigue" (buffer areas)	The same protection as *supra*, but no hunting interdiction (uder the Province management); L. 157/92 and RL 3/94	38,4	1989, 1991
15 Natural Reserves	Territorial Plan of the Park (Deliberation of Regional Council nr. 515/89), modified by Del. nr 223/91) and Specific Regulations	9,7	1991
SIC Macchia Lucchese	Directive "Habitat" 92/43/EEC	1,7	1998
ZPS Macchia Lucchese	Directive "Wild Birds" 79/409/EEC	1,7	1998
SIC Selva Pisana	Directive "Habitat" 92/43/EEC	40,1	1998
ZPS Selva Pisana	Directive "Wild Birds" 79/409/EEC	40,1	1998
SIC Dune litoranee di Torre del Lago	Directive "Habitat" 92/43/EEC	0,5	1998
ZPS Dune litoranee di Torre del Lago	Directive "Wild Birds" 79/409/EEC	0,5	1998
SIC Lago di Massaciuccoli	Directive "Habitat" 92/43/EEC	8,0	1998
ZPS Lago di Massaciuccoli	Directive "Wild Birds" 79/409/EEC	8.0	1995
Hydrogeological Binding – national and regional Forestry Laws	R.D.L. 3267/1923 RL 39/2000	39,8	1923 andt 2000
Landscape protection Binding (urbanisation)	L. 1497/1939 and L. 431/85 D. Lgs. 490 of 29.10.1999	100	from 1960 to 1985

6.3. OWNERSHIP

Private: 8693 hectares (37,6% of total surface)
Public: State, Region, Province, Municipalities, University: 14422 hectares (62,4% of total surface)
San Rossore estate (4880 ha), property of Tuscany Region, since 2000 is directly managed from Park Organisation.
On the restant surface the Park management is exerced indirectly by Management Plan, which defines admissible types of intervention, and by "nulla osta", the Park authorisation which verify if the intervention requested by the owner (both private and public) is admissible (by the Management plan itself, the Park Regulation, and others specific laws). The nulla osta could contain technical prescriptions for the correct execution of the intervention.

6.4. DOCUMENTATION

Important note: we list below (a) monographic studies and (b) publications edited by the Park, hereafter marked by *. We send to its bibliographies to have a complete review of the vaste scientific documentation on the Park.

*AA.VV. (Bianchi et al.) 1996 - San Rossore: Un territorio, un grande valore ambientale – Pacini ed., Ospedaletto (Pisa)

*AA.VV. 1991 - Esperienze e proposte per un'agricoltura compatibile nel Parco (Atti del Convegno) - Pacini ed., Pisa

AA.VV. 1983 - Dal Calambrone alla Burlamacca. Guida alla natura del Parco M.S.R.M., Nistri-Lischi ed., Pisa

*AA.VV. 1984 - Parco Naturale M.S.R.M., Ed. Consorzio del Parco

AA.VV. 1986 - Terre e Paduli. Reperti, documenti, immagini per la storia di Coltano - Bondecchi e Vivaldi, Pontedera

AA.VV. 1988 - Il Fiume, la Campagna, il Mare: reperti documenti e immagini per la storia di Vecchiano - Bandecchi e Vivaldi, Pontedera

*AA.VV. 1988 - L'Agricoltura nel Parco. Atti Convegno Parco Naturale MSRM. Itinerari didattici. Pisa

*AA.VV. 1992 - Eutrofizzazione del Lago di Massaciuccoli (Atti Convegno), Felici ed., Pisa

*AA.VV. 1992 - Gli Enti Parco oggi (Atti del convegno). - Pacini ed., Pisa

*AA.VV. 1993 - Lo studio dell'Agricoltura all'interno del Parco - Pacini ed., Pisa

*AA.VV. 1996 - La valorizzazione delle produzioni ovi-caprine nel Parco Naturale (atti del convegno) - Felici ed., Pisa

*AA.VV. 1996 - Riduzione degli input inquinanti in agricoltura. Il Servizio di controllo e taratura delle barre irroratrici e degli atomizzatori - Felici ed., Pisa

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Past research

- Multidisciplinary geophysical investigations in the Park area, with particular attention to the Massaciuccoli Lake area;
- Hydrological study of the Massaciuccoli Lake basin;
- Evaluation of the concentration of nutrients and pesticide residues in the waters of Massaciuccoli Lake;

- Agropedoclimatic characterisation of the Park territory
- Chemical characterisation of the Park soils with georeferenced system surveys and production of soil maps
- General plan for forestry management on the San Rossore estate: pedologic study

- Monitoring of Massaciuccoli Marshland and Lake
- Lichen monitoring;
- General forestry plan of San Rossore estate, vegetation and forestry pathogens monitoring;
- Experimental trials concerning macrophytes introduction in Massaciuccoli lake;

- Biodiversity conservation in vegetal and microbic systems;
- Floristic atlas of Macchia Lucchese;
- Floristic atlas of San Rossore estate
- Vegetation of Bosco dell'Ulivo;
- Palinological studies on Massaciuccoli lake;
- Mechanization of pine tree cones harvesting, main effects on *Pinus pinea* L.
- Carbo Age, european project concerning forestry systems and carbon balance
- NOFRETETE european project concerning nitrogen flux monitoring, ecophysiological processes evaluation by means of remote sensing and biogeochimic models

- General forestry plan of San Rossore estate, ungulate population and ornithological monitoring
- Research on bittern population, ecology and conservation of a threatned specie;
- Research on the Lake icthyofauna ;
- Research on invertebrate fauna (insects)
- Research on European Pond Turtle (*Emys orbicolaris*)
- Monitoring of the animal populations of dry and wetlands of the Park;
- Further research on invertebrate and vertebrate fauna which characterises the Park environment
- Investigations and studies concerning bee (Apis spp.) behaviour;
- Orientation of the travelling pigeon (*Columba livia*);
- Moth migration. Detailed observations have been carried out on the seasonal movements of different species of moths and in particular the migrating species *Vanessa atalanta*

AGRICULTURE
- General study of agriculture within the Park
- Reduction and diversification of soil tillage techniques: agronomic, mechanical, economic and environmental aspects
- Alternative soil tillage techniques in Tuscany
- Comparison of the main herbaceous cultivations varieties
- Optimising the timing and density of sowing of the main herbaceous crops
- Fertilisation techniques, with particular regard to the use of slow release nitrogen fertiliser, evaluation of the environmental aspects
- Evaluation of the effects and residues of pesticides
- Study on weed distribution and dynamics in the main cultivated crops, cropping system effects
- Use of cover crops as a tool for containing erosion and enhance soil conservation
- Comparison of conventional and alternative agricultural systems; agronomic, mechanical and economic aspects
- Evaluation of low environmental impact systems of cultivation in the Park;
- Evaluation of technical, economic and environmental sustainability of organic and integrated agricultural systems;
- Evaluation of hydric soil erosion and water quality in surface streams as affected by tillage systems, with particular regard to nutrients concentration and pesticides;
- Soil and water quality as affected by agrochemicals under different soil tillage systems (Project of the European Economic Community as part of the 1990-1994 environmental program, developed by the University of Pisa)
- Soil erosion in the district of Massaciuccoli Lake: mitigation techniques (convention between University of Pisa and the Natural Park)
- Evaluation of the effect of waste water distribution on agricultural ground
- Determination of hydric consumption of main cultivations
- Use of geographyc information systems in the territory
- Evaluation of the productivity of forage species
- Agronomic evaluation of the environmental impact associated with "Short Rotation Forestry" (SRF)
- Domestic pinewood (*Pinus pinea L.*) management and mechanisation of the harvesting
- Study of environmental restoration of areas for the semi-wild raising of cattle bred for meat production
- Evaluation of the morpho-functional characteristics of Mucca Pisana cattle
- Raising Mucca Pisana veal-calves for meat production; growth and slaughter characteristics
- Application of an integrated quality control system for milk and animal physiological condition monitoring in a Frisona Italiana population
- Methods of breeding Sardinian and Massa sheep in plain pasture (Interreg II Tuscan Corsican project)
- Artiodactyl Ungulates breeding for faunistic-hunting purposes, faunistic-zootechnical and agri-tourist-hunting purposes in hill areas
- Project PianosaLab: research on terrestrial ecosystems in the Mediterranean area

Ongoing or recently concluded research and/or monitoring activities:

- Hydrological studies of Macchia Lucchese (water table level, capacity surface-drain)

- Drafting of the General Plan for Forestry Management on the San Rossore estate
- Organisation of an *in situ* collection of mycorrhizal fungus in the dune ecosystems for the conservation of their genetic diversity
- Mapping of Park lichens

- Research and monitoring of the bittern (*Botaurus stellaris*) population in the Massaciuccoli marshes
- Icthyofauna management and monitoring of pike (*Esox lucius)* and carp (*Cyprinus carpio)* in the Massaciuccoli Lake
- Monitoring of disturbance of fauna in the natural Reserve of "Lame di fuori" during protection works in San Rossore coast
- Geobotanical and palinological studies in the Massaciuccoli Lake basin
- Isolation and identification of pathogenic agents of the American Red Prawn in the Massaciuccoli lake (*Procambarus clarkij)*
- Experimentation by means of *enclosures* in the Massaciuccoli Lake (LIFE project)
- Research on defining nesting and wintering bird populations
- Research and monitoring of the freshwater turtle *Emys orbicularis* and other amphibious species
- Characterisation of the marine area prior to the carrying out of defensive sea works in the San Rossore area
- Studies, research and experimentation on the fallow deer (*Dama dama*) population on the San Rossore estate
- Veterinary research for the well-being of animals raised on the San Rossore estate

- Co-financed technical assistance project for the application of innovative tools and instruments for an eco-compatible and sustainable agricultural production
- Analysis of agricultural processes
- Effects of rotation and nitrogen fertilisation on wheat cultivation *(in progress since 1981)* (MiPA project; conservation and use of soil resources; defining the quality of the soil for the purposes of ecocompatible agricultural and forestry management)
- Non-irrigated cropping systems in the Tuscan coast
- Systems and methods of organic agriculture for the quality improvement of plant production and the environment
- Comparison between green manure crops and evaluation of the effect on production and soil quality (Research project: organic and bio-dynamic agriculture in Tuscany: agronomic and economic evaluation of systems of plant production with reference to the main cultivations of interest. Convention between ARSIA Toscana and AIAB Toscana, partner of the University of Pisa “Enrico Avanzi” Interdepartmental Centre for Agro-Environmental Research)
- Comparison of fertilisers allowed by Reg. 2092/91 for the purposes of checking the effect on production, on soil organic carbon content and on soil quality (*in progress since 2003*) (Research Project: Organic and biodynamic agriculture in Tuscany: agronomic and economic evaluation of systems of plant production with reference to main cultivations of interest. Convention between ARSIA Toscana and AIAB Toscana, partner of the University of Pisa “Enrico Avanzi” Interdepartmental Centre for Agro-Environmental Research)
- The role of agroforesty resources and management of agro-ecosystems in trapping atmospheric CO_2: the role of soil tillage and crop rotation in the trapping of atmospheric CO_2
- Feasibility study of a new process for extracting “noble” proteins from vegetable biomasses and for the simultaneous exploitation of sub-products in the Pisan plain (Financing from the Cassa di Risparmio di Pisa Foundation assigned to the Sant’Anna of Pisa High School, partner of the University of Pisa “Enrico Avanzi” Interdepartmental Centre for Agro-Environmental Research))

7. SITE MANAGEMENT

7.1. MANAGEMENT PLANS

According to Article 11 of Park Territorial Programme (Del. Regional Council n. 515/89), the Territorial programme is realised by means of Management programmes, so that actions and projects in the Park are provided and/or regulated at more detailed level. Each programme concerns a single Estate/Farm (having similar historical, natural and administrative characteristics). Also the validity period is limited (normally 3 years).

Private or public owner may have a Management Plan concerning its property, or a sector. This Plan is then submitted to the Park authority which, in the framework of Territorial Programme and/or management Programme of the concerned Estate, give the requested authorisation. E.g. forest management plan of the Macchia Lucchese is compiled by Comune di Viareggio (the owner) and then authorised by the Park.

PIANO DI GESTIONE PADULE SETTENTRIONALE E LAGO DI MASSACIUCCOLI
Adopted and approved by the Park Directive Board (Del. nr. 125 du 13.04.1999)
PIANO DI GESTIONE TENUTA BORBONE E MACCHIA LUCCHESE
Adopted and approved by the Park Directive Board (Del. nr.72 du 20.03.1996)
PIANO DI GESTIONE TENUTA DI MIGLIARINO E FATTORIA DI VECCHIANO
Adopted and approved by the Park Directive Board (Del. nr. 360 du 24.12.1997)
PIANO DI GESTIONE TENUTA DI SAN ROSSORE
Adopted and approved by the Park Directive Board (Del. nr. 127 du 13.04.1999).
PIANO DI GESTIONE TENUTE DI TOMBOLO E DI COLTANO
Adopted and approved by the Park Directive Board (Del. nr. 18 du 10.05.2002).

ANNEXES *(available from the Secretariat)*:
- all management Programmes in Italian language;
- Management programmes of San Rossore and Lago e Padule di Massaciuccoli.

7.2. BUDGET AND PERSONNEL

Financial sources of the Park are shared as follows (€):

	2001	2002	% (2002)
- Region (Tuscany)	1.476.671	1.417.827	35.3 %
- local authorities (municipalities, provinces)	781.425	781.425	19.4 %
- self financing (economic activities of San Rossore, administrative penalties, etc.)	1.346.250	1.821.100	45.3 %
TOTAL	3.604.346	4.020.352	100 %

PERSONNEL
- Indirect Management:
49 ps. (9 Managers, 22 Technicians and 18 Guards). Offices organisation: Secretariat; Financial; Territorial Planning; Conservation and Environmental Restoration; Agriculture and Forestry; Promotion and Environmental Education; Control service, Forest fires and Civil Protection.
- Direct Management (San Rossore Estate): 37 ps (1 manager and 36 technicians + vigilance).

8. MAP OF THE SITE

• Physical map:

NATIONAL MAP NUMBER	SCALE	PROJECTION
PISA 104	1:100.000	UTM
LIVORNO 111	1:100.000	UTM

REFERENCE TO AVAILABILITY OF BOUNDARIES IN DIGITISED FORM

• Map of designated sites described in 6.2.

"Carta della Natura". Scale 1:33.000, drawn on the national and regional map basis. On this map are present border lines of the following different topics : Park, Estates (Macchia Lucchese, Lago e padule, Migliarino, San Rossore, Tombolo, Coltano) and the zoning (External and internal zones). Also, the differents environments are shown (woodlands, cultivated lands, wetlands, dunes).

• Aerial photograph(s) included:

	X
YES	NO

NUMBER	AREA	SUBJECT	COPYRIGHT	DATE

9. SLIDES

NUMBER	PLACE	SUBJECT	COPYRIGHT	DATE
1		Localisation Map	Archive du Parc	1989
2	Marina di Vecchiano	Dunes	Gorreri	2001
3	Marina di Vecchiano	Dunes	Gorreri	2001
4	San Rossore	Aerial view of dunes	Archive du Parc	2001
5	Marina di Vecchiano	Dunes	Gorreri	2001
6	Torre del Lago	Coast and Lake in the background	Archive du Parc	2001
7	Bocca di Serchio	Coast	Archive du Parc	2001
8	Bocca di Serchio	Coast	Archive du Parc	2001
9	San Rossore	Transition zone dunes-forest	Gorreri	2001
10	San Rossore	Aerial view pinewood	Archive du Parc	2001

11	Tombolo	Pinewood (pinus pinea) and new plantation	Beldramme	2001
12	Migliarino	Pinewood and dunes	Archive du Parc	2001
13	San Rossore	Pinewood and dense Quercus ilex in the understory	Beldramme	2001
14	Migliarino	Hygrophilous forest	Archive du Parc	2001
15	San Rossore	Mesophilous forest	Gorreri	2001
16	Migliarino	Mesophilous forest	Archive du Parc	2001
17	Migliarino	Quercus robur	Archive du Parc	2001
18	San Rossore	Wetland	Beldramme	2001
19	San Rossore	Mesophilous forest	Gorreri	2001
20	Migliarino	Hygrophilous forest and Taxodium distichum	Archive du Parc	2001
21	San Rossore	Wetland	Beldramme	2001
22	San Rossore	Wetland	Beldramme	2001
23	San Rossore	Canal	Beldramme	2001
24	San Rossore	Mesophilous forest	Beldramme	2001
25	Migliarino	Wetland	Tofanelli	2001
26	Migliarino	Transition zone wetland-pinewood	Beldramme	2001
27	San Rossore, Lame di Fuori	Wetland	Beldramme	2001
28	San Rossore	Cultivated land	Archive du Parc	2001
29	Coltano	Cultivated land	Gorreri	2001
30	Tombolo	Cultivated land	Gorreri	2001
31	Tombolo	Plantation de Peuplier	Beldramme	2001
32	San Rossore	Cultivated land	Beldramme	2001
33	Tombolo	Cultivated land and mesophylous woodland in the background	Gorreri	2001
34	Massaciuccoli	Quality Products	Gorreri	2001
35	Tombolo et Coltano	Typical products	Gorreri	2001
36	Plages du Parc	*Apis mellifera* on *Helicrysum stoechas*	Gorreri	2001
37	Parc	Biological Beach Honey (from Helicrysium stoechas)	Gorreri	2001
38	Massaciuccoli	Aerial view - reclaimed land and lake (south)	Archive du Parc	2001
39	Massaciuccoli	Lake and wetland (north)	Archive du Parc	2001
40	Massaciuccoli	Canal and lake	Archive du Parc	2001
41	Massaciuccoli	Wetland	Archive du Parc	2001
42	Massaciuccoli	Wetland	Archive du Parc	2001
43	Parc	*Alcedo atthis* (King Fisher)	Barbuti	2001
44	Parc	*Merops apiaster* (Bee-eater)	Barbuti	2001
45	Massaciuccoli	Egretta garzetta *(Little egret)*	RAMI	2001
46	San Rossore	Deers	RAMI	2001
47	San Rossore	Grazing Deers	Archive du Parc	2001
48	Parc	Periploca graeca	Gorreri	2001

List of appendices
(available from the Secretariat)

- territorial programme technical provisions of realisation

- General regulation Resolution August 6, 1993, Nr. 7

- Dispositions for the management of the Estate of San Rossore and for the functioning of the Committee of Presidency
  [Regional Law March 17, 2000, Nr. 24]

- Institution of the Park authorities for the management of the Maremma and of the Migliarino, San Rossore, Massaciuccoli Regional Parks. Disbandment of the relative unions
  [Regional Law March 16 , 1994, Nr. 24]

- Institution of the Migliarino, San Rossore, Massaciuccoli Natural Park
  [Regional Law December 13, 1979. Nr. 61]

- Establishment of the Organisation for the management of the "Regional Park of the Apuan Alps". Disbandment of the relative Association
  [Regional Law August 11, 1997, Nr. 65]

- the programme management of the Northern Marsh and the Massaciuccoli Lake

- the management programme of San Rossore Estate

- Statute Organisation Park
  [Resolution Regional Board Nr. 138 of 25.05.1999]

- Secondo piano di gestione delle Tenute di Tombolo e di Coltano (in Italian)

- Documentation (in chronological order) of university reseacher conducted in the Park