PONTINE LAGOONS - ITALY

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The four Pontine Lagoons are located ~100 km south of the city of Rome, in the territory of the National Park of Circeo. The specific names and surfaces, from north-west to south-east, are: Fogliano (408ha), Monaci (98ha), Caprolace (226ha) and Sabaudia (375ha). UNESCO included these coastal lagoons and surroundings since 1978 in the Ramsar Convention list of the world important wetlands. The first three are directly managed by the administration of the Park, the last by municipality of the town of Sabaudia together with an private aquaculture company.

Mean depth of Fogliano and Monaci is close to one meter, being 3m at Caprolace and 4m at Sabaudia.

Figure 1: *The Pontine Lagoons and the National Park of Circeo*

Water exchange with the sea is guaranteed with canals, although intensity of the tidal currents is low. Freshwater inputs have been deviated, as most of them were highly polluted. For this salinity has increased in the last two decades to reach the actual level of over 40 gl^{-1} during the summer season. The drainage basin carries mainly agriculture wastewaters into the lagoon, although loads of phosphorus and nitrogen are not important (15 μgl^{-1} for $N\text{-}NH_4$, 15 μgl^{-1} for $N\text{-}NO_3$ and 2 μgl^{-1} for $P\text{-}PO_4$ in average during the year). Systematic surveys on the lagoons started in the early '80s.

Figure 2: *The lagoon of Sabaudia and the Cape Circeo*

Since then the plankton community has not substantially changed in floristic and faunal composition, what has changed is the timing of the blooms of the different species. Anoxic crises occasionally occur during the early summer season in all the lagoons except for the Lagoon of Caprolace, where only few under-saturation levels are observed during the year. Sediment oxygen demand of the Lagoon of Fogliano is 1 $gm^{-2}day$. Phytoplankton primary production is in the order of 0.5 $g\text{-}Cm^{-2}day$; that due to the macrophytes, *Ruppia maritima*, *Zoostera marina* and *Cymodocea nodosa* is in the order of 20 $g\text{-}Cm^{-2}day$. Chlorophyll *a* in the water ranges between 5 and 25 μgl^{-1} depending on the different lagoons and seasons.

Aquaculture activities are practiced in all the four lagoons, although only at an industrial level in Sabaudia. In those directly managed by the National Park capture of fish traveling to the sea is done at the *lavorieri* (an ancient Italian lagoonal fishing system). Main production is of mullet, but also of sea bass, mussels and eels.

Trophic levels also vary in the different lagoons. Caprolace can be considered as oligotrophic, consisting of organic detritus mineralized by the aerobic community and shows considerable high specific diversity and low production. The lagoon of Sabaudia can be considered eutrophic, while Fogliano together with Monaci are included in the hypertrophic class.

Figure 3: *Spoonbill (Platalea leucorodia) at Fogliano*

Anthropogenic activities highly affect the Park's territory. On one side Rangers control and protect the woods, the coastal dunes and the wetlands, but on another, tourist affluence, especially in summer, strongly impacts beaches and coastline.

Figure 4*: Lavoriero (fishing facility) at Caprolace*

The marvelous environmental mosaic of the Park of Circeo also contains important prehistoric and archaeological findings, witness of the presence of man since remote times. The many grottoes and natural repairs are important prehistoric sites in which, besides the discovery of the cranium of a Neanderthal man in 1939, provide many other witnesses (fossils remains etc) testifying to the presence and activity of man in the past. Many archaeological findings relate to the Roman imperial and republican era when advanced technology permitted huge hydraulic engineering

Figure 5: *The Villa of Domiziano*

and housing constructions, such as the Paola Tower harbour canal, and the Villa of Domiziano (a very well conserved thermal bath). Many very important findings are conserved in museums that come from the Villa Domiziano such as the *Kassel Apollo* and the *Faun with flute*.

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