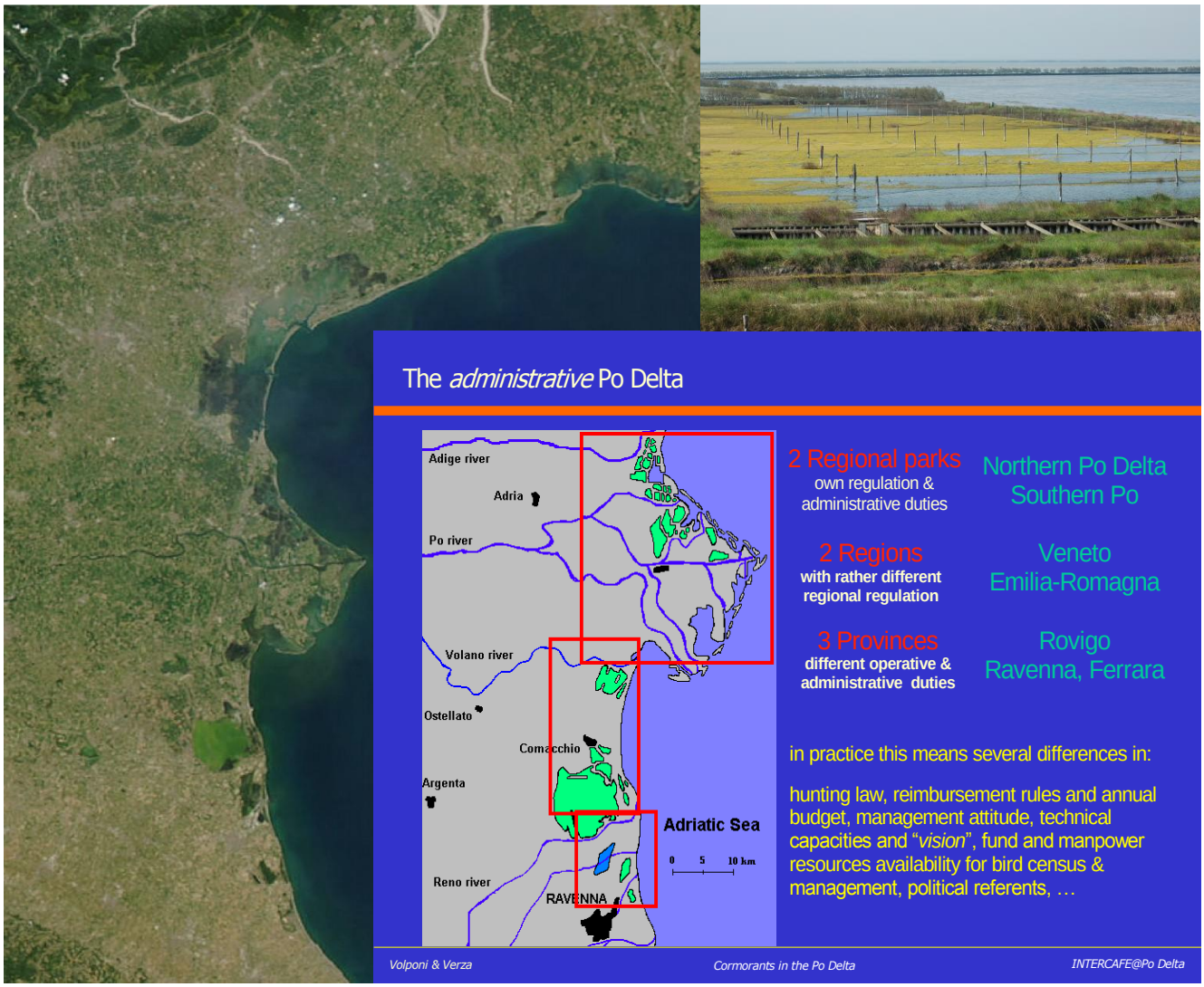
INTERCAFE @ Po Delta

21-23 September 2007

Hotel Capo Nord, Albarella, Italy



"Extensive aquaculture systems and relationships between stakeholder perspectives and different spatial scales and institutional levels"

INTERCAFE Case Study Report, Po Delta, Italy, September 2007

D.N. Carss & M. Marzano (Editors)

INTERCAFE: *Conserving Biodiversity – Interdisciplinary Initiative to Reduce pan-European Cormorant-fisheries Conflicts*

The full report of the INTERCAFE@Po Delta Case Study is in six parts:

Part (1) Introduction: the development of INTERCAFE and the concept of Case Studies

Part (2) Introduction: the Po Delta Case Study – orientation and processes

Part (3) Scene-setting: Case Study presentations

Part (4) Case Study reports synthesis

Part (5) Field Trip report - Po Delta

Part (6) INTERCAFE Work Group progress

The Agenda for the 3-day Case Study workshop is given in Appendix (1).

Italian language version of the INTERCAFE Fact Sheet is given in Appendix (2).

Group Discussion information - (a) Italian translation of issues to consider, and (b) participants of Working Groups, is given in Appendix (3).

Part (1) Introduction: the development of INTERCAFE and the concept of Case Studies

(1) The development of INTERCAFE

The EU Framework 5 Concerted Action REDCAFE took a novel interdisciplinary approach to pan-European cormorant-fisheries conflicts by, for the first time, bringing together avian, fisheries and social scientists and many other relevant stakeholders from across the continent and the Middle East to discuss and report on these issues. REDCAFE's full pan-European synthesis and National Overviews for each participating country are available in two reports (Carss 2003, Carss & Marzano 2005, respectively: both are freely available at http://www.intercafeproject.net).

The COST Action INTERCAFE uses REDCAFE as a foundation and up-scales this work to become more interdisciplinary by including policy makers and a broader range of social scientists. Moreover, INTERCAFE builds on the information/data synthesis process at the heart of REDCAFE by switching the emphasis of pan-European research coordination towards including the current and future the needs of local stakeholders and policy makers. This is important because cormorant-fisheries conflicts are a highly relevant environmental issue across Europe, and one that could act as a model for numerous other human:biodiversity conflicts across the continent.

The wide geographic range of European cormorant populations and their wintering migration patterns require investigation and monitoring at the continental scale. Similarly, cormorant conservation legislation is defined at the EU level but implemented nationally or regionally. On the other hand, conflicts with fisheries are regional or site-specific and so management solutions will require implementation at these finer scales. However, due to the migratory behaviour of cormorants, local management strategies could also affect birds at national or continental scales. Thus researchers, policy makers and local stakeholders need to maintain awareness of these scale-dependent inter-relationships.

During the last 20 years, European biological research has clearly contributed much to an improved understanding of cormorant ecology and potential impacts on fisheries and nature conservation interests, at the pan-European scale (see national bibliographies in Carss & Marzano 2005). However, translation of these scientific achievements into quantification of cormorant impact at fisheries and the resolution of cormorant-fisheries conflicts has been limited. Conceptually, one reason for this lack of success is that these conflicts have too often been misunderstood as primarily a biological conservation issue addressed through such documents as The Bonn Convention, The EU Habitats and Birds Directives, the Ramsar Convention and the Convention of Biodiversity. Obviously, future management of European cormorant populations must accommodate the need for the species' long-term survival and be based on sound scientific findings.

However, through dialogue with stakeholders, REDCAFE and INTERCAFE also show that cormorant-fishery conflicts are an issue of major social, cultural and economic concern across Europe and so these essential non-biological factors must also be taken into account when formulating and implementing practical management policies based on scientific findings. It is evident that technical (scientific) solutions alone are not sufficient for environmental conflicts with social and economic dimensions. Given that

cormorant-fisheries conflicts can be human:wildlife ones, human:human ones or be situated somewhere in between (see Carss 2003: 70-77), research has first to identify the true nature of such conflicts and then look to the most appropriate solutions.

(2) The Case Study concept

Cormorant-fisheries conflicts are a truly pan-European issue being experienced by a variety of stakeholder groups working in a diverse range of aquatic habitats across the continent. An interdisciplinary approach involving the collaboration of biological and social scientific expertise, economic and political interest and practical local experience is now seen as vital to the development and successful implementation of practical cormorant-fisheries conflict resolution strategies across Europe. Furthermore the challenge is to improve information exchange, dialogue, participation and trust between all stakeholders involved in such conflicts.

INTERCAFE offers an opportunity to apply recognised conflict management techniques to cormorant-fisheries interactions on a pan-European level. An holistic approach highlights multiple stakeholder perspectives and facilitates a greater understanding of the inter-relationships between stakeholders. Above all, successful conflict management is shown to be dependent on conflicting parties opening communication channels and developing networks of trust for effective collaboration and dialogue. However, there is no formal approach to applying this process to the thousands of conflict cases across Europe. Wherever possible, INTERCAFE Case Studies also try to include policy-makers in its cormorant-fisheries conflict management processes.

A major aim of INTERCAFE is thus to promote links between the biological and social science communities, local stakeholders, economists and policy advisors to better understand the role of socio-cultural issues in conflicts, their management within legal frameworks, and efforts towards their resolution. These links are to be forged partly through the interdisciplinary investigation of a series of three conflict Case Studies chosen to be 'representative' of cormorant-fisheries conflicts and issues across Europe. Case Study selection takes into account various factors: for example, geographic location, habitat types, stakeholder groups, fishery type, and current and potential mitigation actions.

Case Studies are investigated through Workshops that concentrate on issues operating at two spatial scales. First, local stakeholders give key site-specific inputs providing ecological, social, economic and policy contexts. Second, input from other participants, particularly ecologists and decision makers, enable all to appreciate the specific Case Study in both national and international contexts. Thus, Workshops enable all participants to take a 'holistic' view of specific Case Studies. Moreover, Case Studies also offer opportunities to understand conflicts and learn from experiences elsewhere

and allow INTERCAFE to disseminate such information as fully as possible across Europe. The first Case Study meeting was held in Hula Valley, Israel in January 2006 (see http://www.intercafeproject.net/workshops_reports/documents/Israel_Meeting_Summary.pdf).

INTERCAFE was thus privileged to be offered the Po Delta as its second Case Study and our Italian hosts organised a robust and productive workshop for September 21st – 23rd 2007, held at Hotel Capo Nord, Arabella in the north of the Po Delta.

References

Carss, D.N. (ed) (2003) Reducing the conflict between Cormorants and fisheries on a pan-European scale REDCAFE: Pan European Overview. Final Report to European Commission, (August 2003), pp169. Also available at: http://www.intercafeproject.net

Carss, D.N. & Marzano, M. (eds) (2005) REDCAFE: Reducing the conflict between Cormorants and fisheries on a pan-European scale. Summary and National Overviews. Report to EU, pp265. Also available at: http://www.intercafeproject.net

PART (2) Introduction: the Po Delta Case Study – orientation and processes

(1) The Case Study area

The following section is a very slightly edited version of the material provided on the Parco del Delta del Po website (http://www.parks.it/parco.delta.po.er/Epar.html).

History and culture

The history of the Po Delta area is the story of a millenary interaction between nature forces and human activities, which fostered the existence of a great variety of environments and cultural highlights on the territory; these elements continue to interact nowadays in a constantly changing context.
The delta territory was born in the course millennia from the deposit of detritus by the river Po: this caused the progressive shifting of the Adriatic coastline.

Following the steps of medieval pilgrims, and of the Roman garrisons long before, an ideal geographical triangle has at its corners the legendary Venice, the magnificent Ferrara (Este) and Ravenna (Byzantine). Archaeological finds have revealed the existence of an Etruscan market in Spina, as well as of important trade relationships with Greek and North-European civilisations. The first hydraulic works date back to the Etruscan age too: they were aimed at the development of navigation, fish culture and agriculture. Later on, the Romans provided the region with sea routes and roads, strengthening its ports and all its economic activities. The town of Comacchio, protected by its Valli (small lagoons), is a great historical example of lagoon civilisation. Its development started in the Longobard period, thanks to the abundance of fish and salt – an example of the important link between towns and the precious "white gold". Some important drainage works also contributed to improve the agricultural and hydraulic conditions of the area. The following centuries were characterised by a slow and progressive decline, which caused the territory to turn swampy. It was only in the 16th century that new drainage works were undertaken by Duke Alfonso II D'Este. The Delta landscape began to regain stability in the 17th century, and especially after the country's unification, when new huge drainage works were started on thousands of hectares of marshlands, thus bringing dramatic changes to both landscape and human settlements and activities. Nowadays the delta territory protected by the Parco del Delta del Po is characterised by different kinds of areas, linked by the theme of water and presenting a wide range of environmental, landscape, animal and plant varieties.

Parco del Delta del Po

Parco del Delta del Po dell'Emilia-Romagna – "a park shaped by water" - is characterized by unique territorial and ecological features. It covers more than 52,000 hectares of an area which is considered among the most productive and rich in biodiversity. Even if it is one of the most inhabited and economically developed Protected Areas in Italy, *Parco del Delta del Po dell'Emilia-Romagna* still preserves the largest expanse of protected wetlands – and has supported and founded the International Association of Delta Parks. Given its historical role as a cultural and economic crossroads between West and East, the Po Delta preserves many important traces of its past. Within the Park valuable natural elements coexist with great artistic and cultural beauties – which have been recognized also by Unesco.

Parco del Delta del Po is a very complex Protected Area, since it is at the same time a terrestrial Park, a fluvial Park, and a coastal Park. Its most typical natural element is undoubtedly water. The unstable relationship between water and land, their uncertain balance, gave birth in the Po Delta to a varied and changeable landscape in which woods, pinewoods, and flooded forests alternate with inner fresh or salt water wetlands. The biodiversity characterizing the delta territory is extraordinary, above all for the presence of more than 280 bird species for example. The Park covers some of the most productive and rich in biodiversity areas in Italy, including the country's largest protected wetlands, areas of great ecological value. It is a territory rich in natural environments, housing hundreds of plant and animal species. Their occurrence is linked strongly to the diversity of local habitats, whose characteristics depend on the different chemical-physical conditions of the soil and on climatic conditions.

Besides the Park's 374 vertebrate species, the birds of the Po Delta represent an extraordinarily precious heritage, with more than 300 reported species during recent decades, 146 of which are nesting and more than 151 wintering. Such richness means that the Park is the most important ornithological area in Italy, and one of the most relevant in Europe.

Wetland habitats

Parco Delta del Po presents a variety of habitats, the most representative among them being wetlands. This term is used to refer to areas which are partly aquatic and partly terrestrial. Their importance lies mainly in their extraordinary biological productivity. The definition of "wetland" includes several types of different ecosystems sharing a common element: water. Wetlands represent one of the few ecosystems to be protected by an international treaty, signed in Ramsar (Iran) in 1971 (and adopted by Italy by D.P.R. n.448 in 1976). A wetland is defined in the Convention as being an area of marsh, fen, peatland or water basin, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt and including areas of intertidal marine water whose depth never exceeds 6 metres during ebb tide periods.

Agriculture

During the last two centuries, great expanses of wet pasture lands and fishing valleys have been replaced by agricultural areas, drained thanks to the action of dewatering pumps. Only a few thousand hectares in the area of Ravenna have been reclaimed by alluvium, by filling them with the flood waters of the Apennine rivers, rich in deposits, and favouring the natural process of silting up of the wetlands. The land reclamation activities carried out in the past, in particular between the end of the 19th century and the 1970s, turned thousands of hectares of marshy areas and wetlands into cultivable land.

Agriculture is nowadays the main production activity carried out in the areas surrounding the wetlands, strongly influencing their conservation state and the quality (eutrophication caused by fertilizers and refluent zootechnical substances; pollution deriving by the use of pesticides) and quantity (use for irrigation aims) of water. Agriculture directly influences the conservation of riparian and marshy habitats only when it is practised along fluvial banks or in the marginal areas of the wetlands.

The most important crops include wheat, corn, sorghum, beets, lucerne, sunflower and soya, while in the hinterland - where the soil is richer in peat - rice growing is widespread too. Many low lands characterised by the winter rising of the water table, and situated next to the wetlands, are still cultivated nowadays even if they are not productive; however, some scarcely productive agricultural areas have recently been flooded again or reforested thanks to the support given by the European policies to the reduction of cultivated lands.

Fishing

The Delta territory includes different types of water expanses: the so-called "*Valli*" are inner basins of fresh, brackish, or salt water, whose communication with external waters (river or sea) is artificially enabled through locks and/or dewatering pumps.

Some typical examples are the *Valli di Comacchio*, the expansion basins *Casse di espansione di Campotto* and *Valle Mandriole*.

The "*lagune*" (lagoons) are fresh, brackish, or salt water basins, whose communication with the sea is given by a large opening enabling the ebb and the flow of the tides; an example of lagoon is *Sacca di Goro*. Finally, there are inner *Valli* freely communicating with the sea: they are basins subject to the influence of tides through the canals (*Valle Fattibello*, the wetlands *Piallasse della Baiona*, and *Piombone*).

The human activities linked to aquaculture and to professional fishing are allowed and favoured in the Park wetlands, since they are very important for the economy and employment and because, in some cases, they are activities with a great historical and traditional value. Fishing can be divided into different types: professional fishing (including the harvesting of molluscs) and sport fishing. Fishing is carefully regulated by the Park Authority, in order to ensure the conservation of the fish fauna in the Protected Area, with particular attention to those species whose conservation is crucial. Sport fishing is usually allowed within the Park and pre-Park areas, except for "A zones" and some other particular areas established by the Territorial Plan and quoted in the Regulations, where environmental conditions, the presence of species whose conservation is crucial, or the development of delicate stages of the biological cycle of fish, have led to the introduction of temporary or permanent fishing prohibitions.

Aquaculture is more than the simple gathering of a natural resource. The so-called "vallicoltura", or lagoon fish breeding, is the traditional and extensive fish breeding which has been practised for several centuries in the Valli of the Po Delta: here fishes are caught by exploiting their mass migratory movements at the exit of inner basins. The fish gathering is carried out with a typical structure called "lavoriero", placed next to the breeding basins.

(2) Rationale for Po Delta Case Study and key issues

The Po Delta is a mosaic of over 38,000 ha of wetlands, including examples of all the typical estuarine habitats – coastal bays, brackish lagoons, freshwater marshes, canals, river branches and mouths. The impetus behind conflict management

activities here in the Po Delta was the same as for many other fisheries-cormorant conflicts - fisheries stakeholders viewed predation levels on income-generating fish species as being economically unsustainable (see Carss & Marzano 2005). Rising cormorant populations and, in particular, over-wintering cormorant numbers in the fish farm (vallicoltura) area were linked to "excessive predation" and "economic damage", whilst the growing efforts to scare birds away were contributing to increasing time and monetary costs as well as a potential source of disturbance for the other waterbirds (including many quarry species of interest to hunters) in the region.

Exploring the Cormorant-vallicoltura conflict in such a large estuarine area as the Po Delta, also allowed INTERCAFE to explore a recurring theme: is the Cormorant a symbol of a changing world and the difficult and complex coexistence of the multiple uses of our remaining wetland habitats?

This complexity was further exemplified in the Po Delta by three important facts. First, the area covers **three provinces** (Rovigo, Ravenna, Ferrara), each with different operative and administrative duties. Second, the area covers **two regions** (Veneto and Emilia-Romagna) each with very different regional regulation. Third, the area covers **two regional parks** (northern Po Delta and Southern Po) each, again, having its own regulation and administrative duties.

In addition, the Po Delta supports a much-respected traditional form of extensive fish culture – called **"*vallicoltura*"**. This term comes from the word *valle* (plural: *valli*) which means "an embanked lagoon". Vallicoltura is traditional form of aquaculture typical to the north Adriatic coast and involving very distinctive lagoon management and fish management and exploitation. The most commonly farmed species include Eel (*Anguilla anguilla*), Mullets (*Mugil* spp.), Sea Bass (*Dicentrarchus labrax*), Sea Bream (*Sparus auratus*), and Sand Smelt (*Atherina presbyter*). See also previous **Fishing** section.

Water levels in the valle – and exchanges between them and the sea – are actively managed throughout the year. Natural fish fry are recruited from the sea through channels (and altered salinity) into valle, although nowadays fry are more often stocked artificially. There is no use of either artificial food or drugs and those fish that have not reached harvestable size are usually stocked in high densities in smaller, deeper basis during the winter.

In addition to the vallicoltura system in operation in the Po Delta, the region also supports **commercial fishing** (seasonally with fyke and gill nets), **recreational (angling) fishing**, **wildfowl hunting** (traditional and economically important), and adjacent **industry**. Finally, the area is becoming increasingly popular as a **tourism** and **birdwatching** destination.

Given all these diverse and important – but sometimes conflicting – uses of the Po Delta wetlands, the major themes of the Case Study here were to explore and understand:

(1) How management plans are devised and implemented currently – and how people think cormorants and fisheries could be managed (including who could collaborate on such issues).

(2) How local people see things changing in the Po Delta in the next five years and what they would like to change in the way that management plans are undertaken. And,

linked to this, what wider changes do people think would help – for instance policies, relationships and collaborations, resources.

(3) How the experiences of the Action's network(s) could contribute to the situation of those in the Po Delta.

(3) Po Delta Case Study workshop process

The agenda for the three-day Po Delta Workshop is given as Appendix 1. A list of Italian participants is given in Appendix 2. The Workshop consisted of three main activities:

(1) A series of eleven **scene-setting presentations** on days Two and Three with follow-up discussions that (i) helped establish the local and regional context of the Case Study, (ii) provided detailed information on certain aspects of the conflict, and (iii) offered different viewpoints on human-wildlife conflicts and how these might be approached by different stakeholders. These presentations are summarised in Part (3) of this Case Study Report.

(2) **Working sessions** with nine small (n = 7-9 people) groups made up of both INTERCAFE participants and local stakeholders. After working separately on Day One, these groups were amalgamated into three larger groups which on Day Three summarised progress, synthesised findings and progressed on further discussion and integration. This synthesis and integration, and some resulting conclusions, are given in Part (4) of this case Study Report. The general Terms of Reference throughout these working sessions were to discuss and explore a number of issues detailed (also in Italian – see Appendix 3) in a Group Discussion Worksheet:

Group Discussion Work Sheet

DAY 1 – Topic for discussion

1. How do you do management plans/how are management plans done (at different levels)?
2. How do you see things changing in the Po Delta in the next five years? Choose headings to organise your discussions e.g.
    - Sustainability of fisheries
    - Conservation issues
    - Social changes (e.g. jobs, economics etc.)
    - Environmental changes
    - Political changes
3. How do you think cormorant and fisheries could be managed – what collaborations should take place? (this is where Po Delta delegates and INTERCAFE should share experiences).

DAY 3 – Topic for discussion

From your earlier discussions about (a) how management planning is done, (b) what changes are foreseen socially, environmentally, politically etc., (c) fieldtrip, and (d) your discussions about what vision you have for managing cormorant-fisheries conflicts

4. What would you like to change in the way that management plans are done (not so much what they *say* but how they are *done*)?
5. What wider changes do you think would help? E.g.
    - Policies (local, regional, national, the Parks, European)
    - Relationships/collaboration
    - Resources e.g. financial
6. Any other questions or thoughts about INTERCAFE and how our experiences/networks may contribute to your situation?

Reports and a synthesis of these working sessions is given in Part (4) of this Case Study Report.

(3) **Field visits** and field-based presentations from key experts were provided on Day Two of the Workshop. A report of the field trip is given in Part (5) of this Case Study Report.

Part (3) Scene-setting: Case Study presentations

(1) The Po Delta Park Emilia-Romagna - multi-purpose uses of wetlands, the lagoons of Comacchio

Lucilla Previati	Director of the Po Delta Park of the Region Emilia-Romagna
Gianni Cavallini	Responsable of Wetlands of the Po Delta Park of the Region Emilia-Romagna
Federico Brunelli	Environmental monitoring, management plan, Manifattura dei Marinati

The Po Delta Park of the Region Emilia-Romagna was established in 1988 by a law of the Emilia Romagna region and in 1996 the seat of the Managing Consortium of the Po Delta Park of the Region Emilia-Romagna was established. This Managing Consortium is composed of 9 Municipalities and two Province Authorities (Ferrara and Ravenna). The Park stands on roughly 54,000 hectares and includes the south part of the modern Po delta, the "historic delta", and a wide portion of wetland sites of great natural interest.

The Po Delta Park offers a significant variety of natural environments and cultural attractions. For example, it is possible to see the remains of the primitive Mediterranean woodland, hygrophilous ("living in water or moist ground") woods, lagoons, brackish and fresh water marshes, saltpans, the riparian areas of rivers and canals and the location of both present and ancient dune systems. Furthermore, there are also important architectural sites such as Mesola Castle, Pomposa Abbey and Cervia Salt Warehouse. The Park was placed on the World Heritage list during the session of the World Heritage Committee held on December 2nd, 1999 in Marrakech, Morocco. This new site called "Ferrara, City of the Renaissance, and its Po Delta"

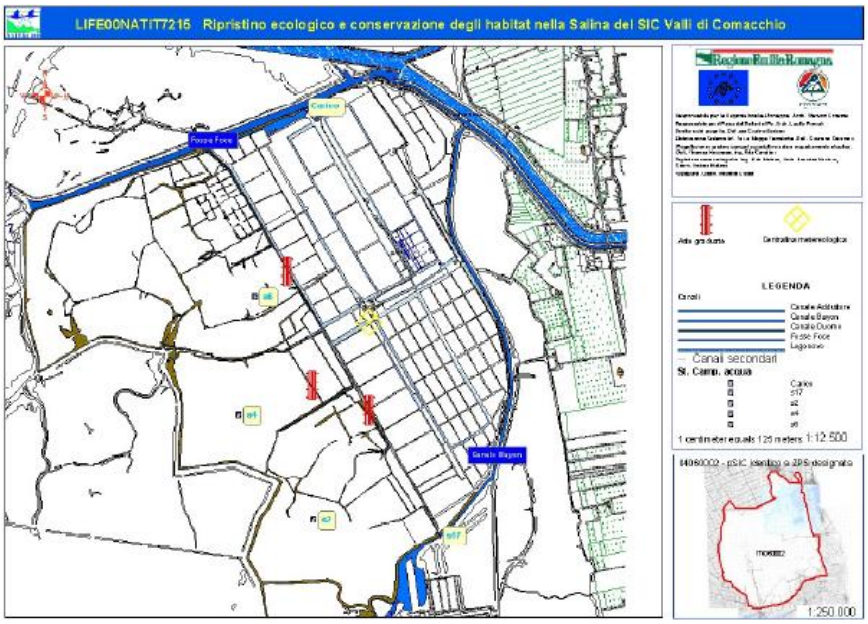
because it is an extension of the Este town site already placed on the list in 1995. In their rationale for the inclusion of this area, the Committee praised the Park's extraordinary natural ecosystem, which was always closely linked to the town, especially between the 14th and the 16th centuries.

The main human activities in the Po Delta Park of the Region Emilia-Romagna are agriculture (22, 000 ha), aquaculture (19,000 ha), hunting, and tourism (650,000-700,000 visitors/year). How is it possible to manage all these different aspects? The lagoons of Comacchio are a good example. The Po Delta Park of the Region Emilia-Romagna directly manages the lagoons, not only for conservation, but also for production of fishes such as the European Eel (*Anguilla anguilla*). The "*lavoriero"* is the traditional tool for capturing Eels (and other fishes). Whilst the "*Manifattura dei Marinati*" expresses a 'modern' idea for the most typical product of Comacchio, the marinated Eel. This is a factory with 12 fireplaces and old rules for the production of marinated eel. The rules are: (1) use only fish from the Lagoon of Comacchio, (2) capture of fish should bne through traditional tools such as 'lavoriero', (3) cooking of the fish should be at fireplaces, (4) the composition of the 'salamoia' (liquid for conservation) is white vinegar, water and salt (the 'sweet salt' of Cervia) (also, see PART Five – Field Trip report). The traditional "Anguilla Marinata" of Comacchio has been presented at the most important expositions in Italy and Europe and has also been sold in the USA.

Indeed, the "*Emblema Prodotti di Qualità Parco Delta del Po – Emilia Romagna*" is used to propomote our vision of sustainable development - how to reconcile and integrate economic growth and environmental protection. Production of the marinated Eel is also very important for scientific research, in relation both to quantifying the abundance and availability of the fish stock and also the logistic support for fishery activities. The Po Delta Park of the Region Emilia-Romagna also works hard to realize projects of applied research in order to both maximize scientific results and to improve management plans. One of these "scientific tourism" projects is now running for students and researchers: a special visit program in the Protected Area, depending on the participants' specific needs.

The "*Manifattura dei Marinati*" is a museum with some 35,000 visitors/year, it has been the subject of three documentary productions (in 2005-2006) and many TV programmes/year (regional, national and international). It also represents a great opportunity for the city of Comacchio, with its numerous B&Bs, restaurants and services. The "*Manifattura dei Marinati*" is both a museum and a factory and will soon form part of an archaeological trip which includes also the necropolis of Spina and its treasures. It is an example of the potential development of an idea of culture, the promotion of heritage, and an economical opportunity.

The Saltworks of Comacchio and its salt production is another example of the sustainable use of a natural resource in the area. One of the goals of the recent LIFE Project for the "*Environmental restoration and conservation of the habitat of the salt-pan of the Comacchio Marshes*" (which ended in 2006) is the highly useful Management Plan for the salt-pans of Comacchio. The keywords which guided the operations related to this LIFE Project concerning the salt-pans were (a) nature/biodiversity, (b) education/tourism, (c) the production of salt, and (d) culture. An Operative Centre here supports the instructive and scientific activities and the *scientific tourism* programme related to the salt-pans of Comacchio is now running with a large number of contacts. Other important keywords in this context are (e) *Artemia salina* (say what this is) and (f) nature conservation and management.



In this region, a GIS (Geographical Information System) is used as a powerful tool for the management of numerous activities such as environmental monitoring and maintenance of such things as water, flora, fauna, fisheries etc.

The Comacchio lagoon is a good example of our approach to addressing all these very complex management issues in an area where there is a strong link between people and the environment and where we want to maintain economic activities. It is very complicated to manage this Park. The landscape and ecology are constantly changing (they are 'active') but some parts are considered stable (or 'historic'). Overall, we've discussed the management rationale and philosophy but, importantly, we need always to consider in what territory is this being undertaken in? When we are discussing Cormorants, we always need to consider the "container" in which they live.

(2) Words of Welcome from Sandro Gino Spinello (Province of Rovigio)

It is an honour to welcome INTERCAFE on behalf of the Province. This meeting is proof that the Province's activities are being recognised, especially in relation to scientific research for the future. For too long has local policy been based on empirical ideas and not on a true knowledge of reality. With a very real knowledge of the issue we can correctly manage environmental resources (including fauna and flora). Fishing and hunting are important activities here, especially from an economic point of view. It gives particularly pride that, ten years ago, counting birds seemed a weird idea but the Province continued with it as an important ornithological activity. This did not start because of political will but thanks to the passion of our collaborators. Now we are

ready to share with the scientific community at the EU level what we have done. We have published a number of books and reports and believe this is a duty to the region – one of the most important wetlands in the Mediterranean. Indeed not enough attention has been paid to these areas.

There are lots of conflicts here and institutions often have the difficult role of negotiators. There is also conflict between wildlife and some production sectors like agriculture, or the classical clash between cormorants and fishing.

It gives us particular pride to host all the stakeholders at this meeting, plus the scientific communities and members of individual industrial communities – hopefully all will get ideas for future management in this area. I wish you fruitful proceedings and a pleasant stay in Albarella.

(3) Cormorants in the Po Delta – data and information for an open discussion

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Introduction

The Great Cormorant is a well studied species in the Po Delta (and in the N Adriatic coastal area) and there is good availability of data and information about almost all aspects of its biology and ecology. Although most data are in the grey literature, much information is also available from papers published in both national and international publications. Great Cormorant issues related to conflict management and impact on extensive aquaculture in the Po Delta have also been the subject of talks at meetings

and scientific conferences open to stakeholders held both in and outside the region, as well as abroad.

In this talk we report briefly about findings described with more details in other papers and publications. Our aim is to provide enough information to allow an informed discussion between local stakeholders and the INTERCAFE group. The leading idea of our talk is to provide basic facts instead of *facts and interpretations*, so to provide local stakeholders the opportunity to ask the visiting INTERCAFE group about the reasons for what has happened, and is happening, in the Po Delta. At the end of our contribution we provide a list of publications related to the Cormorant and aquaculture issues in the Po Delta to facilitate a more detailed understanding of the peculiarities of the conflict in the Po Delta area. Our presentation is in six parts:

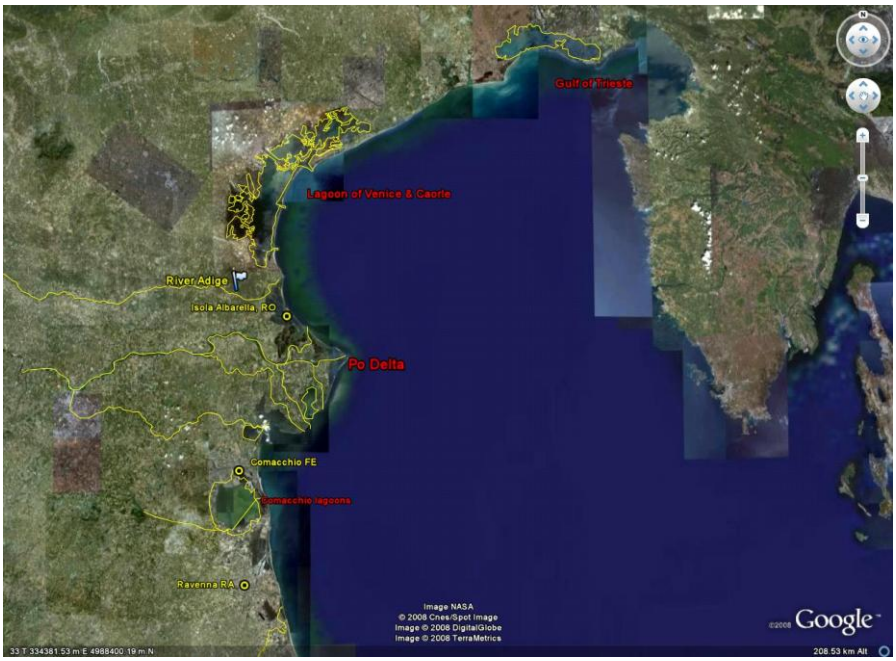
- The Po Delta
- Origin of cormorants living in the Po Delta
- Wintering and non breeding season: numbers and trend
- Breeding: numbers and colony trend
- Diet composition and seasonal variations
- Estimate of biomass removed and fish depredation

The Po Delta

From our point of view (i.e. considering the conflict between aquaculture and cormorants), the Po Delta is defined as the coastal belt lying from the River Adige to the wetlands North of the town of Ravenna (see map below), to include the present (Veneto region) and the historical river delta (Emilia-Romagna region). In this area, wetlands form a complex ecological system that, from a waterbird's point of view, is like a wetland *continuum*. There are many observations that Cormorants, as well as other colonial waterbird species like flamingos, ducks and gulls, may have *intra-seasonal* or even daily home ranges within this wide wetland system.

As is common for large estuarine areas, the Po Delta is a mosaic of different wetlands which include coastal sea bays (about 6,200 ha), brackish lagoons (25,000 ha), freshwater marshes (800 ha) and a complex web of river and canals that considering only the largest ones account for more than 170 km.

From an ecological and an ornithological point of view, it is worth considering the geographical position of the Po Delta (see map below) which is located at the end of the Po water basin (the largest in Italy) and, northwards, forms a continuum with the lagoons of Venice and Caorle (57,000 ha) and wetlands of the Gulf of Trieste (30,000 ha), i.e. at the centre of two important fly ways for bird migration.

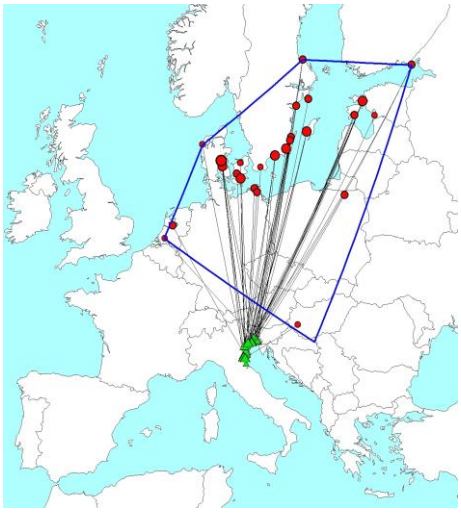


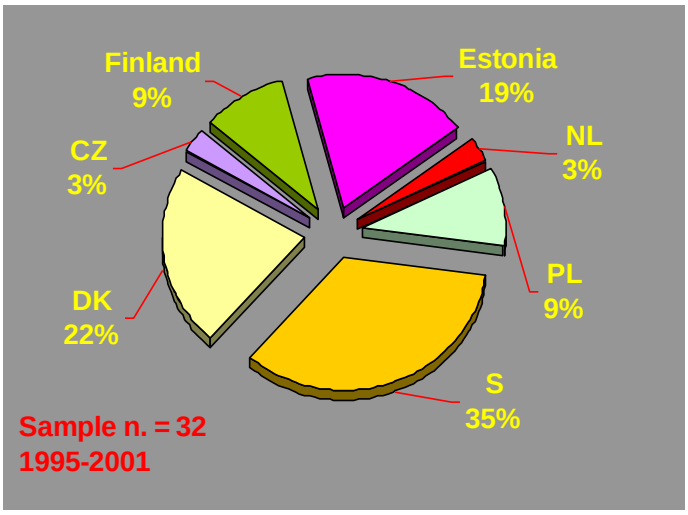
The geographical and ecological complexity of this region is also reflected by its administrative and political organisation, a human aspect that may have several effects on the management of the cormorant-aquaculture conflict. The existence of two regional administrations (Veneto in the northern part and Emilia-Romagna in the southern one) with their own park authorities, and three local districts administrations (Rovigo in Veneto, Ferrara and Ravenna in Emilia-Romagna) with different operative and administrative duties, means in practice rather large differences in conflict approach, managing rules, annual budget and reimbursement policy, technical capacities, funds and manpower resources availability for bird counts and field work, and, last but not least, different political referents. These differences lead to uncoordinated and concurrent management activities where administrations sometimes act to move the conflict from their district to the neighbouring one.

Origin of cormorants living in the Po Delta

Data from ring recoveries and colour-ring reading show that Cormorants visiting the Po Delta, and more generally speaking the whole N Adriatic coastal area, originate from a wide geographical region, ranging from The Netherlands in the West, to Croatia in the East and up to the Russian White Sea in the far north (*P. c. carbo*). However, the core area is centred in the Baltic countries. In this region, according to the eastward and northward spreading of the species and an increased ringing effort, in recent years an increasing numbers of recovery and resightings referred to birds born in new established colonies in Sweden Estonia, and even the Gulf of San Petersburg (Italian Ringing Scheme unpublished data; Spina, Volponi *et al*. 2007).

Birds recovered during the 1960-70s originated from only three colonies located in Denmark, Germany and south Sweden. Later, from early 1980 to mid 1990s, and even more in the following ten-year period, the area of origin moved north-east to include a wide area in the Baltic as well as in central and Eastern Europe



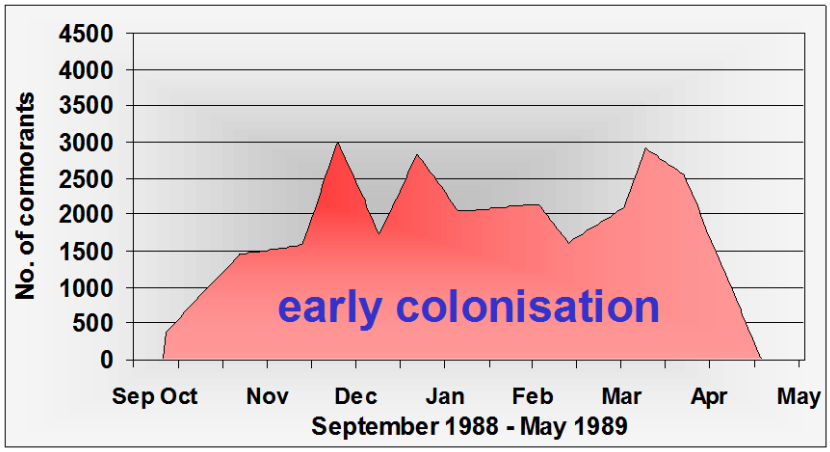


The origin of Po Delta Cormorants – some recoveries and colour-ring sightings

Wintering and non breeding season: numbers and trend

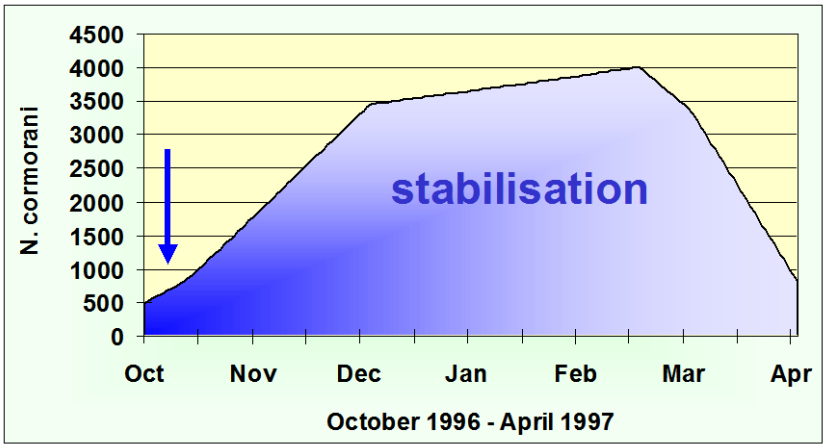
Until the late 1970s, only sporadic observations of single Great Cormorants and small groups were recorded during the migration periods. First wintering records date back to the early 1980s when Cormorants were present consistently in the Comacchio and Volano lagoons. Numbers remained low until the winters of 1985 and 1986, when 1,000-1,500 Cormorants were regularly counted. In the following years, mid-winter numbers varied from about 2,000 birds in 1988 to somewhere under 6,000 birds in 1995.

The population trend showed three distinct phases. After the first stage of colonisation, exponential growth began in 1982 and continued until 1992 (mean annual increase 43 %), while after numbers showed a tendency to stabilise around a mean value of about 5,000. Presumably, this was the result of a combination of (1) density dependent mechanisms (availability of safe roosting sites and food), which forced cormorants to disperse in the whole Delta establishing new (often small) roosts closer to the preferred feeding areas, and (2) the effect of management measures introduced to reduce predation in the "fishing-valli".

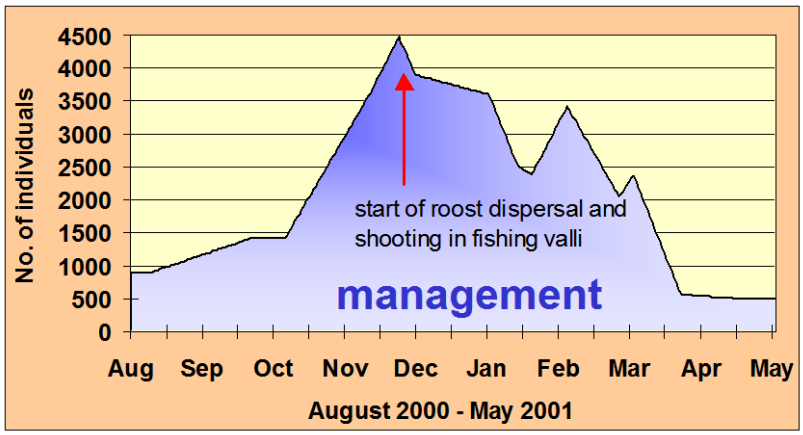


During the early colonisation phase and until the late autumn of 1989, all cormorants concentrated in the huge Valle Bertuzzi roost (up to 3,500 birds) and flew daily up to 40 km to reach foraging grounds. In December 1989, about half of the cormorants shifted to a new roost (Sacca degli Scardovari) located 16-18 km far from Valle Bertuzzi. These two groups behaved quite independently, exploiting different areas for

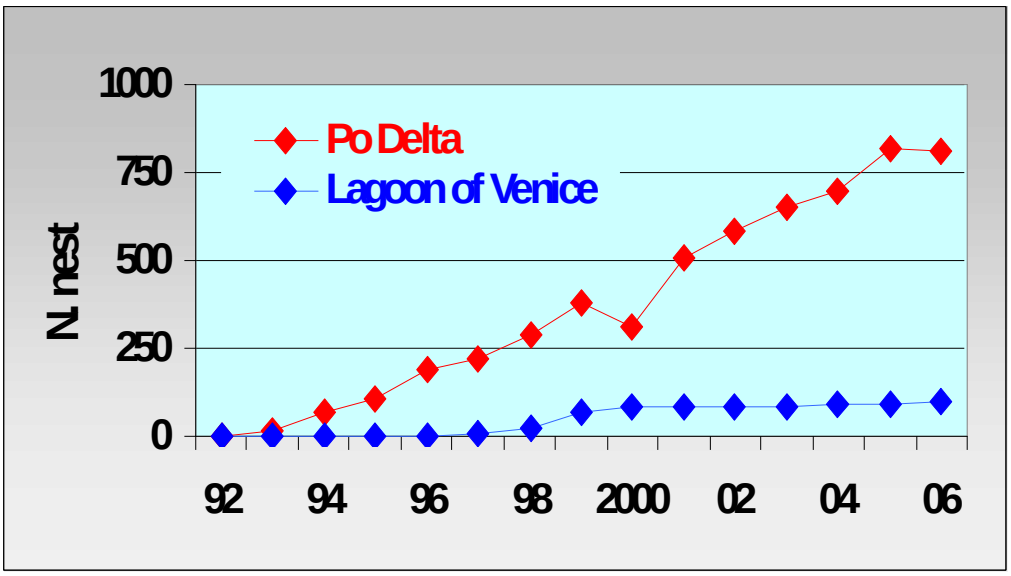
food. From winter 1994/95, twelve new roosts (ranging in mid-winter from some tens to about 1,500 birds) were established close to the primary foraging areas in "fishing-valli" and river outlets, leading step by step to an even distribution in the whole Delta (Volponi & Addis 2004).



During the 1980s, Cormorant occurrence was restricted to autumn and winter months with strongest peaks determined by the flow of migrants in late November and early March, and by temporary immigration from inland freshwater wetlands and coastal lagoons along the upper Adriatic Sea during the coldest period. In the 1990s, a growing number of Cormorants, mainly first-year and sub-adults, began to stay all year long at main roosting sites, where breeding colonies established in 1993 (Volponi 1999). Now, during the summer, Cormorants are not numerous in the N Delta (less than 100 individuals), where the species does not breed, while in the S Delta Cormorant numbers remain higher due to the presence of the largest Italian colony. So, in the S Delta cormorant numbers usually show two peaks, during late autumn for the influx of immigrants from central and northern Europe and in mid summer when young fledge and stay in the colony before dispersal.



Cormorants are ringed in the S Delta colonies since their establishment. During 1994-2007, more than 700 nestling were ringed with metal and colour rings yielding a total of 360 records among recoveries and resightings. These showed that cormorants born in the Delta mainly disperse along the N Adriatic coast, but can also migrate south to winter along the Tyrrhenian coast or in Tunisia, as well as fly to Germany, France, Switzerland, Slovenia and the Czech Republic.



Cormorant diet

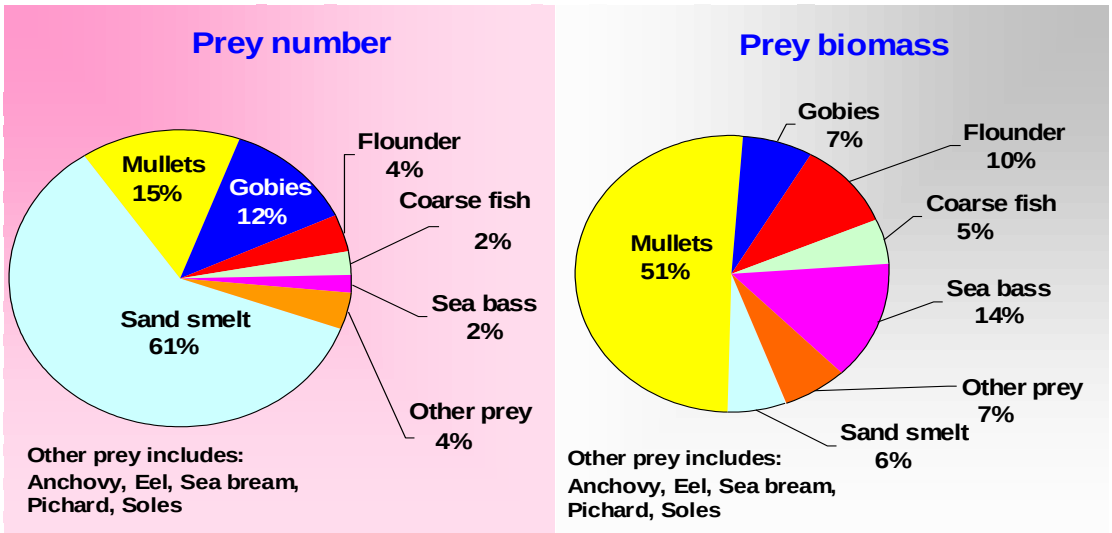
Diet studies carried out in different areas of the Delta showed that cormorant food composition is clearly related to the fish fauna of the foraging areas in term of species composition and their relative abundance. Fish fauna is greatly influenced by the management regime with large differences among open coastal waters and commercial fishing *valli*, which are enforced by seasonal changes of climatic condition (water temperature and salinity) and biological phases (growth, reproduction, wintering). All these factors act together influencing availability and accessibility of different prey species and size to cormorant predation. So, for example, most valuable commercial species, such as Sea Bream and Sea Bass, are almost exclusively taken in fishing *valli* during autumn and winter when both commercial size and juveniles gather in huge number from open water basins, where are dispersed at low density most of the year, to the canals (so called *colauri*) leading to the fishing gear (*lavorieri*) and small deep wintering ponds where they can be subject to heavy cormorant predation.

Cormorant diet in the Po Delta has been assessed through several different techniques, observing both individual and socially-foraging birds, analysing the stomach contents of shot birds, the undigested food remains regurgitated by nestlings, and the oral pellets collected at roosts and colonies. Stomach contents analysis of 104 Cormorants shot during the winter in eight fishing valli in the northern Po Delta during 2000-01 showed that diet was diverse but was dominated numerically by Sand Smelt, Mosquito Fish and Mullets, and in terms of biomass by Mullets, Sea Bream and Sea Bass (see Table below). Apart from a very small number of Mullets and sea Bass, most fishes taken by Cormorants were estimated to be less than 25cm long.

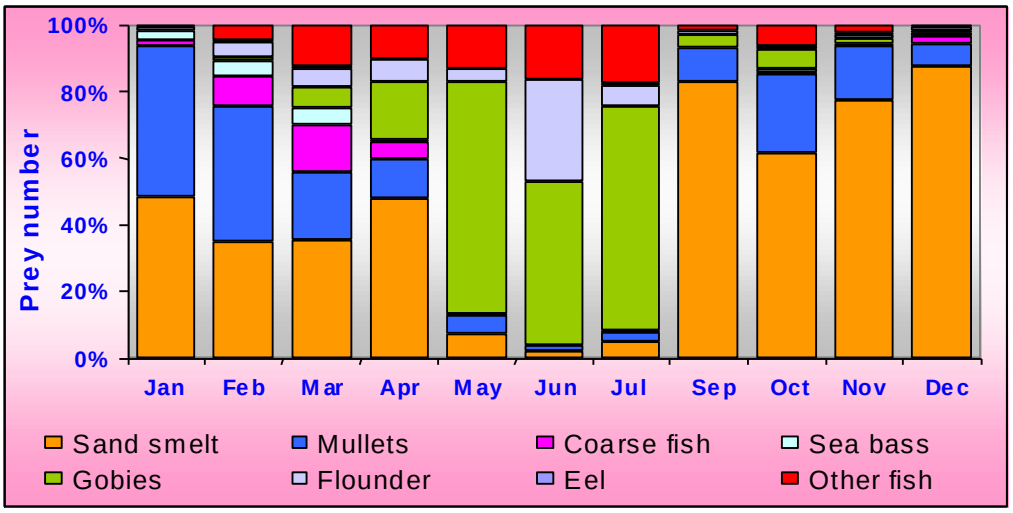
Across the whole Po Delta, Cormorant diet has also been assessed by pellet analysis – with 1,606 pellets being collected in late summer and winter over three years. Again, Sand Smelt, Mullets and Sea Bass dominated the diverse diet either in terms of biomass or number.

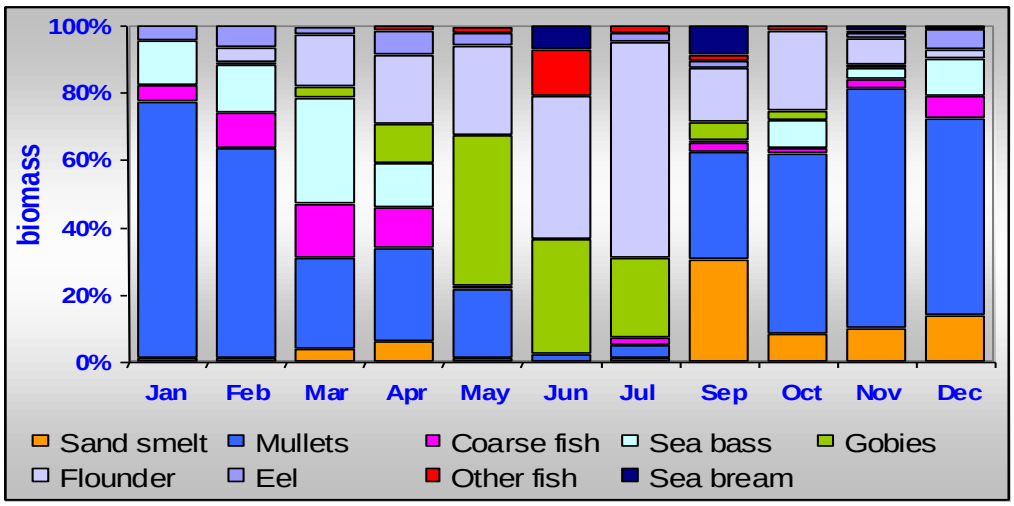
Prey	Totals			
	N	N%	B	%B
Mullets	166	11.2	9,546	41.1
Sand smelt	797	54.0	1,539	6.6
Sea bass	33	2.2	4,050	17.4
Sea bream	49	3.3	6,605	28.4
Eel	1	0.1	15	0.1
Gobies	65	4.4	120	0.5
Catfish	1	0.1	2	0.0
Flounder	40	2.7	1,030	4.4
Mosquito fish	213	14.4	70	0.3
Anchovy	3	0.2	7	0.0
Sprat	43	2.9	86	0.4
Coarse fish	16	1.1	160	0.7
Sun fish	1	0.1	4	0.0
Aphanius fasciatus	7	0.5	3	0.0
Shrimps	14	0.9	5	0.0
Totals	**1449**	**100**	**23,240**	**100**

There are also seasonal changes in diet (see Figures below). Diet was consistently diverse, but in terms of biomass, Mullets and Sand Smelt dominated diet in the autumn/winter (Sept-Dec), Mullets dominated in Jan-Feb. Thereafter, the proportion of Mullet declined and was replaced by varying proportions of Sea Bass, Flounder and Gobies.



Cormorant food composition expressed by number (left) and biomass (right) resulting from the analysis of 1,606 pellets and 32,066 prey sampled over 3 years in the S. Po Delta.





Monthly variation of the Cormorant food composition expressed by number (top) and biomass (bottom) resulting from the analysis of 1,606 pellets and 32,066 prey sampled over 3 years in the S. Po Delta.

Estimate of biomass removed and fish depredation

Data from regular counts carried out at roost and/or feeding areas can be integrated with results of food composition and daily energetic requirements to estimate cormorant predation.

A broad-brush biomass consumption of Cormorants could be made using a simple formula:

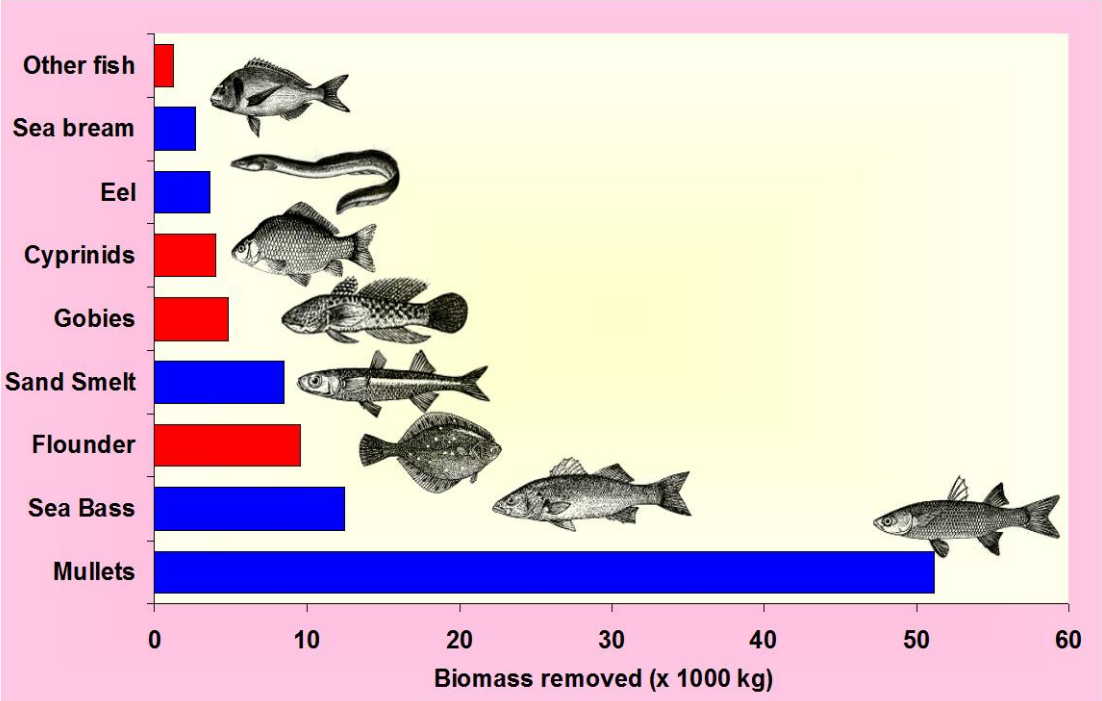
$$\mathbf{P_i = N \times Bi \times r}$$

where $\mathbf{P_i}$ is the mass of the species ***i*** removed by Cormorants, ***N*** is the number of cormorant-days calculated multiplying results of field-counts at a water-system (or a fishery) by the number of days they are present, **r** is the birds' average daily food intake, and **B*i*** is the proportion of the prey species ***i*** in the diet.

Allowing for some basic assumptions to simplify the model, such as a constant food consumption of 425g/ bird/day, it is possible to estimate both the overall and fish

species-specific predation levels and to then produce some estimate of economical impact. Such an estimate could be used, for example, to quantify reimbursements or evaluate economic feasibility of management activities carried out to reduce Cormorant impact.

Among fish of commercial value, Mullets and Sand smelt are abundant both in open coastal waters and managed *valli*, while Sea bream, Sea bass and Eels live mainly inside the commercial fishing *valli* where are stocked with fry of natural or artificial breeding.



Estimates of fish biomass predated by Cormorants roosting at Valle Bertuzzi (S. Delta) from October 1996 to April 1997. Overall biomass removed over an average of 1,087 cormorant/day was estimated at about 98 tonnes. Dish species of high local commercial value are highlighted by the blue bars.

It is clear that effective management needs regular and co-ordinated monitoring to:

- Conduct regular counts at all roosts and colonies to monitor Cormorant numbers and distribution.
- Promote survey counts at fishing valli and open lagoons to assess numbers of foraging Cormorants
- Promote ringing at colonies and ring-reading surveys to evaluate bird site-fidelity and dispersal.
- Collect prey samples to assess Cormorant diet composition and temporal and spatial variations and trends.
- Improve reporting of bird shooting at fishing valli and open waters.

- Promote the use of research data to define methods, check results, and improve management activities.

The Pygmy Cormorant

Research work has also begun here on the Pygmy Cormorant – a poorly-known and vulnerable species which suffered a large-scale decline since the second half of the 19th century because of drainage and degradation of wetlands, persecution by fishermen and destruction of breeding colonies. The species is cited as being "near threatened" on BirdLife's Red List listed in category 1 of Species of European Conservation Concern, as well as included among the priority species by the Bird Directive 79/409/CEE.

In Italy, the first breeding of Pygmy Cormorants was reported in 1981 in a mixed heronry, located in the natural reserve of Punte Alberete (Ravenna) in the southern Po Delta. Then, after more than ten years of absence, in early 1990s breeding was again confirmed for Punte Alberete and suspected for the Lagoon of Venice. In the Delta, numbers of Pygmy Cormorant have increased slowly from 1994-1999 but thereafter increased dramatically to some 1000 individuals by 2003 – and numbers have continued to increase peaking to around 3000 in winter 2006. In the Po Delta, nesting is still restricted to Punte Alberete where the colony settled in a seasonally flooded area holds more than 600 breeding pairs and results the largest in Italy and in western Europe. Colour-ringing showed that from late summer birds move to Northern Po Delta and the Lagoon of Venice where they can settle for breeding.

At early stage of the colonisation process, this species may have suffered, as other predator at the top of the food chain, a low breeding output because of chemical pollution as testified by a nestling with bill defect found at Punte Alberete. Chemical industries are numerous around the main feeding grounds of waterbirds breeding at Punte Alberete and some illegal discharge of PCBs and other organic compounds have been reported in the past. Nowadays, however, a further spread of the species may be mainly limited by actions aimed to reduce the impact of piscivorous birds on extensive aquaculture. Illegal shooting and disturbance of breeding colonies has been recorded in aquaculture areas of the Lagoon of Venice and Po Delta where the Pygmy Cormorants are often confused with Great Cormorants which is subject to lethal measure to reduce damage at traditional extensive fishfarms.

The Pygmy Cormorant nestling found at Punte Alberete in 1995 showing a deformed bill. Such defects have been recorded for several fish-eating species at locations with elevated levels of persistent lipophilic (= "fat-loving", ie they accumulate ["bioconcentrate"] in body fat) contaminants (e.g., PCBs and dioxins) in the aquatic food chain. Fish-eating birds may bioconcentrate lipophilic chemicals in their eggs by as much as 2 .5x 107 times the environmental concentration in water.

(Left) Aerial view of the industrial area and Ravenna harbour.

(Below) Partial view of the industrial area of Ravenna. The construction of the industries in the 1950s and 1960s strongly modified a large wetland area close to the sea.

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(4) "Vallicoltura" and cormorants

Gino Ravagnan, Fabio Fioroni – Valle Ca' Pisani

4.1 Introduction

What's is "Vallicoltura"? It is a system of aquaculture based on the natural productivity of wetlands (extensive aquaculture). In a recent past the "*Valli*" (fish ponds) of Veneto region and of the Po river Delta in particular, have been a model of integration between the production of fish and the conservation of habitats. Since 1980 and 1984 (in Palma de Majorca and Rome) the FAO recognized the importance of this model. The areas that could be used for fish production with this system are 100,000 hectares in Italy, and 500,000 ha in the Mediterranean. We think that the sustainable

use of these coastal wetlands could put together with both high quality food production (fish) and the conservation of nature. However, the joining of scientific, political and socio-economical forces is necessary.

4.2 Cormorants

In Veneto region there are 20,000 hectares of "valli", divided in 50 private societies – an expression of ten centuries of local culture. In these valli there is a high production of fish – at 100 to 150 kg/year/hectare - considering the area is quite cold by Mediterranean standards. The production could be higher with help of scientific technology through intensification. However, to produce 2,500 tonnes of fish (though not of the same quality!) within an intensive system would need the transformation of 12,500 tonnes of fish into fish-meal to feed the stock.

Over the last thousand years, vallicoltura has evolved, adapting to new environmental and social conditions - for example the sinking of the Delta. However, nowadays a new and enormous problem has arrived - the Cormorants. They arrive from ecosystems where the ecological balance is lost, and they come here to eat everything. Not many years ago the presence of cormorants was very rare. Now they number in the thousands, they can move very quickly, and they go where there are the highest concentrations of fish. These birds are organized and very adaptable.

Within the valli, the fish is spread over wide areas and so the passive defences (e.g. barriers like cables and nets) can only be used in some places, and "active defence" (i.e. killing birds) is difficult because it is financially expensive, time-consuming, and labour intensive. Herons, egrets and other fish-eaters are typical of the valli, and they are part of the ecosystem, but cormorants can destroy an entire economy based on this kind of extensive aquaculture.

During 1995-96, a study of cormorant diet in Venice lagoon showed that each bird eats 0.425 kg/day. Thus, with 2,000 cormorants a day in a single valle, 850 kg/day of fish are destroyed. This is equivalent to 102,000 kg each autumn-winter period. The cormorants prefer fish that are not yet adult. However, 1 kg of young fish produces at least 50 kg of commercial-sized fish. Thus the damage caused by cormorants is on a 5-year cycle. This explains why some people are abandoning valle aquaculture, some are maintaining it only as a tradition, and most of the valli survive only on the money coming from hunting activities. Indeed some habitats are now conserved only through hunting. Those occupied in vallicoltoura have decreased by 90%, and the financial loss is of about 20 milion euros each year. Importantly, a cultural heritage of experience and knowledge is also disappearing as the classical extensive aquaculture is disappearing. The problem is not only one of the loss of money and culture, recent scientific studies are now promoting the kind of integrated aquaculture seen in the valli-model.

4. 3 What can we do?

Actually we don't how to eliminate what for us is this Cormorant calamity.[1] The fish in the lagoons are distributed in large areas but passive protection by using things like scaring techniques and nets really only protects small areas of water. However, active defence does not really seem to influence things and it is labour intensive. The birds themselves are very mobile and are potentially destructive – they are like an army in our undefended lagoons. There have always been fish-eating birds here – herons and egrets – but their presence was limited and under control. They were part of a sustainable, consolidated balance. The presence of Cormorants is an imbalance. For lagoon fish farms, their effects are so negative that the industry is at stake. We are losing traditional, integrated fish farming as a direct result of Cormorants. What should we do?

Maybe we can ask those who have protected this predator – to reduce breeding output, to reduce the number of roosts, or to do a combination of both? Is massive killing in roosts and colonies the answer? We think that cormorants are no longer in danger of extinction, like they were in the past. In recent years something has been done, but it is not enough. The only way not to have Cormorants is not to have fish inside the valli. The Veneto Region has made an evaluation of the economical damage on the valli.[2] However, compensation is too high to be paid and so only relatively little money has been offered as a "symbol" of the restoration of the damage. So, ultimately, only when Cormorants cannot find fish anymore will their population(s) be reduced and their numbers decrease again.

Does this problem affect the EC and their policies or not? When Cormorants destroy lagoon fish farming for all time, there will be a double failure of environmental policy.

Guiseppe Penzo's comment: Fifteen to twenty years ago, the company employed 10 people and the turnover was about one billion lire. Now the company employs two people and the turnover is around 150,000 lire – only 10-20% of what it was before. The company is dying – it is the same with all the companies.

[1] Additonal note – further background information supplied post-meeting: Fishfarmers were used to the presence of fish-eating birds (herons and gulls), but until the late 1970 these birds were not protected and shooting was a common and widespread means to reduce their (potential) impact. The largest wing feathers of the grey heron were used in the Comacchio area to spread oil during fish cooking. These species became more numerous and abundant after the 1980s and the fishfarmers started to complain as in the Ravenna areas where the local administration payed and still pay compensation for predation.

[2] Additonal note – further background information supplied post-meeting: Following the Ravenna district, the Veneto fishfarmers went to the civil tribunal to ask for full compensation - supposed and calculated –for damage caused by cormorants.

(5) Great cormorant conflict management in Friuli Venezia Giulia, NE Italy

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5.1 Introduction

Friuli Venezia Giulia is a relatively small region (7,485 km^2) in north-east Italy, but it is one of the richest Italian regions in terms of habitat diversity. Wetlands are included in this heritage and they can roughly be recorded in three main categories: freshwater inland wetlands, coastal wetlands, and rocky coast.

5.2 The Great Cormorant in Friuli Venezia Giulia

The Great Cormorant *Phalacrocorax carbo* is a very important species amongst waterbirds in Friuli Venezia Giulia, not as one of the most numerous species but as one of the most impressive on human society. This is also one of the reasons why the Great Cormorant is a species that research is focussed on so much in this region, through several monitoring programmes:

- The annual wintering waterbird census within the Wetlands International census (IWC)

- The ANSER project (an Interreg project focussed on the ecological role for waterbirds of the Adriatic Sea coastal wetlands)

- The Great Cormorant monitoring programme and diet study in inland freshwater wetlands

- The study of interactions between fish-eating birds and fisheries in the Grado and Marano lagoon

These monitoring programmes are promoted and carried out by the Autonomous Region Friuli Venezia Giulia and/or the University of Trieste, sometimes together with other institutional partners, private companies and the regional ornithological association A.ST.O.R.E.-FVG.

Great Cormorants in Friuli Venezia Giulia are regular migrants, wintering birds and non-breeding summer visitors. The winter population has fluctuated between ca. 1,600 and 2,400 individuals in the last ten years, after an increase in the period between 1998-2001. Now the species consistently numbers about 1,700 individuals counted at roosts in mid-winter. The Great Cormorant has established several roosts in the region, in all types of wetland and coastal habitats, sometimes mixing with other cormorants (Pygmy cormorant, Shag) and/or herons (mainly Little Egret and Great White Egret). About ten roosts were occupied by more than 100 individuals in January 2007, and the biggest held over 300 birds.

One roost is located about 50km from the sea coast. Monitoring (carried out in the 2005/06 and 2006/07 winters) registered that the Great Cormorant population varies with the same seasonal monthly trend both in inland and coastal wetlands, showing increasing numbers from September to December. Thereafter numbers remain stable until February and start to decrease from March, reaching the minimum during the summer. Similar seasonal trends of bird numbers were also found in both winters.

5.3 Normative reference frame and control of Great Cormorants in Friuli Venezia Giulia

Within the normative reference frame in Friuli Venezia Giulia, the Great Cormorant is obviously a protected species under the Birds Directive (79/409/EEC) and the national Law (157/1992) but Friuli Venezia Giulia is an autonomous region and it has a peculiar institutional setting concerning wildlife management. Damage is partly indemnified by Provinces (about 800,000 euro per year in the whole region and for all species) and it is known that the maximum compensation per fishery may amount to 3,000 euro per year.

A new regional law has been approved after the EU took out an infraction against Italy. It started in 2007. The aim is to prevent “serious damage” to fisheries by Cormorants. Authorisation to kill Cormorants has to be given by the Region to the management body (Provinces, Portected Areas) – i.e. not the fisheries. Assessments of damage are based on what damage has occurred and the probability of recurrence. Cormorant control can only be carried out by certified hunters or people form the environmental offices.

Year	Roost count	Authorised number of Cormorants	Number of Cormorants shot
2004	1,657 birds	ca. 200,000*	696
2005	1,662 birds	200	65
2006	1,821 birds	146	55
2007	1,714 birds	164	48

Table: Number of cormorants counted in mid-winter roosts, and the numbers of birds authorised to be killed and the actual numbers reported to be shot (2004-07). *Figure in 2004 was based on a quota of 20 Cormorants/hunter.

In **marine- and brackish-water habitat systems**, many valli are no longer managed as fisheries. Nevertheless, complaints against Cormorants increase in relation to increasing winter numbers and the numbers of control requests increase as a consequence. There are negative aspects, some fish companies think the methods are costly and technically difficult – so they still ask for lethal control. The University of Trieste has Cormorant diet data for the Grado and Marano lagoons. The most common prey, by number, are the Sand Smelt (or 'silverside' *Atherina boyeri*) and, by mass, the Flounder (*Platichthys flesus*) and Grey Mullet (*Mugilidae* spp.). Overall, it appears that Cormorants impact the wintering fish ponds mostly in November and December but is not constant throughout the winter. When weather conditions improve, birds tend to move into the lagoon.

Cormorant issues have also been explored in a different habitat system – that of **freshwater wetlands**. Here, sport fishermen (recreational anglers) have increasing complained about Cormorant predation in recent years. Some 25,000 of these fishermen are represented by the Ente Tutela Pesca (ETP – "Institution for Fishing Protection"). The ETP promotes fish population management actions and carries out fish restocking. In freshwater wetlands, a number of issues have been considered for a new approach in conflict management:

- Is the exploitation of fish communities harmonised with the productivity of freshwater wetlands or does it mostly support "ready-to-fish" restocking?

- Does intensive re-stocking contribute to the support of higher densities of fish-eating birds?

- Fish re-stocking should be intended as a tool to create/strengthen natural and self-sustaining populations.

- Other limiting factors should be considered – physical and chemical alteration to wetlands, habitat reduction, alterations to fish populations and freshwater communities for instance.

- In cases where fish populations are at risk, why not consider alternative measures such as forbidding sport fishing?

- Within all these factors, what is 'the weight' of fish-eating birds – where do they rank amongst the issues?

- Cormorant control can only be an extraordinary measure and used only for its scaring effect.

- Control should be limited in time and space in order to support restocking (for natural purposes) within coordinated projects

- It must also be considered that the Birds Directive justifies control if its effectiveness can be demonstrated through monitoring the effects of the technique.

In 2005, these issues lead to the launch of a Great Cormorant project in inland freshwater wetlands. The diet of Cormorants in the Isonzo River was studied in the winter of 2005/06 and showed the most commonly taken fish (estimated biomass) were Nase (*Chondrostroma nasus*) – an introduced, alien species – the European Chub (*Leuciscus cephalus*) and the Ray-finned Roach (*Rutilus aula*). As elsewhere, two issues have emerged. First, Cormorant diet appeared to reflect the community composition of the prey fishes. Second, good impact data should include quantitative data on these fish populations and communities.

In conclusion, summarising the current management approach to Great Cormorant management in freshwater wetlands in three areas:

- Control actions are much more focussed today than they were in the past

- The control of 50 birds was authorised in 2005/06 along 4 river sections in order to protect Grayling (*Thymallus thymallus*) and Marble Trout (*Salmo [trutta] marmoratus*).

- Stronger collaboration is needed between fish and bird management institutions.

(6) The management of Great Cormorant (*Phalacrocorax carbo sinensis*) in the Ravenna province (southern Po Delta)

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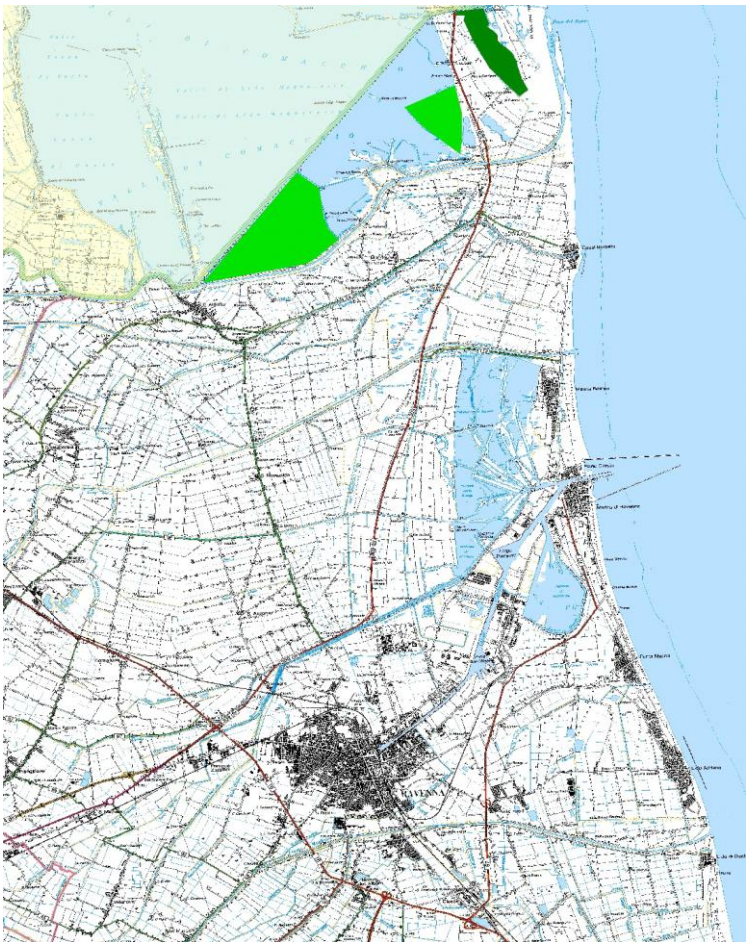
Agriculture Dept., Provincia di Ravenna.

6.1 Fish-farming in Ravenna province

There are three fish-farming companies in Ravenna province inside the Po Delta regional Park and in the area of the Comacchio lagoon. Two fish-farming areas are within the "CO.VA.RER" (The Agreement of fish-farmers of Emilia-Romagna) and have a double cycle intensive-extensive approach (2 sites to west ■), the third is a traditional extensive fish-farming operation (eastern site ■).

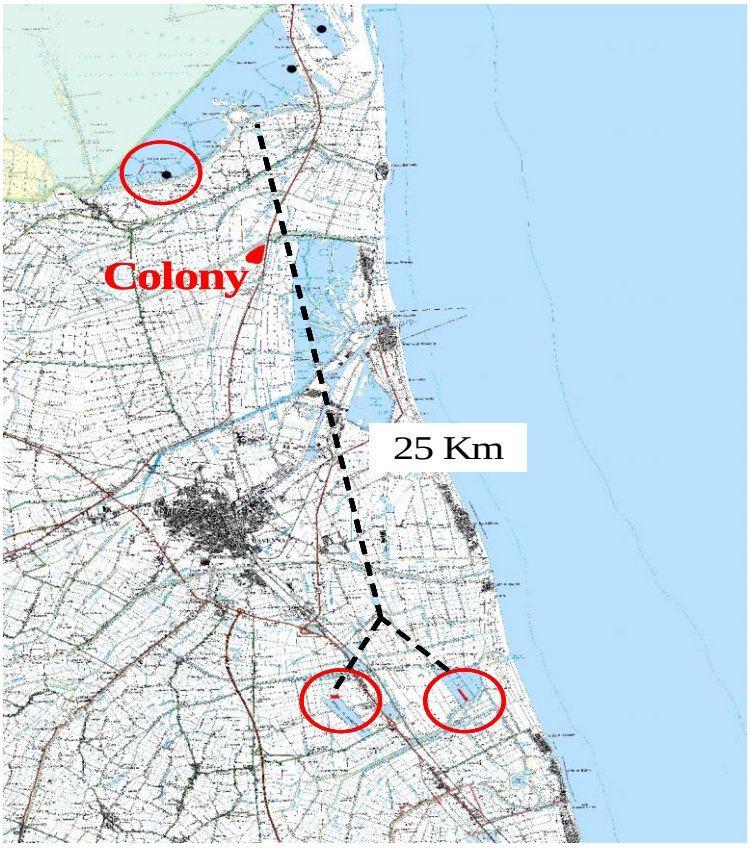


Location of three fish-farming regions

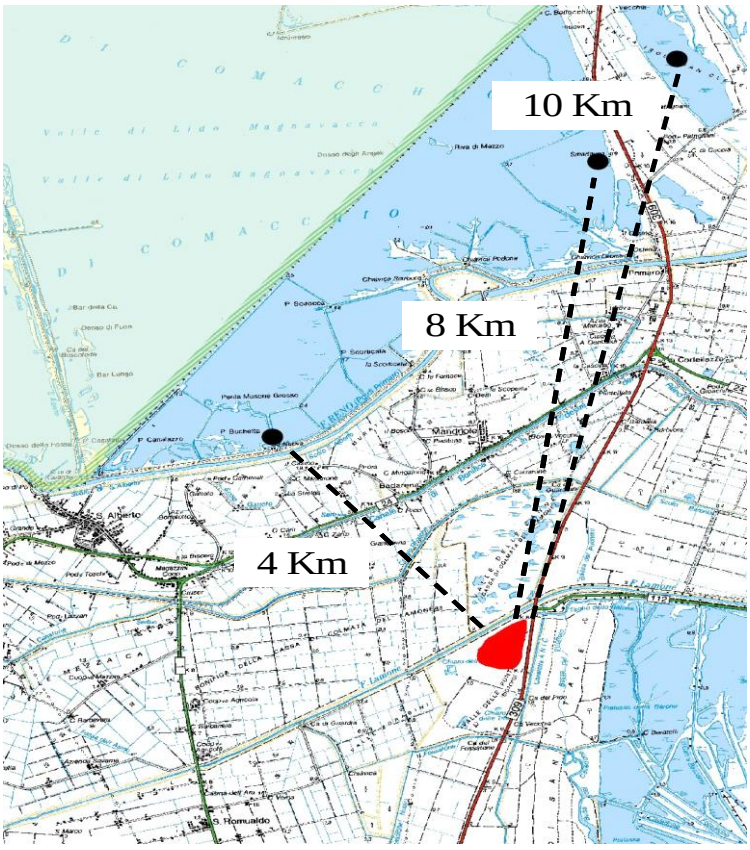
The seven fish species raised here are Eel (*Anguilla anguilla*), Thick-lipped Grey Mullet (*Chelon labrosus*), Golden Grey Mullet (*Liza aurata*), Thin-lipped Grey Mullet (*Liza ramada*), Flat-headed Grey Mullet (*Mugil cephalus*), Sea Bass (*Dicentrarchus labrax*), and Gilthead Sea Bream (*Sparus auratus*). The more profitable fish are Eel, Thick-lipped Grey Mullet, Sea Bass, and Gilthead Sea Bream.

6.2 Status of Cormorant in Ravenna province

There is a single nesting colony, located at Punte Alberete, which held 815 nesting pairs in 2006. This colony is within 10km of all three fish-farming areas.



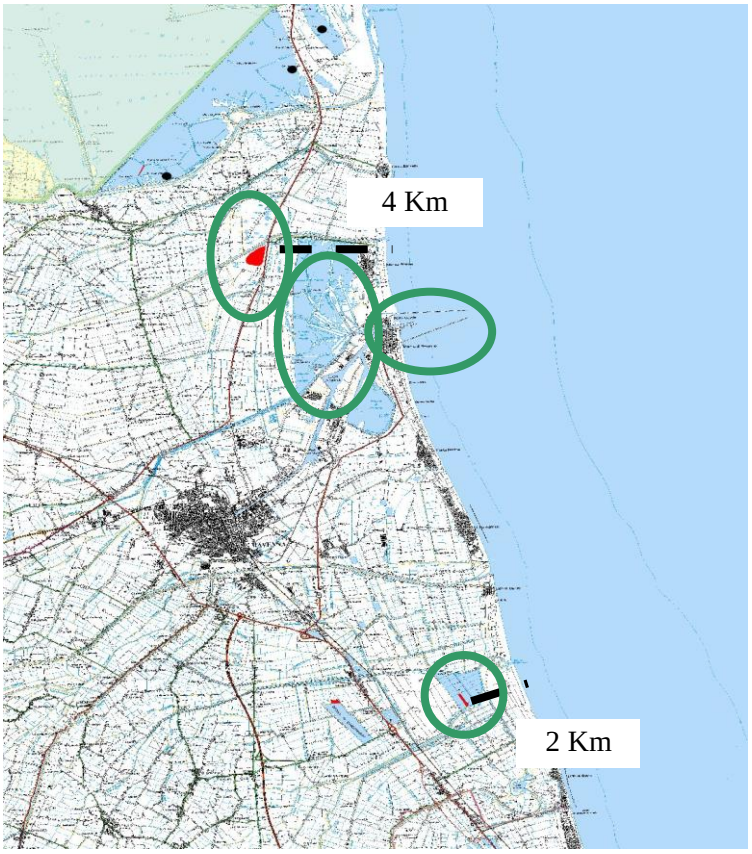
Location of cormorant roosts (circled) and colony (■) and distance from fish-farm areas (●)



Location of cormorant colony (■) and distance from fish-farming areas (●)

There are also four main roosts in the region, located at Punte Alberete, Valle Furlana, Ortazzo, and the Rowing Basin. The average number of wintering cormorants here (2003/2006) is 2,500. Although some of these roosts are some 25km from the fish farming areas, all are within commuting distance for the birds.

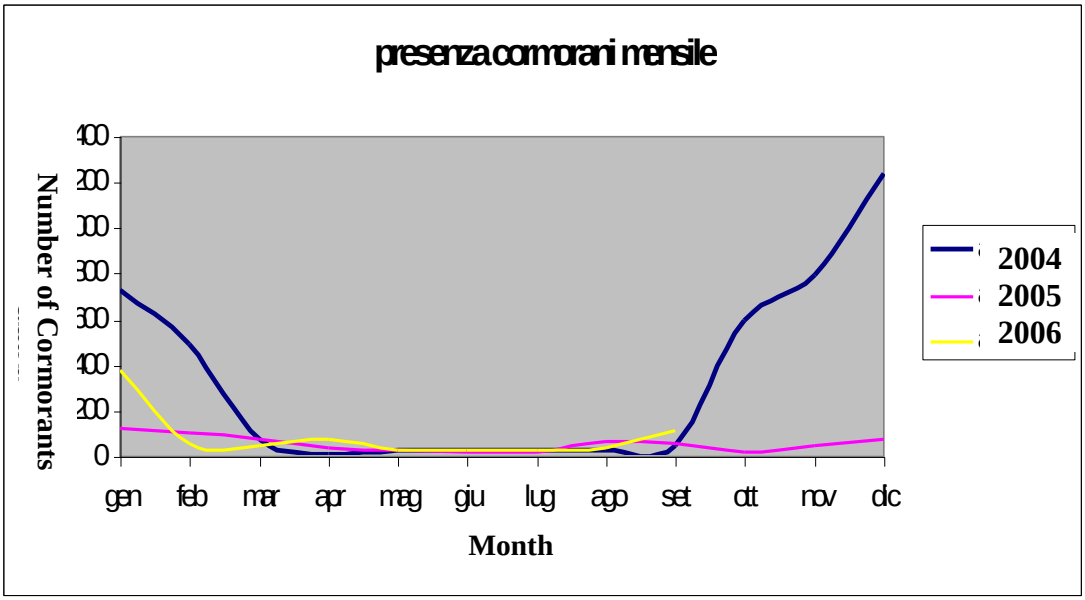
There are also good natural feeding sites closer to the Cormorant colony and roosts than to the fish-farming areas. Cormorants mainly use these natural sites during nesting season and as an alternative they often feed in the sea.



Location of natural Cormorant feeding sites (■) and distances from roosts and from the colony (■)

6.3 Counts of fish-eating birds

CO.VA.RER (The Agreement of fish-farmers of Emilia-Romagna), Emilia-Romagna Region and Ravenna Province signed an agreement deal for the counting of fish-eating birds in the fish-farming areas, in 2004. From November 2004 we thus started the regular counting of fish-eating birds, using a standard method as established by the agreement. Counts are conducted every 15 days, with counts rotating between morning (from dawn) and afternoon (till sunset). Two teams of two people each conduct the counts which are undertaken directly with telescope (20-60x50) and binoculars (10x) of birds both roosting or feeding. Twelve bird species are counted: Great-crested Grebe, (*Podiceps cristatus*) Great Cormorant (*Phalacrocorax carbo*), Pygmy Cormorant (*P. pygmaeus*), Grey Heron (*Ardea cinerea*), Purple Heron (*Ardea purpurea*), Great White Egret (*Egretta alba*), Little Egret (*Egretta garzetta*), Night Heron (*Nycticorax nycticorax*), Squacco Heron (*Ardeola ralloides*), Cattle Egret (*Bubulcus ibis*), Greater Flamingo (*Phoenicopterus rubber*), and Yellow-legged Gull (*Larus michahellis*).



Monthly counts of Cormorants 2004-2007

6.4 Damage appraisal

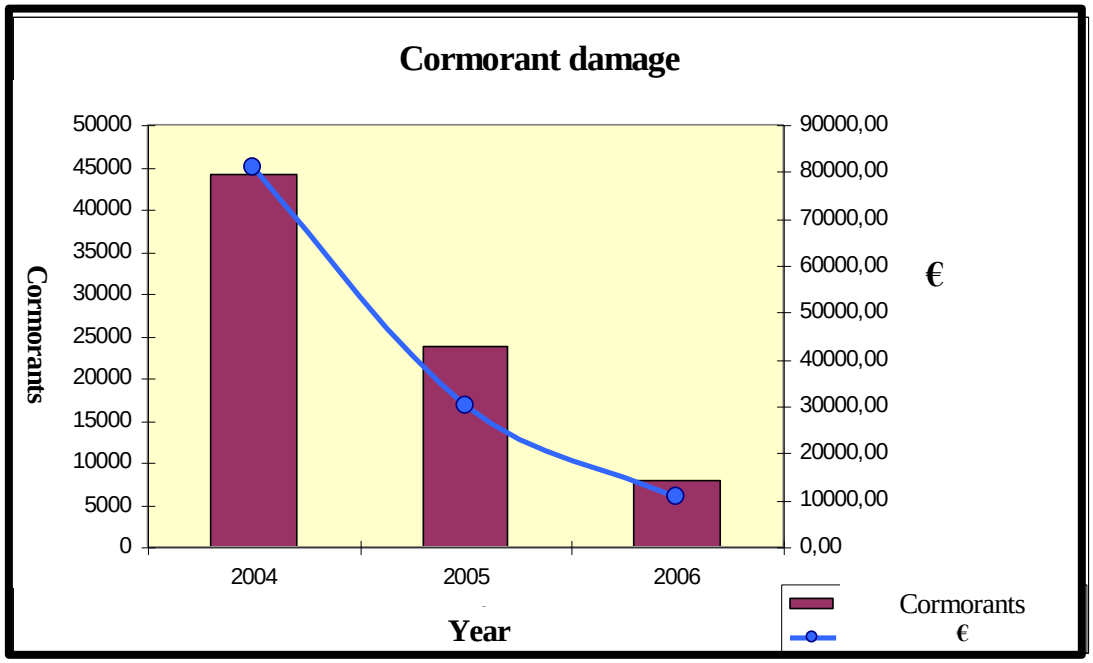
We don't have all the information for a perfect evaluation, but we have everything we need for an estimate of the damages. The Cormorant counts give us the number of feeding birds of each day of the year, assuming the number detected during the survey remains valid until the next count.

We also know the local diet and daily food intake of Cormorants and we can multiply the quantity of eaten fish for the medium price of each species according to the formula:

$$D = N \times Tj \times C \times Pij \times €i$$

where D = damage (€), N = number of birds counted during a survey, Tj = number of days until the next survey, C = daily food intake, Pij = proportion of fish species "i" in the diet, and € = cost of one Kg of fish species "i".

Using this formula, we can see that both the numbers of Cormorants and the estimated financial losses have declined annually from 2004-2006.



6.5 Control plan

The National Law 157/92 ratifies the possibility to beginning control plans for damaging animals, after the failure of every other preventative action. Ravenna Province immediately provided fish-farmers with covering nets and air cannons as means of non-lethal Cormorant control. From 1995 a killing plan started, at the beginning to study the diet, and then to move away Cormorants from fish-farming areas. Only named hunters could be involved in the killing plan (after attending a course) and only in the fish-farming areas outside the Po Delta Park.

Cormorants can be shot from September to March, although shooting in January would be enough, according to our counts. Fish-farmers provide the number of Cormorants killed (about 200 per year) to the Province each year.

6.6 Best practises

During the counts we discovered means of environment and farm management that could reduce the damage caused by birds.

Some problems can be avoided by the use of the "best practises" that we advised the fish-farmers to adopt during meetings with them.

(I) Environmental management

(a) Roosts

Remove every structure that can be used for roosting.

- remove unused old posts,
- stick long nails into posts,
- cover post tops with metal cones,
- quickly expel Cormorant roosts as they are established.

(b) Decoys

In some fish-farming areas there are often Cormorant decoys that attract Cormorants to the basins:

- remove all the cormorant decoys.

(c) Plant cover

By managing water, it as possible to increase the submerged beds of Spiral Tasselweed (*Ruppia cirrhosa*) or of Fennel Pondweed (*Potamogeton pectinatus*) and the shore reedbeds (*Phragmites australis*).

- maintain shore reedbeds along the basins,
- reduce salt water (5-10‰) to increase *Potamogeton pectinatus*,
- enhance salt water (20-30‰) and oxidize the bottom (also with summer drainage) to increase *Ruppia cirrhosa*,

(II) Artificial shelters

(a) Covering nets

Covering nets are used in most basins and channels (paid for by the Region and Province), but they are often poorly cared-for, submerged, or too high over water. Finer, square-meshed nets capture and kill birds, and some new basins for fish storage haven't covering nets.

- maintain and upkeep existing nets,
- lower the nets closer to water surface (i.e. less than one meter),
- change old nets to ones having larger square mesh (i.e. 25 cm square).

(b) Vertical barriers

Flush barriers, at a distance of about 10 meters and with crosspiece every 30-50 meters, to avoid Cormorants drowning and taking off.

(c) Cables

In large basins (such as open lagoons used for extensive farming) it is impossible to install covering nets or vertical barriers, but it's easier to put in clear cables (with a large diameter or attached with colourful tapes).

(d) Submerged barriers

Submerged barriers allow fishes to escape from diving birds.

(e) Artificial hiding places

These are better if combined with natural shelters and placed in the corner of basins or along the shore.

- floating shelters,
- submerged shelters (bundles, rolls of wire netting, pipes),
- combining both floating and submerged shelters.

(III) Fish management

(a) Farm cycle

Cormorants prefer fish smaller than 400-450 grams, so it could be useful to extend the intensive farming period, so that larger fish are ultimately released into the open lagoons.

(b) Live fish storage

Reduce the time of live fish storage (or shelter) in all the storage basins.

(IV) Control plan

(a) *Blank shot*

Can be used outside of hunting period and also by non-named hunters/farm workers who can shoot blank shots to scare Cormorants.

(b) Raise the fear for men

Don't shoot from hides: the aim is to scare birds, not to reduce their number, so be visible.

(c) Colourful jacket

Hunters, workers and fishermen should all wear the same colourful jackets to reinforce the 'fearful' image of people.

(7) LOST: The Lack of Synergy Theory

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7.1 Foreword

The "LOST" theory has been conceived by the author. It is based on the progressive interrelationship that today concerns human activities as a whole. As a result, relations are so important that a lack of connection brings failure, as we shall demonstrate in this case study.

Policies, or researches on development and sustainability, must not point to a single activity, nor to the cause-effect relationship, but at a cluster of activities. Without a synergistic action, neither studies nor economic activities can be effective or proficient. This is correlated to the basic idea presented in the EU Green Paper on Maritime Affairs (2006), which we would apply to the case study of the Po Delta.

7.2 Introduction

We can individualize reasons of this "LOST" theory, along the Po Delta, in geographical patterns, originated by territorial constraints, as lagoons or marshes, enclosing every community in itself, exalting peculiar traditions and even peculiar languages or even extolling contrasts and fights. Rivers and seas generally function as tools of division but, as we can see, even the marshes do so.

The milieu is also the reason why people in the Delta do not consider themselves as pertaining either to sea or to land - for that they were not able to catch the opportunities alternatively offered by one or other environment or policy. This lack of coordination, in the past and at present, does not help the dispersed villages in the large campaign, and there is also a general lack of synergy between sea and land. Other lacks have originated from the administrative borders pertaining to the Po river and splitting it into

two regions: the northern bank to Veneto, the southern one to Emilia Romagna. The same is true for the Delta Park, split as it is into two regional parks, even if its 'worth' requires national supervision.

7.3 LOST in the Delta

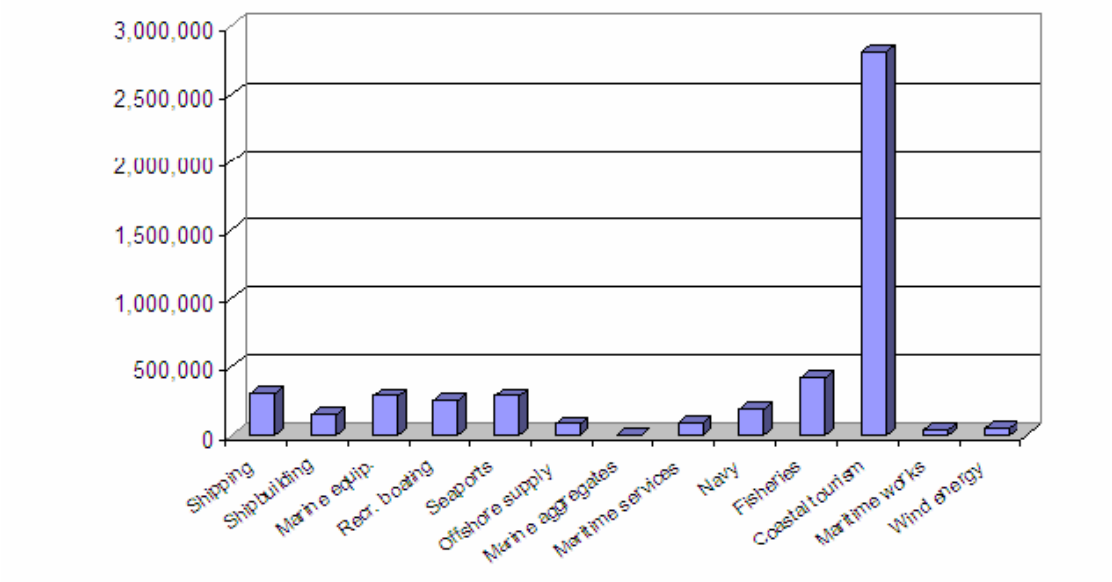
According to the cited Green Paper, coastlines are emerging as being amongst the areas which offer most new job opportunities. On the other hand, the area of the Po Delta suffered many blows throughout history and now has some of the lowest levels of Human Development Indices in Italy, despite being included in the Emilia Romagna Region which is positioned in the sixth rank of the EU regions. These circumstances are based on geographical matters, due to the evident marginal position of the area in the region, and in respect of the central national roads. Even if delta areas are very rich in biodiversity and the land-water (fresh and salt) interconnection offers a richness of opportunities, the local population has never been able to 'catch numbers of chances' and local development was always managed by external forces.

History testifies that the ancient first rich Etruscan port of Spina had plenty of connections but became separated from the sea by new alluvial land, subsequently losing its functions. Similarly, the first agrarian settlement of the Saint Benedict monks, in the VIII century, remained localised along the locality of Pomposa. The government of Ferrara's territories remained centred in the capital, where the Este princes gave priority to city organisation. When they started the drainage of the marshes, this first big efficient work remained stalled by the death of Alfonso the Second (who left no) heirs, when his feudal dukedom passed to the Roman Church State. The Vatican did not take care for any drainage, nor for local needs and development. Instead, it charged the population with heavy taxes, erased property rights on the lagoons, and deprived the population of the Eel breeding revenues. This situation continued until the passage to the Italian State, created in 1861. Figure above is of the Castle of Mesola (Source: *Provincia di Ferrara*).

In the nineteenth century, poor labourers followed the socialist party in fighting against the new united Italian government, in order to obtain jobs or cultivatable land for landless peasants. The fights were unsuccessful and they ultimately obtained land only after the passing of the famous Agrarian Law of 1950 which imposed the redistribution of big land tenures into small parcels. However, by this time many workers had already emigrated towards industrialized foreign countries or towards northern Italian cities. Other lands have been obtained by the big drainage schemes favoured by the same Agrarian Law but these did not become useful to the unemployed who were unable to become landlords, even if they claimed it, because for ages they had been involved only in the fishery or as manual labourers.

In these times the State spent a huge quantity of money in the quest to gain new territories because agriculture seemed the only activity able to ameliorate the poorest conditions. Also, in the 1950s, more than 50% of workers in Italy were employed in the in the primary sector (fisheries included). The State legitimised the land property rights for workers after thirty years of management, at zero interest, so that the final payment by the peasants was lower than was the drainage costs. Unexpectedly, most of the peasants sold their property as soon as possible at the same time as they became owners. Generally, those lands were bought by big foreign investors, shifting, in this way, the legally-adjusted situation back to the previously criticised conditions of extensive estates, leading to monoculture.

In many cases, the money thus derived was not utilised for new investments, on the contrary, it was spent for status symbols and material goods. The population did not catch the opportunity to invest in the service sector with tourism, when, at the same time as peasants sold their parcels of land, new investments in buildings were initiated by foreign investors along the uninhabited coasts of the Delta. The edification of the coastline continued at a fast pace, leaving only the lowest unskilled jobs to the local population with the rich gains going to the foreign investors, coming from the richest Italian cities or from the southern Riviera.



Share of different maritime sectors, 2004/2005 (Source: ECOTEC Research & Consulting, 2006 [individual sources identified in country reports]).

Surely today, the high taxation (ICI) imposed on summer second homes is enriching the local public administration of Comacchio, but the city planning and organisation does not reflect the quantity of money spent by residential tourists and so the sustainability of the area is at stake. In fact, the tourist development realised here is placed at the opposite end of the concept of sustainability. Entrepreneurs here have always privileged the second home investment instead of pointing towards hotels or B&B accommodation for instance. However, second homes do not have the same economic repercussions on the social and economic development of an area.

In this way, there still remains today, a social and economic divide between the city of Comacchio and the *Lidi*, as two separated worlds. Even if the heavy taxation deriving from the seven lidos is an important income source for Comacchio's administrators, the money does not help actions towards sustainable development here.

7.4 The Delta's settlements

A similar LOST scenario occurred in the city of Goro, which for several years had been the "blue garden" for molluscs (*Tapes philippinarum*) and producing huge financial capital derived from scientific aquaculture research applied along the shallow sea waters. The new fortune was not invested in productive initiatives, as new tools for the fishery or for ships, but was used for expensive status symbols or was dispersed in political corruption. In the end, the desire for 'easy money' lured the youth from schools who then went to work without taking the time to acquire specialised skills. This economic success, instead of ameliorating the fisher's conditions or the quality of production, was directed only to the quantitative aspects of the market, degrading the fisheries consortium's reputation until the financial collapse. We should consider, according to the Green Paper consultations (from June 2006-June 2007),that "*the human element is part of the competitiveness of the maritime industry and it will be the actor in reducing the impact of human activities in the maritime environment*".

7.5 A politic-economic theory test

Throughout this sequence we can continually speak of "lost opportunities" because the area maintains, even today, some of Italy's lowest cultural and economic levels and ones similar to those in Southern Italy. The first thing to consider is the cultural level, which should usually be the engine of technical innovation and which should promote economic advances. The specific reason for "lost" in this area is tied to the limited coordination with external powers. First of all with the city of Ferrara deputed for centuries to the provincial administration and with the surrounding area, without pointing at the same time towards specialized marine activities.

The connection of Venice with its hinterland has ever been more proficient. Ravenna was an imperial city facing the coastline whilst Ferrara has never been a port, apart from a river port because it was more interested in the Po River than in the seas. Comacchio, Codigoro, Goro, and Mesola never reached the demographic level of a city. Only Mesola was programmed to become a strong seaport, in order to contrast the power of Venice ("Queen of the Adriatic Sea") which was continually contrasting itself to all other cities along the Mediterranean coasts. The project, announced through the construction of a wonderful castle - similar to the castle of Ferrara – was blocked by the extinction of the Este family and the site became covered by alluvial deposits during the subsequent Catholic Church domination. In this way, Mesola is nowadays a marginal little settlement instead of a big city. It was the last jewel of the noble Este dynasty which planned to create a second capital after Ferrara, a big sea harbor maybe bigger than Venice, but the abandonment and the progressive accumulation of alluvial deposits caused both the advancement of the Delta and the separation of the settlement from the sea. The castle remains today as a mark of the last dreams of a "lost city", in a land of lost opportunities.

All these cases could be seen as the best examples to demonstrate the value of the new policy affirmed by the European Commission Green Paper on Marine Policy, which sustains the necessity of a synergy among activities, especially along coastlines, where different options between seas and land are facing each other. The coastlines should become the triumph of fisheries and agriculture, transport, and manufacturing in order to ameliorate the benefits of the production and export-import of goods, not only for the local areas involved but for the enhancement of the entire region.

A social synergy or an economic coordination among the Deltas' settlements has never been realised here. On the contrary, local ethnical aspects, deriving from the physical separation of the territories due to the lagoons, has been reinforced throughout the years. Dispersion of forces, investments, and jobs, and the lack of economic, social,

and political aspects did not bring to this area an evolution comparable to other parts of the region.

The European Social Funds, the European Agrarian Policy, and the 5th and the 6th, Framework Programmes specifically helped this area with the Objective 5 and Objective 2 programs and the special conditions of 87.3c rules. However, the noticeable lack of synergy is evident even today.

7.6 The future in deltas

In two of my previous works (1994 (a) & (b), I underlined the importance of integration among local, national and super-national policies and synergy among sectors of activity. I will close with the same remark, according to the policy suggested by the European Commissions' Green Paper, presented in June 2006 and discussed until June 2007, which reveals on the coast lines the richness of economic opportunities which can be developed respecting, at the same time, the safeguard of the environment. Along the coasts, marine and terrestrial resources must be developed in clusters. Any activity does not act as a monoculture, because it can cause irreversible damage when climate, market or demographic conditions change. New activities should merge with the old ones, especially today as new energetic technologies, or fishery-related food innovations are required as suggested by FAO (which indicates the seas as the future source to alleviate famine) and prosposed by the Millennium Goal. Indeed, the Food and Agricultural Organisation indicates that most of the new demand for fish consumption will have to be met by aquaculture.

"*Special attention will be given to activities to promote the sound management of fisheries and other marine resources, the protection of sensitive marine habitats and the management of coastal zones*" (Green Paper, 2006, p.8)**.**

The seas and oceans hold great potential for providing new jobs, economic growth and prosperity, as well as for increasing our well being. The Green Paper (2007, p.47) thus concludes: "*An effective implementation of European policies in the maritime field requires an assessment of the policies aimed at boosting sea related employment".*

7.7 Conclusions

We tried in this work to cement the idea of the necessity of an integrated analysis of land and maritime activities, hopefully leading to "coordinated actions", as suggested by the Green Paper's statement which appears really innovative.

In fact the new condition posed by the EU is "*a holistic policy approach, strategically combining maritime, employment, regional R&D, energy, environment and transport policies, required to fully exploit this economic and employment creation potential in a sustainable way.….The maritime cluster concept has not traditionally comprised activities such as coastal tourism, cruise tourism, offshore and coastal wind energy – all of which are strong growth sectors in Europe*" (Green Paper, 2006, p.32).

Our final conclusion thus implies the maintenance of the "biodiversity of *activities*".

Discussion

When asked, Adriana said that she did not really know where the Cormorant comes in this story. Manilla clams (*Tapes philippinarum*) were mentioned as one potential reason for market collapse. These bivalves have a natural distribution in the Philippines, South China Sea, East China Sea, Yellow Sea, Sea of Japan and Sea of Okhotak. However, since the beginning of the 20th century they have become widely introduced into the Hawaiian Islands, Pacific coast of North America, France, UK, Germany, Canada, Spain and Italy.

The issue of antagonism between the fish farmers themselves was also mentioned. Stefano observed that pollution is mainly a question of nutrients coming into the lagoons. Issues like eutrophication (nutrient enrichment) were actually very new here. Cormorants were another limiting factor. Peoples' standard of living had improved in recent years and now cormorants are seen as coming in and the fish farmers have a lower income. These are not necessarily local issues – and so people become unhappy with the situation.

7.8 References

COM (2006) 275 final, GREEN PAPER, Towards a future Maritime Policy for the Union: A European vision for the oceans and seas, Volume II – ANNEX, Brussels, 7.6.2006.

A future EU maritime policy should take into account:

(a) The international challenges of shipping industry and the particular shipping interests of EU MS.

(b) The need for continual improvement of EU's maritime industry competitiveness and for the achievement of long-term growth and development.

(c) The need for a sustainable use of existing marine resources.

(d) The need for effective implementation of the safety and environmental standards that have been adopted at the international level.

(e) The enhanced environmental performance of shipping.

(f) The decisive role of R&D initiatives, as well as of innovative technologies in the improvement of the maritime sector.

(g) The importance of developing the human resources employed on ships and onshore maritime-related activities.

(h) The necessity for further promotion of EU maritime clusters.

(i) The need for improvement of regulatory framework under the auspices of IMO.

(j) The importance to bear under consideration the actual objectives of the maritime industry and the European coastal regions and avoid the influence of a wide variety of not directly related political agendas.

Extracts from a future maritime policy (Source: *Green Paper, 2006*).

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(8) Experimental plan for mitigating the impact of the Great Cormorant (*Phalacrocorax carbo*) on Po Delta fisheries (Rovigo District, Italy)

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8.1 Study area

This experimental plan relates to the northern part of the Po Delta river, in north-eastern Italy (Rovigo District). This Delta is one of the most important wetlands in the Mediterranean region, and is a hotspot for biodiversity and birds populations. The Rovigo Delta is composed of three main types of wetlands: 8,000 hectares of brackish fisheries ("*valli*"), 11,000 hectares of tidal lagoons, and 4,000 hectares of river branches.

The "valli" are the most peculiar sites because they are a complex mixture of natural and human factors. They are divided in to three groups (Rosolina, Porto Viro and Porto Tolle), with a mixture of fresh water coming from the river and salt water coming from the lagoons. The water level is shallow, valli they are completely embanked to form big lakes inside big lakes, they have a mixture of artificial and natural banks and typical "alophile" (meaning salt-loving or salt-tolerant) vegetation. Valli are privately owned for hunting and to grow fish, and there is artificial management of all the characteristics (water level and salinity).

In these valli there is a conflict between the Great Cormorant *(Phalacrocorx carbo)* and the fisheries' activities. The rapid increase of the Pygmy Cormorant (*Phalacrocorax pygmeus*) population is becoming a problem here too.

8.2 The plan

In this District, different laws operate to regulate the plans of fauna control: a national law (No. 157/92) and a regional one (No. 50/93) regulate in general these kind of activities. There were two regional laws (Nos. 7/02 and 17/04) that allowed hunters to shoot Cormorants but have these have been deleted. Now a regional law (No. 2072) allows the District to control this species after preparing a plan, with no limitation on the number of birds to be killed or at which time of the year.

Experiences in the area demonstrate in these years that simply killing cormorants is not the solution of the problem. This is because the Delta is an important site for the

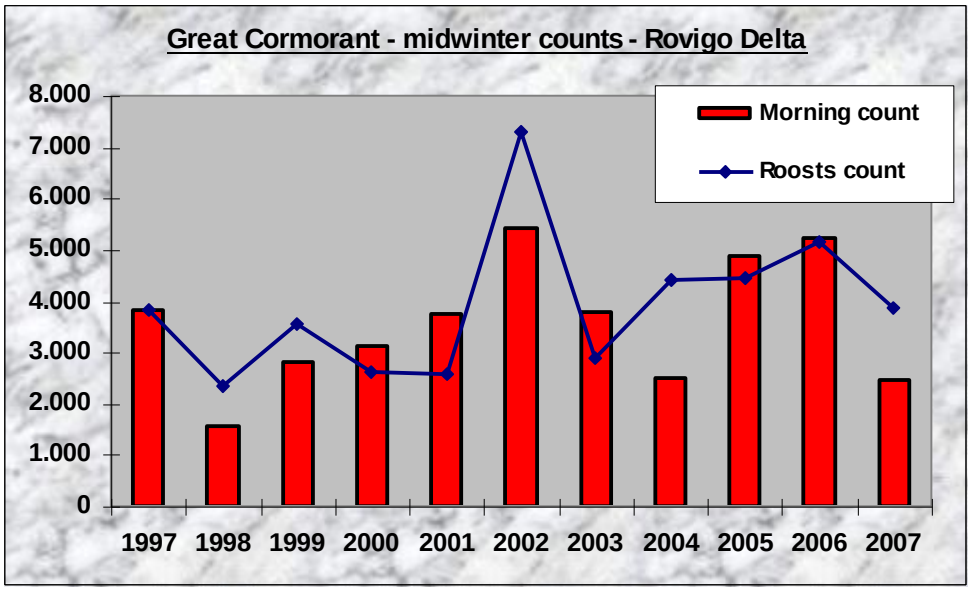
species, with a huge quantity of birds passing during migration and wintering, and because the valli are quite difficult to defend completely.

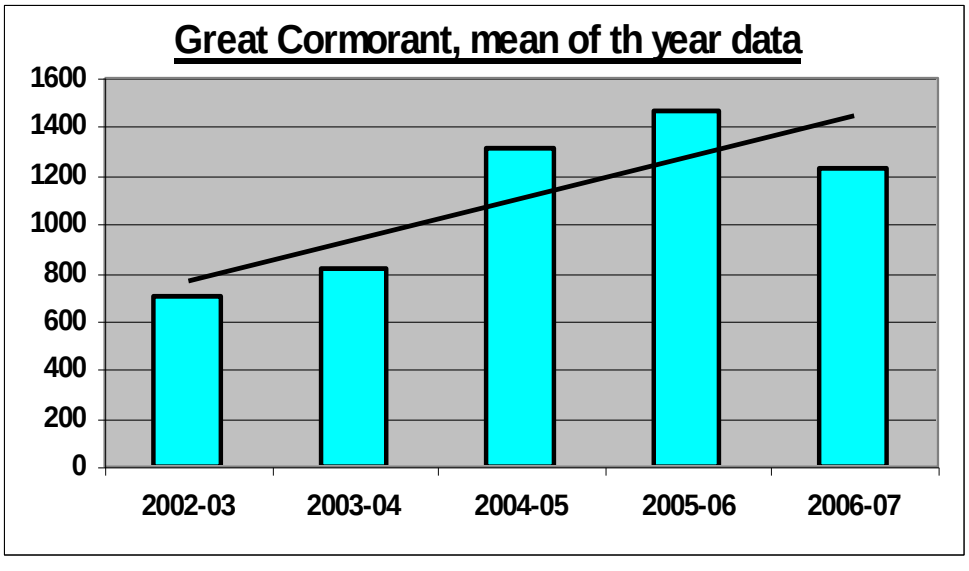
The Rovigo district plan is composed of four different parts:

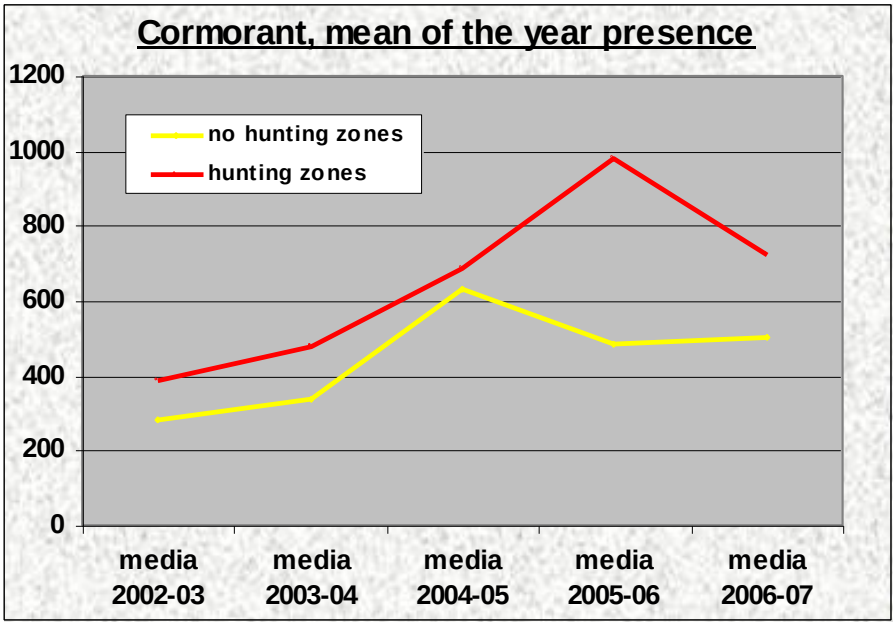
- monitoring of the species every 15 days, both during the daytime (on 15,000 hectares) and at all the night roosts
- diet studies
- dissuasion (scaring) at the main night roost
- passive and active defence of the most vulnerable sites inside the valli

8.2.1 Monitoring

The mid-winter counts show that the Great Cormorant is present in January with a mean of 3,600 – 4,000 birds (top figure). The mean of the birds counted all year round shows that Cormorants are increasing in the area (lower figure), even if it is under a shooting control plan.







The monitoring shows too that Cormorants use the valli most during the autumn, in particular in October and November, the period during which all the fishes swim into the channels and are stocked in narrow places to be harvested (the traditional "*fraìma*"). From December the fish are harvested or stocked for the winter in defended channels ("*peschiere")*, so Cormorants start to use other habitats, such as the Po river branches and lagoons, with a reduction in the conflict.

During the morning, flocks of Cormorants move around a lot to find the places in the valli that are not disturbed by human presence. This mobility consequently makes it very difficult to defend the open lakes of the valli from the flocks. Another problem is that hunters do not want to disturb Cormorants in the roosting and feeding places of ducks and so Cormorants can always find undisturbed places inside the valli. The diet of Cormorant in the area has been studied through stomach examination of shot cormorants and pellets (Volponi, 2002).

8.2.2 - Dissuasion at the main night roost

An experimental system has been used to test the dissuasion of Cormorants at the main night roost, located in a riverine willow forest (Po di Maistra) very close to the valli. From 1998 to 2004, during the autumn-winter period, a laser gun has been used (with the help of night-sight binoculars) at the sunset to merely disturb the birds. The use of this system provoked the creation of satellite roosts, located far from the main one. This scaring technique was stopped because of the rising presence in the main roost of other protected birds (egrets, herons, pygmy cormorants, ducks). Nevertheless, this system did not solve the conflict inside the valli.

8.2.3 - Passive and active defence

One of the most important actions of the plan is the passive defence of the most vulnerable sites inside the valli. This is carried out with the use of fences and cables over the channels where the fishes have to winter. This system does prevent Cormorant flocks from fishing where the fishes are stocked in large quantities in narrow channels.

To make this system more efficient, the owners of the valli are allowed to shoot Cormorants (from 500 to 1,000 birds each year in the valli). The regional district (Regione del Veneto) allowed Cormorants to be shot (under derogation for this species) by all the hunters for a short period (in 2002-04) but with low interest from the hunters of the lagoons outside the valli. Most of the birds are killed near the passive defences because shooting inside the big valli's lakes can frighten the wild ducks. Most of the cormorants are shot in autumn, the period of highest presence inside valli. Shooting, however, is not enough to control the cormorant population in this area and to prevent the damage of fishing activities.

8.3 Results

To date, the plan, until now, has provided these results:

- less pressure from cormorants on the most delicate parts of the valli

- new knowledge for the valli owners on the management of this species and, in particular, the necessity of their concrete actions and cooperation
- diffusion of good management practices of management (passive defences, etc.)

However it is necessary, in the long term, to obtain more financial tools for local aquaculture. At the moment the only money that the valli' owners can obtain for cormorant damage comes from hunters' taxes and this is not enough. It is necessary to modify the regional law in order to obtain more money for the defensive tools and the restoration of damage, based on scientific data.

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Questions

Q: How does the Cormorant count information get to the people who need to know it?

A: *Through discussions. We know when the worst period is – September/October and November-December – when the fish start to move into the channels (to try to get to the sea). Thus they are vulnerable to Cormorants because they are so aggregated. The fishermen say there are hundreds of Cormorants in spring and summer but the counts do not back this up.*

Q: Do you have problems with other fish-eating birds?

A: *No. Herons appear to be very selective and only take sick fish. Cormorants are a big problem. Also there is an increasing number of Pygmy Cormorants – they eat shrimps and small, young fish.*

Stefano Volponi comment: Fish farmers fought with the heron at the beginning – but they know this species. But the Cormorant is seen as a more efficient fisherman from abroad.

Q: Is the laser gun used to kill or scare Cormorants?

A: *It's only used to scare birds.*

Q: Can you tell us any more about coordinated efforts?

A: *We don't know if birds move south from here. We don't know if they go elsewhere – but we have seen then in some branches of the Po. The lack of synergy between the Provinces is important. For example, the objective of the Venice management plan is to send the Cormorants to the south [i.e. towards waters of the Po Delta]*.

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(9) Cormorant Management in Italian Extensive Aquaculture Systems: analysis of the situation and guidelines

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The Italian Wildlife Institute (INFS) operates in the sector of conservation and management of wild fauna (mammals and birds) and represents the scientific and technical reference for the Administrations (Ministries, Regions and Provinces). One mission of INFS is to supply technical indications and to approve management plans for numerical control of wild birds causing economic losses, as requested by the Italian law n. 157/92 and the Directive 409/79/CEE.

The Great Cormorant *Phalacrocorax carbo sinensis* is a sedentary species in Italy, breeding and wintering locally and a regular migratory species (Baccetti & Brichetti, 1992). The status of Italian populations has shown a gradual and important increase beginning in the 1980s. In January 2001, 61,600 individuals were present spread along an important part of the Italian coasts and in some inland fresh waters. Initially the increase in numbers was very fast but from 2000 onwards cormorant density seems more stable. At the beginning of the winter colonization (during the 1980s), coast areas were preferred - probably because of their high ecologic fitness. Subsequently, some inland areas with the presence of intensive fish farming or rivers have been used as wintering sites.

Data scheduled in the INFS archives regarding requests for cormorant numeric control indicate a fairly low number of conflicts if compared with the amount of Italian wintering cormorant sites. Thirty cases are recorded in the period 1991-2002. Probably they don't represent the problem at all but only the situations were conflict is higher from a social and economic point of view. According to the different habitat ecology and fish productivity systems involved, requests for numerical control cover four types of conflicts (7 in extensive aquaculture systems, 5 in artificial angling lagoons, 6 in intensive fish farming areas, and 12 on rivers or lakes). Demands for numerical control started in 1991, about ten years after the first cormorant re-sighting in Italy.

The main Italian extensive aquaculture systems are located in: (1) the *vallicultura* of high Adriatic Sea (from Grado to Delta del Po and Ravenna pinewoods), (2) Orbetello lagoon (Tuscany), and (3) Oristano coastal ponds (western Sardinia). These situations differ both from ecological and productivity points of view. Also the limiting factors and management problems are different in each.

In relation to the legal status, the Great Cormorant is a protected species in Italy like in the other EC countries. Nevertheless the species can be subject to numerical control (by shooting) for reducing damage, according to letter (a) of article 9 (derogations) of n. 409 EC Directive and article 19 of national law n. 157/92. The application of the derogation scheme is allowed in cases of high economic losses due to wild birds when it has been demonstrated that there are no other satisfactory solutions and when effective ecological methods (prevention and dissuasion) have been employed (but have failed). If ecological methods prove inefficient, numerical control is allowed. Control tools must be selective and must be used only by individually selected operators. Regions plan and coordinate the wildlife numeric control activities. The several regional laws fund economic compensation in relation to prevention of wildlife damage but financial sums are not enough for a total refund.[3] Numerical control is a management tool and a "surgical operation" used only where and when damage is highest. The aim is to reduce damage, not necessarily to reduce the density of Cormorants. Numerical control and hunting are different activities. In our experience the extent of effort carried out by public Administrations in reducing cormorant damage is limited both by the legal status (i.e. the Cormorant is a protected species) and by economic aspects (i.e. a lack of adequate public resources).

Valli da pesca are semi-natural embanked areas where extensive fish farming and duck hunting are carried out together. Both these activities are located inside important areas from a conservationist point of view – those where a variety of protected bird species occur. *Lavorieri*, channels (*colauri)*, wintering ponds (*peschiere di sverno)* and open *valli* are parts of this typical fish farming production system. After fish harvest (normally taking place in December) most remaining fish are concentrated inside wintering ponds and channels. During winter, these areas are particularly vulnerable to Cormorant predation. For this reason the first action suggested by INFS is to provide dissuasion facilities, such as the use of nets (20x20 cm mesh) all around these wintering ponds. Horizontal nets across fish wintering ponds and channels, placed less than 5 m above the water level, are also recommended. Furthermore, vertical net panels along fish farming channels placed

[3] Additonal note – further background information supplied post-meeting: There are two different systems that relate to the status of the pest species: (1) If is not protected (i.e. huntable) reimbursement is made by the associations that manage the hunting districts (at least two for each province in Italy) with money coming directly from hunting fees, (2) If the species is protected, the regional administration pay compensation, but because the overal funds are finite and divided among damages caused by all species (including large mammals) the reimbursement is only partial and never cover all the requested money.

about 10 m apart from another are useful to prevent Cormorants flying in and take off. If carefully employed (i.e. correct times, places and management/upkeep), these tools are effective in reducing Cormorant damages in locations within *valli da pesca* where and when damage is highest. When protecting areas of wintering fish stocks is not sufficient, numerical control by shooting is allowed with the aim of reinforcing prevention and as a scaring tool. Normally killing activity is allowed in the birds eating areas (open valli).

During the period 1991-2005 extensive aquaculture systems were interested in increasing Cormorant killing activity. A total of about 19,800 cormorants were shot with a maximum (4,500 birds) during the winter of 2004. In this year 16 Provinces operated. Moreover 2,000 cormorants were shot from March to September (Volponi *et al*., in press). A strategy of numerical limitation of the breeding population must, first of all, be shared by several stakeholders inside homogeneous areas (for instance the high Adriatic sea wetlands). For this purpose they have to determine the numbers, the dimension and the location of accepted breeding colonies. In terms of a possible strategy aimed at bringing cormorant breeding numbers to an "agreed level", it is necessary to determine an accepted number of cormorants to be removed and for this number to be shared within specific areas (for instance the high Adriatic coastal wetlands). When a "surplus" of colonies is recorded the removal plan starts. Clearly this is not only a technical matter. In fact, at present, it has not been activated.

In conclusion, also in Italian extensive aquaculture systems there is no general solution for conflicts between Cormorants and fish farmers. Notwithstanding this, the law permits the use of several management tools which allow satisfactory results at the local level particularly where the problem is strong. For the future, if - on a pan-European scale - it were to be commonly agreed that actual Cormorant density has reached an unsustainable level, then the EC can decree a new legal status for the species and support management plans aimed at limiting sustainable numbers of breeding colonies in each Member State.

Questions

Q: Is national legislation not enough? Why do you need pan-European management?

A: It depends on the objectives set and on the level we want to act upon. The law is an expression of different interests – but we do what is allowed currently.

Q: Is the conclusion to ask Brussels to say what number of Cormorants there should be in each Member State?

A: I am not saying that is the solution.

(10) Aldo Tasselli's presentation

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Aldo said that he was responsible for the fisheries/fishing Department in R. E. and also coordinator for fishing in two other regions. Together, these three regions are setting-up plans for the development of the fishing sector in the high Adriatic Coast. They were

working not just on economic development but also on reducing the so-called "critical points".

One of the sectors of economic action for these regions are the lagoon fisheries. Cormorants and other fish-eating birds cause problems for this activity – so they are trying to analyse the situation and help fish farmers find a balance. The regions act in collaboration with the provinces which are the people acting on the territory itself.

The method of determining damage is as follows. First, it requires information on a specific parameter – does the lagoon have "productive structures"? If there are hydraulic structures in the lagoon (such as dams and sluices) then the waterbody can be considered a "productive area". Then, the presence of fish-eating birds is assessed in the area – a task of the province. They undertake visual monitoring, counting birds in the same place and at the same times through weekly and monthly surveys.

To calculate economic reimbursement, the company's budget is analysed – looking at the year, at sales, at stocking, and at the initial and final budgets. As a reference year, the three years prior to 1980 are taken and these figures are used to determine the productivity of the lagoons before the massive arrival of fish-eating birds. This 'prior to 1980' figure is compared to that for the current year, taking into consideration the weather conditions – and thus a 'productive average' figure is produced. Finally, the 'production loss' is calculated – note that this is not the actual damage estimated to have been caused.

Based on the calculated 'production loss', a financial contribution is given to the fish farmers to help with restocking the farm. This is not a direct welfare reimbursement, - it is just a financial contribution. If the lagoon and fish farmers have not carried out prevention activities (see Pesentation 9 then the financial contribution is not given to them. Fish farmers have to show that they are willing to do something to prevent the problem.

The three regions are now discussing a lagoon management plan that will use EU funding for fisheries (2007-2013). This management plan aims to delineate protected areas within the lagoons: (a) for the growing of fingerlings (juvenile fish), (b) for holding wintering fish, (c) for holding fish at harvesting times, and (d) the network of canals and channels where intensive fisheries are located (i.e. where fish are aggregating).

The system that the regions is trying to implement is a low impact one and the basis of an ethical economy focussed mainly on *preventative* actions. It is acknowledged that

hunting and shooting Cormorants is not a solution. However, science has not yet provided an answer to the balance of fish-eating species and the fish themselves. Fish are more sensitive than are birds and other predators.

Questions

Q: Using the late 1970s economic conditions compared to the current ones, do you also look into the costs of the preventative activities? Mitigation measures cost money and take time, is this taken into account when calculating the 'production loss'?

A: The years prior to 1980 are considered, these are years when no cormorants were in the lagoons. It is just a method to assess the investments realised in the lagoons and to take into account the increased productivity as a result of these investments. Also, we take into account the weather (i.e. fish-growing) conditions – then try to get a picture of the overall system.

Q: But when damage is assessed, is 100% compensation provided for the measures taken?

A: When a company that has carried out preventative measures has Cormorant damage to its stocks, a public body pays for some of the time and money that have been spent on preventative measures. This management programme was devised after two rulings. The first ruled that 800,000 euro worth of damage be paid to a farmer, then a second ruling decreed that 1.5 million euro be paid to a second farmer. The Judge applied a mathematical formula:

Numbers of cormorants x Number of days x Cormorant diet = Fish loss

However, the results of this calculation were two times the real estate value of the lagoon. So, the public bodies decided that farmers had to show efforts towards protecting their fisheries.

Q: Are there other co-operative activities between these regions?

A: A Memorandum of Understanding has been signed between the three regions for the development of the whole fishing economy – Cormorants are just one aspect of this and it concerns the fishery district within the higher Adriatic Sea. It is an economic and environmental plan with other coastal communities – in Slovenia and other places.

In the future we will need such plans for the whole Adriatic coast, not just within Italy. We can not talk about fish and other fauna without considering all the territories involved. This is especially true when we

are considering migratory species.

The current programme is for three years with a cost of 8-9 million euro. Next year, other projects will be presented to the EU with a funding request for over 25 million euro.

Q: Going back to those two rulings you mentioned – the method used by the Judge to arrive at a value more than the worth of the company. Could there not be an appeal against such a ruling?

A: This is still the subject of legal proceedings at the Court of Appeal – they had to pay the money but we are waiting for the appeal. The law says that wherever there is damage, a crime has been committed – but birds eating fish is not a crime it is a need that has to be satisfied. So, it is legally complex – and we are aware of people trying to extract money from public bodies.

Q: What proportion of the money available is paid in compensation – and is there a similar compensation system elsewhere?

A: Each region has its own assessment regime. These three regions would now like to work on shared programmes between 2007 and 2013. The share of the money differs between farms but, on average, 45% of the value of the annual restocking costs is paid out.

Q: In relation to these 2007-2013 plans, there is increasing integration and also talk of combining hydrological and limnological data, even across borders. Do you think you should include carrying capacity into this plan too? Is there enough habitat or space for the fauna? Do you consider improving the natural conditions in the plan?

A: A hydraulic network is to be built within the lagoons and people also want to build basins for roosting and nesting, and want to plant trees to act as windbreaks – so a lot of environmental things are under consideration. We can assess the standard profitability of each lagoon. The average productivity is 50kg of fish per hectare. Fish farms contain around 100kg of fingerlings (juvenile fish around 9-12 cm long) per hectare and 2-year old fish are about twice this size – around 18-24cm. In the commercial sector, average production is considerably higher, say about 1kg per square metre – or about 10 tonnes (10,000kg) per hectare.

We also have data on the average loss of production – what is stocked minus what is produced – this gives us the losses. On average losses are 30%. In addition we know the numbers of fish-eating birds and their food consumption rates etc. It is the final balance that is needed.

(11) Alessandro Faccioli's presentation

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I'd like to start with a description of the fishery activities in the Po Delta. This is a very important sector regionally but also nationally in relation to both the number of fishermen involved and the productivity of the system.[4]

[4] Additional note – further background information supplied post-meeting: This fishery is interesting as it is mainly related to shelfish production, which is very important in the area. In fact in only a few (10-

There are 30 co-operatives in the area, united into two consortia. One of these is for 12 co-operatives in the area that employ 1,500 men and which deals with fish farming and shellfish. The consortium follows all stages of the growing of shellfish and organises all stages from the stocking to the final selling of the products. It produces 7,000 tonnes of clams per year, 5,000 tonnes of mussels, and 1,500 tonnes of oysters. It is also very active in relation to the quality and certification of its products and has ISO 9001 certification. Five products (mostly clams and mussels) carry typical traditional product trademarks. This consortium, whose head office is in Scardovari, is also trying to get the DOP trademark for its mussels and clams.

The second consortium – Rosolina – comprises nine companies and 160 men. This, the delta Nord consortium, is growing. In relation to fish production in Rovigo, there are 70 boats with dredges and 18 with hydraulic facilities. In addition, there are 400 smaller boats and 700 boats specialising in clams. There are also three fish markets – at Pila (7 million kg of fish), Donada (300,000 kg), and Scardovari (400,000 kg). All together, these markets have a value of 9 million euro. In terms of quantities sold at market, the total value of the area is 100 million euro.

So, what is limiting further development? First, there has been a reduction in the areas devoted to fishing. Siltation of the lagoons occurs via the rivers and industrialisation also takes over in traditional fishing areas and increases the maritime traffic there. Additionally, a power plant also increase maritime traffic. There area also disputes amongst fishermen in the Delta – some believe that there is no private property here but others (who have stocked clams) claim ownership of some areas. There is also a decrease in the quantity of fish caught – falling catches are due to pollution and increasing numbers of fish-eating birds like Cormorants.

With regard to Cormorants, they have produced social tension here. Fishermen are nervous, they have invested to improve their productivity and then it is damaged by this bird. So, I organised a conference in with many VIPs and Brussels people – we produced a paper to the EU asking for derogations to limit the numbers of predators.

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15) years, the economy and social condition of this coastal area have been completely reversed with the establishment of the Philippine clam. In this area, the fin-fish fishery has mainly been considered the industrial one in that it uses quite large fishing vessels operating in the open sea sea and never inside the lagoons. Such fishing inside the lagoons, and in the river branches, has greatly lost its old value, mainly because the other leading economical activity (ie clam breeding and fishing) was relatively "easier" to carry out and was economically more interesting/profitable. Fin-fish fishing inside the lagoon and the river branches is actually a part-time activity carried out to fill time-gaps in the shell fishing programme – as there are both quantity and effort quotas for fishing clams or it is a source of additional income to the regular shellfishers' "salary".

We also want fishermen in open water to receive compensation for the damage done by Cormorants, as currently compensation is just available to fishermen in the lagoons.

Questions
Q: Please could you tell me more about the dredging/trawling for benthic ('bottom-living') shellfish? Also, do we need an EU plan? What could be stronger measures to protect farms?

A: Dredging and trawling is allowed under Italian law (3 miles from the coast) but does not allow it in the lagoons. The EU needs to find a system to reduce the numbers of predators because shooting cormorants risks extinction. The Commission said that the Birds Directive does not mention compensation – so we think that including it would be a good idea.

Q: Why ask the Commission for a derogation to kill Cormorants if there is regional legislation at Venice (and has been since 2002)?

A: there is a regional law – that 50 Cormorants per year can be killed per hunter – but it is going to be dropped.[5]

Q: the Birds Directive does not provide for compensation but, in the spirit of the legislation, Member States are given objectives but not told how to reach them. So, Member States could set compensation payments.

A: We were recently told that the regional law will not be in force in the near future and we have a growing problem with Cormorants here.

Part (4) Case Study reports and synthesis

4.1 Introduction

INTERCAFE participants and Italian delegates were grouped into nine small groups on Day One of the meeting. The names of participants in each group are given in Appendix (4b). Each group produced a 2-3 page summary of their discussions around four questions:

1. How are management plans done at different levels?

2. How do you see things changing in the Po Delta in the next five years? Choose headings to organise your discussions e.g. Sustainability of fisheries; Conservation issues; Social changes (e.g. jobs, economics etc.); Environmental changes; Political changes

3. What sort of changes would you like to see?

[5] Additional note- further background information supplied post-meeting: You are still allowed to shoot cormorant during the whole year inside fishing valli under derogation of the Bird Directive (art. "to protect the field crop"). As a result in the Province of Venice several hundreds of cormorants are shot during the summer (and during the winter season) and breeding settlement outside protected areas are prevented.

4. How do you think cormorant and fisheries could be managed – what collaborations should take place? (Po Delta and INTERCAFE delegates should share experiences).

On Day Three, participants were divided into three groups. Based on discussions from Day One, observations from the fieldtrip, and informal exchanges among delegates, these groups addressed three further questions.

5. What would you like to change in the way that management plans are done (not so much what they *say* but how they are *done*)?

6. What wider changes do you think would help? e.g.
   - Policies (local, regional, national, the Parks, European)
   - Relationships/collaboration
   - Resources e.g. financial

7. Any other questions or thoughts about INTERCAFE and how our experiences/networks may contribute to your situation?

Some groups were interested to explore additional questions, or to re-frame the original questions under different headings concerning cormorant-fisheries conflicts in the Po Delta area:

i. The role of the environment
ii. Cormorants as *the* problem, or as one problem in a wider set of concerns
iii. Expectations of INTERCAFE vis-à-vis the EU
iv. Production and co-ordination of management plans
v. Managing change – e.g. private vs. public
vi. Role and use of law

Discussion outcomes from Day One were collated and written up by the Day Three group facilitators. These are synthesized in this chapter.

4.2 Summary of the Group Discussions

Only two responses from one group addressed the second question "How do you see things changing in the Po Delta in the next five years?" and these are reported. However, most people actually reflected almost exclusively on past changes and the current situation, so the majority of text associated with question two is in the past tense or current situation (not the future tense expressed in the original question). Information was provided on other issues important to consider in relation to cormorant-fisheries conflicts in the Po Delta (and these are recorded in 4.2.5 below). No information was provided in relation to questions (3) Changes you would like to see, and (7) how could INTERCAFE contribute to the local situation.

One of the nine small groups took a slightly different approach and primarily explored the experiences of one particular local stakeholder, whilst also weaving into their discussions some lessons and experiences gathered from others during the meeting. This "Deeper exploration of a particular perspective" is provided in section 4.3 before these group discussions are synthesised in the final section (4.4).

4.2.1 How are management plans done at different levels?

Many of the Italian stakeholders said there is little or no guidance on how to prepare plans. The administrative structure is quite complicated and has to fit into the hierarchy of federal, regional, and provincial levels of administration. The following points are distilled from comments summarised by different groups.

European Union (EU) Level

EU subsidies support agriculture in the Region and elsewhere. Subsidies take the land out of agricultural and aquacultural productions. Many stakeholders try to take their problems directly to the EU, instead of proceeding via the national government in Rome.

National Level

At present, there is no national management plan for cormorants in Italy, nor any discussion about cormorants at the national level. Yet one person commented that *"… Animals are the property of the state, so if they cause damage the state is responsible".*

There was concern over the power of the National Institute for Wildlife Management vis-à-vis the regional authorities – *"… If the regional plans are not 'politically correct' the National Institute for Wildlife Management can overrule the plan."*

Culling is based on numbers confirmed by experts from I.N.F.S. Once a year, the authorities meet with the fishermen and present them with the number of birds they are allowed to cull in the following season/year. When there was a request for managing the cormorant population and the regional government asked the INFS, the INFS suggested covering the fishponds with nets.

Regional/District Level

When there is conflict, a management plan is produced at the district or regional level, depending on the situation. These plans are more like regulations, directions, or actions decided upon by the local governments than actual management plans.

The Rovigo District is responsible for developing cormorant management plans but planning was felt by some to be weak or absent *"…There is no plan at the moment that takes account of bird numbers, and the so-called plans are too remote from the problem.*"

Regional governments pay compensation for cormorant damage. The provinces control payments for the ecological mitigation techniques. When the province pays for the damage caused by cormorants in the open lagoon (outside the ponds), the basis of those payments is calculated according to the number of feeding birds, not the roosting ones.

Farmers and other Stakeholders

There are many users and active forces in the Park: private landowners, farmers, fishermen, salt producers, hunters, conservationists, recreational users, scientists, etc.

Representation and membership of lobbying or union groups is clearly an important issue. Fish Farmers are part of a bigger 'agriculture group' when it comes to issues for representation and they have to approach regional government to make changes.

The Vallicoltura Consortium in the Provincia di Ravenna is a group for farmers, but at least one farmer in the workshop is not a member. He felt that The Consortium is political – it lobbies, rather than producing more fish and so his farm is a member of the

National Union of Agriculture. He gave advice on the management plans because his farm was the first to adopt a policy of shooting cormorants. There was consultation in the beginning of the project to attempt to create management plans. Those who were consulted were not paid for their effort and lobbying took place to bring the problem to the authorities' attention.

Complaints about the cormorants from the fishermen led to a five-year plan.[6]

Compensation
There seemed to be slightly differing views on compensation among some of the groups. In one Group it was mentioned that there is no money for compensation. There is limited financial support in the form of symbolic funds for equipment, based on the size of the farm or company. Another group said that it seemed like nonsense to use public money to provide nets and other deterrents that don't really work, so there is no effective plan. A third Group noted that since the plan for the Provincia di Ravenna first came into action the compensation sum has decreased dramatically. Compensation is based on biweekly cormorant counts.[7]

One farmer prefers to obtain money through production rather than compensation and doesn't ask for reimbursement of damages because he wishes to have a good relationship with the local authorities. However, his farm receives additional funding for habitat conservation. His farm has high quality habitat, but farms with poor quality habitat have had to look to compensation funding instead. Other farmers have asked for reimbursement, and *"…after long court battles"* the local authority was forced to pay *"…large sums"* on compensation for cormorant damage.

One INTERCAFE delegate noted that compensation amounts should be discussed together. In France and Denmark, fish farmers now accept that they have to live with the cormorants but they want their activity to continue, and for that they need some subsidies.

4.2.2 How has the situation changed over the past several years?

In relation to the original question – about how things may change in the ***next few years*** - there were two responses from one work group: (i) Fish production will probably decrease, but price and demand will increase, and (ii) The cormorant population will continue to increase because of eutrophication and selection pressure on large fish by fishing, which results in a large availability in relatively small fish that cormorants prefer.

In terms of the general discussions around ***past and current changes***, several issues were raised: (a) Fishery sustainability, (B) Conservation issues, (C) Social changes,

[6] Additional note – further background information supplied post-meeting: It should be kept in mind when talking about plans and organisations of fishfarmers that the Po Delta is divided in two regions (and parks) and three provinces so there are differences in what they do. Also fishfarmers have different view and needs depending on how large their property is, whether fish is the only or main source of income and who owns the fishfarm.

[7] Additional note – further background information supplied post-meeting: After having payed a sum of around 4 million Euro in the late 1990s (after the decision of the tribunal ...) the region Emilia-Romagna made a new regional law to define rules of reimbursement e.g. how to estimate it and especially to put an annual limit of the overall sum that can pe payed by provinces. In this way there is a contribution towards the damage but not a full reimbursement as requested by fishfarmers.

(D) Environmental changes, and (E) Political changes.

(A) Fishery Sustainability

Fish Farms

Fish farmers monitor the salinity, oxygen level, and temperature of the water. Salinity is managed by controlling the freshwater and saltwater inputs into the ponds (see also Part 2 (1) The Case Study Area, p9). The farms have been privately owned since the 16th century.

The fish are not fed - all food is provided naturally by the system. It is very difficult to catch Eels, and in some areas local people say they have completely disappeared[8].

One fish farmer said that many other fish farms had turned to hunting (especially for ducks) to make a profit from their ponds, something he was also considering expanding since his property is also used for waterfowl hunting. He says his income is gradually shifting from fishery to hunting.

Economic Concerns

A major issue is the importation of low cost fish from Greece, including cheap fish taken in Turkey & N Africa – mainly bass & sea bream. This depresses market prices and decreases fish farm profit margins. Vallicoultura has to rely on high quality product and good prices. However, the market is relatively stable for traditional fish species.

The local fish market is separated from neighbouring markets, so it is not influenced as much by national and global changes. Fishermen also understand the new rules of the global market. For example, they are all using the same logo in order to create a known and desired brand.

Cormorants

It is not possible to accurately measure the impact of Cormorants on the fish. Cormorant predation is certainly greater in the winter since there are more birds at that time and the fish aggregate in certain areas, becoming more accessible prey .

The fish farmers report a steady increase in the number of Cormorants. About 10 years ago cormorants were so unusual they were called 'black ducks'; there are now 8-12,000 cormorants in the area. Many are on fish farms, especially in the winter. One fish farmer said that he had 6,000 cormorants feeding in his ponds, including Pygmy cormorants. However, Stefano Volponi said in his introductory speech that there were only 5,000 cormorants wintering in the Po Delta (see p17).

One fish farmer believes the cormorants are responsible for the disappearance of Eels in his ponds (see Footnote 1). He also states that fish farming traditions are being threatened by invading cormorants.

Cormorants arrive in large numbers (it is possible to get up to 5,000 birds at one site), so quick action is necessary in the opinion of several stakeholders, *"…to prevent huge problems."*

[8] There has been a major decline in the recruitment of Eels to European waters over many years. Recent estimates (ICES/EIFAC) suggest that the whole stock of this species is at a historical minimum (for example, see
www.fiskeriverket.se/download/18.1490463310f1930632e8000343/**ICES_eel**_05.pdf)

One person remarked that ten percent of the cormorants cause ninety percent of the cormorant problems in Europe, so even if the population were reduced by fifty percent, most of the problem would not disappear. It is better to concentrate of what *can* be done.

Management of Cormorants – Different approaches

One Italian participant said that measures include scare guns, removal of nesting places, horizontal nets, scarecrows and shooting to kill. Shooting is the best method but it cannot be done 24 hours a day, so nets are a good back up. Scarecrows and cannons are only effective for a few days. This fish farmer used to have a quota for the number of birds he could shoot, and this had to be shared with others. Now, however, cormorants can be shot as required and he culls 100-300 birds each year. Shooting also takes place outside the hunting season, since the main problem is in February and March.

There followed a discussion on measures taken in other countries. There are several methods for cormorant control in Greece but nets, scarecrows and cannons are less effective than shooting. Shooting cormorants is not legal, but the authorities ignore that it is done. The number of fishermen is very small. There is no system of compensation or grants.

In Poland shooting cormorants on fishponds is allowed, and there are no controls. There is no overall plan and no one really cares about the cormorants. The main concern is the value of the fish.

In Slovenia the main areas of concern are alpine rivers. There is a quota system, but around two to three times as many birds are shot illegally.

In Lithuania attempts were made to make cormorants into food, but the smell was awful. Shooting cormorants on ponds is allowed.

An Italian fish farmer said that his workers spend too much time dealing with the cormorants. They have to go to the middle of the ponds on boats to stop the group of cormorants feeding.

In another Group, fishermen said that shooting around the lagoon disturbs the fish because it increases stress. It seems the fishermen understand the sense in using nets. Another Group noted that the area under discussion here in the Po Delta is a national park, with lots of birds and ducks, so intensive shooting is not an option. Shooting scares the ducks, thereby damaging the biodiversity. It also affects hunting. Every company has one or two people allowed to shoot birds. Since the birds are protected, normal hunters are not allowed to shoot them. There are resident birds as well as migrants. The birds have behaviour patterns that are known locally, so shooting them should be manageable. However they are very clever and difficult to shoot. In another Group, the statement that "Killing is the last resort" was highlighted.

Background Information on Managing Stock

One Italian fish farmer said that it is not possible to determine or influence what is caught, and it is particularly difficult to attract larger Eels to the harvest areas (see Footnote 1). Feeding the fish is not allowed. The selling price of the fish is not really affected by fish size. The preferred fish is 600-700g bass, which take four years to mature.

Another Italian fish farmer in a different Group stated that he used to produce 200 tons of fish each year; he now produces 15 tons. His property is very large – 1,110 hectares. They now buy fish larvae to stock to ponds, a material increase in expenses (see vallicoltura discussion, Part 2 (2), p9). He used to farm Gilthead Seabream (*Sparus aurata*), Sea bass (*Dicentrarchus labrax*), Eel (*Anguila anguila*), Sole (*Solea solea*), and several species of Mugilidae (Mullet). At present they are stocking 50,000-60,000 fish each year. He explained that the management of the systems is like an art form based on traditional knowledge, called Vallicoltura. Salinity is managed by controlling the freshwater and saltwater inputs into the ponds. Oxygen level is also checked at crucial times. Temperature is checked and the fish are moved in the winter. He has no management plan. However he monitors water quality for salt content, oxygen level (if needed), and temperature. Water analysis is carried out if it is considered necessary. Normally they simply look at the water and taste it. Salt level is managed by pumping stations.

The discussions in another Group explored the fact that during the winter the fish farmers manipulate the channels to allow water from the sea in, and confine the fish to small areas to collect the fish. Smaller fish are kept in restricted areas where they can be protected by nets. From March to May specialist fishermen collect the small fish in the outer lagoons to be stocking in the fish farms. There is also some natural recruitment of fish. The minimum cycle to produce marketable fish is two years; the ideal time is four to five years.

Summary

Factors affecting the sustainability of fish farming include:

1. the salt content of the lagoon (rivers without water in the summer)
2. water levels changing because of climate change
3. the decline of Eel density over the past decades (see Footnote 1)
4. competition to open fish farming
5. cormorant predation.

(B) Conservation Issues

Environmental Conversation

In general, there has been an increase in the number and diversity of the birds.
Wetlands are important bird-watching sites with rare species (e.g. red list). Some believe that they play a significant role in maintaining biodiversity, and it is important that this be preserved.

Some people consider that others have a blinkered view to shooting where this might be necessary for reasonable management of wetland sites.

One local stakeholder felt that it might be useful to consider buying land for conservation purposes to preserve cultural heritage, biodiversity, and livelihoods.

Tourism is increasing very fast, perhaps too fast according to some local people. In 15 years, there has been a lot of construction along the coast between Ravenna and Rimini. Natural dunes are being destroyed. There are very few protected areas on the coast. There are several large projects going on, for example Salina di Comacchio, a LIFE project aimed at recovering the ecological conditions (eg water circulation and quality) of the area (salt production ended many years ago and basins/gates/sluice/etc need a lot of mantainence), to restart salt production (demonstrative for tourists and for keeping

the traditional acitivity alive), and promote birdwatching and sustainable tourism. But there are problems around maintenance because no money is provided after the projects finish.

the Comacchio saltpan (salina) has been the object of a just finished Life projetc aimed to recover the ecological condition

Cultural Preservation
Fish farming in much of the area is based on 300-year-old traditions, with a combination of fishing and hunting. It was an issue of great importance to several local stakeholders that fish farming traditions are preserved. *"... Do we want to keep traditional landscapes? Fish farming traditions must be kept up in the future. They are important to keep the environment in a good condition, which also benefits hunting."*

(C) Social Changes, including employment and economics

Italy is located on the end of the EU migration route of birds, and several stakeholders feel that countries with increasing breeding populations are "exporting" the Cormorant problem to wintering regions.

Public Involvement
Greater awareness of environmental limitations has lead to many groups seeking to create protected areas and impose other regulations. This gives a new framework for many activities, such as hunting, fisheries, and land use. One local stakeholder sees little media coverage of the cormorants. He believes publicity is greater in Tuscany or Slovenia than in the Po Delta, where it is usually linked to new hunting regulations. *"The general public probably doesn't even know what a cormorant is!"* On the other hand, Group Six wrote that there has been increased public awareness, and the distance between humans and nature has decreased. Wetland 'visibility' is increasing.

Several stakeholders felt unhappy that, in the words of one fish farmer *" ... the public attitude is influenced by the campaigns of 'city' people"* while others felt that The Po Delta was not just about vallicoltura but is attracting researchers from around the world because of its wetland and ecology.

Demographic Changes
Regional demographics are changing because of in-migration and the reduction in the number of children born to Italian families, see (www.un.org/esa/population/publications/migration/italy.pdf).

Several stakeholders agreed that because of demographic and wider changes in society, traditional fisheries may not be able to survive in their current form but should address wider market issues and economic opportunities such as tourism.

Workers
On one farm, only four people are involved in aquaculture, with a further six engaged in work on water areas. Another farmer used to employ 15 workers but was forced to reduce this number because in his view cormorants made the ponds less profitable. Participants in Group Four felt that cormorants are not the reason for the decline but that there were more jobs in the past because there were more fish and there was more work involved in preparing the lagoon for fish farming. They concluded that nowadays there are three to five employees for each fish farm in the South region.

Economic Opportunities
There is some economy around hunting for sport although this is restricted to small areas.

Tourism is a growing industry in the Po Delta; in 1999 the Park attracted 140,000 visitors, and this had risen to 650,000 by 2005. Recreational fishing is becoming more popular in the sea for fish like tuna but less so in the rivers. The ponds also provide biodiversity for the general public to enjoy. The tourist season has become longer in the last decade and thanks to conservation/protection action, the number of bird species has increased in the park.

By 2000 it was clear that bird watching was an important attraction in the park, the flamingos in particular attracting many people. This increase adds to the other pressures on the area, especially the park. Some stakeholders even regard tourists as a threat to the park, as too many visitors will scare birds and endanger the flora. Although stakeholders agreed that increasing tourist numbers definitely opens up opportunities for new jobs and alternative revenue streams, young people from the cities seem to be taking these jobs, *"…not old fishermen!"*

Costs to Fish Farmers
According to one calculation from a local stakeholder, *"…15,000 cormorants consuming 0.5 kg each, means each cormorant eats €3 per cormorant per day for four to five months – a significant monetary loss."*

Farmers alluded to very high costs in relation to business (pumping, maintaining water quality, etc.) and the fact that the economic profitability of fisheries has declined in the last few years. Cormorants are seen as one of the explanations for this. However, some stakeholders also mention the recruitment of glass Eels, which has declined for unknown reasons (a problem shared with the rest of Europe, see Footnote 1 on page 27); changes in consumers' interests/tastes; and new demands from wholesale dealers, who prefer more regular fish deliveries during the year. Others argue that the old system of extensive fish farming simply isn't profitable anymore. The fish farmers, on the other hand, argue that their way of producing fish is probably the most environmentally friendly.

(D) Environmental Changes
Lagoons are closed systems which in many peoples' view are much more vulnerable to Cormorants than the open sea.

Human-Made Issues
One lagoon was reportedly in a bad condition because of pollution**.** There are also some national decisions that will affect the park which have yet to be enacted. Firstly, a new road connection between Rome and Venice will go through protected areas, negatively affecting the birds and other species. Secondly, a new harbour in Ravenna will affect the areas between the wetlands, causing fragmentation of the habitat.

There is a project to build dams and a plant for energy production, which would impact the river dynamics and the environment of the delta. Some restoration projects will be going on for fruit and grape production.

There are several commercial fisheries in the Adriatic Sea but over-fishing has led to decreasing yield and changes in fish size. Some projects are focused around developing an artificial reef to stimulate fish production.

In Comacchio lagoon, the influx of fresh water is decreasing because people are using the river water upstream. Consequently, Eelgrass is decreasing and there have been noticeable changes in fish and bird communities. Sea fish are also entering the lagoon.

Subsidence is also a problem, caused by the extraction of water and natural gas from the seabed, reclamation, and a decrease in the amount of sediment brought by the rivers. This subsidence increases water salinity. Many ponds have sunk below sea level because of gas pumping, but the problem has been addressed. In addition, natural dunes are disappearing because of erosion and the construction that has been taking place along the coast.

Water Quality
Water enters via gates and channels linked to rivers and the sea. This is mixed in a controlled manner. One Group pointed out that the high nutrient load of the rivers is caused by agricultural runoff. The eutrophication of the Po is increasing. However, there are measures to combat this, such as creating green corridors along the rivers. New protective laws are also to be implemented. Until now, the reserve has flooded every September and there have been no problems. However, in the last 10 years the turbidity of the river water has increased dramatically, causing a fall down the entire food chain.

Attempted Solutions
There is potential to buy natural areas for conservation (e.g. as bird reserves). One participant noted that in theory this sounds great but in practice environmental bodies in Italy do not have the wealth or power to accomplish it. Earlier goals to create national/regional areas of conserved land (as nature reserves, etc.) have been achieved in Italy. However, there are no new goals to replace these, and the national focus is on climate change. There is also an ongoing debate about land use – for instance, is this land best used for aquaculture, ecotourism, golf courses, and so on?

(E) Political Changes
The political situation is complex, with lots of different bodies responsible for different sectors. For example, separate institutions control water and environment. There is an impression among some that the effect of the cormorant problem on sustainability is exaggerated to get more money.

4.2.3 How do you think cormorant and fisheries could be managed? What collaborations should take place?
Most stakeholders do not see any real advantage of having a management plan on a higher level than exists today (district or regional level).

There are very high expectations from some stakeholders about the outcomes of a visit from INTERCAFE. For example, the fishermen would like INTERCAFE to make a clear statement to the EU commission about how to deal with the situation.

Who Gets a Say?
There was a disagreement about the number of stakeholders in the conflict. According to some Italian participants at the meeting there are only two stakeholders - fish farmers and the government. However during the discussions it became apparent that there are more stakeholders, including hunters, park administrators, tourists, landowners and bird

watchers. In addition, there are conflicts with other interests, such as land use. One stakeholder said that it wasn't just politicians who weren't listening. *"... Every stakeholder should listen and accept the existence and perceptions of the problems of others."* Another stated that *"... we need to find a consensus between different parties."*

Fish Farmers
Fish farmers seemed to agree that they wanted the number of cormorants to be reduced to "*...equitable levels*" - they don't want the birds to be removed. Also they don't want shooting alone but they don't know what other solutions there might be and are looking to the scientists for these solutions.

One farmer does not recommend shooting cormorants because this would disturb the wildfowl in his farm. The best solution is to disturb the cormorants so that they will leave the fishponds. However this also disturbs the waterfowl. When asked if he ever tried any underwater refuges for fish, which would allow fish to escape cormorant predation, it was clear he had never introduced anything that was out of the tradition.

Collaboration
Many people felt that collaboration was important even if geographic distances, different interests and political issues made this difficult. One key issue was that scientists and fish producers should collaborate and discuss together.

One person noted that at a meeting 12 years ago they suggested the same techniques they're suggesting now (digging underground tunnels for fish, using laser guns, or producing cheap fish to feed the birds). *"...There has been no scientific innovation, and we need a scientific way to reduce the number of birds."*

4.2.4 What sort of changes would you like to see, for example in policies, relationships, resources?

Regional Government vs. National Government
The most commonly held view concerning scale and political possibilities to address cormorant-fisheries conflicts was a combination of local, regional and EU level approaches.

Several people felt that the most efficient thing to do is to control the cormorant population locally; both breeding and wintering can be dealt with on a local level. Working through Regional level government would be preferable and more effective because goals and financial concerns vary from region to region.

In Italy, only one national institute is responsible for wildlife and habitat management. There is little activity in the Institute, which is restricted to a few activities and has no grant or loan-giving role. Almost all local people at the workshop concluded that national law is not capable of managing the problem given current arrangements and structures.

Many participants felt that the EU should support solving the cormorant problem, *"... but it doesn't seem to be doing so."*

Also, many people felt that their politicians weren't taking enough responsibility to inform themselves and engage in meaningful cross-regional dialogue. "It is very important that the politicians realise the problem and learn about the situation so they can decide what to do" said one stakeholder. Others noted that politicians do not recognise all the international laws and the politicians don't want to make the appropriate decisions. Political influences and connections (on all levels) are seen as a handicap for solving problems.

Collaboration and Integration

There was a wish among some stakeholders to involve all the important institutions in the North Adriatic area. However, in past cases, initial agreement has been followed by last-minute withdrawals. There seems to be potential for institutional cooperation but administrative constraints are an impediment.

Many districts and regions work in parallel with different actions, and better cooperation should improve the future handling of conflicts, etc. There is a need for some kind of forum for discussing the future management of the park and adjacent areas. To date there has been dialogue between people, but it has not been formalised.

Most management plans are prepared for single species, and usually there is no connection between the plans. At least for the park, there seems to be a need for a more integrated management plan that includes all aspects (culling, hunting for other species, protection, compensation, land use, etc.). Such a management plans should be updated every fifth year.

Stakeholders should be asked to take part in the discussions - hunters, all kind of exploiters of the areas, fish farmers, other fisheries, tourist, conservationists, etc. Many people expressed frustration around the lack of collaboration and partnership working "…We should look for solutions in partnerships. What are our options for partnerships here?"

The Role of Science

Several people agreed that the foundations for management plans are much better today than they were some years ago. Thanks to hard scientific data it is much easier today to communicate with the public, and as many as 170 people have been working with monitoring and related issues. The data they have produced is important for the future work at different levels in the region. However, people felt they still don't have enough information.

For example, people don't know where wintering cormorants spend their summers (where they breed). Better economic and ecological assessment of different areas is required because there are differences between areas in terms of things like habitat types, stocking, land use, and pollution. Some numbers on fish production such as 50 kg per hectare *"…belong to past – the figure has to be updated."*

Science doesn't seem to help, according to some, because after years of study scientists still can't say how much exactly cormorants eat. *"… Science seems too remote; we need more dialogue."* Improved collaboration between scientific institutes and park authorities was seen as essential.

Other Outside Involvement

Neither the media nor the NGO's were seen as independent – *"… If some persons outside the political parties engage in a problem they are soon integrated into the*

parties." The view was widely held that the debate would at least be more interesting if NGO's were more independent and if a more independent media reported about the situation more objectively.

Economic Concerns
The economics of the area came in for much debate. Indeed some saw the issue as almost entirely one about economics. *"… This is an economic problem, and a great deal of money is already being spent in the area."*

Some saw potential for aquaculture to be branded as a high quality product which people would pay more for. Greater emphasis on the eco-friendly nature of the product was felt to be a way of addressing market forces and cheap imports. But cormorants were still seen as central to the economics of the area by several stakeholders. *"…If we want to eat fish from aquaculture production, produced in an eco-friendly way, it seems logical that we need to reduce cormorant numbers. Otherwise we should just make golf courses, and focus on tourism."*

Others felt that greater attention was needed on the economics of what 'nature' had to offer, and to develop more potential for ecotourism activities, like bird watching.

Another local stakeholder felt that the market is not causing the problems; *"… there are no big changes in the lagoons, they are more or less stable, so cormorant control measures are needed."*

Cormorants
Some farmers agreed that when making plans, it is necessary to establish the number of cormorants that is acceptable to ensure the survival of the fish farms. Cormorants probably would not pose a threat to endangered or rare species, some felt, but it is imperative to identify the key sites for threatened fish, like spawning places, and to be prepared to protect them from cormorants if necessary.

One participant noted *"… The question is, what is the real role of the cormorants in the system? We need to know this to create a serious plan or new approach, in addition to short-term solutions."*

4.2.5 What other issues are important to consider in relation to cormorant-fisheries conflicts in the Po Delta context?

There are Pygmy Cormorants in the area, which are protected. It is difficult to take action against the Great Cormorants when you have Pygmy Cormorants in the same area.

There is an interesting parallel between this situation and the issue of the pigeons in Venice. If there are too many pigeons, they spoil the monuments, etc. If there are too few, you lose tourist opportunities. Who is responsible for the management of the pigeons?

The plan does not take into consideration the ecological damage that might be caused by the cormorants. The Parc del Po is not a natural habitat, and the population of 40,000 inhabitants within its range requires special management.

4.3. Deeper exploration of a particular perspective

4.3.1 Factual Background

Giuseppe Penzo (GP) owns land and a fish farm in the northern part of the delta in the Veneto region. All the fish farms are privately owned. There are 23 in this area, and all of them are based on the use of brackish water in an enclosed lagoon. They extend over 8000-9000 hectares. Although these lagoons are enclosed, they have access to the sea by gates and to the river by channels. A number of species are kept (e.g. 5 species of grey mullets (*Mugil cephalus, Chelon labrosus, Liza aurata, L. ramada, L. saliens*), sea bream (*Sparus aurata*), sea bass (*Dicentrarchus labrax*), Eel (*A. anguilla*) are managed (restocked, gathered in wintering ponds), while sand smelt (*Atherina boyeri*), anchovies (*Engraulis encrasicholus*), gobies (*Gobius niger*), soles (*Solea* sp.) and flounder (*Platichthys flesus*) may enter the fishing valli from the canal connected to the sea and/or be present on lagoons directly opened to the sea e.g. Sacca di Goro, Sacca degli Scardovari, Pialasse di Ravenna) which prefer different levels of salinity, ranging from 10 to 30 parts per thousand, though 15 to 20 is best for shrimp. Fish used to be taken from the sea but are now artificially stocked in every case. Fish are bought from other fish farms, locally and from other parts of Italy. Fifteen to twenty years ago there were a number of fish suppliers but there are now only two.

4.3.2 Identifying the problem: threats to the skills and traditions of vallicoltura

Since the lagoons are artificially enclosed and below sea level because of human activity such as gas extraction, they can only survive as they are by active and continuing human intervention. Natural evaporation means that fresh water needs to be introduced to counteract increased salinity. The stillness of the water means that eutrophication must be prevented, usually by stirring the water to increase oxygenation.

Maintenance has become more difficult because of two key reasons. Firstly, the delta has sunk because of gas extraction, and this appears to be continuing despite attempts to prevent the problem. As a result, more salt water comes over at high tide and the increased salinity of the lagoon has to be dealt with. The second reason is that the fall in the price of fish has reduced the economic viability of the fish farms. This makes the costs of maintenance less easy to bear, and it is difficult to continue employing people with the required knowledge and experience. There is a spiralling problem here: it is difficult to employ sufficient manpower to carry out routine maintenance activities at a cost-effective level, while reduced employment for skilled workers means that it will become impossible to find skilled workers in the future. Maintenance failure would lead to continued evaporation, increased salinity, and eutrophication.

Maintenance of the basins involves certain costs: the cost of employing skilled workers; the tax on the extraction of river water; controlling the water level and the salinity and ensuring adequate oxygenation requires electric pumps (or manpower); and the cost of cleaning channels of mud and rotting vegetation. Pumps are used every day; other costs vary according to the seasons. Although GP prefers to maintain the lagoon in a state where fish can feed naturally, other fish farmers have chosen to feed the fish artificially. Another cost is engendered by the need to use fresh river water from the Po in order to counteract salinity, but the water is polluted.

4.3.3 Public/Private Divide

Although the fish farming in the area is private and commercial, it is argued that it is also (perhaps predominantly) a public interest. GP is adamant that he is carrying out a public service, because he maintains a traditional cultural process, which provides employment and upholds other aspects of the traditional lifestyle of the Delta. His

actions also benefit the lagoon ecology. GP argues that private owners have a responsibility to maintain a public interest.

The problem seems to be that the commercial viability of fish farming has declined to about 10-15% of its original productivity, because of issues such as pollution, the falling price of fish, and poor trade policies (though interestingly he doesn't seem to mention cormorants). In the 1930s and 40s productivity was reportedly about 150 kilos per hectare. In the 1980s it was about 80-100 kilos per hectare. Productivity per hectare is now about 30 kilos. Since around 1986, GP has begun to shift production to include shrimp. There is therefore little incentive to maintain the lagoons, so now he feels that increasingly he is carrying out a public function. This is voluntary rather than a legal obligation. He would like his role in the public interest to be recognised, and eventually to receive some form of financial reward or incentive.

There is concern about whether private operators will be considered to be using public resources (this has apparently been a problem in Venetian lagoons). This would primarily be a problem of taxes. There also seems to be a question of whether private owners are also subject to the restrictions of the Park (and perhaps of Natura 2000). The Park offers no financial incentives, only restrictions on how the private owners can use the land. Private owners therefore see the Park as an enemy. They also see Natura 2000 as an opportunity for public institutions to receive community money that is meant for maintenance but is instead used for other purposes such as financing intensive fishing. It was not clear whether private owners could be subjected to such severe constraints without their prior consent.

There are also ecological concerns in the lagoon, primarily about the ability of fish to live in the lagoon, duck hunting, and broader environmental values such as the provision of wetlands, etc. Opening the enclosed lagoons to the sea would lead to extensive flooding as well as the loss of the special nature of the enclosed lagoons. GP believes that publicly controlled areas are poorly maintained, probably because of lack of funds. He believes the best habitat protection occurs in private hands.

GP is very concerned about the loss of traditional knowledge and skills. He employs two people, and he thinks there might be another 50-100 people with the requisite skills and experience. He also thinks that a greater workforce would help with defensive actions against cormorants. This would presumably have to be publicly funded because he can only employ two men at current commercial activity levels. He would also like to see public funding used for training young people, rather than imposing the costs on private landowners.

4.3.4 Hunting

Hunting is a major local activity, for subsistence purposes, traditional/cultural recreation, and tourist or 2nd home resident activity. GP doesn't hunt or have hunting on his land, but others do. Maintenance of the land for hunting means a shift towards freshwater and away from brackish lagoons. Some owners do both; some have gone to hunting only. Fishing is unregulated, but hunting requires a permit, so management is split rather than being harmonised.

4.3.5 Role of cormorants

Fish farming has become a marginal activity, and cormorants are the last straw. In the 1980s, GP produced 20 tons of Eels, in the 1950s it would have been about 40 tons, and now it is about 1 ton. He believes that Cormorants eat them preferentially and that they are the cause of the low yield. He believes that Stefano's findings (that Eels are a small

part of the cormorant diet) were distorted because Eels are not freely available to the Cormorants. He also says that he stocks the same amount of Eels every year, so the reduced yield cannot be explained by failure to introduce them into the fish farm.

Pygmy Cormorants are now becoming an increasing problem. They tend to go for the high-value stocks such as shrimp and for small fish. Fish farmers are probably more hostile to pygmy cormorants than the Great Cormorant.

4.3.6 Actions to counteract cormorant activities

GP believes that non-lethal methods do not work in the basins because of the sheer size of the waterbodies. Netting repels/is dangerous to other birds, as are scaring methods, which affect ducks more than cormorants. Non-killing methods are also labour-intensive and difficult with a small number of workers (GP has two).

There is anger about a local resident who killed a cormorant without a permit because it was feeding on fish he felt were there to feed his family, and who was prosecuted and sent to prison. This may perhaps explain a reluctance to kill cormorants or perhaps distrust of the authorities that both punish and encourage killing. Hunters were allowed to kill at an earlier period but they were not interested and did not reach the full permitted quantity. GP has too few workers to be able to spend the time required to shoot cormorants. He did not seem to think that killing would be the solution even if it were done by specially paid and trained outside workers.

4.3.7 Compensation

There is a system for requesting compensation, but when GP claimed compensation for damage by cormorants it was extremely difficult and slow. Eventually he was offered a lower sum than claimed, which he could receive immediately, or the choice of a long and expensive process before the courts to achieve an uncertain outcome. He says the compensation system is unwieldy and insufficient, but it is now governed by a semi-formal agreement that provides for a level of annual compensation. Sometimes claims can also be made for equipment. However, GP doesn't want to continue to ask for compensation because it might be more difficult to obtain other permissions, etc. from the local authorities.

4.3.8 Summary

The fish farmers would like to see certain things implemented in the area; specifically: the protection of vallicoltura – community law protection for vallicoltura (maybe Article 9, maybe more specialised protection and financial support); more money for nets and other defensive techniques, to make changes to channels, and to train and fund more workers; and financial incentives to work for the public interest, given the problems with defending fish farms from cormorants and the difficulty of getting compensation. The view is that agricultural subsidy schemes don't apply to aquaculture.

4.4 Feed-back discussion

Group reports

Group One - Rosemarie Parz-Gollner, rapporteur

This group tried to focus on the questions in the original paper – and produced two key phrases: "environmental conditions" and "pollution". Ultimately the question seems to be – does the Cormorant play ***the*** role in this or is the bird ***part*** of the discussion? Our discussions suggest that it depends on the area and the timescale being considered.

Group Two - Erik Petersson, rapporteur
This group produced two key points. First – it was very clear that some people have great expectations of INTERCAFE in regard to changing legislation – does INTERCAFE do this? Does INTERCAFE have the power? If not, we have to address these expectations. Second – in relation to management plans, there is almost no plan concerning Cormorants and if there are any, they are only on the local level. There is nothing at the national level. Is this the correct way to work?

Group Three - Ilona Cheyne
On Day One, this group had the opportunity to talk to Guiseppe Penzo – as a result, we didn't talk about management plans but talked of other issues – ones that are important to discuss ***before*** the management plan process. On Day Three, the group talked to those involved in protected areas. A strong theme in relation to fish farming was the relationship between private and public and the shift from private in the past to public now. Two themes seemed to come out of every group: First, the role and use of law – there seem to be different understandings of what the law does. Second, the real importance of the Cormorant in the management of local environments. The group was forcibly struck by the fact that Cormorants were little mentioned. People talked about all the other things threatening the environment (especially in relation to fish farming).

General discussion
DNC: addressed Erik's point about the expectations surrounding INTERCAFE. The Action was not funded to undertake new research and certainly had no influence over EU policy. Having said that, as we know from the Slovenia meeting, the Ornis Committee is aware of our work. The aim of INTERCAFE is to act as an information transfer network – not to influence policy – we also work hard to draw local experts and stakeholders into our meetings in order to better understand their perceptions of the cormorant-fisheries issue. The general aims and processes of INTERCAFE are made clear in a series of Fact Sheets – indeed an Italian translation has been produced for this Case Study meeting (see Appendix 4).

Nils Røv: said that we have to manage Cormorants at the European level but look at the Po Delta system – there are 2 main objectives. To conserve valuable traditions associated with fish farming and to conserve the ecosystem. These two objectives are very tightly related. So, Cormorants should be included in the planning.

Thomas Keller: There seems to be a lack of integrated management planning. There might be a need for a land use management plan, for a water use management plan, and for a NATURA 2000 management plan. However, there does not seem to be a tradition here for integrated management plans.

Scott Jones: Can I ask our Italian colleagues whether there is something in relation to management planning procedures that they'd like to talk about?

Roberto Cocchi: from the perspective of INFRS, the need is for a scientific approach to solve the problem.

Giuseppe Penzo: I am wondering whether foreign governments appreciate how sceptical fish farmers and fishermen are towards the authorities that have managed the system so far. Often, they have just made things worse – we need to reverse that trend.

Scott: What about these relationships between private and public entities?

Oleg: As I understand it, there is a public role in relation to economic activities within lagoons in order to enhance the environment. Whilst private capital investment is used to improve the profit margins of fish-rearing and marketing. The public role occurred when the biodiversity enhancement role occurred. Biodiversity is a public good but because of this the private capital investment has lower economic returns.

Manos: But it seems to be more complicated. There is public and private water and land, and extensive systems are very close to intensive ones. On top of this comes hunting, fish farming, gas extraction, oyster production and so on. It needs a real management plan to cover the *integrated* system and to engage with these different stakeholders.

4.5 INTERCAFE's overview synthesis of Case Study discussions

This overview synthsis was produced after the Case Study meeting. It was not written during the meeting otslef but is based on outputs from the two days of group discussions involving local experts and those with practical working experience of the area. Of course, it hasa also been influenced by what INTERCAFE participants learned during their Field Trip day. Undoubtedly, INTERCAFE's overview of the complex situation(s) in the Po Delta will be incomplete – but we hope that what we learned in our short visit to the area is accurately described in this concluding section.

There is considerable scope for positively addressing cormorant-fisheries conflicts in the Po delta region. There exists a good range of agencies and groups who are well positioned to lead and take dialogue forward, a number of successful initiatives that are raising the profile of the region, and significant creative ideas for further enhancing livelihoods and amenities for local people as well as visitors.

These are set within broader hopes and plans for the region in terms of economic diversification and growth, and a range of initiatives that reflect strong interest in the cultural, historical and biodiversity values that the Po Delta can offer to Italy and beyond.

In this concluding section we first consider in a European context the issues we met in the Po Delta. We then suggest four areas of policy support that might be helpful to consider.

Fisheries-cormorant conflicts in the Po Delta share many characteristics with other places. At least four different types of conflict were apparent:

1. *Conflicts of interest*: different groups and agencies seeing their interests as under threat by the policies or actions of others, holding fast to their definition of the problem and their view of the solution to it. Relatively new actors such tourists and the National Park, and new policies within Europe have created a more complex landscape of potential alliances and conflicts of interest.

2. *Personality clashes*: We heard that the way in which certain individuals act is upsetting to others – some people just don't "get along" very well.

3. *Structural conflicts*: the way society is structured, the history of the area and wider relationships with Venice and beyond were seen as highly influential in the way different groups perceive conflicts in general. The comparatively new fisheries-cormorant conflicts are embedded within these wider current and

historical issues. Relative economic or educational advantage/disadvantage, social exclusion/inclusion, political arrangements, cultural differences and a range of different rights, roles and responsibilities give advantage to some groups compared to others; for example in terms of power, influence or access. Some voices can be heard, while others may be ignored. Some people and groups seem to have almost given up because they perceive weak leadership and an unwillingness to address the situation in key agencies that have some control over policy or the policy making process.

4. *Conflicts over process*: It is clear that different groups prefer to address problems in different ways. Some would favour a legal approach through national law or the European Union. At least two agencies/groups see themselves as so powerful that the law can be ignored (e.g. with regard to hunting). Others take a more consensus-based view and feel that a partnership approach would be the best way forward. Some would include the wider Adriatic region and feel that cormorants and fish-eating birds in general should form part of Adriatic regional arrangements. Informal arrangements and agreements based on trust and precedent also were suggested. However, the coming of the National Park has created a need for more formal, written agreements that would be somewhat different from any informal arrangements that might have been entered into previously, for instance between fisheries owners and hunters.

In many ways, process issues seem to be the most urgent. There needs to be a process that can engage with many different perspectives among diverse stakeholders at policy level as well as at local level - "can we agree *how* we are going to work together to address the problems."

Some of the specific issues in the Po Delta are similar to situations elsewhere. Vallicoltura is a type of customary fishery management that is special to Delta del Po, as coastal Pound fishing, certain types of angling, or pond fishery management are special to other areas. Vallicoltura has a long history; "coltura" is not just "culture" in an ecological and fisheries management sense but in a social and human sense as well.

Many fishing communities share similar social and cultural concerns about local identity, pride, and a way of life that crosses generations. This history, expertise and love for the area deserve respect and appreciation. Indeed, there is a real sense in which stakeholders are all on the same team in this very special part of Italy – but do not seem to be behaving as if they are.

Regrettably, the Po Delta is not unique in experiencing concerns with respect, political will and neighbourliness among agencies and political representatives. These issues perhaps have as much to do with attitude as with politics or conflicts of interest and can be found across many areas INTERCAFE has visited, not just the Po Delta.

Conditions in the Po Delta reflect social changes across Europe; for example, fewer younger people are staying in the area to continue this method of fish farming, and conservation is seen by some as a 'city' issue imposed on rural communities. There also seems to be something of a private/public divide. Many fish farmers see themselves almost as carrying out an unpaid public service, maintaining a unique and valued cultural practice that benefits tourism and wider appreciation of the Region. Although these issues have a specific flavour and expression in the Po Delta, there are similar

issues commonly occurring across Europe, not only for fishing communities but also for rural communities in general.

The Po Delta area has been affected by many biological, social and economic influences (e.g. competition on global fish markets, changing consumer tastes) similar to those we found in Saxony and elsewhere. Biologically, as in other places (e.g. Greece, Bulgaria, Romania, Israel) there are difficulties in managing Great Cormorants because there are also Pygmy Cormorants in the region. Fish farming has perhaps become a marginal activity for many people, although it may be the most environmentally sustainable one. Employment prospects also may have been reduced. But are Cormorants alone to blame or are they a symptom of more complex changes, with the increase in Cormorant numbers just "l'ultima goccia" (che fa traboccare il vaso – the last drop that made the jar overflow - the final straw)? This is a story that INTERCAFE has heard almost everywhere we've visited.

There has also been a general shift from traditional aquaculture, to hunting, and to conservation and biodiversity-based tourism. These changes bring both opportunities and concerns. For example, hunting and tourism bring revenue, but hunting has to be limited to minimise disturbance, and increasing tourist numbers bring potential negative consequences for the region's environment.

In addition to these issues, conservation legislation, national park designation and other related initiatives seem to offer limited or no financial incentives. In the opinion of many people we met, these initiatives only restrict people's activities without enabling effective dialogue about alternatives. Compensation often was mentioned but doesn't feature highly in any legislation or plan. Subsidies don't seem to apply to this sector as they do for agriculture.

A common theme was the need for public funding support for traditional fisheries. Local stakeholders appeared unfamiliar with EC funding opportunities and there is scope for INTERCAFE members to research and provide advice on this for our Po Delta colleagues.

There also appears to be little integrated planning and no national plan. In fact, some people said that given current structures and procedures among groups, there could not be a national plan. Others questioned whether there was a need for a national plan at all. Interestingly, nothing seems to be in place above the regional/district level and almost everyone we met felt that politicians were not engaged sufficiently, or even engaged at all.

On the technical side, we learned that some mitigation techniques work in the short-term but that shooting cormorants is seen as the most effective local solution. However this brings us back to the problems with disturbance of other birds, hunting issues and tourism. There is clearly much scope for INTERCAFE members to remain in contact with Italian colleagues in the search for technical solutions. This partnership building and networking for future collaboration was a major success of our time in the Po Delta and reflects the hard work and skill of our hosts in bringing together such a diverse group of people for our workshops.

So what might be the conclusions for policy and for policy making? The situation is not easy but perhaps there are some clear ways forward. There seem to be four general areas for policy support that could usefully be addressed:

- Policies that promote engagement, trust and commitment, developing sincerity and political will through meaningful dialogue across sectors and between legislators, agencies, businesses and communities
- Policies that encourage networking and collaboration, including knowledge-sharing and working with different groups' special knowledge and expertise
- Policies for capacity building, including training in issues such as leadership, partnership building, natural resources conflict management and effective consensus-building
- Policy support for the conservation of cultural diversity, including vallicoltura

Policies to promote engagement

If Cormorant-fisheries related policies are to be supported and sustainable, then a far greater level of engagement of politicians, citizens and other stakeholders is needed in the Po Delta. Leadership is critical and adversarial political processes are proving unhelpful, even damaging. Although we learned of strong leadership and potential direction setting from many stakeholders, there are clear gaps where leadership is either weak, absent or frustrated by the actions of others.

Decision-making is diffuse and takes place in an adversarial, often competitive, heavily politicised environment. Discussions and decisions appear to be based upon weak understanding of the issues where despite good intentions, many of the people involved find it difficult to distinguish between fact, opinion and rumour with respect to both cormorants and fisheries.

The most pressing need, then, is for policies and actions that promote the engagement of:

(a) policy makers themselves, and
(b) a range of groups and people that could contribute to policy making.

Effective engagement may involve policy support for things like conferences, citizens' panels, on-line consultations and other processes. This will require leadership, improved understanding, revitalised political will, effective communications and competent, transparent governance.

Policies that encourage networking and collaboration

A second and related need is for policies and actions that promote effective networking, collaborative problem sharing, and collaborative problem solving. Collaboration is key both to local solutions (everybody helping to solve the cormorant-fisheries concerns that others have) and to the search for collective solutions over a wider area.

One way of approaching this might be for a region-wide conference on cormorants and fisheries. A discussion paper that captured key issues could be developed collaboratively and circulated in advance to all delegates at local, regional and national level in relevant departments. The conference could be used to help inform and strengthen conclusions and ways forward – a *commitment package* where people signed up to particular actions. Strong policy support would be needed to enable these actions to be implemented, monitored, and reflected upon, so that lessons learned could inform the next cycle of policy development.

Policies for capacity building, including training

In the current situation it might be helpful to consider different entry points to problem solving with regard to Cormorant-fisheries conflicts. In our experience, training can provide a neutral starting point for analysing and understanding complex situations such as in the Po Delta, with leadership and partnership building being fostered through the training process.

Policy support for capacity building in natural resources conflict management and consensus-building may be a useful way forward that might engage many of the stakeholders relatively quickly and at low cost.

Policy support for the conservation of cultural diversity

If the consensus is that vallicoltura is part of what defines and sustains the Po Delta, then policy support for the conservation of cultural diversity, including vallicoltura, needs substantial strengthening. While this would likely include policy initiatives for cormorant management, there seem to be a wider range of issues to address that need more understanding than we were able to obtain during our brief visit, such as the structural and process aspects mentioned at the beginning of this conclusion.

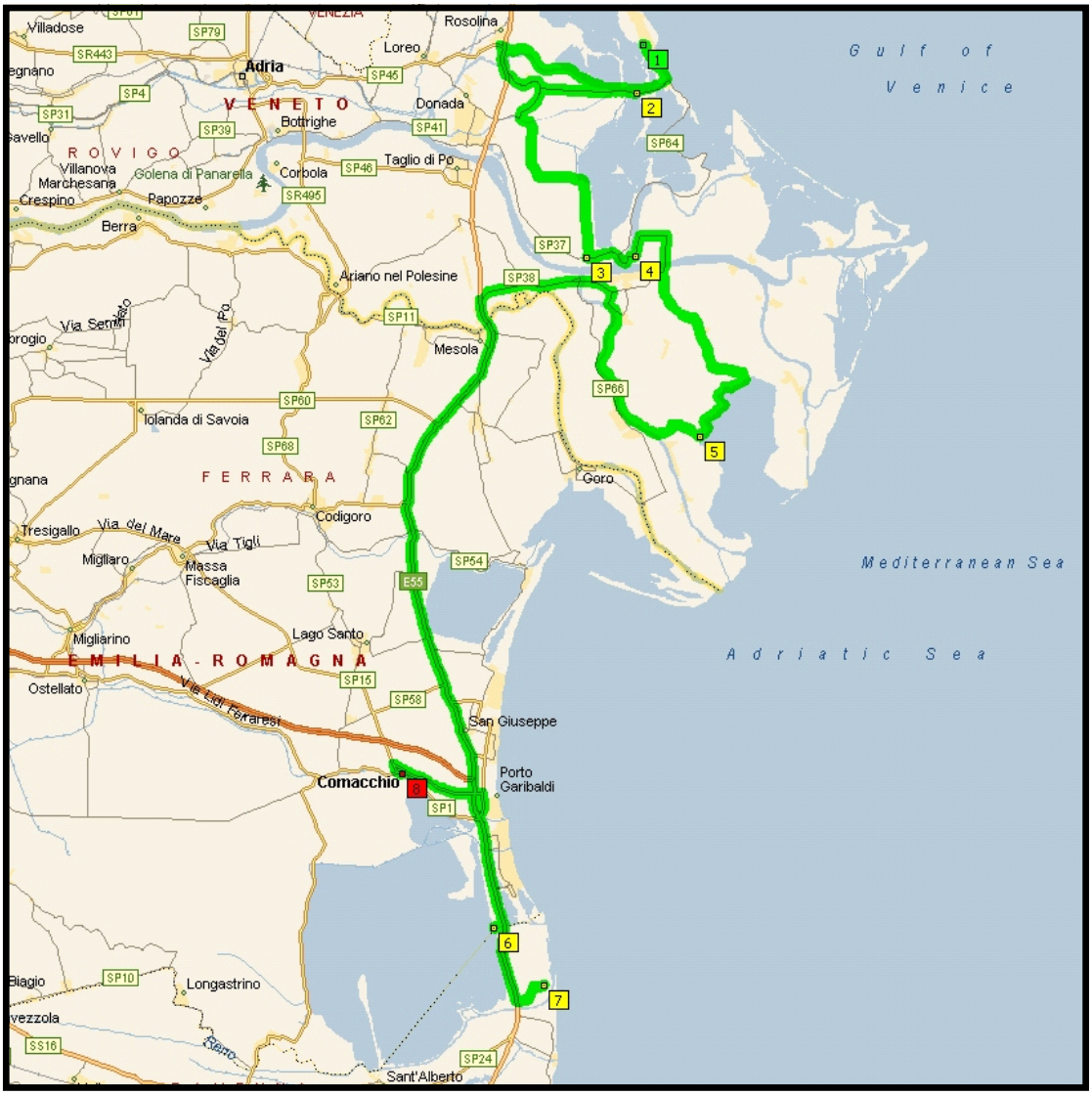
What is clear, however, is that vallicoltura has had a profound economic, social and cultural impact on the area over many years. Whole landscapes and communities have been shaped around this approach to aquaculture. The changes that face the region in general and vallicoltura in particular include, but go far beyond, the fisheries-cormorant conflicts that were the business of our workshops.

Perhaps the engagement process and policy support for collaboration and consensus-building that is suggested here will inform the wider policies that are needed to conserve and protect this unique and treasured aspect of life in the Po Delta.

We saw as many strengths and new initiatives in the region as we saw concerns. We would like to use the "final word" in this section to express again our respect, thanks and deep appreciation to our colleagues and local people and agencies in the Po Delta. We look forward to continuing collaboration.

Part (5) Field Trip report Po Delta

From our base (point 1 on map), we were taken to six stops in the central and southern areas of the Po Delta and Commacchio. We also had a lunch stop (point 5) and ended with a buffet meal at Manifattura dei Marinatti in Commacchio (point 8). At each stop we had a presentation or short talk from a local agency representative or owner.



Golena di Pisani (point 4)
Here we met Marco Campagnolo and visited the wetland by the Po di Maistra one the of seven river branches forming the Po Delta. The Po di Maistra branch is rich in biodiversity and includes a diverse assemblage of ducks (up to 10,000 birds, mainly pochards, mallards, shovelers, teals) and herons (little egrets, night herons, cattle egrets), and one of the largest winter cormorant roost in the N Adriatic (peak of up to 5,000 great and 3,000 pygmy cormorants). This bird richness is due to the freshwater habitat, rather rare in the area where brackish water dominates all around, and a rich aquatic vegetation (floater plants, a wide reedbed and well maintained hygrophilous wood).

The area is now managed by Regional Forest Service. The area, formerly owned privately who carried out the traditional fishfarming, was bought by the Veneto Region in 1997 with the financial help of the European Union through a LIFE project. Using European and regional funds, the area was restored to promote both wildlife conservation and ecotourism. With this in mind they built an observatory tower for birdwatching, pedestrian paths in the wood and a visitor centre with the typical architecture of local fishfarm buildings.

According to several local people ecotourism and birdwatching may now have become more common than duck hunting in the area, although we did not have any numbers on the day to support this. Ecotourism is the main prospect for the future considering it can be carried out all the year and may involve a larger part of citizens of all age. As in other areas of the Delta, local people gather in small cooperatives to promote ecotourism, organising field guides and educational events in the Delta environments. The area acts as a refuge for ducks and cormorants because shooting is not allowed here. The Po branches are included in the Veneto Regional Park where hunting is not allowed. This is very important because most of the fishing valli areas (which are private) and all the lagoons open to the sea (which are public) are not in the Park and thus hunting is allowed (one day per week in the valli and 5 days per week in the lagoons) from September to end of January. This means that waterbirds and especially target species (mainly ducks and coots) must learn where, when and how to move to find food and safe resting places.

This situation implies that owner of the fishing valli where hunting is (economically) important, disperse a large amount of food (seeds such as corn and rice) to attract and keep ducks inside their property and allow higher hunting possibilities. Artificial feeding is not completely legal (being allowed only for helping birds when climatic condition are critical and winters are very cold), but feeding silos were clearly visible.

The area is rich of Nutrias (*Myocastor coypus)* a large rodent native to South America that was introduced for fur at the beginning of the 1900 and escaped from breeding farms, becoming very abundant everywhere in the Delta and in many areas of the Po Plain. This exotic rodent may breed twice a year, has almost no natural predators (fox can take nutrias but they are not very numerous and subject to population control by hunters) and since almost twenty years has become a major problem for local people through its grazing and tunnelling activities (large and deep holes in rivers and canal banks and may cause hydraulic instability). The local

administrations of all the three Delta provinces are fighting hard with this pest species, but with few and mostly temporary results due to the environmental complexity of the delta (which offers infinite refuges and food), more favourable winter conditions (that may allow continuous reproduction) and the need of money and great field efforts for trapping and managing collected animals.

Another exotic species that is causing problems is the North American shrimps (*Procambarus clarkii*) which has also escaped from fisheries and spread everywhere in the Delta and the low Po Plain trough the rivers and canals web. This species, as the Nutria, fills an empty ecological niche and has become a true problem both for the management of the canal web inside the farmland (it burrows deep holes in the bottom finally causing the erosion of the bank) and the ecological equilibrium of the aquatic habitat (it is very prolific and a predator of all Invertebrates, fish and amphibian eggs and larvae).

Also hated and hunted was the Otter - shot and trapped to extinction by 40 years ago. The argument for this was that otters competed for fish.

Valle Ca' Pisani (point 3)

Here we met the person responsible for a large aquaculture farm where both intensive and extensive aquaculture is carried out. He gave us a tour of the operation and talked us through the various activities, describing some of the historical circumstances of the operation that lead to introduce some intensive farming too. Sea bream (*Sparus aurata*) and sea bass (*Dichentrachus labrax*) are artificially stocked and grow on to sell at 10-20 Euro/kg. The intensive aquaculture parts of this wetland have lower biodiversity in comparison with other localities, according to our field trip guides. Some of the farmers are beginning to diversify into restaurants as another source of income. Valle Ca' Pisani was the first place in world to breed sea bream and sea bass, in 1966-67. Fish used to be bred on-farm but now the farmers buy them from Montpelier and Bordeaux. However, the company has made money by selling breeding technology on to others in Italy. The owner is a true expert of vallicoltura who previously published a book where he describes and analyses all productive and management aspects of this traditional form of aquaculture. However, later on, looking for the way to improve the fishing yield and take over difficulties due to the lagoon environment, he proposed a revised form of aquaculture (called Integrated vallicoltura) where artificial fry production, food provisioning and mixing of extensive and intensive aquaculture are carried out together. Obviously, he experimented with this idea in Valle Ca' Pisani.

Inside the intensive-system the fish are graded and fed artificially. The farmer explained the process of rearing and the importance of salinity: the biological cycle of young fish is controlled, so they use chemical medicines to prevent sickness. They feed them at regular times, move them into different basins depending on their size, and they control the salinity to obtain the best water to make fish grow faster. At the end they obtain a good quantity of fish, all of the same size, but grown quite artificially. In relation to the value of fish – intensively-reared fish have a lower market value than those from the sea or from extensive aquaculture but don't have the same scale of problems with cormorants because they are more easily protected. In fact they live in fenced but not natural basins, which are continuously controlled by people. We visited a 400-year-old building, a part of the farmer's house but now used partly to manage fish tanks remotely by computer. Eels are no longer harvested here because the population levels have fallen significantly, but we were shown the old mechanisms for holding eels. This was clearly a different form of intensive aquaculture than the carp ponds in Central Europe or the Slovenian salmonid and grayling fish farms previously visited by INTERCAFE.

Valle Bagliona (point 2)

This was a large scale operation using vallicoltura. We were hosted by Giuseppe and Maria Cristina Penzo, the landowners and managers who gave us a tour of the area and then provided refreshments and a chance for informal conversation at their home. This site showed INTERCAFE participants an example of so-called "Integrative extensive aquaculture" with both shrimps (the Japanese shrimp *Penaeus japonicus)* and fish (Eel, Sea Bream, Sea Bass, the five species of *Mugil*, *Chelon* and *Liza*, and Sand Smelt *Atherina boyeri*). The Japanese shrimp is highly valued on the market as the so-called "mazzancolla". According to our hosts, Great Cormorants do not attack shrimps but pygmy cormorants do attack them. Concerns exist between local fisherman and management of the Regional Park or other regional and national authorities. One of the key frustrations is the fact that distant authorities, for example in Rome or at district level, do not understand local situation or what is required to effectively implement policies when the local context is so variable. The vallies are a separate world, with complex laws and mechanisms and it seems that politicians are not as interested in understanding this. Consequently, it is felt that they don't make

laws in favour of vallicoltura. The area we visited, like all the vallies in the Veneto

part, is two metres below sea level, since gas extraction for 20 years caused subsidence of the land. The managers need expensive pumping and good control of the sluice gate and drainage system to prevent inundation. To obtain the brackish water for these areas, the fresh water coming from the Po River branches is mixed with the salt water from the lagoons. They thus have to pump out some water, because water circulation is vital for these wetlands. There is a tax on returning effluent water to the lagoon, even though according to the owner, data show that the returned water is cleaner than the received lagoon water.

We discussed fish capturing mechanisms that are designed to attract fish during autumn and winter into gates, where they can be captured easily. Farmers induce this "fish migration" by putting more salt water near the gates – the fish congregate there in the autumn because they are trying to get to the sea (this water is also warmer). The fish that are not the right size are stocked in a particular part of the Valle (the "peschiere"), where they spend the winter. An impressive amount of local knowledge and experience is required to manage this production system – e.g. balancing temperature, water levels and salinity. The salinity in the valle could be up to 20/000 but if it increases to 30/000 it becomes difficult to make fish go into the gates. Furthermore, if the water is too fresh, the fish

will not survive, and during winter time the big valle lakes could freeze. The three-year cycle of fish growing has to be monoculture. It is not possible to rear fish and shrimp together because the shrimps have a one-year cycle. The shrimps are stocked here in spring and harvested in autumn. They are bought from France every year. Moreover, they can be eaten by fish (sea bass for example). The situation for the fish is different: every year the young larvae are taken from the sea and put in the valle because the valle is a closed system and not in direct contact with the lagoons. Here the fish grow for three years eating (in this traditional extensive way) only the natural food they can find in the valle. After three years they are then harvested and sold. The owner stated, "*Fish production is going down and I would like you to tell me that it is not the cormorant*."

In fact, apart from the cormorant, the big problem appears to be the declining fish price due to intensive aquaculture and the production of fish in sea-cages. The problem he said was "*to get everyone together and put everything on the table – what are people's concerns?"* Everything before happened "naturally" – now it is more difficult to get people together and more work is involved in doing so. Activities in the valle are reversible, with changes in water levels, salinity, and the digging of channels and banks. Thus there are numberous possibilities to maintain both biodiversity and the economy. The owner further stated, "*We are all upset that our tradition is being changed*" There were also were concerns expressed about the impact of the National Park, another layer of rule-making and outside influence that is changing life and taking away local control based on local knowledge. It is important to remember that conservation of the extraordinary biodiversity of the vallies is due to the maintenance and managment of these places for fishing and hunting.

Regional station Bellocchio (point 6)

Here we met Pino Parmiani worker of the Po Delta Park who described how a canal connects the brackish Comacchio Lagoon to the Adriatic. Fishermen and hunters are pay the park directly for fishing and hunting. The area was once intensively used for commercial fishing and there was a fish processing unit in the lagoon. However, effluent from this made water quality too poor for the fish. Now the water in the canal only good for anchovies (*Engraulis encrasicolus*) that feed on phytoplankton. A demonstration was given of how these fish are caught with nets close to sluice gates, where small fish swim into the canal and are held by meshed gates to grow on. According to our guide the only way of improving the canal and the lagoon would be to leave it fallow for two years

and add fresh water from rivers. However, because this site is located at the end of the watercourse the river is polluted and so this inevitably reduces options to introduce clean water. This company, used to employ 100 people 15 years ago, but now only five are employed. Cormorants were hunted and killed but now, with the Park becoming an active player in the area there are different strategies for cormorants. Pino asked if we knew of recipes for cormorants. He suggested that if you took the skin off you could grill cormorant with salt and pepper for a taste like chicken, a food type used with marinade for "hungry times". Our host said that cormorants reportedly eat all species of fish and that "*don't like the behaviour of cormorants – they move the fish into a corner, eat all they can eat and this just plays hell with the fish*."

Tenuta Orsi-Mangelli close to Bellochio and the river Reno mouth (point 7)
We were met by Paolo Ciani who gave us an extensive tour of the area, including a new basin that was being excavated to reduce problems with the lack of freshwater water during summer. As the salt water table has risen – entry of the sea has caused problems for agriculture through soil salinity and several areas have been taken out of agricultural production. Salt water is also kept separate from fresh water by pumps and extensive pipe arrangements. Even if very close to the river Reno, the area lacks a reliable source of freshwater that can be used both for the field crops and aquaculture to lessen the salt content of the brackish basins. The proximal course of the river is too close to the sea and thus subject to tide and sea water ingression. After a long drought this area has had production and maintenance problems. To address this problem a 7 km long underground pipe has been constructed to take freshwater from the river above a dam that does not allow the sea water to go further upstream. The area is now regarded as a buffer zone between coastal wetlands and inland agriculture. Our guide informed us that the presence of a military area at the mouth of the river (regularly used for target practice activities) has saved it from tourist property development and encouraged higher biodiversity - there are higher species number of plants and animals (e.g. invertebrates) in comparison with previous localities we visited because of restricted access, reduced general disturbance, lower levels of development and less hunting. Other parts of this area have been converted to fresh water, creating new places for

water birds and for other biodiversity. The large place we visited is owned by a rich family based in Milan, who use it for crop cultivation (80%) and traditional aquaculture (20%) but also for private hunting (pheasants). Heron netting has been installed over channels where fish migrate from the growing basins of the *valle* to the fishing station. Here commercial-sized specimens are taken and sold at the market, while juveniles are driven into smaller and deeper basins for wintering. The area is less than 10 km from one of the largest and most important Italian breeding site for colonial waterbirds which hosts seven species of herons and egrets, plus the Eurasian spoonbill, the Glossy ibis, 600 nests/pairs of Pygmy cormorants, the largest Great cormorant colony in Italy (800 nests/pairs in 2006) and one of the largest winter roosts (up to 3000 birds). This obviously causes a strong fish-eating pressure all year long that requires both non-lethal measure to protect fish stock from herons and egrets, as well as authorised shooting to reduce Great cormorant predation.

Manifattura dei Marinati in Commacchio with museum and dinner from traditional products (point 8)

We were given an introductory talk and shown around the museum by Dott. Federico Brunelli and his colleagues. The group was provided with a wonderful buffet that also employed traditional cooking processes. The museum is dedicated to the traditional way of capturing and processing Eels. All the traditional equipment is shown in the museum, e.g. big baskets and boats specially designed to transfer Eels as well different tools that were used to capture and transfer them. Moreover, a historical film shows how all these activities were done. Today there is small-scale production of marinated Eels and anchovies here.

Part (6) INTERCAFE Work Group progress

Work Group 1 – Ecology

Present (whole all or part of sessions): Stefano Volponi, Mennobart van Eerden, Stef van Rijn, Jean-Yves Paquet, Marijan Govedic, Ivailo Nikolov, Catarina Vinagre, Daliborka Barjaktarov, Botond Kiss, Linas Lozys, Mindaugas Dagys, Reinhard Haunschmid, Karlis Millers, Zeev Arad, Josef Trauttmansdorf, Ohad Hatzofe. Henri Engström

Work Group 1 continued their tasks on the Water Systems Database, GIS mapping, incorporation of the Cormorant Research Group's counts of Cormorants (in roosts and breeding colonies).

Work Group 2 – Mitigation
Presentations reviewed by Thomas Keller and Bruno Broughton

Present (whole all or part of sessions): Loic Marion, Daniel Gerdeaux, Robert Gwiazda**,** Savas Kazantzidis, Emmanuil Koutrakis, Kareen Seiche**,** Bruno Broughton, Ian Russell, Petr Musil**,** Mikael Kilpi, Timo Asanti, Ion Navodaru**,** Nils Røv, Ger Rogan , Botond Kiss, Ferenc Levai, Michal Adamec, Redik Eschbaum**,** Thomas Keller

In Italy WG2 continued its regular work. Three presentations on Cormorant conflicts and management were given and discussed.

Presentation 1
Loic Marion: Shooting of the Wintering Population of Cormorants in France

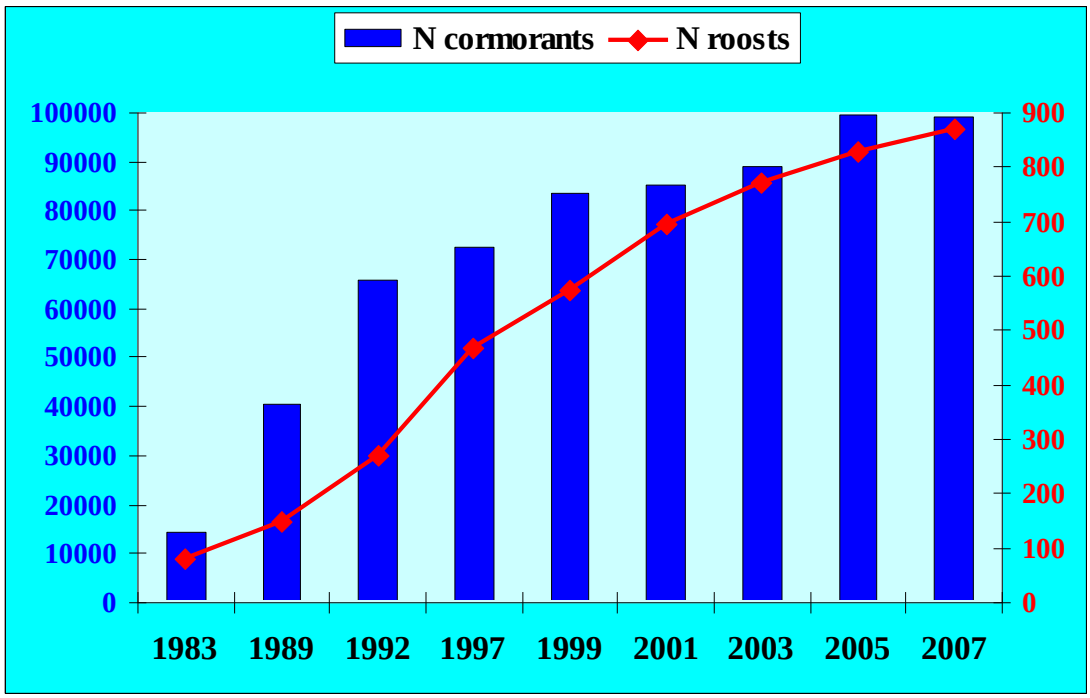
France is the main wintering country in Europe and a migration route toward southern countries (i.e. Spain, Portugal):

- 99,702 Cormorants in 827 roosts in January 2005
- 99,081 Cormorants in 869 roosts in January 2007

Trends of the wintering population size:-

- Levelling off of the population since 1999
- Small decrease (-0.9%) in 2007 may be due to abnormal situation in 2005 (hard winter in northern Europe compared to mild winter in 2007)
- The number of roosts still increasing (+5%)

Fig. 1: Development of the wintering population size of Cormorants in France from 1983 – 2007.



There is a levelling-off of the mean roost size since 2001 after a strong decrease. The peak of the wintering bird numbers has been delayed from November to January.

Trends in the Cormorant wintering population size in the French departments:-

- 59% of the departments show a decrease or a stabilization of the number of Cormorants in 2007
- Most of these were pioneer sites for cormorant settlement in the 1980's and were important and optimal wintering areas (Rhône and Loire valleys, Atlantic and Mediterranean coasts)
- Increase mainly concerns more recently occupied areas.

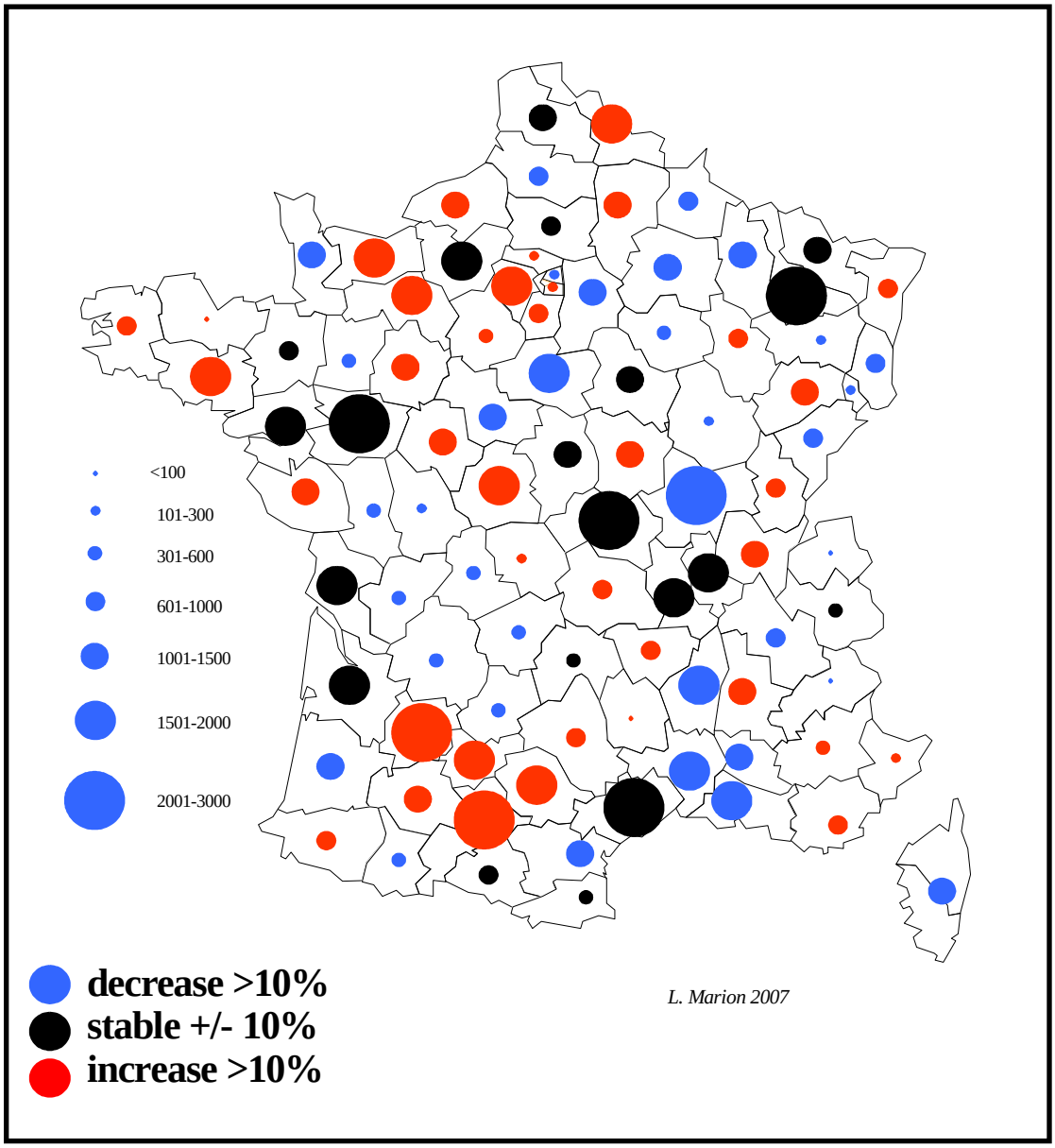


Fig. 2: Trends in the Cormorant wintering population size in the French departments.

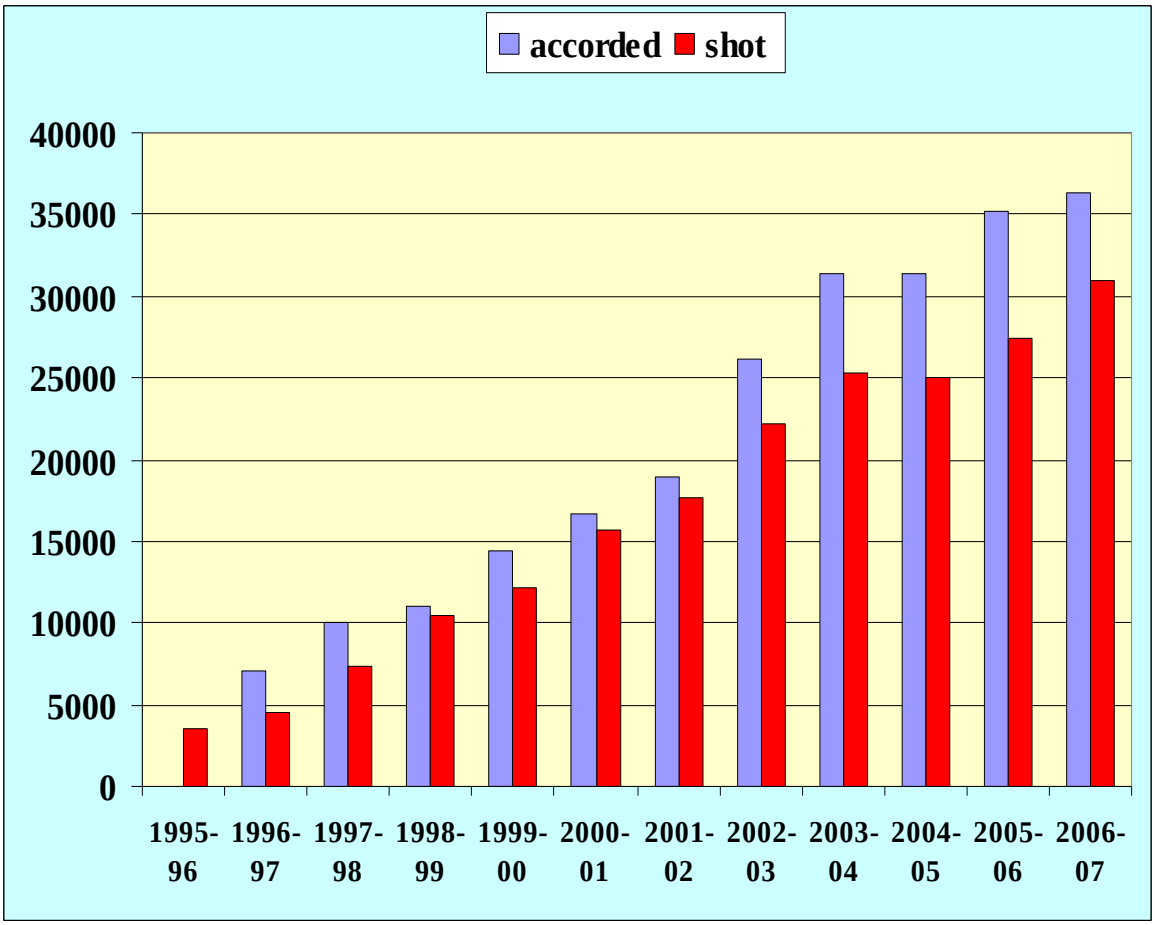
Most of these trends are an evident effect of density-dependant regulation:-

- Levelling-off of the total number of Cormorants in optimal and first settled areas (large rivers and open waters, marine coasts).
- Smaller increase in recent years mainly centred on sub-optimal areas such as heads of rivers.
- Decrease of the mean roost size.
- Levelling-off in the total number of Cormorants in France.
- Strong increase of the numbers of Cormorants in the neighbouring southern countries (about 70,000 Cormorants in Spain) probably due to the buffer effect.

However, what is the role of shooting in the levelling-off? In 2006-07 about 32,000 Cormorants (31% of wintering birds) were shot, which is 8.6 times more birds than in

1995-96. There have been increasing difficulties in reaching quotas, which was 37,000 birds for winter 2006-7.

Fig. 3: Development of the numbers of shot Cormorants in France in the winters of 1995-96 – 2006-07.



There is a strong increase of the number of departments shooting Cormorants, but there appears to be no relationship between the intensity of shooting and recorded changes in Cormorant numbers at the department scale. So the effect of shooting is still debatable. Why?

- Shooting in France only concerns a minor part of the European population.
- The winter mortality is probably rapidly compensated in the following breeding season at a larger European scale.
- Importance of floating population?
- Winter mortality substitution?
- Rapidity of bird movements?

Discussion:

Q.: Is the stabilisation of the winter population due to shooting? In the Czech Republic the population is stable, too.

A.: No, there is a natural stabilisation and no clear proof for a shooting effect. It is diluted due to the very large size of the European population.

Q.: Is there an influence of climate on the Cormorant numbers? In Finland the growth of the breeding population was only 25% in 2006 due to the preceding cold winter. In 2005 the equivalent figure was 58% and in 2007 54%.

A.: Yes, climate is important.

Q.: What are the Cormorant numbers in France?

A.: There were 99,081 wintering birds in France in the winter of 2006-07 and 4,600 breeding pairs in 2007.

Q.: Why is there a shift of the maximum bird numbers from November to January?

A.: The reason for this is not known.

Q.: There is a pattern in seasonal numbers in the Czech Republic. We record the maximum bird numbers before Christmas. This is related to food availability as most ponds are harvested in readiness for Christmas.

Presentation 2

Daniel Gerdeaux: Some notes from France

In 1996 in France, when the conflict was strong, the Ministry of Ecology asked two experts for seeking the views of all stakeholders and for a proposal to quiet down the conflict. It was decided to limit the maximum wintering Cormorant to the level of the year 1996, i.e. 73,000 birds. Thus, with the increase of the bird numbers there are increasing annual shooting quotas:

2006-07: Total quota: 36,169 of which 21,384 were on fish farms
Killed Cormorants: 30,861 (85% of the quota) of which 17,000 were on fish farms (80% of the quota)

2007-08: Total quota: 39,905 of which 23,035 were on fish farms

In general it is becoming easier to be allowed to shoot Cormorants. Changes in 2007:

- Shooting allowed until 30th April on ponds with stocking or fishing. Gas gun scarers not allowed.
- Everybody with a hunting licence should be on the list for shooting.

There is an annual questionnaire on the management of Cormorants on water bodies managed by anglers' associations (of 93 federations of angler associations, 84 answered at the questionnaire). Results:-

- Satisfied with the management: 46.4%
- Not satisfied: 46.4%
- No answer: 7.2%

During all years an increase of quotas is the most often demanded (30%) followed by an increase of shooting areas and longer periods for shooting.

Fish farmers in France:

After the last national annual meeting vote of a motion:

- Fish farming is no longer sustainable.
- More and more fish farmers are ceasing their operations.
- 30% of the annual subscriptions (to ?) are missing in some areas.
- No more extensive fish farming in Camargue and Sologne.

- Fish farmers in other European countries receive financial compensation: this is unfair competition.

Fish farmers have tried a lot of deterrent methods, the last of which was the Cormoshop device (hydroaccoustic killer whale noises). It was not efficient as Cormorants became accustomed to the sounds!

- Example of last attempt to use Cormoshop involved stocking of 7 tonnes of young-of-the-year carp in November. By the end of March following, all the fish had been consumed, even though the Cormoshop had been deployed (but not continuously),
- Nearby was a roost with 700 Cormorants, 85 Grey Herons and 100 egrets

The French Ministry of Agriculture and Fisheries got in touch with the EC in Brussels. Several meetings on freshwater aquaculture were convened, with more scheduled in 2008, and Cormorants are usually the first topic of discussion.

Discussion:

Q.: On what is the population quota of 73,000 Cormorants based?

A.: In 1996 the January count recorded 73,000 Cormorants. It was agreed to limit the number of Cormorants to that figure. The difference between that figure and the actual bird numbers counted during the last winter makes the next two years' quota. This was intended to manage the Cormorant conflict but this is no solution as the number of birds cannot be limited to 73,000. It was almost 100,000 birds in the last winter in spite of the shooting of about 32,000 birds.

Q.: Who were the stakeholders?

A.: All the 'typical' ones.

Q.: Which fish species are consumed by the Cormorants in the ponds?

A.: Pike, pike-perch, carp and roach. Cormorants prevent the production of young carp.

Comment: In Israel there are no problems with carp in winter.

Comment: In Bavaria we have observed the same pattern as in France since the winter of 1996-07. In spite of shooting large numbers of wintering birds their population size is stable or even increasing.

Presentation 3

Savas Kazantzidis and Emmanuil Koutrakis:

Great Cormorants and fisheries in Greece: Conflict and management

Hellenic National Agricultural Research Foundation

In Greece there are six colonies of Great Cormorants (*Phalacrocorax carbo sinensis*) with a total breeding population of approximately 5,600 pairs. The Great Cormorants breed in mixed colonies with Pygmy Cormorants, Night Herons, Squacco Herons, and Little Egrets. During the winter the number of G. Cormorants reaches almost 22,000 birds, which originate from Scandinavia and the Ukraine.

Marine fishery and fish culture in Greece are very well developed activities. Fish culture units and big fish farms are distributed at the coastal areas in central and southern Greece. On the other hand, inland fisheries at freshwater lakes and brackish lagoons are developed only at a local scale, in a traditional manner, especially in northern and western Greece. Angling, as it is known in northern European countries, is

an almost unknown activity whereas amateur fishing is popular, especially during the summer and in the sea. Only recently immigrants, especially from former USSR countries, have begun to fish in the rivers and lakes.

The conflict between fishermen and G. Cormorants became prevalent at the end of 1990s, a period that coincided with the G. Cormorant population increase. Nevertheless, the conflict is restricted to a few wetlands only. The main problem exists at three wetlands in northern Greece (Porto Lagos Lagoon, Axios Delta and Kerkini Lake) and at two in western Greece (Amvrakikos and Messolonghi). At the wetlands of the western Greece and at Porto Lagos lagoon the conflict occurs during the winter whereas at Kerkini Lake it takes place during the spring and summer; problems occur at the Axios Delta during the whole year.

In order to protect their yields, fishermen at Porto Lagos lagoon put nets over the fish wintering channels to discourage G. Cormorants to fish in these channels, which retain large quantities of young fish. In the rest of the areas not any similar action is taken and apart from occasional shooting at the G. Cormorants and the use of gas canons, no other protective or deterring methods are known to be used.

According to a few studies on the diet of G. Cormorants that were carried out at the Axios Delta, Prespa and Kerkini Lake, the birds consume mainly fish of low or medium market value, contrary to the fishermen's beliefs. However, at Porto Lagos and the lagoons of the western Greece G. Cormorants consume or injure fish of high market value. Fishermen believe that cormorants are among the main reasons for yield decreases, especially in western Greece.

Although fishermen in all coastal lagoons and lakes are prejudiced against G. Cormorants they do not feel the same for other fish eating birds, such as Pelicans, which very often are fed by them with discarded fish.

From the Greek State point of view, the problem with G. Cormorants does not officially exist and no compensation is given to fishermen (or fishery cooperatives) for the fish loss or the expenses for the fish protection actions. Nevertheless, no official claim has been submitted so far by fishermen to the Ministry of Rural Development and Food, which is the responsible authority for the fisheries in Greece.

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Liordos V. and V. Goutner. 2007. Diet of the great cormorant (*Phalacrocorax carbo* L. 1758) at two Greek colonies. Journal of Biological Research 7: 51-57.

Box 1: A unique technique of protection fishing sites from Cormorants

At Kerkini Lake, northern Greece, fishermen use a combination of visual and audio technique in order to discourage cormorants approaching the sites where they place their fishing nets. This technique is consisted of a system of ropes laid on poles placed to the lake shore up to the fishing place (usually in a distance of less than 100 metres from the shore). On the ropes they hang bells and empty cans one after the other. When cormorants approach to the fishing place, fishermen from the lake shore pull the rope resulting to the movement of the bells and the cans. This scares cormorants that leave the area for a short period (few hours max.). This technique that takes place during the daylight throughout the year requires a permanent presence of at least one fisherman in the area and is considered effective when the fishing place is close to the shore and easily to be controlled by the fishermen.

Box 2: A change in fishermens' attitude towards Pelicans

Many years ago fishermen in Greece (especially at inland freshwater lakes) used to shoot Pelicans because they considered them as a big threat for the lake fishery. Of course this has changed over the years with the environmental awareness campaigns and the promotion of protected bird species. Especially at Kerkini Lake, the attitude of fishermen against Pelicans started changing when scientists from the Aristotelian University of Thessaloniki, during the 1990's implemented a project which aimed to conserve the Pelican population through the raising of fishermen awareness regarding birds and Pelicans in particular. At the end of the project most of the fishermen were persuaded that Pelicans were not the 'enemies'. Today, especially after the establishment of the Management Authority and of an Information Centre on the lake, fishermen believe that Pelicans can "attract" visitors or tourists to their area, so they could also benefit from their presence in their area (selling their fish in the taverns or by other means). Concluding, although there is a loss in fish, it is believed that the Pelicans' presence in a long term could be helpful for them. Furthermore, it is widely known that Pelicans are protected species, so fishermen hesitate to act against them.

Discussion:

Q.: How large are the nets used at Porto Lagos lagoon to protect the fish wintering channels?

A.: These nets are about 2 km long and 40-50m wide. They are expensive!

Q.: Why did the carp yield decrease by about 70% at Lake Kerkini in eight years (from 53 tonnes in 1994 to 17t in 2002)?

A.: Carp were not found in the Cormorant diet, but an artificial increase in the water level led to fewer shallow areas for spawning.. But, there is a special method to deter Cormorants from the spawning sites - the birds are flushed by a rope. See details in Box 1 above.

Q.: Why do the fishermen not complain about Pelicans and Pygmy Cormorants, but complain heavily about Great Cormorants?

A.: See details in Box 2 above. See also much more detailed information in the Greece sections of the IMEW (Integrated Management of European Wetlands) Final report to the EU. IMEW was an interdisciplinary project (Contract number EVK2-CT-2000-00081) co-ordinated by Sandra Bell,
(see http://www.dur.ac.uk/imew.ecproject/).

Work Group 3 – Policy and best practice

Present (whole all or part of sessions): Mariella Marzano, Rosemarie Parz-Gollner, Erik Peterson, Susana Franca, Faustas Stepukonis Ilona Cheyne, Scott Jones, Miha Janc, Pekka Salmi, Nikolay Kissiov, Dave Carss, Renata Kopecka, Jaroslav Bohac, Michale Andersen, Vilju Lilleleht.

Work Group 3 continued their tasks on the scientific input into management plans, an essay on 'successful' conflict case studies, a media analyis, an exploration of legislation, the 'Ruffe Guide' selected literature review, an exploration of the Bonn Convention's African-Eurasian Action/Management Plan, and an investigation into linking science and policy.

Appendix 1: Agenda

INTERCAFE@Po Delta
September 20-24rd 2007

http://www.intercafeproject.net

INTERCAFE
Interdisciplinary initiative to reduce pan-European cormorant-fisheries conflicts

Case Study 2: Po Delta, Italy

Extensive aquaculture systems and the relationships between stakeholder perspectives and different spatial and institutional levels

Hotel Capo Nord, Albarella, Italy

Expected arrival of participants: Thursday 20th September
Landing at Marco Polo Airport (Venice)
Transportation (approx 1.5 hours) to Hotel Capo Nord

Thursday 20th September
DINNER from 19.30pm
ACCOMMODATION and DINNER at HOTEL, MEETING TO BE HELD AT THE CLUB HOUSE

DAY ONE (Friday 21st September)

07.30 Breakfast

08.30 Catch miniature train to meeting rooms at Club House

09.00 Opening session with Dave Carss and Scott Jones. Welcome and Introduction to Case Study.

ca. 09.30 Vice President of Province di Rovigo – Gino Sandro Spinello (Political boss of Office – sponsorship) 5-10 minutes!

10.00 Presentation 1 - Po Delta: history and local economy - Adriana Galvani

10.30 Presentation 2 – Vallicoltura – (fish farming) an integrated perspective – Ms. Paola Fantin?

11.00 Coffee break

11.30 Presentation 3 – Multi-purpose uses of wetlands – Lucilla Previati

12.00 Presentation 4 – Regional Management Plans – Massimiliano Costa (Ravenna), Giuseppe Cherubini & Lucia Fedrigoni (Venice) & Gabriele Facchin (Cosolo-Friuli)

12.30 Presentation 5 - Cormorants in the Po Delta - Stefano Volponi & Emiliano Verza

13.00 Discussion

13.15 Lunch

14.15 Integrated working session with INTERCAFE participants and invited stakeholders - facilitated by Scott Jones.

Topic of discussion (in groups): "*Three local/district viewpoints and three stakeholder view points (fish-farmers, hunters and conservationists)*"

16.15 Coffee break

16.45 Integrated working session with INTERCAFE participants and invited stakeholders - facilitated by Scott Jones – continued.

17.45 Plenary session with Dave Carss and Scott Jones

18.15 Night school – STSM presentations

19.15 Catch train to hotel

19.45-20.00 Dinner at the hotel

DAY TWO (Saturday 22nd September)

FIELD TRIP

07.30 Breakfast

Visit to fishing *valli* and other productive/environmental areas in the North Po Delta (Rovigo District)

Lunch provided by Province of Rovigo close the Sacca di Scardovari (plus a short visit to a shellfish company that is socially and economically important locally).

Continuing the field trip in the Southern part of the Po Delta around the Valli di Comacchio (Ferrara & Ravenna Districts) where different productive and environmental conditions meet.

19.00 Dinner in the town of Comacchio (also known as "Little Venice"), traditional food offered by the Regional Park Authority at the "Manifattura dei Marinati" an old traditional restructured building where traditional Eel cooking was performed, now hosting an exhibition on traditional fishing.

Return to the hotel in the evening

DAY THREE (Sunday 23rd September)

08.00 Breakfast

08.45 Catch train to meeting rooms

09.00 Opening session with Dave Carss and Scott Jones
Integrated working session with INTERCAFE participants and invited stakeholders - facilitated by Scott Jones.

09.45 Short talk – Alessandro Faccioli, National Vice President of Fisheries – fisheries VIP

10.00 Coffee break

10.30 Presentation 6 - Regional scale management issues: Veneto, Rovigo district – Emiliano

11.00 Presentation 7 – National scale management issues – Robert Cocchi

11.30 Presentation 8 – Regional scale management issues: Emilia Romagna – Aldo Tasselli

12.00 Discussion

12.30 Lunch

13.30 Integrated working session with INTERCAFE participants and invited stakeholders - facilitated by Scott Jones.
Topic of discussion (in groups): "*Integrating different stakeholder perspectives at different spatial scales*"

15.30 Coffee break

16.00 Integrated working session with INTERCAFE participants and invited stakeholders - facilitated by Scott Jones – continued.

17.30 Plenary session with Dave Carss and Scott Jones

17.45 Work Group/subgroup meetings

19.30 Train to hotel

20.00 Dinner at hotel

Appendix 2: Italian version of the INTERCAFE Fact Sheet

AZIONE COST 635
INTERCAFE

Vi è un crescente interesse in Europa per il progetto COST Action "INTERCAFE". Questo breve documento si propone di: (1) rispondere ad alcune domande frequenti riguardo il progetto INTERCAFE, (2) indicare i riferimenti per accedere al sito Internet di INTERCAFE, (3) fornire informazioni di base su un precedente progetto, chiamato REDCAFE, che è stato il precursore ed ha posto le basi essenziali per l'attuazione di INTERCAFE.

(D1) Che cosa è COST?

COST non fa parte del programma strutturale standard di finanziamento europeo noto come "Programma Quadro". E' invece una struttura intergovernativa per la cooperazione europea nel campo della Ricerca Tecnica e Scientifica. Dal 1971, COST ha promosso il coordinamento a livello europeo di ricerche scientifiche finanziate dai singoli paesi. Questo fornendo finanziamenti per formare reti che coinvolgano i progetti nazionali di ricerca. Attualmente COST finanzia circa 200 di queste reti, chiamate "Azioni", che coinvolgono un numero complessivo di quasi 30.000 ricercatori. Maggiori informazioni su COST possono essere trovate nel sito: http://www.cost.esf.org

(D2) Che cosa è INTERCAFE?

INTERCAFE è il nome dell'Azione COST 635 intitolata "Iniziativa interdisciplinare per ridurre i conflitti tra cormorani e mondo della pesca a livello pan-europeo". INTERCAFE è iniziato nel settembre 2004 ed opererà sino al settembre 2008. Concepito a partire dal progetto REDCAFE (si vedano D9-10), INTERCAFE è una rete di ricercatori delle scienze naturali e sociali con uno specifico interesse per le interazioni tra cormorani e mondo della pesca. Attualmente INTERCAFE conta 55 partecipanti provenienti da 25 paesi europei e del medio oriente. Tra i membri vi sono: 16 ornitologi, 16 tra ittiologi e rappresentanti di aziende ittiche, pescatori di mestiere e sportivi, 10 ecologi, 7 sociologi e 6 ecologi impegnati sugli aspetti gestionali e regolamentari del conflitto.

(D3) Quale è l'obiettivo di INTERCAFE?

L'obiettivo principale di INTERCAFE è migliorare a livello europeo la comunicazione e lo scambio di conoscenze scientifiche riguardanti le interazioni cormorani-pesca e la gestione dei conflitti tra uomo e fauna selvatica. INTERCAFE spera di portare un contributo utile alla presa di decisioni regolamentari, dal livello locale a quello internazionale, creando e coordinando un sistema di interscambio di informazioni attraverso l'Europa. INTERCAFE si interessa a tre aspetti principali: (a) la riduzione della diffidenza e della mancanza di fiducia tra tutti coloro che hanno un interesse per i cormorani e la pesca; (b) lo sviluppo di strategie di gestione condivisa e collaborativi; (c) il mettere a disposizione informazioni utili e pratiche agli addetti alla gestione delle risorse naturali ed ai legislatori.

(D4) Quali sono i gruppi di interesse coinvolti in INTERCAFE?

INTERCAFE è un'Azione COST inusuale perchè cerca di coinvolgere i gruppi di interesse locale nel lavoro scientifico. Infatti, oltre ad ecologi e sociologi, vi sono molti altri gruppi che, attraverso l'Europa, hanno un qualche interesse nei molteplici aspetti che legano cormorani e mondo della pesca. Tra questi vi sono i pescatori di mestiere, gli itticoltori ed i pescatori sportivi (in acque dolci e marine costiere), i gestori delle risorse ittiche e della pesca, i protezionisti dell'ambiente e degli uccelli, gli addetti alla gestione delle risorse naturali ed i legislatori. INTERCAFE cerca sempre di invitare una rappresentanza degli esperti locali agli incontri di progetto ed ai casi di studio (si veda D5).

(D5) Come funziona INTERCAFE?

Seguendo le procedure previste nell'ambito COST, consiglieri scientifici indipendenti valutano il programma di lavoro di INTERCAFE, prima e dopo ogni iniziativa. I membri di INTERCAFE si riuniscono 2-3 volte all'anno ed in occasione di ogni incontro lavorano per sintetizzare e scambiare le informazioni raccolte in ambito nazionale. Oltre al lavoro generale di INTERCAFE (si veda D7), nel corso di ogni incontro viene affrontato un tema specifico ed un piccolo gruppo di esperti locali viene invitato per discutere con i membri di INTERCAFE aspetti peculiari del conflitto cormorani-pesca. Ad ogni incontro una giornate di lavoro è dedicata ad una escursione "sul campo"; ciò allo scopo di permettere ai membri di INTERCAFE di vedere e discutere con gli esperti invitati gli aspetti specifici della realtà locale. In aggiunta, ogni anno INTERCAFE propone di lavorare su un "caso di studio", un incontro dove membri di INTERCAFE ed esperti locali lavorano insieme per 2-3 giorni analizzando nel dettaglio uno specifico esempio di conflitto cormorani-pesca.

(D6) Come INTERCAFE è finanziato da COST?

INTERCAFE riceve un finanziamento annuale da COST. Così come per tutte le altre Azioni, questo finanziamento non paga per il tempo impiegato né per il lavoro svolto dai membri di INTERCAFE. Il finanziamento copre principalmente i costi di viaggio e le spese di soggiorno dei partecipanti agli incontri periodici. La somma data alle Azioni COST è di circa 70.000 euro l'anno. INTERCAFE non fa eccezione: per le spese di trasporto e soggiorno nel 2004/05 ha ricevuto in media un finanziamento di 350 euro per ricercatore per ciascuno dei tre incontri (Brussels, Lisbona, Danzica) e, nel 2005/06, una somma media di 303 euro per ricercatore in occasione dei meeting in Germania ed Israele.

(D7) Cosa fa INTERCAFE?

INTERCAFE non è un gruppo di pressione. Non ha alcun legame diretto con normatori nazionali o internazionali. Il suo scopo principale è di agire come una rete per lo scambio di informazioni in grado di fornire a scienziati, gruppi locali, e tutti coloro che hanno compiti legislativi e normativi, l'acceso ad informazioni aggiornate sulla situazione in Europa. Nei suoi 4 anni di svolgimento, INTERCAFE conta di produrre, tra le varie cose: (a) un manuale pratico metodologico per coloro che lavorano sui temi cormorani-pesca; (b) una "scatola degli attrezzi" delle potenziali tecniche per mitigare l'impatto dei cormorani; (c) una banca dati ambientale per esplorare stato e distribuzione ecologica e geografica dei cormorani; (d) una serie di brochure su specifici temi legati al rapporto cormorani-pesca.

(D8) Dove trovare maggiori informazioni riguardo INTERCAFE?

Ulteriori informazioni e dettagli sull'Azione COST INTERCAFE sono disponibili nel sito Internet del progetto: http://www.intercafeproject.net

(D9) Cosa è stato REDCAFE?

REDCAFE (*Ridurre il conflitto tra cormorani e pesca a scala pan-europea*) è stato un progetto svolto nel 2000/02 nell'ambito del 5° Programma Quadro dell'UE. Rivolto principalmente agli aspetti biologici, REDCAFE ha formato una rete di ricercatori interessati al tema cormorani e pesca. Come altri progetti del suo genere, l'UE non ha finanziato REDCAFE per svolgere nuove ricerche. Così, in modo del tutto simile a INTERCAFE, REDCAFE non aveva lo scopo di fornire "raccomandazioni" o "soluzioni" per il conflitto cormorani-pesca, ma ha cercato di riunire le informazioni esistenti e renderle disponibili anche al di fuori della comunità scientifica. REDCAFE ha sintetizzato: (a) gli aspetti dell'ecologia del cormorano; (b) il conflitto tra cormorani e gruppi di interesse; (c) i potenziali mezzi di gestione del conflitto usati in Europa. REDCAFE ha anche analizzato un "caso di studio" esplorando il conflitto tra cormorani e pesca ricreativa in un'area dell'Inghilterra meridionale.

(D10) Come trovare maggiori informazioni riguardo REDCAFE?

REDCAFE ha realizzato due rapporti. Il primo, del 2003, ha preso in rassegna il rapporto cormorani-pesca a livello pan-europeo. Il secondo, concluso nel 2005, ha sintetizzato il conflitto in ciascuno dei 24 paesi coinvolti nel progetto, provvedendo informazioni su numero di cormorani, dieta, interazione con la pesca, situazioni specifiche di conflitto, mezzi potenziali di gestione ed una dettagliata bibliografia nazionale. Entrambi i rapporti sono disponibili presso il sito INTERCAFE http://www.intercafeproject.net

Appendix 3 – Group Discussions

(a) Italian translation of broad issues to be covered and membership list of small (N = 9) and larger (3) groups during two days of discussion

Gruppi di Discussione
- istruzioni di lavoro -

GIORNO 1 – VENERDI' 21 SETTEMBRE
Argomenti per la discussione

1. Come preparate o come sono preparati i piani di gestione (o di intervento) nei confronti dei cormorani (ai diversi livelli operativi: es. zona produttiva, comprensorio, provincia, ..)

2. Come pensate/prevedete che le cose cambieranno nel Delta del Po (o nel comprensorio dove operate) nei prossimi 5 anni ? Potete organizzare la discussione utilizzando, ad esempio, i seguenti spunti:

- sostenibilità della pesca / vallicoltura;
- conservazione delle risorse naturali (ambientali, faunistiche, ittiche, …);
- cambiamenti socio-economici (posti lavoro e occupazione, reddito, incremento costi, competizione altri mercati, richiesta prodotto, diversificazione attività produttive, …);
- cambiamenti ambientali;
- cambiamenti politici e normativi;
- altri fattori

3. Come pensate che il rapporto cormorani e pesca potrebbe venir gestito? Quali forme di collaborazione potrebbero/dovrebbero essere messe in campo ? (questo punto è quello che può permettere lo scambio di informazioni, idee ed esperienze tra esperti del Delta del Po e membri INTERCAFE)

GIORNO 3 – DOMENICA 23 SETTEMBRE

Argomenti per la discussione

Ripensando e riprendendo gli spunti della vostra precedente discussione riguardo a:

- come i piani di gestione e di intervento per la mitigazione del conflitto sono preparati e portati avanti;

- quali cambiamenti sono previsti a livello sociale, economico, politico, legislative, etc.;

- le cose che avete visto o sentito durante l'escursione di ieri (sabato 22/9);

- la vostra discussione riguardo quale è la vostra visione per la gestione del conflitto cormorani-vallicoltura;

Illustrate:

4. cosa vorreste cambiare nel modo in cui i piani di gestione sono portati a termini (non tanto in termini di che cosa *dicono*, quanto piuttosto di come sono *fatti*);

5. quali cambiamenti a più alto livello pensate sarebbero d'aiuto? Ad esempio:

- norme e regolamenti (locali, regionali, nazionali, parchi e aree protette, Europa …);

- collaborazioni e relazioni tra enti, organizzazioni, strutture …;

- uso di risorse (es. finanziare, informative, strumentali, …);

6. avete domande e richieste a proposito di INTERCAFE o suggerimenti di come la nostra rete di esperienze e conoscenze potrebbe contribuire a migliorare la vostra situazione ?

(b) Names of Participants in Work Groups

Group 1
INTERCAFE
Bruno Broughton - UK
Marijan Govedic - Slovenia
Szymon Bzoma - Poland
Faustas Stepukonis - Lithuania
Savas Kazanzidis - Greece
Stefano Volponi – Italy (Istituto Nazionale per la Fauna Selvatica (INFS)

ITALY DELEGATES
Paolo Ciani – Vallicolture Azienda Orsi Mangelli

Group 2
INTERCAFE
Ilona Cheyne - UK
Miha Janc - Slovenia
Josef Trauttmansdorff - Austria
Susana França - Portugal
Manos Koutrakis – Greece

ITALY DELEGATES
Emiliano Verza – Province of Rovigo
Giuseppe Penzo – owner of Valle Ca' Pisani

Group 3
Thomas Keller - Germany
Renata Kopecka – Czech Republic
Karlis Millers - Latvia
Loïc Marion - France
Erik Petersson - Sweden

ITALY DELEGATES
Lucilla Previati – Direcot of Regional Park of the Po Delta
Antonio Venturi – Agicultural Department, Province of Ravenna
Sergio Frasson – President Enalcaccia, Province of Ferrrara

Group 4
Reinhard Haunschmid - Austria
Redik Eschbaum - Estonia
Ion Navodaru - Romania
Stef Van Rijn – Netherlands

ITALY DELEGATES
Massimiliano Costa – South Delta Region Park, consultant Ravenna Province
Francesca Curzola – Agriculture and Environment Department, Province of Ferrara
Roberto Cocchi - Istituto Nazionale per la Fauna Selvatica (INFS)

Group 5
Rosemarie Parz-Gollner – Austria
Jaroslav Bohac – Czech Republic

Mikael Kilpi – Finland
Nikolay Kissiov – Bulgaria
Henri Engström – Sweden

ITALY DELEGATES
Gabriele Facchin – Region Friuli Venezia Giulia
Mauro Cosolo – University of Trieste
Milva Sacchetti – Agricultural expert (Po Delta Park)
Michele Bottazzo – Veneto Agricoltura, Settore Ricerca e Sperimentazione, Ufficio faunistico Viale dell'Università
Davide Emiliane – WWF
Maria Cristina Veratelli – Po Delta Park

Group 6
Ian Russell – UK
Kareen Seiche – Germany
Oleg Nemenonok – Latvia
Pekka Salmi – Finland
Mindaugas Dagys – Lithuania

ITALY DELEGATES
Alessandro Todisco–Agronomist consultant, Province of Ravenna
Vanni Bellonzi – Head of Institute, Province of Rovigo
Giacomo Benelli – Collaborator of the Environment department, Po Delta Park Emilia-Romagna
Gherardo Marcolin - Representative for 25 aquaculture companies in Region known as CONFAGRICOLTURA [Associazione Vallicoltori Provincia di Rovigo]

Group 7
Mennobart Van Eerden – Netherlands
Nils Røv – Norway
Ger Rogan – Ireland
Petr Musil – CzechRepublic
Botond Kiss – Romania
Catarina Vinagre – Portugal

ITALY DELEGATES
Galeazzo Vianelli – Fishing valli owner, Po Delta
Roberto Cocchi – INFS

Group 8
Viliu Lillileht – Estonia
Ohad Hatzofe – Israel
Robert Gwiazda - Poland
Linas Lozys – Lithuania
Ivailo Nikolov – Bulgaria

ITALY DELEGATES
Federico Brunelli – Ministry of Agriculture from Ravenna
Francesco Galletti – Fauna damages, Province of Ravenna

Group 9
Zeev Arad – Israel

Timo Asanti – Finland
Michael Andersen – Denmark
Daniel Gerdeaux – France
Jean-Yves Paquet – Belgium

ITALY DELEGATES
Adriana Galvani – University of Bologna
Giorgio Lazzari – L'Arca (NGO)
Sandro Gino Spinello – Province of Rovigo
Francesco Veronese – Province di Rovigo

Other local contacts for the meeting:
Alessandro Faccioli (Vice President of FEDERCOPESCA a national fishermen association)
Aldo Tasselli –Region Emilia-Romagna
Monica Attolini- Province di Rovigo
Emanuela Finesso- Director of Po Delta Park, Veneto Region
Giovanni Mazzolani – Province di Rovigo

On Day Three:
Group A = Groups 4, 5, 8
Group B = Groups 1, 3, 7
Group C = Groups 2, 6, 9

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Provincia de Rovigo