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Topic 2: Priorities in industrial transformation strategy

Priorities for attracting global resources and talents to drive industrial transformation
(Experience from specific countries/localities)

**The experience of the Po Delta Natural Park in the sustainable economic
development of the territory**

Massimiliano Costa

Biologist

Ente di gestione per i Parchi e la Biodiversità-Delta del Po (Po Delta Natural Park
Management Body)

Director

massimilianocosta@parcodeltapo.it

+39.335.7890341

Abstract

The Po Delta Natural Park of Emilia-Romagna is a 540 km² and part of a 1.640 km² UNESCO World Heritage Site and of a 1,400 km² UNESCO Biosphere Reserve, in northeast Italy.

Over the last 35 years, thanks to the presence of the protected area, this territory has developed sustainable and flourishing productive activities, such as naturalistic and cultural tourism, agricultural or fishery products, transforming a depressed territory into an economically important area and guaranteeing, at the same time, the conservation of landscape, of natural heritage (biodiversity) and of cultural assets.

The role and actions of the Natural Park and the Biosphere Reserve are analysed and quantified in this paper.

Main content

Introduction

The Po Delta Natural Park was established by the Emilia-Romagna Region in 1988. It is located where the waters of the Po River and those of some Apennine streams of the Romagna plain, which once became swampy at the southern limits of the Po Delta, meet the Adriatic Sea.

It has an area of over 540 km², along 80 km of coastline and extends inland for approximately 35 km at the furthest point from the sea.

It includes the southern part of the active delta, with the branch of the Po di Goro and the Sacca di Goro and the entire historical delta, from the Po di Volano to the Po di Primaro (today the Reno River) and to all the wetlands and dune belts remaining of the coastal system from Roman and medieval times.

Since 1999, the Po Delta is also part of the UNESCO World Heritage Site “Ferrara, City of the Renaissance, and its Po Delta”, as a remarkable cultural landscape.

The area comprises the urban centre of Ferrara and adjoining agricultural lands within the ancient and vast Po Delta.

The Po Delta been settled for millennia. From the 14th to the 16th centuries, the ruling Este family carried out extensive land reclamation and building projects, which give this area a distinctive character link with Ferrara, seat of the Este family.

Transformations made to the countryside surrounding Ferrara during the Renaissance included: drainage of huge swathes of swampland, establishment of *castalderie* (estates), creation of new waterways and streets as part of the overall urban development plan and construction of a network of noble residences known as the *delizie estensi*. This work led to a new fabric of agricultural production and the construction of Ducal residences as the political sign of magnificence. These were designed to mirror the image of the Court beyond the urban confines, and again formed part of a process of integration and continuity between the city and the surrounding countryside.

The original form of the Renaissance landscape of the Po Delta is still recognizable in the region’s 21st-century layout.

The Po Delta is also a Biosphere Reserve, nominated in 2015, including the entire active Delta, up to the portion falling within the Veneto Region, up to the Venice Lagoon.

The Po Delta has a rich variety of environments: river branches and freshwater swamps and marshes, brackish “valli” (lakes and marshes) and sea lagoons, woods and pine forests, dunes and natural beaches, in three fundamental typical landscapes, recognizable in a journey towards the sea flowing from the ancient Delta (on the west and on the south), to reach the coastal dunes and, finally, to make room for the water in the active Delta, wedging into the sea.

The current structure of the Po Delta is the result of the action of the river and the most recent human activity, which, nevertheless, contributed to its structure.

Over the centuries the Po has progressively sedimented its alluvial deposits at the mouth, thus determining the progressive advancement of the coastline, of which are the remains (abandoned riverbeds, fossil dunes, marshes) between Venice and Ravenna.

Cultural values

The first human settlements date back to the Bronze Age (1200-1000 BC), but it was during the Etruscan civilization that the Po Delta became a strategic area, with the three important ports of Adria, Spina and Ravenna, which the Romans subsequently expanded, also establishing a network of colonies.

In the Middle Ages, the economy regressed and the survival of the people of the Delta was for centuries linked to fishing, hunting, wild farming, salt production, harvesting and processing of marsh herbs, which have resulted in a various and interesting popular culture.

Two extreme events contributed to the formation of the current Po Delta: the “Rotta di Ficarolo” (mid-twelfth century), which moved north the main course from the Po di Volano and the Po di Primaro to the Po di Venezia; the “Taglio di Porto Viro” (1600-1604), made by the Venetians to prevent the silting up of the Lagoon, thus giving rise to the development of the modern Delta and the definitive abandonment of the fossil Delta, from the Valli di Comacchio to Ravenna.

Natural values

The Po Delta is one of the areas with the highest biodiversity in Italy and Europe with over 1,000 species of plants, almost 800 species of vertebrates, including almost 350 species of birds, which make it one of the most important destinations for birdwatching on a continental level.

Among the various species, the ones worth highlighting are pigmy cormorant (*Microcarbo pygmaeus*), great white egret (*Ardea alba*), squacco heron (*Ardeola ralloides*), purple heron (*Ardea purpurea*), spoonbill (*Platalea leucorodia*), glossy ibis (*Plegadis falcinellus*), greater flamingo (*Phoenicopterus roseus*), shelduck (*Tadorna tadorna*), ferruginous duck (*Aythya nyroca*), marsh harrier (*Circus aeruginosus*), red-footed falcon (*Falco vespertinus*), Eurasian crane (*Grus grus*), oystercatcher (*Haematopus ostralegus*), black-winged stilt (*Himantopus himantopus*), pied avocet (*Recurvirostra avosetta*), Kentish plover (*Charadrius alexandrinus*), Mediterranean gull (*Ichthyophaga melanocephalus*), slender-billed gull (*Chroicocephalus genei*), gull-billed tern (*Thalasseus sandvicensis*), little tern (*Sternula albifrons*), whiskered tern (*Chlidonias hybrida*), roller (*Coracias garrulus*). The endemic species are very important. Among plants there are the Venetian glasswort (*Salicornia veneta*), the Tommasini’s centaury (*Centaurea tommasinii*), the Venetian feather grass (*Stipa veneta*), the Italian salt grass (*Puccinellia gussonei*); among fish the Adriatic sturgeon (*Acipenser naccarii*), the Adriatic roach (*Rutilus aula*), the Southern pike (*Esox cisalpinus*), the Adriatic dwarf goby (*Knipowitschia panizzae*), the Canestrini’s goby (*Pomatoschistus canestrinii*); among amphibians the Italian crested newt (*Triturus carnifex*), the Northern Italy common spadefoot (*Pelobates fuscus* ssp. *fuscus*), the Po’s tree frog (*Hyla perrini*), the Italian agile frog (*Rana latastei*), the Italian edible frog (*Pelophylax kl. hispanicus*).

Large mammals, extraordinary for such an inhabited plain area, such as wolf (*Canis lupus*), wild cat (*Felis silvestris*), Italian red deer (*Cervus elaphus* ssp. *italicus*), roe deer (*Capreolus capreolus*), wild boar (*Sus scrofa*) are also of interest.

Tourist attractions and activities

The Po Delta amazes wherever and however you visit it.

Starting from Mesola Castle, along the spectacular Biverare boulevard, you reach the Wood of Santa Giustina and, more South, the large Wood of Mesola, overlooking the Sacca di Goro (which can also be visited by boat, up to the lonely lighthouse stretching out into the Adriatic, at the beginning of the long sandy Scanno di Gorino) and on the complex of marshes at the mouth of the Po di Volano.

Along the Romea road, which leads south, the Pomposa Abbey is a fascinating and unmissable place. Further south is Comacchio, the “capital” of the Delta, with its historic centre crossed by canals and bridges, just like Venice. From the Manifattura dei Marinati, a “living museum” where marinated fish is still produced according to ancient Comacchio recipes, we continue towards the Bettolino di Foce, from which the boat tour to the ancient “casoni” (fishing houses) in the marsh starts. The nearby Saltwork of Comacchio, with breathtaking views and flocks of flamingos, completes the visit to the northern part of the Valli.

Further inland, the Vallette di Ostellato are a well-equipped paradise for birdwatching and the Valli di Argenta, which can be visited starting from the Campotto ecomuseum, which represent the most important freshwater marsh complex in Italy.

After crossing the Reno River, overlooking the southern Valli di Comacchio, you will find the town of Sant’Alberto, with the Palazzone Estense, home to the ornithological museum of the Delta, from which the visit to Boscoforte and the Valli starts. Not far away are the Lamone marshes: Valle Mandriole and the magical flooded forest of Punte Alberete, which concentrate the highest biodiversity of the Delta, together with the neighbouring San Vitale Pinewood (one of the largest woods in the Po Valley) and, towards sea, to the coastal lagoon Pialassa della Baiona.

South of Ravenna, it is possible to visit the Pineta di Classe, from the ancient pinewood house of the Aie and the coastal marshes of the Ortazzo-Ortazzino, even by boat, starting from the Bevanella visitor center. Here, the beaches surrounding the stream Bevano mouth are probably the most beautiful in the Delta. Finally, the great Salina di Cervia, a kingdom of waders and flamingos.

Lots of great photos of birds: colourful, confident, abundant and easy to observe everywhere. Then, intimate and unforgettable memories and fascinations, like the scent of the brackish that rises, among the mists, from the marshes dotted with glasswort; the light and elegant dance, in the first warmth of spring, of the impalpable duvets of the poplars; the pure white of the magical water lily’s flowers, floating on the water of the marshes and the delicate violet of the sea lavender prairies in bloom,

at the edges of the lagoons between August and September; the incessant and unmistakable song of the great reed warbler, from the dense reedbeds.

The Delta stimulates all the senses. But, above all, the taste: the famous Rice of the Delta PGI; the unmistakable Wine delle Sabbie DOC; the Asparagus of Altedo PGI; the Peach of Romagna PGI and the Pear of Emilia-Romagna PGI; the Slow Food Presidia of Marinated Eel of Comacchio and Sweet Salt from Cervia. As for crafts, undoubtedly artifacts in marsh grass, such as hats, bags, slippers, placemats: beautiful, fragrant and unique.

The spur and pull of the territory

The presence of the Natural Park and the Biosphere Reserve has allowed us to attract important funding and stimulate the renovation of historic centres (Comacchio, Mesola), the recovery of ancient traditional food and wine products (also enhanced through a Natural Park quality mark), and the start-up of private activities linked to territorial valorization.

To stimulate and assist the start-up of sustainable and innovative activities, the Park Authority has also promoted sector studies and scientific research aimed at new sustainable agricultural or fisheries production.

The benefit determined by the establishment and initiatives of the Natural Park on the local economy is undeniable. The unemployment rate in the province of Ferrara (which occupies approximately 2/3 of the Natural Park) went from 9.3% in 1991 (32.1% youth unemployment alone) to 5.2% in 2001 (17, 1% youth unemployment) (ISTAT, 2011). The income per person went from 12,039.00 euros in 2001 to 15,603.00 euros in 2016 (Comuni Italiani, 2016).

A slight decline in both economic figures has occurred in recent years, due to Covid-19 and, locally, the explosion of the Atlantic blue crab (*Callinectes sapidus*) population, which has destroyed shellfish farms.

The direct related revenues and the general economic impact

The network of structures created by the Park over 35 years (7 visitor centres; 8 museums; dozens of km of pedestrian, cycling, equestrian and nautical routes) has attracted, over time, an ever-increasing number of tourists.

The visitor centres, museums and some of the routes where the accompaniment of a guide or the pilot of a tourist boat is mandatory are entrusted to private companies. The paying visitors to these Park facilities, managed by external companies, are approximately 200,000 per year, for a turnover of approximately 2,000,000 dollars per year (unpublished Park Authority's data).

We do not know the precise number of visitors who frequent private facilities and visit free-to-use sites and paths, which we can estimate at around 20,000,000 per year, according to the number of tourists of the 9 cities and towns inside the Park. For these it is impossible to directly detect the economic impact, but, estimating a per capita expenditure of around 10 dollars, the total revenue is around 200,000,000 dollars.

The international cooperation

In over 35 years of activity, the Park has established partnerships with the other European Deltas (Volga, Danube, Rhone, Ebro), promoting the establishment of the *Delta chiama Delta* (Delta calls Delta) agreement, to organize joint activities and exchange know-how and good practices.

The Park, as a member of the Italian Federparchi (the association of the Italian natural parks), participated actively in the foundation of the Europarc Federation (the association of all the natural parks of Europe).

The Park collaborates closely with the other European and Italian UNESCO World Heritage sites and UNESCO Biosphere Reserves.

This made the Po Delta known internationally and allowed us to develop numerous projects to obtain international funding, for an amount of about 100 million euros.

In the next future, we hope that the imminent agreement with the Italy-Vietnam Foundation will allow us to develop joint activities with other areas of the world and, for example, to develop joint activities and marketing with other international destinations for birdwatching, such as the extraordinary Mekong Delta.

Some case studies

UNESCO Biosphere Reserve

Since 2015, the Po Delta has been designated a Biosphere Reserve as part of UNESCO's Man and Biosphere (MaB) programme.

The inclusion of a territory in the UNESCO MaB program network offers multiple advantages and opportunities.

1) Stimulates constant improvement of good management, so as not to lose the acknowledgement. The periodic control of management tools and management effectiveness carried out by UNESCO, for confirmation of recognition, pushes the body responsible for managing the Biosphere Reserve to constantly update its tools and maintain high standards of management of the area protected. Then, every 10 years, the specific Management Plans of the Biosphere Reserve must be renewed, verifying the effectiveness of the policies implemented and foreseeing new specific activities for the following decade. Furthermore, the nomination gives awareness (not only to the staff of the Park Authority, but also to administrators, businesses, NGOs, private citizens), of the importance of the territory and gives the community a responsibility before the whole world.

2) Stimulates the active conservation of natural and cultural heritage. The conservation of natural heritage (geological and biological) is one of the purposes of Biosphere Reserves and must be conducted effectively by the managing body. Likewise, especially after the introduction of the MaB program which combines the naturalistic value with the importance of sustainable human activity, the conservation

of cultural values, the maintenance and enhancement of traditional human activities, sustainable socio-economic development have become a must for the Biosphere Reserve manager. This aspect is also very important for tourism promotion and success: if the elements attracting visitors are not well-preserved (landscape, biodiversity, traditional products, monuments, ethnography and folklore) the territory will lose appeal; thanks to this awareness, the whole community will commit to conserving the peculiarities and values of the Biosphere Reserve.

3) Allows you to participate in research activities, exchange of good practices, financing promoted by UNESCO or by national governments for UNESCO sites.

In 2017 the Po Delta Biosphere Reserve organized and hosted the first World Youth Forum of the UNESCO MaB programme; the global event, organized by the secretariat and regional office of UNESCO in Venice, took place for the first time and hosted young people from all over the world. The objective was to involve and invest in the young generations who live in the territories of the MaB reserves, to draw up a program of objectives for sustainable development.

In 2021 the Po Delta Biosphere Reserve has participated in the Intergovernmental Hydrological Program (IHP), meeting researchers and experts in water management, particularly in transition coastal areas, as part of a project aimed at addressing problems caused by the effects of climate change; during this activity, the Park Authority participated in the MaB-IHP Regional Symposium “Managing Water Resources in Biosphere Reserves in South East Europe and the Mediterranean” (16-17 December 2021, Venice).

In 2022 the Emilia-Romagna Region received funding for an amount of 30 million euros for the strengthening of the visit system of the tourist attractions of the Po Delta (cycle paths, museums and visitor centres, hiking routes, equipped areas).

In 2023 the Park Authority received funding for an amount of 875,000 euros from the Italian Government to be distributed to the Municipalities in its territory for energy efficiency, reforestation, and the creation of cycle paths.

Every year the Park Authority receives from the Italian Government approximately 80,000 euros for environmental education activities relating to the issues of the Biosphere Reserve, to be carried out in the schools of the protected area.

Every year the Park Authority receives from the Emilia-Romagna Region approximately 70,000 euros for research, promotion, valorization and citizen awareness activities on the issues of the Biosphere Reserve; with these funds we organize awareness-raising activities on sustainable development, programs for the promotion and valorization of the natural and cultural heritage, a gastronomic competition between the restaurants of the Biosphere Reserve to valorize the typical products of the territory, an international photography competition to promote the territory and the MaB network.

4) allows to an effective promotion of the territory, thanks to the prestigious UNESCO brand. In addition to the availability of funding aimed at promoting the territory, highlighted in the previous point, the mere inclusion in the global network of Biosphere Reserves is an added value for the valorization of the territory.

The Park Authority has developed and approved a brand image of the Po Delta Biosphere Reserve, with the main purpose to convey the values of the Reserve and promote the culture of sustainability. It is exclusively a promotional brand image, not a "quality mark" that certifies the performance of those who boast it, but rather, the use of the Po Delta Biosphere Reserve brand intends to reward the ambition of a territory and a community towards improvement, growth, the need for sustainable development.

The brand is granted to public and private entities who, sharing the objectives and strategies of the UNESCO MaB program, start a path of improvement, proportional to their capabilities and independent of the starting point.

Secondly, the brand image is aimed at increasing knowledge of the Po Delta Biosphere Reserve, both within the local community and by addressing the international context. The choice to extend the use of the Po Delta Biosphere Reserve brand to all types of public and private entities intends both to guarantee its wide diffusion and, at the same time, to carry out an effective action to involve local stakeholders. For the purposes of the local and global diffusion of the brand image of the Po Delta Biosphere Reserve, the role of private entities is fundamental. Their international audience and their roots in local communities can in some cases be superior to those of the Po Delta Biosphere Reserve, therefore private entities obtaining and using the Po Delta Biosphere Reserve brand are "supporters" of the Biosphere Reserve, since they strengthen its identity and diffusion.

By requesting and granting the use of the brand image, these subjects and the Biosphere Reserve sign a "pact": the former commit to pursuing the environmental, social and ethical values of the MaB program, aiming for continuous improvement; the Biosphere Reserve guarantees them visibility and broader involvement in its communication and awareness strategy, which will also tell the ways in which these subjects implement their commitment to the sustainable development of the Po Delta, or their daily contribution to the pursuit of the Reserve's objectives. The subjects to whom the "Biosfera Delta Po" brand will be granted will therefore constitute an informal "network of supporters of the Reserve", who may subsequently be involved in further promotional initiatives, or projects useful for pursuing the sustainable development of the territory.

We have nowadays 30 "Supporters of the UNESCO Biosphere Reserve" companies, using the brand image, of which:

- environmental guides and outdoor tourism: 5
- agricultural companies: 3
- hotels, B&B and other accommodation facilities: 5
- gastronomic artisan workshops: 3

- hunting or fishing associations: 2
- environmental services: 3
- tourist agencies: 1
- trade and fair agencies: 1
- trade associations: 1

A strategy for the relaunch of birdwatching

There are tens of millions of birdwatchers in the world (for example 96,000,000 in the United States according to M. Devokaitis), with significant business volumes (80 billion dollars in the United States according to J. Ewing).

The European market is strongly increasing, according to CBI (2021), stating this based on the following reasons:

- birdwatchers are usually elderly people, but the age range of birders is getting broader;
- the use of online tools is becoming more and more popular, both before and during travel, offering a huge amount of information on birdwatching, birding and bird travel worldwide;
- wildlife and birdwatching photography have become increasingly popular among tourists; this trend is largely driven by the decreased prices of high-quality cameras;
- European birdwatchers care about preserving the natural habitat of the birds they want to see.

“The ornithology tourism market is predicted to rise at a CAGR of 5.3% from 2024 to 2034. The global ornithology tourism market is anticipated to reach US\$ 1.1 trillion by 2034” (Saha, 2024).

With almost 350 species of birds reported, of which over 250 regularly present and 100 easily observable every day and concentrated in easily accessible sites, with the presence of IUCN World very rare species such as ferruginous duck, greater spotted eagle (*Clanga clanga*), red-footed falcon, Italian sparrow (*Passer italiae*) and large and fascinating species such as greater flamingo, Eurasian crane and mute swan (*Cygnus olor*) the Po Delta Park is an ideal site for birdwatching, certainly the most important in Italy. Furthermore, the presence of a very rich biodiversity, with many endemic species among plants, insects, fish, amphibians and the ease of observation of large mammals, including fascinating species such as the Italian red deer and the wolf, make the Po Delta Park a potential destination of choice for birdwatchers and biodiversity observation enthusiasts. Despite this, the Po Delta has never managed to become a real international destination for nature tourism and for birdwatching.

In the early 2000s, the Local Action Group GAL Delta2000 (a sort of agency for the promotion of the territory), in collaboration with the Park Authority and the Provinces of Ferrara and Ravenna, started a program to enhance and promote the Po Delta as a destination for international birdwatching. In a few years of work, they managed to position the Po Delta on the international market, making agreements with about ten international tour operators (mostly English) to include the area among their

destinations. The Po Delta Natural Park has also participated several times at the prestigious British Birdwatching Fair (now the Global Birdwatching Fair).

However, the territory was not ready to properly accommodate this type of tourism. There were only a few sites equipped for birdwatching and, in most cases, they were not well-designed or were in a state of abandonment. Furthermore, in the car parks of the most important birdwatching sites, thefts of optical and photographic equipment from cars were very frequent. Finally, the private tourist reception system (hotels, B&Bs, birdwatching guides, boat pilots) was not prepared and adequate to the needs of birdwatchers.

The result of all this has led, within ten years or so, to the disappearance of the Po Delta from the important international birdwatching market.

The Park Authority currently intends to relaunch the Po Delta as an international destination for birdwatching, so as not to lose this important unexpressed vocation.

We are now planning to build four new perfectly made birdwatching and photography hides and a new tower, to restore three existing towers and to renovate the entire birdwatching sites already set up (with walkways, bridges, huts, towers), but partially in a state of degradation. All these actions are already financed with regional funds or European Union funds.

It is essential that birdwatching facilities are:

- built in the best places for birdwatching;
- with the right light;
- with a beautiful landscape and “scenography”;
- well screened to cause minimal disturbance and to get close to the birds;
- built to allow the observation and photographing of the greatest possible number of different species, especially the most interesting ones.

In the next five years we want to equip also all the other most important areas for birdwatching and improve the sites already set up, starting with the most suitable ones.

Maintenance and cleaning of the hides and towers is very important. Even more important is that the management of the areas in front of the hides and towers is then constant and careful. Finally, the management of natural habitats is fundamental: the management of water levels and vegetation must be carefully adapted to the needs of the birds in stopover and feeding. Over the past three years, the Park Authority has perfected and optimized the hydraulic management of the wetlands for the needs of birds and other wildlife. Furthermore, we have set up a work team for the maintenance of the vegetation and the Park's structures, including those for birdwatching, to always keep them at maximum efficiency. This team will also directly manage the photography and birdwatching hides, conserving the birds and accompanying the visitors.

To solve the problem of car thefts, we have already obtained regional funding to set up surveillance cameras, connected to the operations centres of the Police Forces.

In the entire territory of the Po Delta Park, there are less than five active and adequately trained birdwatching guides. In July 2022, the Park Authority approved a regulation for the "Birdwatching Guides of the Park", to improve the service:

- select people who are already trained;
- provide them with training courses;
- certify their skills through a special register;
- promote them through the website and promotional materials.

The Riviera Romagnola certainly does not lack accommodation facilities, with over 1,000,000 beds within a few kilometres. However, these accommodations are not suitable for the expectations of birdwatchers and, in general, nature tourists. They are suitable for seaside tourists. What is needed are facilities close to natural sites, with the right atmospheres, passionate owners who can provide suggestions for birdwatching, evocative and suggestive accommodation, perhaps even routes in the areas of the facility.

Once the territory is structured and ready, it is necessary to identify the correct marketing strategy:

- identify the flagship species, which attract the visitor and justify the trip;
- carry out conservation projects for rare birds and promote their results at an international level;
- promote high-level scientific research;
- collect and disseminate data on birds;
- publish guides, manuals, brochures, web pages, videos;
- involve environmental associations and trendy birdwatchers (testimonials);
- organize thematic events;
- directly promote the Po Delta as a birdwatching destination.

The amazing story of shellfish farming

“*Vallicoltura*” is a traditional form of aquaculture typical of the Po Delta, probably dating back to the ancient Roman time. The fish are bred in the wild, free in large salt lakes or marshes, artificially separated from the sea. Once a year, during their migration towards the sea before the winter (eels for reproduction; mullets, sea breams and sea basses to shelter from the cold in the warmer waters of the Adriatic Sea), the connections with the sea are closed using a traditional, ancient structure called "lavoriero". This traditional form of fishing is still done by the Park in the Valli di Comacchio and by some noble families or entrepreneurs in private “*valli*”, to preserve an ancient tradition and the landscape, the environment, the biodiversity connected to it. This activity also requires the maintenance of an ancient gastronomic tradition, protected by a Slow Food Presidium, the *Anguilla Marinata Tradizionale delle Valli di Comacchio* (Traditional Marinated Eel of the Valli di Comacchio), which is still produced with the traditional recipe in the ancient Manifattura dei Marinati (Marinated Fish Factory), now a visitor centre and living museum of the Park, which keeps this historical tradition alive.

However, in the large publicly owned lagoons, still directly connected to the sea and subject to the flow and outflow of the tide, a new and modern form of aquaculture has developed in recent decades, equally linked to the territory of the Po Delta and which has become a good and interesting example of community economic redemption: the shellfish farming.

Clams have always been harvested in the Po Delta and in the Adriatic Sea in front of it and fishing for the Venus clam (*Chamelea gallina*) is still a very widespread practice, with around 20,000 tonnes of annual product in Italy (Bargione *et al.*, 2023). In the Goro lagoon (Sacca di Goro) there was historically a population of grooved carpet shell (*Ruditapes decussatus*), used for food purposes. In 1983, Japanese carpet shell (*Ruditapes filippinarum*) was introduced for breeding purposes, to try to start a breeding farm in the Venice lagoon.

“Italy is among the main aquaculture producing countries of the EU, after Spain and France. Currently, aquaculture contributes about 48 percent of the total national fish production; in 2013, the total national aquaculture production was estimated at 162 600 tonnes, composed of 38 800 tonnes (24 percent) produced in freshwater and 123 800 tonnes (76 percent) in marine and brackish waters. Mariculture consists of finfish (11 percent) and mollusks (89 percent). The farming of mollusks is based heavily on the Mediterranean mussel, the Japanese carpet shell and grooved carpet shell... The shellfish sector is composed of mussels (*Mytilus galloprovincialis*) and clams (*Ruditapes philippinarum*). While mussels are grown by cooperatives having a concession over the areas they use, clam is a cultured resource in a co-management regime. Each area is managed by a consortium, Consorzio per la Gestione delle Vongole (Clams) (CO.GE.VO), having de facto natural property rights over the area clams are grown. While European and national rules apply for technical aspects, as the dimension of each type of mollusk allowed to be taken, each Consortium decides on daily quotas for each vessel and each type of mollusk, fishing hours, period of catch, etc.” (FAO, 2024)

Various attempts have been carried out almost along all the Italian coastline, but in the most cases the results were unsuccessful; except that in the upper Adriatic lagoons of the Po Delta: in the Goro lagoon the Japanese carpet shell breeding started in 1986 and in a few years the production assumes a typical exponential trend until reaching the maximum (60-65,000 tons) in the 1990s (Turolla, 2022).

For years Goro's economy was based almost entirely on shellfish farming, with over 1,300 employees, out of a total working population resident of just over 3,500 citizens, for an annual production in 2011 of over 15,000 tons and with an income of over 60 million euros (Malorgio *et al.*, 2012).

The most interesting element of this experience of economic development is the social organization of the fishermen, which occurred through the establishment of small cooperatives, associated with each other in a single entity. For about 30 years, the Goro Fishermen's Consortium (Co.Pe.Go.) has represented an interesting example

of cooperative consortium activity, capable of reviving the economic fortunes of a territory.

Since 2002 the activity also began in the nearby city of Comacchio, in the Fattibello lagoon and in the channels connecting the Valli di Comacchio and the sea, developing rapidly and soon employing hundreds of fishermen, even in this case organized into small cooperatives, associated with each other. On 25 November 2020 was established by 1,395 members of 32 cooperatives in Goro and Comacchio the unique consortium of cooperatives called Con.Uno, one of the largest in Europe in the shellfish farming sector.

Production in 2021 was 22,000 tons (Turolla, 2022), but in the last years there was a significant decline, because of Covid-19, decrease in the availability of juveniles, climate change and, since 2023, because of the Atlantic blue crab population explosion.

However, the activity and innovation do not stop. Since the second half of the 1980s, mussel farming has also developed, starting from the sea in front of Marina di Ravenna and in the Goro lagoon; in 2022, overall, there were around 30 cooperatives working on mussel farming, for a production of 20,000 tons with the employment of about 300 workers (Vasi, 2022). This activity is less affected by predation by the Atlantic blue crab if carried out in the open sea.

The oyster (*Crassostrea gigas*) farming activity also began in 2015, again starting from the Goro lagoon; production is still limited, but future forecasts are for an increase (Turolla, 2022).

In conclusion, in the stretch of sea between Ravenna and Goro and in the lagoons of Goro and Comacchio, shellfish farming and fishing are brilliant example of economy: the result of cooperation, innovation and the presence of the protected area, which has directed development with rigorous criteria of sustainability and protection of the ecosystem.

References

- Bargione G., Barone G., Fabbri S., Virgili M., Lucchetti A., 2023. La vongola (*Chamelea gallina*): uno studio sulla sopravvivenza della specie. <https://www.pubblicitaitalia.com/pesce/prodotti/il-pesce/2023/1/21220>
- CBI (2021). The European market potential for birdwatching tourism. Centre for the Promotion of Imports from developing countries. <https://www.cbi.eu/market-information/tourism/birdwatching-tourism/market-potential#which-european-countries-offer-most-opportunities-for-birdwatching-tourism>
- Comuni Italiani (2016). Redditi Irpef Provincia di Ferrara. <https://www.comuni-italiani.it/038/statistiche/redditic.html>
- De Angelis G. (2023). Osservatorio sull'economia e il lavoro in provincia di Ferrara. Numero 12. IRES Emilia-Romagna. <https://ireser.it/wp-content/uploads/2023/10/OEL-FERRARA-2023.pdf>

Devokaitis M. (2024). A Third of American Adults Are Birdwatchers, According to Nationwide Survey. <https://www.allaboutbirds.org/news/a-third-of-american-adults-are-birdwatchers-according-to-nationwide-survey/#:~:text=From%20the%20Winter%202024%20issue,benefit%20of%20birds%20in%202022.>

Ewing J. (2019). The big business of birdwatching. <https://www.haciendabaru.com/en/blog/the-big-business-of-bird-watching/>

FAO, 2012. "*Chamelea gallina* (Linnaeus, 1758)". Species Fact Sheets. Fisheries and Aquaculture Department, Food and Agriculture Organization. Retrieved February 14, 2012.

FAO, 2024. Fishery and Aquaculture Country Profiles. Italy, 2014. Country Profile Fact Sheets. In: *Fisheries and Aquaculture*. Rome. Updated May 18, 2015 [Cited Wednesday, August 28th 2024]. <https://www.fao.org/fishery/en/facp/ita>

ISTAT (2011). Mercato del lavoro. Disoccupazione. Istituto Nazionale di Statistica, <https://ottomilacensus.istat.it/sottotema/038/038008/12/>

Malorgio G., De Rosa C., Mulazzani L., 2012. Quarto rapporto sull'economia ittica in Emilia-Romagna – 2012. Regione Emilia-Romagna, Assessorato Agricoltura, Economia Ittica, Attività Faunistico-venatorie, Servizio Economia Ittica. <file:///C:/Users/Utente/Downloads/Rapporto%202012%20Osservatorio.pdf>

Saha S. (2024). Ornithology Tourism Market Outlook from 2024 to 2034. [https://www.futuremarketinsights.com/reports/ornithology-tourism-sector-perspective-and-](https://www.futuremarketinsights.com/reports/ornithology-tourism-sector-perspective-and-outlook#:~:text=Ornithology%20Tourism%20Market%20Outlook%20from%202024%20to%202034&text=The%20ornithology%20tourism%20market%20is%20predicted%20to%20rise%20at%20a,US%24%201.1%20trillion%20by%202034)

[outlook#:~:text=Ornithology%20Tourism%20Market%20Outlook%20from%202024%20to%202034&text=The%20ornithology%20tourism%20market%20is%20predicted%20to%20rise%20at%20a,US%24%201.1%20trillion%20by%202034](https://www.futuremarketinsights.com/reports/ornithology-tourism-sector-perspective-and-outlook#:~:text=Ornithology%20Tourism%20Market%20Outlook%20from%202024%20to%202034&text=The%20ornithology%20tourism%20market%20is%20predicted%20to%20rise%20at%20a,US%24%201.1%20trillion%20by%202034)

Turolla E., 2022. Le sfide della molluschicoltura regionale, il caso Goro. Istituto Delta Ecologia Applicata. <https://www.alimenti-salute.it/sites/default/files/6.%20Turolla.pdf>

Vasi P., 2022. Molluschicoltura in Emilia-Romagna: fra tradizione e sviluppo. Regione Emilia-Romagna, Settore Attività faunistico-venatorie e valorizzazione della pesca. https://www.alimenti-salute.it/sites/default/files/10.Vasi_.pdf