



Munich Personal RePEc Archive

## **Sustainability Models for the Venice lagoon fishing sector**

De Pin, Antonio

Dipartimento di Economia - Università Ca' Foscari Venezia

1 March 2006

Online at <https://mpra.ub.uni-muenchen.de/82603/>  
MPRA Paper No. 82603, posted 11 Nov 2017 08:01 UTC

# **Models and indicators for the analysis of the local sustainability in the example of the fishing sector of the Venice lagoon**

## **Sustainability models for the Venice lagoon fishing sector**

### **Premise**

The concept of the sustainability, even if in the diversity of the scientific positions, needs, to assume an operating valence, the choice of suitable instruments to its measurement, generally flavored and accepted. The knowledge that in the territory we have the relations among the environmental components and we define a greater subjective responsibility in pursuing objects of sustainability, places in the first place the importance of the local within like dimension of analysis. The territory becomes the reference of the sustainable development, the cure of its substance implies the acquaintance of the elements that generate its identity.

Is above all the city context the privileged within of surveying, in which the confrontations between environment, economy, quality of the life are manifested, for the elevated concentration of people, activity, flows of matter and energy. The measure and the evaluation of the different aspects of the sustainability become preliminary to the assumption of local political choices. To Venice, problems the relative ones to the sustainability specify in the peculiar relationship between economic development and lagoon ecosystem, become gradually more complex, effect of a progressively evolution more and more detached from the environmental problems.

The search of the re-balance is expressed in the possibility to realize and to maintain a model of compatible economic and social activities and not in contrast with the complexity of the ecosystem. From such tasks, ours intention is to contribute to the analysis of the sustainability in

local within, through the proposition of the specific instruments, suitable to identify and to exemplify the different problems of the Lagoon's development.

The focus of the our study has been to research and evaluate the sustainability and development of the Veneto lagoon system, with particular reference to the fishing sector and the activities related to fishery.

The indicators develop to you are proposals also which instrument of monitoring and verification of the congruenza of the undertaken distance, in surveying of the adequacy of objects to you is pursued and of the degree of caught up convergence, emphasizing, under the methodological profile, the importance of sector indices in the preparation of models of reference of the sustainability, bases to you on a sistemico approach, according to one vision of development shared from the local actors. In consideration of the complexity of the interactions between the fishing sector, and more in a generalized manner, than that head physician, with the others members of the lagoon system, turn out to you proposals can become object of ulterior specification and deepening, as the convergence on the theoretical presupposed ones, if sufficient, lasci the space to a mainly operating approach.

For the dimension and qualification of the problematic premises, having undertaken a job of construction of relatively specific instruments of surveying of immediate reading, can play an important role in the elaboration of the territorial political, in case different evolutionary hypotheses of the complex truth are wanted to be compared environmental, economic and social veneziana.

## **1. Problems and dimensions of the sustainability in the lagoon of Venice**

The lagoon of Venice represents one of the more extended coastal systems, with a surface of approximately 550 sq km, more then 90% of which consists of the water system comprised of

channels (10%), seabed, sandbar, "valli da pesca" and shoals (80%), while all together the emerged lands, islands, shorelines, banks, catches up the 36,38 hardly kmq [Province of Venice, 1998]. For the profile of the sustainability, Venice and its lagoon are an emblematic case for wealth and complexity of the historical, environmental, economic and social dimensions that shape them. Constituting one of the most significant examples of antropizzata humid zone, the interaction between environmental and economic objects involves a development plan that holds account of the population and the characteristics and modality of preservation of the ecosystem. Care the environmental dimension, one of the huge emergencies refers to the pollution problems of waters. They derive above all from cargos of injurious elements generate from the economic activities facing the lagoon and those deriving from the draining river basin. For the industrial profile, the pole of Marghera Port and the insistence in the lagoon environment of the one petrochemical the largest ones of Europe on translates in real dangers for the ecosystem. The polluting emissions in water, in atmosphere and in shape of toxic refusals, have lead to the changes of the lagoon hydrogeologico order, also for the excavating of the channel of the oils. The hydrologico and morphologic ruin, high water cause and erosion, shape, an ulterior specific emergency of Venice. The lagoon loses annually in sea approximately a million cubic meters of material, effect of the erosive process reassumed in the demolition of typical morphologies (shoals, velme and ghebi), in the deepening of the slums, the interrimento and reduction of the section of the channels, in the flattening of the river basin and in graduates transformation of the lagoon in an arm of sea; with the result of undermining the dynamic equilibrium, result of the natural process control, put in action from Serenissima, for not irreversibly demaging the structural stability of the system [MENCINI, 2003].

Degradation elements imply the reduction and modification of the species, that is as well as more serious in how much the veneto's lagoon represents one humid zone among the more vital and important for wealth of flora and fauna, with the territory placed on the migratory route of numerous birds. The morphologic modifications have involved an adaptation of the species,

therefore, the Cases of Overwhelmed, reclaimed from years ' 60 in order to constitute the third industrial zone, come colonized from one rich vegetation and fauna, until assuming extraordinary naturalistic valence. Under the economic aspect, Venice represents a meaningful pole of diversified activities, industrial, manufacturing, commercial, tourist. The standing out of one more detached tourist vocation, with the revealing of the recent factors of development evidences important elements of imbalance, particularly obvious in the industrial area of Marghera Port. Though up like coastal productive pole, it has been developed until to the years '70. The contraction of the industrial activities of base with the expulsion of workers, the diversification of the activities and the dimension of the enterprises has lead, however, to its crisis, parallel to emerging of the chemical pollution problems, with warehouse and absorption in sediments of toxic substances [FABBRI, 2003].

The composition of the activities particularly shapes an articulated situation, in which to base productions search activities are placed side by side, of service to enterprises inserted in external productive rows to the area. The crescent attention to the protection of the environment, the evidence of the external negative effects of the economic activities on the health, the high dangerousness connected to some productive cycles puts in argument the local economy, privileging requests not more postponing. In the historical center of Venice, instead, the progressive movement of the economy towards the activities of the third sector has involved one marked marginalization of those handicraft ones, whose survival is tied to specific products, strongly integrated with its tourist specialization. To the high quality is connected the prosperity of the working of the glass to Murano, specific occupational and economic pole of Venice. Among the artisan activities those connected traditional economy are numbered, like the working of laces to Burano, the construction and repair of the boats [BRUSSA and others, 1995].

For the art of the glass, its spread in lagoon has remote origins, but in the time it has gone concentrating itself in the island of Murano. If in the 1788, 44 furnaces were active in the island, little time after, with the landslide of the Republic, was reduced to 16. Is in the past century that

on assists to throw again of the glass art that, currently, receives approximately 2 thousand assigned on 7 thousand residents [MIANI and others, 1984].

The general lessening of the occupied ones appears to affect directly on the economic sustainability of the lagoon. If it turns out obvious as the policies of development pursued in past highly turn out indefensible for the environmental profile, the necessity to carry out new directives of development could translate in one yield lessening. To that appears counter the situation that characterizes the port of Venice, that annually enlivens besides 25 million tons of fleeting goods and shows a traffic of passengers in strong expansion, with little less than a million unit. The structural evolution is characterized for the regression of the industrial and oil traffic and the constant progress of the commercial one. The Special Law for Venice, since from first years '70, has recognized in the oil traffic one of the main environmental risks.

If the future development of Venice appears progressively untied from the industrial production, the evolution towards the economy of the services does not translate in competitive advantages for Venice. The attraction of the third activities towards centers characterizes for the huge economic dynamics and productive, the different costs of localization, the competition among cities in the increasing of the innovative process, do not seem favorable elements for Venice in the choice function. To coming less of the prerogatives of the productive activities like engine of the development, one counts the crescent role of the tourist demand. The danger associated to the detached specialization appears inborn in the theory of the cycle of life of the tourist destinations, rendered more explicit in case comes to lack economic activities that compensate it. Nevertheless, is just the tourist activity that more agrees again to the requirements of the environment safeguard, and that can constitute an incentive to the proposition of new modalities of using the lagoon.

The new requests of development make stand out the role of the preservation of the naturalistic values, revitalizing its property of alimentary production, both in the fishing sector and in the agricultural. Among the multiple uses of the lagoon, ancient and of the present time it is the

fishery activity. Considered a poor fishery, that lagoon one was tied to the directed maintenance of the fisherman, that assigned to the market the surplus. Today it suggests promising shapes of integration with the sector of the naturalistic tourism, the fishery-tourism, the ittico-tourism. For against, the introduction and the development of the "Philippine vongola", with the modernization of the collection technologies, lead to the modification of the lagoon morphology. The important impact environmental of the venericoltura emphasizes the damages of economy of holdup based on the maximization of the individual samples [CESARI, 1994].

A particular shape of management of part of the lagoon system is classified, since antique times, to the "valli da pesca", in which come raised numerous species, like spigole, branzini, orate, cefali and eels. The restoration of their economic functionality represents an important element of entire local fishing sector.

Also the agricultural economy shows special characters in lagoon, organized on minimal parcels and the gardens, of ancient tradition. In spite of the extreme fragmentation, in some fields has known to evolve towards elevates qualitative goals. The agricultural poles of Lagoon are localizes in the peninsula of Cavallino-Treporti, in the island of Sant' Erasmo and in the area to south of Chioggia. If the peninsula of the Cavallino were characterized from prevailing systems of orchard, in more recent times, the burdens for theirs renew have advised the productive reconversion in favor of the protected horticulture [BRUSSA, FRIGO, 1994]. The agricultural importance of the island of Sant' Erasmo is testified constituting, until to recent years, the great garden of the Serenissima. The corporate structure, the disposition of the cultivations, the peculiarity of the supplay render the Lagoon's agriculture a rare example of economy elsewhere passing, in which the level of productive efficiency the payement of the labor concurs.

## **2. The indicators like instrument of valuation of the local sustainability**

The importance of the use of the indicators in the valuation of the progress of a social, economic context and environmental towards the sustainability widely is recognized. As the valuation of the sustainability concerns all the aspects of the territorial within, the implicit costs of their control justifies the usefulness of specific simplifying indices. Commonly the indicator identifies one instrument in position to supplying information in synthetic shape of a more complex phenomenon and with meant more wide one, than to render a course or phenomenon not immediately perceptible visible, extending besides that really measure. Therefore, the indicators quantify and simplify the information, favoring the communication and the comparison. Defined like measure, representable in numerical or graphical shape, contributes to the valuation of the degree of attainment of the sustainability. For being effective, they must interconnect the various aspects environmental, economic, social of one community. In fact, besides identifying the topical conditions of a system, they follow the monitoring, employed in local within can represent an important instrument of planification, working in the preparation of environmental and territorial policies of the city.

Local Agenda 21 characterizes the indicators like support, besides in the environmental impact valuation, in to the processes of construction of the territorial plan, and, during control, employable in the verification of the results regarding strategic objects, offering the comparison between the complex of the transformations, alterations, flows and consumptions of resources, in action or programmed, and the speed of their regeneration. An important aspect is inborn in the participativa dimension since the phase of selection of the indicators, the involvement of the stakeholders strengthens the decisional outcome more according to one elevated convergence of the objects. The opportunity to leave the single communities the independent selection of the indicators, joined to the consent around their usefulness becomes prerogative of the decisional processes, implying the responsibility of the various territorial actors.

Since they constitute an instrument for the environmental local policy, but not the aim, they have to be select to totally describe the reference within. In the selection process, the valuating



request influences the numerosity, therefore as it appears opportune to characterize a precise hierarchy among them. An important critic element is inborn in the determination of the object values, that define the environmental quality (benchmark of reference). This is tied to the threshold concept, that can opportunely be identifiable, or to depend on the peculiar characteristics of the local within.

The methodological development of the indicators has been made with reference to the approach of O.E.C.D., known as the (P.S.R.) “Pressure-State-Response” model, that means to give a causal interpretation of the relations between society and environment [OECD, 1998].

The determining factors of the model presupposed that the “Pressure” of the society on the environment modifies it, in quality and quantity (State). The reactions to the changes, natural or induced from the society, through the environment, economics, or social policy, represent the “Responses”.

The pressure indicators, therefore, evaluate the anthropic effects, which degrade resources, or tax them excessively.

Those of “State” give, instead, the implications on the present environmental quality, with the objective, also, of monitoring the modifications. The “Response” indicators are directed, above all, to improve the efficiency of the environmental and territorial policy, with the purpose to stimulate a greater deepening in the proposition of specific actions, especially in the local sphere.

The belief that the sustainable development is not only shaped by the environmental components has helped to incorporate other dimensions, for example the economic, the social and the institutional, that constitute the unique outline of the (DSR) “Driving Force-State-Response”.

The analysis approach, introducing ulterior variable, strengthens the role of the various component of the sustainability and their relations, inducing one vision mainly articulated. In this way, the analysis ends for comprising all those factors of relevant to the territorial within that influence the sustainability of the development. The interpretation within comes developed to the complex of the reality interacting between human and environment. To the inside of this outline

the driving forces, in a wider meaning of the pressure concept, represent all the activities and the processes that can generate impacts on the local sustainability.

### **3. The specification of the model of sustainability for the lagoon of Venice**

The outline (DSR) “Driving Force-State-Response” has been adopted in the model developed for the Venice lagoon, in which for the four dimensions of sustainability, environmental, economic, social and institutional, we preferred to organise by topics and subtopics, to reach a greater adhesion to the local particularity (Tab. 1).

Concerning the first dimension of the sustainability, the environmental, the themes developed makes reference to the lagoon waters, to the quality of the air, of the ground, of the natural resources. Therefore, the thematic “waters of lagoon” is specified in the topics “pollution of the waters”, “hydrological ruin”, and “fishery”.

The role of the river basin is analyzed through the driving force identified in “annual charges of nitrogen and phosphorus”, contributing to increase their concentration in waters (State). The plan to rid the lagoon of pollution and the network of dynamic monitoring represent contrasting actions. The evolution of macrofite and macroalghe is one of the effects of the qualitative decay of waters (Response).

For the hydrogeological ruin the “Pressure factors” indicate the annual loss of sediments, to the creation, or destruction, of the typical morphologies, to the number of exceptional high waters, to the evolution of eustatismo and subsidenza, let alone the waves motion, with the “Responses” identified in the reopening of “valli da pesca”, in the “Plan of morphologic recovery and for defense from high waters”.

Regarding the “quality of the air”, it is important the role of the Marghera Port, for which the polluting emissions and the number of incidents with pollution (Driving forces), feed the injurious concentrations (State), and cause the increase of specific diseases, such as tumors (Response).

Marghera Port represents a remarkable importance also for the topic “ground”, for the production of refuse (Driving forces), in part dangerous, while the measure of pollution is offered from the contaminated areas (State), answered by the reclamation plan.

Particularly important for the environmental profile is the unique natural resources of which the lagoon is the depository. The evolution of the Lagoon’s fauna and flora (Driving force) attests to the importance of the humid zone for many species, the Response indicator is represented by the protected areas. The importance of the habitat is evidenced by the modifications that take place and in the variations of the Lagoon’s biotopi (Driving forces).

For the economic dimension, the topics are developed for the traditional sectors, to which it joins, for importance, that of tourism. The peculiarity of the secondary sector comes from the fundamental role that represents Marghera Port, in which the variation and distribution of the employment, and the firms represent the Driving forces, together with to the consumption and production of energy. To that, the topics of the smaller productions is accompanied, with the specificity of the glass industry and shipbuilding.

The development of the third sector is analyzed through the variation of the employment and of the firms, especially in the historical center, which connotes the variation of the shops. To that, is united the important role of the port in the development, characterized by the analysis of the traffic, goods and oils.

For the tourist field the “Driving forces” are represented by the number of the arrivals and the length of stay, also by the number of one day visitors, that influence the indicator of “Pressure”. The indicator of gross and net use attests, instead, the receptive ability to the structures (State),

the action of the regulation of the flows represents the response to the requests of the management of tourism.

The social dimension is studied through the topic of population, subdivided into subtopics like the quality of the life in the historical center, and Porto Marghera, that grasp important aspects of the industrial place, which the incidence of the professional diseases and the index of gravity of the accidents represent crucial aspects (Driving forces).

The quality of the life in the historical center is analyzed by various means. The aging of population, the cost to purchase a house, the rent paid, the number of evictions and the rate of migration (Driving forces), all help to explain the variation of the residents (Response), evidenced by constant population reduction.

The institutional and operating dimension means to reconnect the aspects that refer to implementation of the strategies of sustainable development and in the participation to the international cooperation, by ratifying it and the application of the agreements (Response), by more operating aspects, identified in analysing the condition of the safeguard works and reclamation which have been done.

The specification of the model of reference through the selection of the indicators has constituted the first operation. The following phase being the collection of the data and their organization, the calculations, and then the representation of the indicators.

In particular, one means to emphasize the participative valence of the construction activity and finding of the information, the forecast of the direct involvement of the local actors for the various fields becomes fundamental presuppose for the successive adhesion to policies of development based on a shared vision of the sustainability, involving opportune modifications of the individual behaviors. The elaboration of the model appears, in fact, instrumental to the requirement to involve the population in the construction of the sustainability's policies, to render it conscious of being craftsman of the effects of the own choices on its outcomes. The activity of collection and organization of the data constitutes an unavoidable stage of the

operating research, the evidence of their deficiency stimulates, other part, the activation of processes finalized to the construction of suitable local informative bases, that they become, in perspective, an element catalyzing in the elaboration of the local policies.

#### **4 . One proposal of indicators for the lagoon fishing sector**

The indicators affixed for the fishing sector, using the model Driving forces-State-Response, mean to value the potential operating of the outline, with the opportunity to characterize punctual as synthetic objects, to which to orient the future actions and political choices of the sector (Tab. 2). The analysis of the role of the fishing sector in the lagoon has been considered, primarily, the modifications taken part in the consistency and structure of the fishing resources. The indicators selected refer to the amount and distribution of fishing (Driving force), for the environmental dimension, just as the economic are identified by the value of the sales.

The impact on the fishing resources is verified through the analysis of the firms that operate, therefore the indicators refer to their consistency and variation, to the local centers and units, and to the evolution of the employment. For the environmental variable, particular importance is assumed by the technology used (Pressure factor) and by its impact on the environment, an important impact for the sector of the clam culture. The reserved surface of the “valli da pesca” evidences their strategic importance in the management of the lagoon, while the number of product seized by the Public Health Department, to measure the degree of food contamination, represent many factors of Response. Likewise, for the institutional dimension, it is the predisposition of the “Plan for the management of the fishing resources” [PROVINCE OF VENICE, 1998].

A consistent indicator of the pressure exercised on the fishing resources is offered from the annual fishing production (Tab. 3).

In quantitative terms, the most important productive source of the lagoon is represented by clams, the production of clams is valued in 370,000 quintals annually, approximately two thirds of the total, Also important is the supply of mussels, today approximately 180,000 quintals. The traditional fishing, estimated in little more than six thousand quintals, evidences a productive decline, in fact, it appears practically halved in the course of the years since 1990, from 12,000 to 6,500 quintals.

To aggravate the pollution problems, the induced hydraulic modifications, as well the employment of the new technologies of fishing induces the selection of the species. The modification of the local communities and of the seasonal migrations has ended in order to influence the same practical of fishing. If the decrement of the capture interests all the species, appears ulteriorly strengthened for those to minor escape ability.

The spread of the Philippine clams, with a production increase between 1994 and 1998 of 130%, has damaged the traditional fishing, by impacting the harvest, which also converts part of the fishing effort. The harvesting pressure of the clams introduces remarkably negative effects, through the loss of sediments and the modification of the ground, with losses in all the sector.

The evolution of the fishery can ulteriorly be evidenced through the analysis of sales by the origin of the species commercialized in the local gross markets of Venice and Chioggia. In 2001, the species of lagoon out put equals 10,209 quintals, for a value of 3.5 million euro, divided between fishing market of Venice, 6,911 quintals and gross market of Chioggia, 3,297 quintals.

Adding to the lagoon product of the “valli da pesca”, the sea and the fresh water, the local production reaches 97,168 quintals, 11,363 of which comes from the fishing market of Venice.

The trend of a long period of time (1945-2001) evidences for the “valli da pesca” a constant product, altogether equal to approximately four thousand annual quintals, when the lagoon fish introduces large increments until the 1980's, reaching 24 thousand quintals, then decreasing quickly to the values of those of 1945, approximately five thousand quintals.

The fishing productions disembarked in the Lagunar markets show, in the last few decades, altogether a decrement of the supply, the modification of the supplying sources privileges other national centers, or foreign countries.

In the last few years, the centers and local units of the fishery manifest, to the contrary, an increase, in fact 65% assumes the one-man company, showing reduced dimensions, only 13 are corporations. The greater part of the local units is composed of small firms, with a maximum of 9 employees, the average (10-49 employees) represents a small minority (3.9%), while larger corporations are absent.

There are little more than two thousand fishermen who operate in the lagoon, of which approximately 1200 harvest clams and the remaining are traditional fishermen.

The total fishing fleet is about six hundred boats, mostly consisting of small fishings boats. Approximately three hundred punts and eighty hydraulic dredges harvest clams [DE PIN, 2002; GRANZOTTO and others, 2001].

A meaningful shape of management of part of the lagoon is represented from "valli da pesca", they occupy approximately 9 thousand hectares, 70% of which constituted from watery surface in which the breeding of the fish happens. In the course of the time their surface turns out in lessening, above all for the inactivity for some of them, for others it is assisted to tried of restoration. The management of the fishing production appears of traditional type, shaping itself like extensive policulture, in which to relatively low productive return, contained operating costs are associated. Only 10% of "valli da pesca" shapes of orata and spigola semintensive breeding.

The venetian valley system does not play a role of relief for the occupational profile, with a hundred of assigned to full time and as many temporaries employed in activities of breeding and hunting. The productivity of the valleys is remained in the relatively constant, variable between 75-130 kg for hectare, comparable level to that of end of ' 800 and beginnings of ` 900. The species raised is constituted for approximately 60% from mugilidi, only remaining is represented from valuable fish (branzini, orate, eels). The course of the capture evidences a seasonal

concentration in the last three months of the year, in which is collected 80% of the production. If the gross revenue reported to a medium valley is approximately thousand euros for hectare, for a total turnover of 7,5 million euros, only the half is constituted from the fish sale, the rest deriving from the hunting activities and agriculture. In the last years, the competition of the import product has caused the lessening of the prices to the production of the valleys, emphasizing the difficulties of the venetian enterprises to differentiate their product with adequate techniques of marketing.

For their extension, the "valli da pesca" cover an elevated naturalistic value and environmental. The continuous maintenance operations of which they need for preservation of the conditions of productive efficiency, carry out to guarantee the conservation of the peculiar habitat. The maintenance of the ecological stability is to the base of the conservation of the potential productive of the valleys [MAURACHER, 2003]. The lagoon valleys area turns out, moreover, one of the humid zones more important for spending the winter of the aquatic avifauna.

## **5. The role of agricultural economy in the sustainability of the development of the Lagoon**

Complement to the fishing activities, the role of the primary sector in contributing to the sustainability of lagoon's within is identified from the peculiar characteristics assumed from the agricultural component. The sector indicators suggested for the agricultural field, according to the proposed model, consider, in the first place, the evolution of the agrarian surface that, expression of the environmental dimension as economic, represent the main driving force (Tab. 4). The analysis of the structure of the companies (State) contributes to identify the economic dimension, while intrasectoral dynamics are explained through the evolution of the practiced type of agriculture (Driving force), considering that the incentive toward natural practice is translate in the reduction of the negative interactions with lagoon environment. The study of the



firms for heads breded, that means to find out above all the impact in Lagoon of the zootecnic activities and the evolution of the biological productions, constitutes ulterior driving forces of the field, concurring to shape different aspects of the environmental dimension.

To the aim to delineate the effects of the agricultural practices for the ecological profile, a meaningful indicator of pressure is covered from the evolution pointed out from cargos of elements bring in the Lagunar waters (Driving force), of which the agricultural practices, above all those zootecnic one, represent among the most important responsables. Characteristic aspect of the lagoon agriculture is the smallness of productive lands, their dispersion on a territory covered in great part from water and from feeble morphologic structures is trasleted in the great fragmentation of the firms. The most extended lagoon agricultural pole is characterized in the islands of S. Erasmo and Vignole, with 103 firms and 159,3 hectares of used surface (78.6% of the total). In the other islands, if meager is the number of firms, in the course of the years is presents an ulterior reduction. The marked lessening of firms (-34,2% in the decade) is accompanied to that one of SAU surface (-31,4%), with the land yielded to employs not agricultural, or diminished because of the morphologic transformations. The esiguità of the spaces available and the estrema fragmentation of lands is translate in that one of the firms, whose usable surface is hardly 1,57 hectares. The realization of the agricultural activity involves great part of the natural territory, rendering its interaction with the environment particularly important and complex. In Lagoon, the contraction of the agricultural activities is reflected in the use of the land, therefore the surface to intensive agriculture appears reduced of a third party in the last decade (Tab. 5).

The use of the surface still privileges the sowed still (51.0% of the total), their contraction (-29,7%) appears nevertheless to favour the requests of sustainability. Among the wood cultivations is above all the vine to show mainly of the productive restructure, whose surface turns out more than halved (-53,2%) in the course of the last decade. To the lessening of the areas more intensely cultivated on accompanies the increasing of the natural ones, to foraggiere

and forests, that represent now a third party of the total surface. Lagoon agriculture is not characterized for zootechnic activity, that show a number of firms (85) and heads very limited, especially concentrates in the island of Sant Erasmo. In the course of the time, if consisting is the contraction of firms (-28,0%), more marked appears that one of the heads, with nearly the passing of the bovines, but particularly emphasized also for rabbits (-94,6%), porks (-84,7%) and avicultural (-51,1%).

For the analysis of the pressure on the lagoon environment from the agricultural sector, to affect directly in the aquatic component of the ecosystem are the cargos of elements brought in lagoon, among them the huge to the nitrogen and phosphorus refer, poured from the draining river basin (Tab. 6). The comparison between contributions evidences the importance of those of agricultural and zootechnic origin, that render them the main pollution source of the water of the Lagoon, whose cargos poured exceed that permissible. In particular, the increasing of nitrogen cargos of agricultural origin renders them the greater source of polluting, with others 3,200 annual tons (+20.9% in the decade), to which follows the zootechnic activity that reveals its upgrades negative on the environment.

## **6. Elements for the analysis of the economic sustainability of the Lagoon**

To exemplify the specificity of the economic dimension of the lagoon some indicators who can come develop for peculiar thematic, like the economic development of Marghera Port, as well the tourist field. In particular, as indicator of the quality of the economic development of the industrial pole of Marghera Port is characterized the variation of the assigned and the companies for comparto productive (Driving force), in which the important occupational lessening appears

to affect the lagoon economic sustainability directly (Tab. 7). The past decade crisis have deeply changed the industrial order, therefore the occupational contraction and of the enterprises it has interested all practically the productions of base. In the specific one, the decrease of occupied, from 32.980 of 1965, to 12.727 of 2000 (-61,3%), appears, in fact, emphasized for metallurgical and iron and steel field (-80,6%), of the constructions and building (-77,3%), of chemistry (-76,5%), but also comparto oil (the -66,9%) and that one to feed (-63,2%), evidences one emphasized restructure. The increment of the enterprises, passages from 229 to 288 units (+25.7%), has had exclusively to those of "other fields" (+156.9%), that they become the more important occupational source (29.9% of the total), how much those of the base productions introduce huge lessening, species for constructions and building (-56,2%), energy (-50,0%), oil (-47,8%), but consisting also for alimentary field (-44,4%), chemical (-30,4%), metalworker (-33,3%). Although that, continuous the industrial pole to conserve some own characters, the more important fields remain chemistry, the oil, mechanical field, siderurgic

The increment of the productions of the main ones comparti carry to think that the undertaken restructures have privileged the investments to elevated productivity of the job, while the development of new shapes of integration, the formation of innovative productive rows and nets d'impresa, attests the adaptations to of today economic requests. Under the profile of the environmental sustainability, the pursued policies of development cannot that to turn out incompatible, however, the necessity of esplicitare ecocompatible directives of development could not succeed in contemperare the economic sustainability, translate in one yield lessening. For the tourist field, the main indicator of pressure, or social impact, is given from the relationship between visitors and residents, riferibile to the single spending the night tourists, or can comprise also the hikers. The increment of the index, from 27,5 of 1981 to 50,1 of 2001, confirms the emphasized impact of the tourism especially in the historical center, stimulating political of control of the tourist flows (answer). The market of the tourism is shown in continuous expansion, with 1.730.330 it arrives and 3.293.693 presences in 2001. Only a third

party of the presences, however, is given from the spending the night tourists, with one medium permanence of 2,4 days. The majority of visitors turns out composed by daily hikers, calculates to you in 6 million altheanno. The problem of the hikers explicit under two various aspects, managerial and economic, contributing in economic terms less of the tourist resident, but introducing huge indirect labor costs.

To the presences in the historical Center, on joins those of the shoreline of Cavallino (5.863.795 in 2001), of Lido (558,010), Mestre (1.762.981). The pressure of the tourism to Venice has translate in the extension of the area of hospitality, the number of tourists spending the night to Venice is limited, in fact, from the receptive structures, with an availability of beds, in the 2001, equal ones to 22.469, of which only 11,994 in the historical center. Therefore, the rate of gross use, calculated rapportando the presences to the potential capability, that is the availability of beds expressed in day-bed totals, evidences in the historical center an intense exploitation of hotel structures (0,73 in 2000). The contribution of the tourism to the local economy can be deepened, through specific economic indices, as well with the analysis of the occupational incidence and the tourist local units, that it concurs to appreciate the caught up degree of specialization.

The concentration of the tourist activities appears emphasized in the historical center and some islands, like Murano, stimulated from the vetraria industry. Marked turns out the sector economic dependency in sestiere of Saint Mark and Castello, that they collect a third party of the total of the assigned to the tourism. Here, approximately a fifth of assigned (19,4 %) works in tourist local units, that turn out 23.6% of the total, with an incidence of the paraturismo of 41%. In the complex, 7.4% of the population lend the own work in 2.924 tourist local units, that they represent 15% of the total local units, with an incidence of the paraturismo to 27%.

## **Conclusion**

The application of the model driving force-state-response to the reality of the venetian coastal area can represent a useful instrument for the start of a process of sustainable development based on the deepening of the acquaintance and the sharing of plans of lagoon environment management. With the present search is intention to supply a first applicativo approach of methodologies turned to the implementation and valuation of a coherent stroke of sustainable development to local level, to intersectorial character. The consideration that the analysis of the sustainability of the lagoon development induces to inquire the modalities of interaction of the different convergent activities, makes own the hypothesis that the relationship between lagoon ecosystem and economic must put in the first place the demand of the environment safeguard, particularly fragile in Lagoon. The stroke of development will has, therefore, to conform to the principle not to see natural environment compromised.

From such tasks, the adoption of the model driving force-state-response preliminarily has meant to reach the understanding of the determining factors of impact for the various fields of the economic system and environmental, in order then to focus itself on the specificity of the comparto of the fishery. The selection of the indicators has privileged those in a position to exemplifying the local peculiarities. In such context, the interactions of the fishing sector appear variously complex. The attainment of the better sustainable productive level meets with numerous incongruità environmental, intersectorial conflicts, perspective of reconversion. The resources of the fishery and the acquaculture denote a sure productive decay, but if the reduction of the watery mirrors, the hydraulic modifications, the pollution of waters attests the interferences of external fields, the employment of the modern technologies to the fishery , the new windward species, the modification of the effort fishes, represents the Driving forces intrasettoriali. The spread of the Philippine vongola, as an example, has involved the partial reconversion of the effort fishes, translate itself, but, in an ulterior impact it environmental. Because of that, the traditional decrement of the species appears particularly elevated.

The understanding of the specific sector factors of impact becomes propedeutica to the definition of a coherent operating outline of management integrated of the lagoon area. In such sense, the adoption of the model not only driving force-state-response is useful to the identification and decomposition of the phenomena, as far as the predisposition of the consequent political of participation. The affirmation of valid operating methodologies stimulates the constitution and implementazione of local informative bases, that they still turn out particularly devoid, but more and more indefectible with proceeding of the applied search. The development of suitable data banks favours implicit the informative and comunicativa request in the construction of the sustainability political. The involvement of the local actors, in fact, developments the collective perception of the problems, the participation to microeconomic level and sector it facilitates the responsibility assumption, without these requirement cannot realize that modification in the styles of life, presupposed to the undertaken one of a distance of local sustainable development.

## **Bibliography**

- AA. VV. (1999): Indicators and environmental accounts: towards an economic integrated informative and environmental system, *Annals of Statistics, Series X, Vol. 18, Rome.*
- ANTONELLI G., BISCHI G. I., CASONI G., POLIDORI P., VIGANO' E. (2001): Theoretical models and guiding principles for one sustainable exploitation of the resources in the field of the

fishery, Sustainable development and economic efficiency in the fishing sector, (edited by) Trevisan G., Mauracher C., Venice, Cafoscarina.

ANTONELLI G., BISCHI G. I., PIERLEONI S., VIGANO' E. (2003): The concept of management integrated of the coastal zone as guida for the analysis of the sustainability of the marine system, Economy and Politics of the fishery and the acquacolture: thesis to comparison, (edited by) Trevisan G., Venice, Cafoscarina.

BALDUCCI A.. (1999): Agencies of local development like new actors of the governance city, Urban planning, n. 122.

BRUSSA N., FRIGO V. (1994): The Cavallino: environment and territory, Office educational routes, Council of Venice, Venice.

BRUSSA N., PORCELLATO E., VECCHIATO A. (1995): The handicraft to Venice, Council of Venice, Venice.

CANESTRELLI E., COSTA P. (1991): Determining Tourist Carryng Capacity: to Fuzzy Approach, Annals of Tourism Research, 18 (2).

CASONI G., POLIDORI P. (2002): Environment economy and methods of valuation, Carocci, Rome.

CESARI P. (1994): The molluschi of the lagoon of Venice, Venice, publishing Arsenal.

COGO V. (2001): Indicators of local sustainability: an international analysis, in Handbook of ecocompatibility, Moriani G., Venice, Marsilio.

DE PIN A. (2001): Interaction between requests environmental and economic in the production of vongole in lagoon of Venice, in Sustainable development and economic efficiency in the fishing sector, (edited by) Trevisan G., Mauracher C., Venice, Cafoscarina.

DE PIN A. (2002): Elements for the location of a distance of sustainable development of the Lagoon of Venice, Working-paper of the Department of Statistics, University Ca' Foscari of Venice, n. 2.

FABBRI F. (2003): Marghera port and the lagoon of Venice. Life, Dead, Miracles, Milano, Jaca Book.

FIORENTINI F., RAMIERI E. (1998): Indicators of sustainability one instrument for Agenda 21 to Venice, Executive Summary, Working-paper 02,98, Foundation Eni Enrico Mattei, Venice.

GATTA L. (1999): The accounting environmental in acquaculture, Mountain Economy, n. 5.

GRANZOTTO A., FRANZOI P., LONGO To, PRANOVI F., TORRICELLI P. (2001): The fishery in the lagoon of Venice: a distance of sustainability in the recovery of the traditions. The state of the art, Report on the sustainable development, n. 2, Foundation Eni Enrico Mattei, Venice.

MAURACHER C. (2003): The valliculture between past and present in the Veneta Lagoon, Rural Genius, estimate and territory, n. 1.

MENCINI G. A. (2003): (edited by), Venice, environment, lagoon, Venice, Supernova.

MIANI M., D. RESINS, LAMON F. (1984): The art of the masters of glass of Murano, Treviso, Matteo ed..

MORDENTI O., RAGAZZONI A., RONCARATI A., STANZANI N. (2002): An accounting environmental model for acquaculture systems: the case of breedings in inner waters of the Emilia Romagna, in Sustainable development and economic efficiency in the fishing sector, (edited by) Trevisan G., Mauracher C., Venice, Cafoscarina.

MORIANI G. (2001): Handbook of ecocompatibility, Venice, Marsilio.

MUSU I., RAMIERI E., COGO V. (1998): Indicators of sustainability one instrument for the Agenda 21 to Venice, Working-paper 01,98, Foundation Eni Enrico Mattei, Venice.

MUSU I., RAMIERI E., COGO V. (2001): The indicators of sustainability in the plan Agenda 21 for Venice, in Handbook of ecocompatibility, Moriani G., Marsilio, Venice.

MUSU I. (1998): Sustainable Venice, suggestions from the future, Bologna, Il Mulino.



OECD (1998): Using the Pressure-State-Response Model to Develop Indicators of Sustainability, OECD framework for environmental indicators, OECD Environmental Directorates, State of the Environmental Division.

PEARCE D. G., KIRK R.M. (1986): Carrying capacities for coastal tourism, UNEP, Industry and Environment, January, February, March.

PILERI P. (2002): To interpret the environment, Florence, Alinea ed..

PROVINCE OF VENICE (1998): Program plan for the management of the fishing resources of lagoons of the province of Venice, Councillorship to the fishery, Venice.

REHO M. (2000): (edited by) Valuation and decision for one sustainable development, Milano, Franco Angeli.

SCARTON F., PERCO F., BORELLA S. (1995): Importance of the protection of the Lagunari environments for the avifauna, in Active protection and vivification of the humid zones. Lagoon of Venice and delta of the Po, Monographic number of the Quarterly Notebooks, New Venice Consortium.

SCOTTI A. (1994-95): Planning of the defense works from high waters, II, New Venice Consortium, Quarterly Notebooks, n. 4-1994, n. 1-1995.

STIVAL E. (1996): Atlas of the svernanti birds in province of Venice, winters from the 1988/89 to the 1993/94, Ornithological Center East Veneto, Montebelluna (TV).

TIEZZI E., MARCHETTINI N. (1997): Climatic changes and evolutionary comparison of the anthropic and the natural ecosystems. The implications for the lagoon of Venice, Quarterly Notebooks, New Venice Consortium, n. 2.

UNITED NATIONS (1992): Agenda 21: the United Nations Programme of Action from Rio, United Nations, New York.

TREVISAN G., MAURACHER C. (2001): (edited by), Sustainable development and economic efficiency in the fishing sector, Cafoscarina, Venice.

TREVISAN G. (2004): (edited by) Economy and Politics of the fishery and the acquaculture: thesis to comparison, Venice, Cafoscarina.

VIANELLO G. F. (1993): Storys of a fisherman. The Lagoon of Venice before the pollution, Venice, Filippi ed..

VAN DER BORG J., RUSSO A. P. (1997): A system of indicators for the sustainable tourist development to Venice, Working-paper 06.97, Foundation Eni Enrico Mattei, Venice.

VAN DER BORG J., RUSSO A. P. (2001): The art cities: to the search of the limit in the tourist development. The case of Venice, in Handbook of ecocompatibility, Moriani G., Venice, Marsilio.

ZOLIN M. B. (2003): The sustainability indicators: some critical reflections, in The Italian agriculture to the thresholds of XXI century, Actions of XXXV Convention SIDEA, Palermo, Anteprema ed..