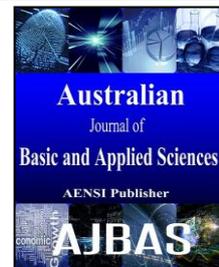




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A Process of Sustainable Productive Reconversion Involving Property Rights and Externalities: A Case Study from Southern Brazil.

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ABSTRACT

Background: This paper raises the problem of the definition of property rights over natural resources - coastline, fish, corals - which lead to the conflict between industrial and artisanal fishing. Since the 1960s, the advance of industrial fishing has severely affected artisanal fishermen in southern Brazil, not least of which were the economic losses suffered by this population for whom fishing represents a means of survival. Other problems that resulted from industrial fishing include increased migratory movement from the coast to other areas, unemployment, environmental problems caused by trawling and plunder of corals and of other natural resources. **Objective:** This study attempts to explain the solution found in one of the cities affected by this problem and its externalities. The paper will present the initiatives implemented in the city of Florianopolis in the State of Santa Catarina, southern Brazil, to reverse the unsustainable process that was occurring there caused by the advance of industrial fishing. **Results:** The solution founded for the present case involved a process of cultural embeddedness, the significance of sustainable actions and the role of Institutions in a zone of productive reconversion. **Conclusion:** We could verify the lack of a suitable tool - especially suited to the Brazilian reality - to provide forecasts or reviews of the processes of productive reconversion and the progress or results of operations; The use of connected sustainable dimensions to assess the success or failure of the reconversion as a useful starting point to providing some key indicators; The link between beliefs and choices, combined with advanced studies to assess cultural embeddedness; participation of stakeholders, posing a new economic activity with expected return to the desired goals; the complexity for define and share Property Rights using the theory of New Institutional Economics.

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INTRODUCTION

When an organization, productive sector or geographic region finds it difficult to preserve its primary productive activity, the agents involved seek to replace it with another activity that meets new needs and desired goals. This process of replacement of existing productive activity is called "productive reconversion".

Productive reconversion is, according to Alvarez (2000), "a number of changes that occur in the company to successfully adapt itself to changing conditions and market requirements". It can also be considered "the name of the remedy indicated for uncompetitive sectors, although specific policies for

this purpose are not very obvious, and relevant financing, even less." (Wilkinson, 1996).

The reconversion of such decadent productive systems presents some challenges with respect to changes in the territory's development. Here it is considered that sustainable territorial development must necessarily account for the four pillars of sustainability: social, environmental, economic and institutional aspects.

It is not uncommon for a region to replace its main and traditional economic activity with another. Researchers develop studies into the factors which influence the possible success or failure of these productive reconversion processes in order to answer the question: what is required to implement a sustainable productive reconversion process?

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Assessing or measuring the success of sustainable productive activity has always been a complex endeavor. In addition to the conventional concerns of economic projects and their functionality, environmental and social considerations also need to be analyzed. To be successful, the project benefits must outweigh costs, both for each agent individually and for the development as a whole (Chertow, 2003).

This theoretical work aims to present a case of actual productive reconversion and compare the practices involved to the assumptions of the theory that addresses the issue of sustainability. Implementing a process of productive reconversion within the standards of sustainability may be the key to success for the new activity.

The case chosen to illustrate this paper was the conversion to mariculture in the state of Santa Catarina, southern Brazil, with emphasis on the production of oysters – or oyster farming.

A survey of secondary data sought to combine theories of authors regarding the definition of property rights over natural resources and externalities, the studies of sustainable actions and the productive reconversion process, plus public data provided by IBGE, LMM / UFSC and EPAGRI, relevant to mariculture in the state of Santa Catarina.

The first part of this paper raises the problem of the definition of property rights over natural resources - coastline, fish, corals - which lead to the conflict between industrial and artisanal fishing, followed by some externalities, such as the environmental, social and economic problems in the region.

The second part theorizes the process of cultural embeddedness, the significance of sustainable actions and the role of Institutions in a zone of productive reconversion.

The third part exposes the sustainable results promoted by the actions proposed in the above case.

From an environmental perspective, the case in question showed the importance of maintaining the local population in its original environment, preserving the region and engaging in economic activity that is compatible with the region. From an economic standpoint, the leverage of production is emphasized. Besides the economic and social problems that may arise from local population displacement, it appears that the alternative implemented in the region of this case study resulted in more successful production because it considered an existing demand for a product that met appropriate means to develop. In the social dimension, working with a product that is taken from the sea was already inherent to the local culture so to shift and manage the new production methods merely required specialization of labor (training courses, assistance in management). In short, the solution used local expertise and resources already in place (with the exception importing initial seed batches).

The important step of this social dimension was the realization that the region needed to create a new activity.

The role of local institutions was highlighted. The development of production, done cooperatively by local institutions, demonstrates that technological development was an important first step in analyzing the local situation, as well as investment in research to improve the production and in education for the population. The role of these institutions was crucial to advancing of the reconversion process. The link between beliefs and choices, as well as advanced studies in the area and the type of production, led the LMM / UFSC (Laboratory of Marine Mollusks of the Federal University of Santa Catarina) and Epagri (Enterprise for Agricultural Research and Rural Extension of Santa Catarina) to study creative proposals that would be workable with respect to cultural embeddedness, posing a new economic activity with the expected return for the desired goals.

1. Mariculture in Southern Brazil:

According to Diegues (1999), before the 80s, most of the theses written by social scientists on fisheries and fishing communities were produced in institutions situated in southern Brazil, given the importance of this activity in the region. Geographic diversification of these papers only started to occur after this period. This is attributed to the fact that a problem that had already been evident in the prior region for some years had started to spread to other parts of the country.

This problem was the growth of the industrial fishery. The traditional fishing economy was being transformed by the action of the fishing industries. According to Diegues (1999), these industries initially used their own boats to intensify fishing of commercial species targeted for export, such as shrimp, for example. In the second phase, they also began to explore areas reserved for small-scale fishing. This caused serious conflicts with artisanal fisheries, resulting in rampant looting of natural resources and causing the decimation of small-fish populations through dragging and destroying the traditional fishing mechanisms.

This process, which started in the 60s in southern Brazil, was intensified over the following decades before spreading across the whole country. This process gave rise to many scientific papers on the issue of fishing practices. Still in the Brazilian southern coast, Diegues (1999) highlights the following works: a paper by the anthropologist Lucia Helena Cunha - "Between the Sea and Earth: Time and Space in Fishing in Barra da Lagoa", 1987; a study by the anthropologist Anamaria Beck - "Farmers and Fishermen: Study on the Family Work and Accessory Work" in 1979; and the sociologist, Celia Maria e Silva in her book "Hooks: Rise and Decline of Small Fishing Mercantil Production ",

published in 1992. All these studies analyze how artisanal fishermen use the coastal area and refer to the disorganization of the fishing communities in Santa Catarina.

The emergence of mariculture in Brazil is a relatively recent activity. According to Souza (2007), the earliest research into cultivation was done in the 50s and increased gradually in the 70s and early 80s. In Santa Catarina, the Department of Research and Extension of the Federal University of Santa Catarina (UFSC), together with the Enterprise for Agricultural Research and Rural Extension (EPAGRI), had the initiative to conduct the first experiments in the second half of 1980s. Since then, through the work of researchers, technicians and fishermen of the state's coastal communities, Mariculture has become a real alternative for income generation, enabling many of the artisanal fishermen who saw themselves compelled to abandon their activity, and in many cases, the local community, and even to sell their property and homes to speculators attracted by tourism in the region, to continue living in their place of origin.

2. The Problem of How to Define Property Rights Over Natural Resources:

Harold Demsetz (1967) points out that property rights are an instrument of society which helps individuals to hold reasonable expectations concerning agreements made with others. These expectations take refuge in society's laws, customs and other factors. Property rights convey the right to benefit or harm one or others and, faced with this posture, we can see the relation between property rights and externalities.

According to this same author, "externalities" can be seen by the Economics of Organization as costs and/or benefits outside the focus transaction. The primary function of property rights is to guide the incentives to achieve a greater internalization of externalities (Demsetz, 1967). The emergence of property rights can occur as response to adjustments of interactions between people, when faced with cases of change, whether of knowledge, the way to produce or what to produce. For Demsetz (1967), property rights can be developed to internalize externalities when the gains of internalization are higher than the costs of internalization.

Coase (1960) proposes that if the parties can bargain without cost, benefiting everyone involved, the result will be efficient, regardless of how property rights are specified.

But how to address property rights over natural resources? In 1997, Yoram Barzel raised the problems of dealing with property rights of what is in the public domain. Pindyck and Rubinfeld (2010) exemplify the problem with a simple case. Assuming that a company owns the property rights to dump its wastes in a river which fishermen depend on for daily fishing. The company may not be forced to

compensate the negative externality caused to the fisherman by reducing the number of fish in this river. However, if the fishermen possessed the right of ownership over the river, the company would be forced refrain from dumping its wastes or incorporate this in their externality costs, compensating the fishermen for damage.

The situation is not always so simple. Laws regulating rights may be unclear or nonexistent or parties involved are unable to reach an agreement, resulting in costs for both. The negative externalities of a given productive activity that benefits society may be indispensable for the development of this activity and costs to internalize them would be costly to the point of the company ceasing activity and thereby further undermine society. The issue of property rights over natural resources, therefore, appears to center on how to deal with the externalities so that the costs involved - economic, social and environmental - be minimized while the benefits of the transaction are great and extend to all parties involved in this transaction.

In the case presented in this paper, who could have right of ownership? Do the industrial fishing companies have the right of ownership over the coast or does it belong to artisanal fishermen? The Property Rights should be shared? Who would bear the cost of social, environmental and economic externalities involved in the transaction? Can local community survive from artisanal fishing only? And what about the rest of the population who also depends on the fish coming from this region? Would the demand be met? Where will the artisanal fishermen go if they lose their space to industrial fishing? Would such a migration create social problems? And environmental problems caused by dragnet fishing, the plunder of corals and coastal degradation?

In the case in question, the growth of industrial fishing encroached the space of artisanal fisheries apparently without an agreement between the parties.

Elinor Ostrom (2009) emphasizes the importance some authors place on the role of institutions in defense of natural resources when the parties involved in a transaction involving these resources do not communicate with each other. She also emphasizes the failure of scientific theory to address the self-organization of individuals who use common resources leading them to create their own institutions even. She still remembers the comments of Clark (2006) on the devastation related to fishing where solutions may seem simple when you put the costs at levels to induce sustainability, although in a dynamic and complex world that solution seems more difficult to achieve.

Ostrom (2009) listed the principles of self-organization and development of institutions. Although case studied this paper does involve the problem of property rights over a natural resource, the solution that was found did not directly address

the dispute over the right but rather involved actions initiated by existing institutions seeking to minimize the negative effects of the dispute on fishing communities in the region. These actions have translated into sustainable activities for the region, as will be discussed in the following chapters.

3. The Sustainable Actions:

The term "sustainable development" was first coined in 1980 and was consecrated in 1987 by the World Commission on Environment and Development (known as the "Brundtland Commission"), which produced a report which defined the basic definition of "sustainable development" and of the principles related to it. According to the Brundtland Report - published in Portuguese in 1988, entitled "Our Common Future" - "sustainable development" is "a process of change in which the exploitation of resources, the application of investments, the direction of technological development and institutional change are made consistent with future as well as present needs. (...) Is one that meets the needs of the present without compromising the ability of future generations to meet their own needs." (IBGE, 2012).

Carvalho and Barcellos (2010) point out that the Brundtland Report also highlighted the dimensions - or elements - which may be numerous, but are normally restricted to three - economic, social, environmental - (known as the "three pillars") or four - adding the institutional dimension.

John Elkington (1997) argues that the performance of organizations established on a triple bottom line, i.e., supported by economic, environmental and social prosperity, would effectively be the basis for real progress. Thus, Elkington (1997) suggests that sustainability can be a situation where $2+2 = 5$. Therefore, efficient performance between partners could ensure better overall end results for the organization. During a transition to more sustainable practices, partnerships can be crucial and they can be formed between public and/or private sectors, companies and groups who share the same objectives of sustainability.

The fourth pillar advocated by other researchers such as Viana (2013), is that of the Institutional (term used in the Brundtland Report) or "governance" dimension and which was recently adopted by the UN as the 10th Millennium Goal.

3.1 The economic pillar:

According to Romeiro (2010), an economy is considered "unsustainable" if "the total saving is below the combined depreciation of produced and non-produced assets, the latter ones usually restricted to natural resources."

Cechin and Veiga (2010) remind us that the economic pillar should be aligned to the other three, thus assuming that not only the financial returns are able to characterize a sustainable project, although

financial returns are necessary: "*can be disastrous, so, to use only monetary analysis of issues related to environmental sustainability of the development process. These give the impression that the damage can be reversed if there is enough money. It is essential to evaluate the ecological costs of growth based on biophysical indicators.*" (Cechin & Veiga, 2010).

According to Romeiro (2010), efficient solutions to sustainable use of natural resources could be obtained through the market: "*the growing shortage of a given environmental good or service increases its price and induces the introduction of saving innovations of this good or service, either by increasing efficiency in their use, or by replacing it with a more abundant resource.*"

In the present paper, artisanal fishing has been replaced by another activity to guarantee satisfactory economic returns assuming the investments and environmental and social needs.

3.2 The social pillar:

Granovetter (1985) argues that economic action is "embedded" in social relations ("Social Embeddedness") which influence the behavior of economic agents. Thus, it can be said that the productive activity must be chosen to conform to the cultural "roots" of the local population.

Sznalwar et al. (2011) consider two other approaches to the social role in sustainability, specifically in the paper: "The work for sustainable production" and "The sustainability of work for workers", which may represent, respectively, the need to produce and the need to have someone to produce, and the need for self-actualization of the worker in his productive activity.

Moreover, as important as the benefits for business and for the environment are the aspects of valuing social equity and environmental justice for community members in the re-development of local economies (Schlarb & Musnikow, 2003).

Schlarb and Musnikow, (2003) posit development objectives acquired by local community participation in eco-industrial development, which can also be replicated to other types of sustainable development, which are: (1) strengthen the local economy, (2) environmental quality for health (3) social justice and equity, working through activism, joint identification of needs, design and participatory governance based on community.

Many of the interests of industries and of citizens overlap and thus sustainability strategies can mutually benefit the parties. Some of these benefits are: economic efficiency and profitability, retention and growth of jobs, community development, environmental management, capacity building and community pride, building social capital and community support (Schlarb & Musnikow, 2003).

Some strategies can engage the community. Schlarb and Musnikow (2003) propose to integrate

community members into processes, making them part of the creative and innovative thinking that will shape the eco-industrial development. It is essential to include the community in the design of solutions to planning problems, hold conferences, conduct research and interviews, establish committees and, most importantly, maintain the organization of the community so that it can encourage the general public to participate in eco-industrial development.

3.3 The environmental pillar:

With respect to the production and scarcity of natural resources, Cechin and Veiga (2010) provide a relevant example for this essay.

Machinery and equipment cannot replace primary factors of production, i.e., elements of nature. So, natural capital cannot be substituted by capital built. They are complementary. Fishing has been limited by the number of fishing boats in the sea, for they were few boats for large populations of fish. Today, the limit is the amount of fish and their ability to reproduce. Many fishing boats race to catch the few remaining fish. Building more boats will not increase the fish catch. Fish stocks have become a limiting factor for the fishing industry (Cechin & Veiga, 2010).

For it to adhere to the pillars of sustainability, the production method or the good produced (or, in the case of reconversion, the "new" good produced), must not cause imbalance in the ecosystem, as exemplified by Romeiro (2010) in the Yanomami people's use of fire.

In the case of oyster farming in the state of Santa Catarina, from the environmental point of view, what we see is not only the preservation of the reconverted areas, but there is also the fact of the insertion of a new species of non-native mollusk which apparently generates low environmental impact.

3.4 The pillar of governance:

The dimension of governance or the institutional dimension comprises, according to the IBGE indicators: the Institutional Framework (Existence of municipal councils) and Institutional Capacity (Costs incurred through Research and Development - R&D, public funds spent on environmental protection, access to telephony services, Internet access).

According to the preliminary version for public consultation of the "Action Agenda for Sustainable Development", from the Network Solutions for Sustainable Development (SDSN), "good governance" includes the role of the various agents involved in the decisions that promote a country's economic development, not limited to the national government only. These agents include social enterprises, community leaders, religious organizations, universities, research centers, experts, governments and non-state entities:

In the era of globalization, governance within and between countries is becoming more widespread

and complex. While in the past national governments made most of decisions related to domestic economic development, today they must coordinate a broad spectrum of stakeholders including entrepreneurs, local governments, civil society organizations and regional and international organizations. The revolutions in information and communications are leading to a process of transparency and growth, unprecedented in the key decisions on the part of all segments of society in all countries. Therefore, an action agenda for sustainable development needs to mobilize governments at all levels, as well as civil society and business.

The SDSN believes that the four dimensions proposed are part of a holistic view that companies should adopt. When one of these areas fails, such as the environmental area, for example, the progress of the other three can be affected.

4. The Results:

Carvalho and Barcellos (2010) state that, "sustainability is immeasurable." What they mean, according to their justification, is that sustainability is not even well defined on its multiple explanations, much less has it been addressed by metrics or statistics in Brazil: "A good example of this are the statistics on deforestation in Brazil. There are only statistical series for Amazon, and these series have problems" (Carvalho & Barcellos, 2010).

Aware of the problem of defining metrics to measure sustainability, in this paper we attempted to obtain results observed during the evolution of the case in relation to each of the pillars of sustainability.

4.1 The economic pillar in oyster farming:

According to the Statistical Bulletin of Fisheries and Aquaculture of 2010, released by the MPA (Ministry of Fisheries and Aquaculture) the state of Santa Catarina is the largest producer in the segment of extractive fishing plus aquaculture in the country and which, in 2010, resulted in the production of 183,769.7 tons, representing approximately 7% of the total produced in the country, which was 1,264,764.9 tons.

In 2007, this production was divided, according to IBAMA, into 74.9% in industrial fishing, 6.3% in artisanal fisheries and 18.9% in aquaculture.

The state is still the largest producer of shellfish, producing 11,297.5 tons in 2007, representing approximately 84.3% of national production, which amounted to 13,405.0 tons. The production of oysters is just over 10% of this production, 1,158.5 tons, however, it represents 83.6% of national production, which is 1,385.0 tons (IBAMA, 2012).

The latter percentage about represents the result of a recent growth in production and is not representative of a long-term average in that oyster farming only began to intensify in the state of Santa Catarina in the early 80s (Souza, 2007). In this region, the production of oysters came to represent

an economic activity that could substitute artisanal fishing which was in rapid decline at that time (CEDAP 2012).

According to Oliveira Neto (2005), the first commercial production of oysters was registered in 1991 in the city Florianópolis. A consistent seed supply, attained by expanding the physical capacity of the Laboratory of Marine Mollusks of the Federal

University of Santa Catarina (LMM / UFSC), together with the new technologies introduced by Epagri (and the laboratory) for handling of seeds, eventually led to recent harvests exceeding 1,500t annually.

The following figures illustrate the practice of mariculture in the southern region of Florianópolis, the state capital of Santa Catarina.



Source: The author.

Fig. 1: Mariculture in Florianópolis / SC (1).



Source: The author.

Fig. 2: Mariculture in Florianópolis / SC (2).

Figure 3 illustrates the evolution of oyster production in Santa Catarina from 1991.

The higher production volumes registered in 2004 were concentrated in Florianópolis and Palhoça which produced 61.4% and 27.9% of the state's harvest respectively.

4.2 The social pillar in oysters farming:

Santa Catarina is now responsible for 95% of the national production of bivalve mollusks (SOUZA, 2007). There are over 1,000 farming families distributed in 11 municipalities.

Figure 4 illustrates the evolution of the number of oyster producers registered with the LMM / UFSC to receive the seeds.

Figure 5 illustrates the evolution, over a similar period, of the number of workers employed in the fisheries sector in the state of Santa Catarina.

In a comparison chart of the percentage changes in the number of workers in the fishing industry and the percentage changes in the number of oyster producers, in the period from 1996 to 2003, we get a result as shown in Figure 6.

The proportional increase, or percentage, of oyster producers is higher than the overall number of workers employed in the fisheries sector. This means that the overall goal of the work developed by EPAGRI together with the LMM / UFSC developed the local oyster production and reaches the objective of stabilization of the working population.

In addition, the percentage change in the production of oysters is relatively higher than the

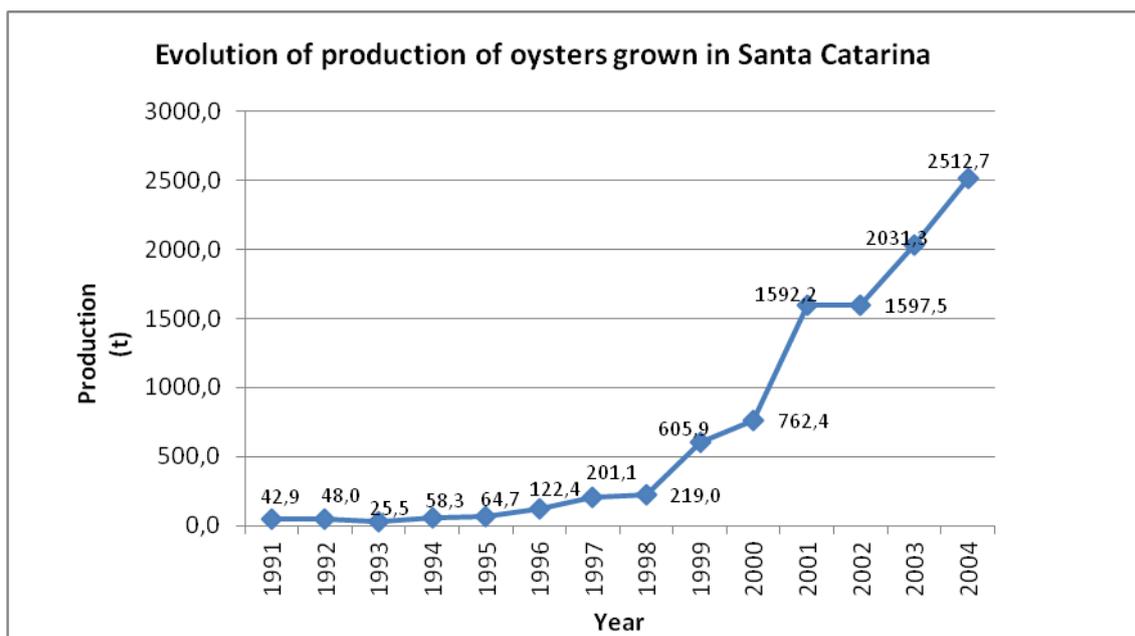
percentage change in the number of oyster farmers in SC, from 1996 to 2003, which shows that the input "workers" of the production did not have to increase

proportionally to the volume produced, as shown at Figure 7:

Table 1: Production of oysters grown in Santa Catarina per municipality in 2004.

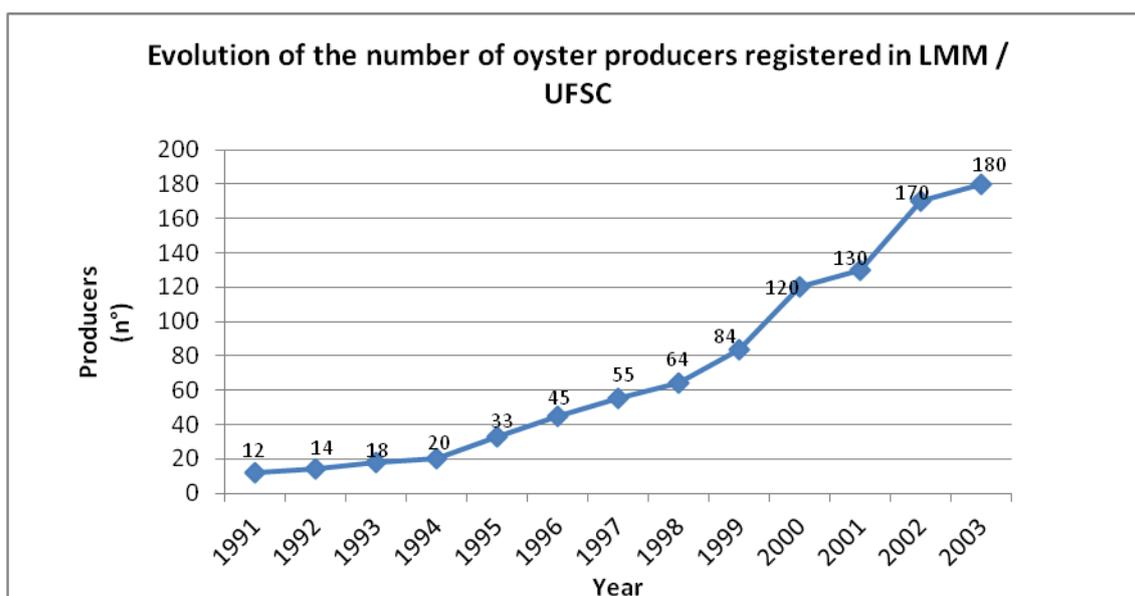
Town/City	Production (t)	Town/City	Production (t)
Florianópolis	1,542.4	Gov. Celso Ramos	75
Palhoça	700	Bombinhas	40
São José	69	São Francisco do Sul	10.2
Penha	37	Porto Belo	5
Biguaçu	2.5	Itapema	1.6
Baln. Barra do Sul	30		

Source: Oliveira Neto, F. M. (2005).



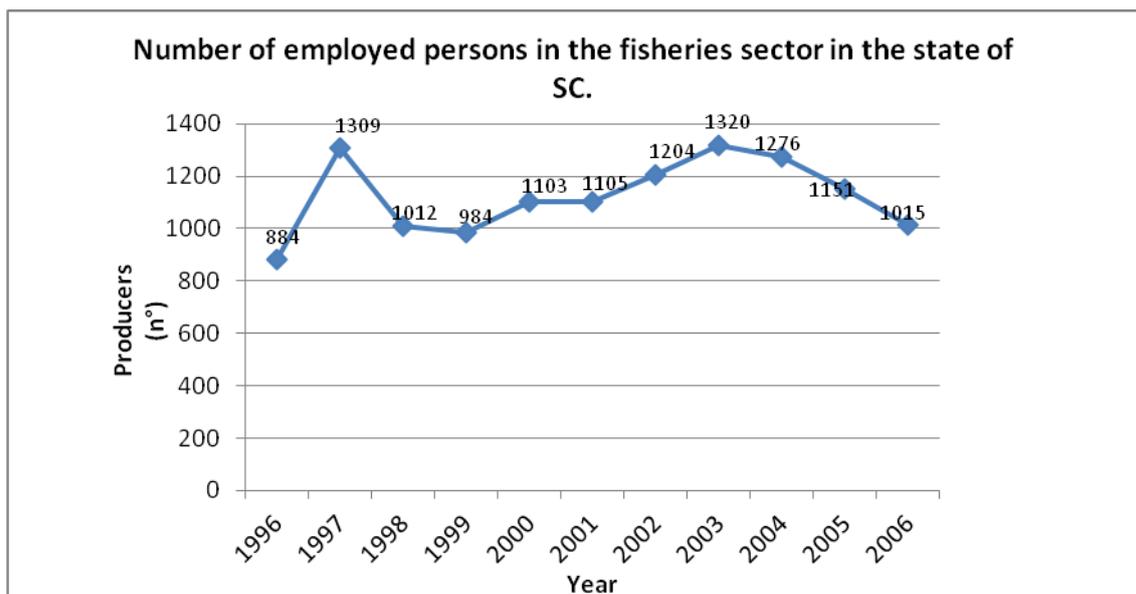
Source: Oliveira Neto, F. M. (2005).

Fig. 3: Evolution of the production of oysters grown in Santa Catarina.



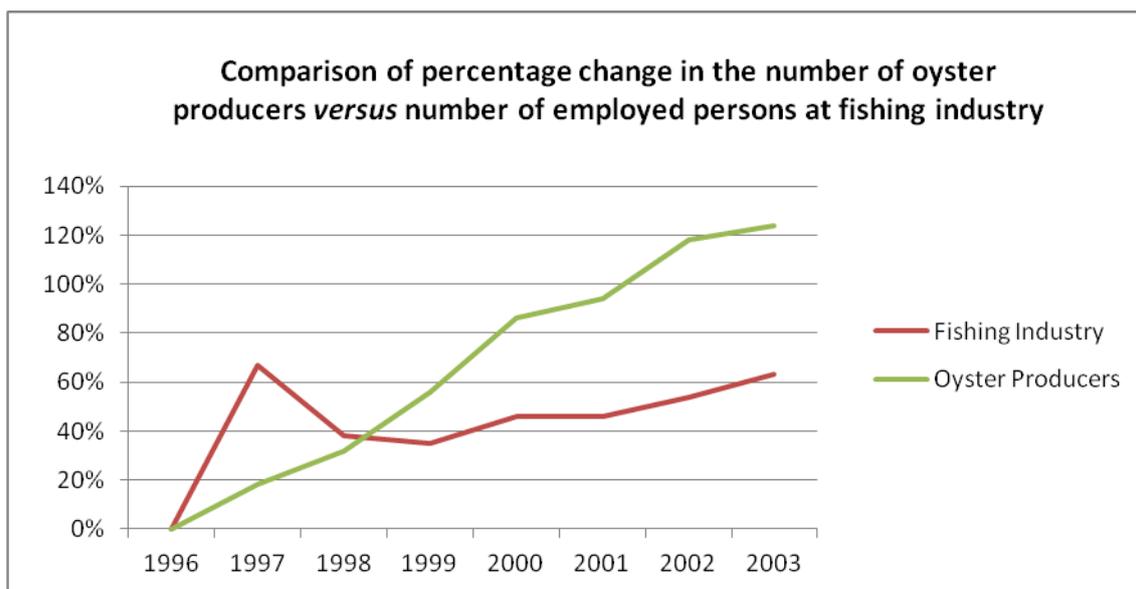
Source: Oliveira Neto, F.M. (2005).

Fig. 4: Evolution of the number of oyster producers registered with the LMM / UFSC.



Source: SIDRA/IBGE, 2012.

Fig. 5: Number of persons employed in the fisheries sector in the state of SC.



Source: The author.

Fig. 6: Comparison of percentage change in the number of oyster producers *versus* number of employed persons in fishing industry.

4.3 The environmental pillar in oysters farming:

According to research conducted in 2003 by Mariano and Porsse, in 1992 Epagri defined, through an agreement with IBAMA which granted specific areas, the aquaculture park off the coast of the state of Santa Catarina, in which 102 farmable areas were designated. Fifty of these areas were located in Florianópolis, occupying 0.23% of the water depth of the North and South Bays.

The city of Florianópolis is primary city of mariculture of Santa Catarina, because it has the most favorable conditions for the activity, such as

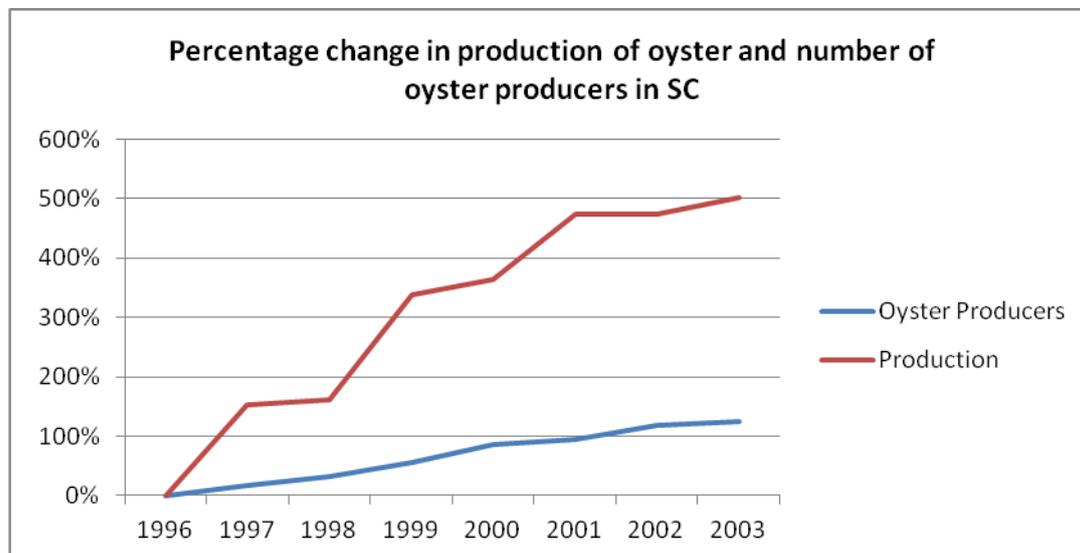
bays with calm waters between the mainland and the island, instances of a cold tidal stream, rich in phytoplankton production (Mariano & Porsse, 2003).

However, despite the favorable environmental conditions, it was not possible to produce native oysters, as explained by Mariano e Porsse (2003):

The experience with the native oyster (*Crassostrea rhizophorae*) did not attain good results. To solve the problem, in the mid-80s, seeds from other regions were introduced and the Federal University of Santa Catarina (UFSC) started to produce seeds in a laboratory, built in 1986 in the

Sambaqui beach district (north of the island). Two years later, Epagri, together with the Department of Agriculture of the State, began to increase cultivation techniques with native mussel seed in coastal

communities. The low cost of production and technical support offered by Epagri proportioned the growth in the number of marine producers.



Source: the author

Fig. 7: Percentage change in production of oyster and number of oyster producers in SC.

The cultivation of oyster by the traditional fishing communities only started later because of the complex technical management and high initial investment. But gradually, fishermen, coastal populations and students began to engage in this activity, developing new crops (Mariano & Porsse, 2003). The involvement of the traditional fishing communities was reflected in environmental preservation:

Mariculture also generated a positive contribution to the environment because it stimulated the ecological awareness of communities and helped preserve the environment. Producers today are aware of the importance of not polluting the water, which had previously served as a garbage and sewage dump. Mollusk farmers now help supervise cultivation areas, educating those who pollute the sea, because the pollution harms oyster production. On the other hand, the area under cultivation became an attraction for its marine biodiversity, a natural refuge that repopulates the bays and coastlines. (Mariano & Porsse, 2003).

4.4 The governance pillar in oyster farming:

The role of local institutions was vitally important in the productive reconversion process. The development of oyster production in partnership with local institutions demonstrates that technological development was an important first step in analyzing the local situation, as well as the investment in research to improve the production process and the knowledge of the population.

The work of the Laboratory of Marine Mollusks of the Federal University of Santa Catarina (LMM-

UFSC) began in 1990, with the commercial production of seed oysters in the laboratory, then a pioneering work in the country, which has ensured the sustainability of the activity following the growing demand for seeds.

This work was carried out in a partnership between EPAGRI (Enterprise for Agricultural Research and Rural Extension of Santa Catarina) and the artisanal fishermen as a non-extractive alternative means of survival, i.e., the cultivation of marine mollusks. Thus, it has generated employment and income as well as improving the quality of life and the preservation of the traditional fishing communities in coastal regions by reducing urban migration.

According to the LMM-UFSC, joint initiatives developed by public institutions and the private sector generate knowledge and technology, allowing the successful development of innovative technology used by society and enabling regular production of the Japanese oyster seed in crop production from December to July, or according to specific demand.

Nowadays, Santa Catarina has a prominent role in the production of oysters in the country. Since 1999, the city of Florianópolis has held the annual "Fenaostra" festival which aims to promote Santa Catarina clams and expand the market for producers. Fenaostra is organized by the city of Florianópolis through its Departments of Tourism and Culture, by the Institute for Creation of Opportunities, the Department of Education, Bureau of Fisheries, Municipal Guard, Military Police and is also supported by Funturismo (Incentive Fund for Tourism of the State of Santa Catarina).

The link between beliefs and choices, combined with advanced studies in the area and the type of production, therefore, conducted the studies of the LMM / UFSC to creative and feasible proposals, with cultural embeddedness, and participation of stakeholders, posing a new economic activity with expected return to the desired goals.

5. Conclusions:

This aim of this study was not only to relate the case of oyster farming in the state of Santa Catarina to the assumptions of sustainability and evaluate the case, as it stands, but also to arouse the reader for some important issues, such as productive reconversion, property rights and the need for sustainability indicators of processes and outcomes of actions.

Another goal of the study was alert researchers and multidisciplinary professionals working with these types of projects and processes that the theoretical framework that unfolds hitherto on the subject of the reconversion still does not have a suitable tool - especially suited to the Brazilian reality - to provide forecasts or reviews of the processes of productive reconversion and the progress or results of operations.

The first division between the four pillars to assess the success or failure of the reconversion can be a useful starting point to providing some key indicators.

From an economic standpoint, the leverage of production is emphasized. Besides the economic and social problems that may arise from local population displacement, it appears that the alternative implemented in the region of this case study resulted in more successful production because it considered an existing demand for a product that met appropriate means to develop.

In the social dimension, working with a product that is taken from the sea was already inherent to the local culture so to shift and manage the new production methods merely required specialization of labor (training courses, assistance in management). In short, the solution used local expertise and resources already in place (with the exception importing initial seed batches). The important step of this social dimension was the realization that the region needed to create a new activity.

The role of institutions was crucial to the strengthening of the reconversion process. According to North's (1994) studies of institutions, human beings, in their ability to process and analyze information can generalize from the particular to the general, make use of analogies and make it not only is a source of their creative thinking, but also compose their beliefs that underpin their choices. The link between beliefs and choices, use of knowledge and technology, were the most influential points of the participation of the LMM / UFSC and Epagri in these creative and feasible proposals. The

need for sector management was found by the institutions. One has to consider aspects of legalization of activity and statutory instruments, which could not be forgotten.

Finally, from the environmental point of view, there was the problem of trawling and industrial fishing as factors degrading the local environment. Another point is the coastal depredation that would be caused by local speculation. Hence the need checked by the institutions to maintain the local population in its original environment, preserving the region and engaging in economic activity that is compatible with the region.

It is noted that the dimensions are connected and interact. Sustainable production and territorial development emerge from this well managed interaction. Romeiro (2010) notes that the complexity of the ecosystem is related to this interaction: "It is therefore necessary to introduce other criteria (ecological and socio-ethical) in addition to the economic aspect, in a collective process of decision making". However, identifying the factors that lead to successful processes of productive reconversion may not be a simple task.

Another factor we aimed to highlight in this paper is the specific issue of the property rights over natural resources. This issue affects sustainable practices. The problem of contention for fishing space generates externalities that influence these four pillars of sustainability. But researchers who propose to seek solutions to define property rights in a case like this should be very critical to reflect on aspects such as: Were the externalities caused by the advance of industrial ocean fishing generating more costs or benefits to the region? The local economy was paying the costs of social and environmental problems of the region with the industrial fishing? The Rights should be divided? Could industrial fishing be banned in the region to protect artisanal fishing without resulting in economic losses to the region? Is productive reconversion the only way to solve the social, economic and environmental problems of a region? Will it always be successful? What are the indicators that determine the success of a productive reconversion?

We assumed in here that projects need well-articulated goals and objectives, so evaluators may verify the achievement of these goals. If there are not such goals and objectives, maybe there is no also a set of benchmarks – or references – appropriate for evaluations. But to construct these benchmarks, researchers need more case studies that address the processes of productive reconversion.

Thus, with more scientific and technological research, the researchers would be able to create the basis for future application of processes and practical solutions in sustainable projects and actions in many other regions around the world.

REFERENCES

- Alvarez, R., 2000. Palestra transcrita nos Anais do II *Workshop* Internacional de Tendências do Cooperativismo: reconversão produtiva, fusão e a internacionalização dos negócios. Ribeirão Preto: FEA-RP/Sescoop-SP/Fundace/Pensa.
- Barzel, Y., 1997. Economic analysis of property rights. Cambridge University Press.
- Carvalho, G.M. Paulo, Barcellos, C. Frederico, 2010. Mensurando a sustentabilidade. In: MAY, Peter H. (org.) Economia do meio ambiente: teoria e prática. Rio de Janeiro: Campus-Elsevier.
- Cechin, Andrei, Veiga, José Eli da, 2010. O fundamento central da economia ecológica. In: MAY, Peter H. (org.) Economia do meio ambiente: teoria e prática. Rio de Janeiro: Campus-Elsevier.
- CEDAP - Centro de Desenvolvimento em Aqüicultura e Pesca. Available in <<http://www.epagri.sc.gov.br>>. Accessed on 28 Jun 2012.
- Chertow, Marian, 2003. Evaluating the success of eco-industrial development. In: COHEN-ROSENTHAL, Edward. Eco-industrial Strategies: Unleashing synergy between economic development and the environment. Austin: Greenleaf Publishing.
- Clark, C., 2006. The Worldwide Crisis in Fisheries: Economic Models and Human Behavior. Cambridge: Cambridge University Press.
- Coase, R., 1960. The Problem of Social Cost. *Journal of Law and Economics*, 3: 1-44.
- Demsetz, H., 1967. Toward a Theory of Property Rights. *American Economic Review*, 57: 347-373.
- Diegues, A.C., 1999. A sócio-antropologia das comunidades de pescadores marítimos no Brasil. *Revista Etnográfica*, 3(2): 361-375.
- Elkington, J., 1997. *Cannibals with Forks: The Tripple Bottom Line of 21st Century Business*. Oxford: Capstone Publishing.
- Fenaostra, 2013. Available in <<http://www.pmf.sc.gov.br/sites/fenaostra/>>. Accessed on 10 Jun 2013.
- Granovetter, M., 1985. Economic Action and Social Structure: The Problem of Embeddedness. *American Journal of Sociology*, 91(3): 481-510.
- IBAMA, 2012. Available in <<http://www.ibama.gov.br/index.php>>. Accessed on 28 Jun 2012.
- IBGE, 2013. Indicadores de Desenvolvimento Sustentável - Brasil 2012. Disponível em <http://www.ibge.gov.br/home/geociencias/recursosnaturais/ids/default_2012.shtm>. Accessed on 03 Jun 2013.
- LMM-UFSC. Laboratory of Marine Mollusks of the Federal University of Santa Catarina Available in <<http://lmm.ufsc.br/>>Accessed on 10 Jun 2013.
- Mariano, Adriana, Porsse, Melody, 2003. Programa de Desenvolvimento Sustentável da Maricultura de Florianópolis. Florianópolis: EMAPA
- Escritório Municipal de Agropecuária, Pesca e Abastecimento, 2003.
- Ministério da Pesca e Aquicultura, 2010. Boletim estatístico da pesca e aquicultura: Brasil 2010. 128p. Available in <http://www.mpa.gov.br/images/Docs/Informacoes_e_Estatisticas/Boletim%20Estat%20C3%ADstico%20MPA%202010.pdf>. Accessed on 28 Jun 2012.
- North, D.C., 1994. Economic Performance Through Time. *The American Economic Review*, 84(3): 359-368.
- Oliveira Neto, F.M., 2005. Diagnóstico do Cultivo de Moluscos em Santa Catarina. EPAGRI, Florianópolis, 2005. Boletim Técnico, 220: 67.
- Ostrom, E., 2009. Design Principles of Robust Property Rights Institutions: What Have We Learned? In: Ingram GK, Hong YH (eds) *Property Rights and Land Policies*, pp: 25-51. Lincoln Institute of Land Policy, Cambridge, MA.
- Romeiro, Ademar R., 2010. Economia ou economia política da sustentabilidade. In: MAY, Peter H. (org.) Economia do meio ambiente: teoria e prática. Rio de Janeiro: Campus-Elsevier.
- Schlarb, Mary, Musnikow, Judy, 2003. Community Engagement in Eco Industrial Development. In: COHEN-ROSENTHAL, Edward. Eco-industrial Strategies: Unleashing synergy between economic development and the environment. Austin: Greenleaf Publishing.
- SDSN, 2013. Available in <<http://unsdsn.org/>> Accessed on 09 Jun 2013.
- Sidra/Ibge, 2012. Available in <<http://www.sidra.ibge.gov.br>>. Acesso em 29 Jun 2012.
- Souza, L.S., 2007. Orientações básicas à Famasc para organização de um empreendimento econômico solidário: cooperativa central de beneficiamento e comercialização de moluscos bivalves. Monografia submetida ao Departamento de Ciências Econômicas para obtenção de carga horária na disciplina CNM 5420 – Monografia. Florianópolis..
- Sznelwar, L.I., C.M. Brunoro, I. Bolis, P. Hidani, 2011. Produção, Sustentabilidade e Trabalho: reflexões baseadas na ergonomia e na psicodinâmica do trabalho. In: AMATO NETO, J. (org.) Sustentabilidade e produção: teoria e prática para uma gestão sustentável. São Paulo: Atlas.
- Wilkinson, J., 1996. Integração regional e o setor agroalimentar nos países do Mercosul: a produção familiar na encruzilhada. *Ensaio FEE*. Porto Alegre, 1(17): 155-184.