RIVISTA DI STUDI SULLA SOSTENIBILITÀ

Review of studies on sustainability

...Un orologio, metafora del tempo, scandisce l'inizio di una sequenza catartica...

I valori, la conoscenza, la partecipazione e l'ambiente come i meccanismi di un orologio antico sono a vista, correlati e perfettamente sincronizzati tra di loro, e come gli ingranaggi di un meccanismo funzionante essi sono posti a sostegno del futuro dei giovani.

È così che il volto del giovane, ormai uomo, reso forte ed ottimista per la conoscenza acquisita, guarda verso il futuro, verso i suoi obiettivi, qui rappresentati dalla stella e dall'orizzonte: egli è pensoso ma anche sereno, poichè è certo di poterli raggiungere.

L'elemento acqua-mare, sintetizzato con due lievi onde marine, è l'ambiente ideale in cui tutti vorremmo perderci entro una dimensione temporale illimitata che va oltre la realtà.

Federica Cappelli

RIVISTA DI STUDI SULLA SOSTENIBILITÀ
Review of studies on sustainability

9.'14
N°1

ISSN 2239-1959

FrancoAngeli
La passione per le conoscenze

€ 32,00 (i.i.)
R126.2014.1

FrancoAngeli srl. V.le Monza 106 - 20127 Milano - Poste Italiane Spa Sped. in Abb. Post. - D.L. 353/2003
(con. in L. 27/02/2004 n. 46) art. 1, comma 1 DCB Milano - I semestre 2014

SEMESTRALE DELLA FONDAZIONE SIMONE CESARETTI 9.'14 N°1

Rivista di Studi sulla Sostenibilità/Review of Studies on Sustainability
Semestrale della Fondazione Simone Cesaretti
Founding Editor: Simone Cesaretti Foundation

Managing Editor: Simone Cesaretti Foundation, Via Casaria 12, 80049 - Somma Vesuviana, Napoli.
www.fondazionesimonecesaretti.it, e-mail: rivista@fondazionesimonecesaretti.it.

Subscription Services and Journal Customer Service: viale Monza, 106, 20127 Milan Italy - tel. (0039) 02.28.37.141; fax (0039) 02.26.14.19.58; e-mail: riviste@francoangeli.it

Subscription fees: Please check on our website for subscription fees (www.francoangeli.it). Otherwise, you can send an e-mail (riviste@francoangeli.it) or a fax (+39.02-26141958) to our *Journal Customer Service*, indicating clearly the name of the Journal. You can pay the subscription by credit card or by bank transfer. *The subscription will begin as soon as payment of the year's subscription rate is confirmed.*

Authorized by Tribunale di Milano n. 23 del 12.01.2011 – Half Yearly - Direttore responsabile: Stefano Angeli - Semestrale - Poste Italiane Spa - Sped. in Abb. Post. - D.L. 353/2003 (conv. in L. 27/02/2004 n. 46) art. 1, comma 1, DCB Milano - This issue contains less than 45% of advertisement – Printed by Global Print srl, Via degli Abeti 17/1, Gorgonzola (Mi).

First Half Year - Printed in June 2014

Rivista di Studi sulla Sostenibilità
Food & Sustainability
Anno IV, N. 1 – 2014

Sommario

Presentation
Food & Sustainability

"Is it possible to ensure sufficient, good, healthy and sustainable food for all mankind?". This is the question that underpins the challenge of the 2015 Milan Universal Exposition. The *Review of Studies on Sustainability* will contribute to the discussion on this question with a series of issues. The aim is to explore how the diverse array of present "food systems" is changing in the context of globalization, illustrate serious sustainability problems and discuss possible responses and further perspectives towards greater sustainability.

The World community has acknowledged that the human right to food must be progressively realized despite serious challenges and inequities that exist in the food systems of both rich and poor countries. Food systems – global in production, consumption and environmental impacts, but also deeply rooted in the social, cultural, natural, political and legal environments of societies – are faced with a serious of transformations arising a.o. from changes in lifestyles, from climatic changes, from global increases and changes in food consumption, from loss of agricultural land relative to growing populations and from changing attitudes of societies towards the consequences of food system's activities for environmental, social and economic issues. To cope with these challenges, the support of research and an interdisciplinary discussion, analysis and evaluation of innovations, experiences, opportunities and risk are required. The classical research focus on narrowly defined research domains does not sufficiently match the interrelationships and dependencies with the food systems. Such research needs to be complemented by a broader view and requires different disciplines to interact.

For this first issue of the *Review of Studies on Sustainability* on "Food & Sustainability", contributions have been collected from different disciplines underlining the importance of the interdisciplinary and transdisciplinary work in the field and more strategically each of them attempts in a different

Diversification strategies for sustaining small-scale fisheries activity: A multidimensional integrated approach

by *Giuseppina Carrà, Iuri Peri and Gabriella Antonella Vindigni*[*]

1. Introduction

Within fisheries management and policies, the important contribution that small-scale fisheries (SSF) could provide for promoting the sustainable well-being of the coastal communities in developing as well as in developed countries is being increasingly recognised (Britton and Coulthard, 2013; Coulthard 2011; McGregor, 2009). It is also becoming evident the need to address the social and cultural aspects of fisheries management in order to ensure their long-term viability (Symes and Phillipson, 2009; Urquhart et al., 2013, 2011). The formulation of policies promoting the role of SSF in the wider coastal economy includes the encouragement to diversification of fisheries activities. This is intended as a process by which households increasingly rely on multiple sources of income other than fishing. In the economic literature diversification is seen as an adaptive strategy to increase households well-being and make them responsive to changes in resource states, environmental conditions and market or regulatory constraints (Borrelli et al., 2013; Allison E.H., Ellis F., 2001; Ferrol-Schulte et al., 2013).

Sustainable fisheries diversification is generally promoted for reducing dependence on the resource and conserving fish stocks through a combination of an environmental management and incentives for alternative or complementary activities that may supplement fishing and reduce dependency on fish stocks. Alternative and complementary activities generating income help to reduce pressure on fisheries resources addressing in a coherent way sustainable diversification, since a resource-dependent activity such as fishing as well as the promotion of SSF are concerned (Barrett,

[*] Dipartimento di Gestione dei Sistemi Agroalimentari e Ambientali – Università di Catania.

Reardon and Webb, 2001; Brugère, Holvoet and Allison, 2008). Diversification of fisheries activities however is meant in the strict sense as diversification into activities that maintain a link with fishing related to the product, the profession or the business.

They could play an important role in many of the ecological, social and cultural issue that arise in the coastal areas and that often have a strong local component. Their integration into the local labour market through diversification into activities inshore and onshore other than fishing can contribute to household viability by raising its income levels and stability. Since diversification cover multiple options and associated dimensions, questions raise about how it should be understood in application to small-scale fishing communities, and specially what strategy of diversification could be established among them. As many factors, often context-specific, influence the process of diversification, both within and outside fishing, strategies embedded in the regional/local situation could provide results in order to involve individuals, groups of actors and stakeholders in a decision making process based on an operational approach.

Although the turn of fisheries management paradigm from the biological to the ecosystem approach and the importance of integrating human environment, such as the social, cultural and economic environment has started to be recognised, few researches deal with a fisheries management involving people (Vindigni et al., 2013). Much less attention is devoted to develop participatory approaches in the sustainable well-being of fisheries communities, which also could provide for formulation of criteria and help in making decisions. A more specific narrative of diversification strategies therefore involves complex cognitive tasks. In others word, it is needed to uptake future employment opportunities within or outside of the fisheries sector. The direction of these diversification activities demands an integrated approach from both operational policies and individuals' capacity building. This offers the possibility of seeking a multiple perspectives by involving actors and stakeholders, considering measures and practices within the political and socio-cultural context of the study area and assessing step-by-step their suitability to the context studied.

The main objective of the paper has been to allow both stakeholder participation and awareness improving among fishers through identifying diversification options and assessing their suitability to the economic and social context. The study described in this article has been developed in the framework of the project "DiverSO", promoted by the Fishery Department of the Sicilian Region. The project involved many integrated activities aimed at encouraging and strengthening the diversification activities of SSF

in Sicily, through a structured and personalized process for identification of strategic lines and related objectives. After the territorial analysis concerning socio-economic and environmental context, the cognitive map and the AHP Method was used to work with groups of actors, experts and stakeholders active in local coastal area.

The paper is structured as follows. The first section introduces the debate on the diversification concept in the framework of EU fisheries policy. The second section discusses a case study on diversification of fishery activities based on a participatory process, which is aimed at creating a shared visions of strategic actions directed to the policy makers. The third section presents results and conclusions on the potentials of this approach to deal with dynamic nature of the process for a future identification of strategies and action.

2. Diversification and the debate in EU fishery sector

As response to mitigate declines in catches and to support fishing communities facing changing conditions, the new regulation on the European Maritime and Fisheries Fund (EMFF) displays to incorporate a more significant social dimension, including a number of elements that focus on this aspect. The EMFF enhances the efforts to encourage job creation and diversification into other activities in the marine environment. It promotes the sharing of new knowledge, best practice and the acquisition of new professional skills especially linked to the sustainable management of marine ecosystems, safety and other new activities in the maritime sector. The support to fishermen shall also be granted for the first time to spouses (or life partners) of self-employed fishermen, recognizing the effective participation of women in family fishing businesses. This measure provides an incentive to assess from a gender perspective the SSF development strategies with the aim to allow evolving gender roles and responsibilities in the small-scale fishing communities and to take emerging opportunities.

In the framework of the EU policy for a sustainable development of fisheries areas, strategies of diversification have been therefore recognized as well as the multifunctionality of fishing activity. Recognition of the principle of multifunctionality, taken into account for a long time now by Common Agricultural Policy, gives to fisheries a significant role in the production of non-commercial goods, including the multipurpose utilisation of fishing resources to allow the continuation of fishing activity while ensuring more sustainable use of natural resources. *Diversification of fishing*

activity also contributes to increase income and well-being, thereby providing an adaptive model that is consistent with the concepts of empowerment and social inclusion. Important contribution for the coastal community well-being could arise enhancing multifunctional role of household resources covering both the alleviation of negative externalities and the provision of positive externalities (OECD, 2005, 2009).

Opportunities for SSF may lie outside traditional growth strategy identifying a number of options viable to generate income for fishers and finding all possible synergies with the other marine and maritime sectors as part of a larger development strategy of the coastal areas. However implications that non-fishing income should have for subsidising unprofitable fishing of European SSF is still a controversial issue (Macfadyen et al., 2011; Brugère et al., 2008; Allison, 2003). The main argument used is that small-scale fishers normally have not adequate skills and knowledge in response to alternative employment opportunities, but "such opportunities may be seasonal and support only a small fraction of commercial fishing operators" (Macfadyen et al., 2011, p. 17). On the other hand, livelihood diversification strategies is considered inherent the nature of much small-scale fishing activity, often as side effect of a limited investment capacity of small enterprises (Brugère et al., 2008).

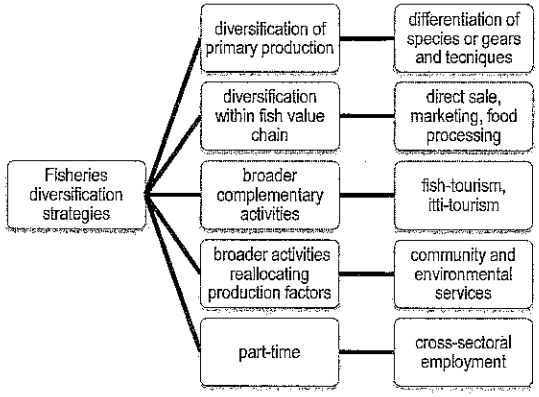
It is more commonly agreed that both the marine resources and the SSF preservation are key components to argue for supporting SSF diversification. Business development opportunities that could be implemented to improve the sustainable development of SSF are in any event to be addressed by strengthening training policy and capacity building initiatives. Diversification and adaptation into new activities jointly calls for technical and/or organizational innovation that may enable small-scale fishers to obtain acceptable revenue and adjust production capacity so that it is more in line with management objectives and conservation measures.

Since it is crucial that policies address regional/local specificities and households' motives for diversifying their income sources, regulation points out diversification as one of objectives that support the sustainable development of fisheries areas through strategies drawn up by local partnerships represented in Fisheries Local Action Groups (FLAGs). These strategies can encompass the development of complementary and alternative activities together with fishing at individual and household level in a broader community/territorial approach. It becomes ever more necessary to address in a coherent way diversification and its links within the territorial context to serve for the specific needs of fishing communities (Smith et al. 2005). Diversification of activities is not an individual strategy. It requires

aggregation and cooperation among producers such as sharing strength and know-how, collaboration between fishermen associations, processors and/or distributors can allow the achievement of supply quantities and quality standards needed for a brand or label strategy, inter-branch organizations and other forms of partnership (Malorgio and Malazzani, 2013).

It can be drawn different types of diversification strategies that can help to define this concept in the context of the fisheries sector (D'Amico et al. 2013; FARNET, 2011; Brugère et al., 2008;Van der Ploeg and Roep, 2003). As we see in Figure 1, it is possible distinguish five types of strategies. The first one is connected to changes of primary production and production systems while continuing fishing activity. The following three strategies include several options to develop and deploy value-added products and services. Finally, occupational mobility which lead to additional jobs away from fishery sector is considered.

Fig. 1 – Fishery activities diversification strategies and options



It should be noted that in our study only the new activities related to fisheries (complementary activities, either through integration or through simple addition to the fishing one) have been considered and subsequently tested in the field. The diversification of primary production and the cross-sectoral employment on part-time basis were not taken into account.

Following the operational classification proposed by Van der Ploeg and Roep (2003) concerning rural areas, three diversification strategies (deepening, broadening, re-grounding activities) could be performed: either in moving down the food chain into small–scale processing and selling prod-

ucts (e.g. direct sales, short distribution chains), or using household resources to expand income-producing activities (e.g. fish-tourism) or reallocating production factors for activities some of which can also be completely independent of fishing activity (e.g. community and environmental services, cultural and recreational activities, or social services).

3. The context for SSF diversification strategies

The study area overlooks the Mediterranean basin laying in the eastern coast of Sicily (Jonian sea). It covers more than 160 km from North (Giardini Naxos-Messina) to South (Portopalo-Syracuse) (Figure 2).It counts ten Maritime Directions[1], of which Portopalo has the largest fleet, followed by Siracusa and Catania.

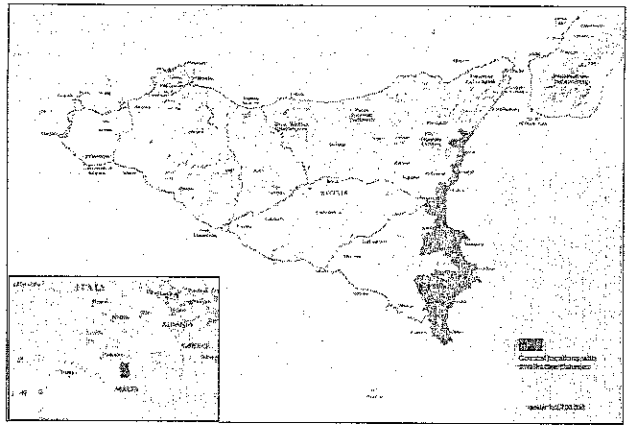
The coastal shelf is characterized by a great environmental heterogeneity and biological productivity. This condition is due to the presence of the mouths of various flowing rivers (such as Alcantara, Fiumefreddo, Simeto, S. Leonardo, Asinaro, Tellaro). Furthermore, the presence of upwelling currents in the Straits of Messina gives a positive contribution to maintain an equitable distribution of fish during the year (Cognetti *et al.*, 2008). The presence of two marine protected areas (Cyclops Island and Plemmirio) and several natural reserves (Fiumefreddo, Timpa of Acireale, Simeto Oasis, Vendicari) positively affect the biological richness of the area.

The SSF characteristics, in the study area concerned, are in line with those of the fisheries in the whole Sicily[2], but the small-scale segment is even more relevant (92% of 631 vessels registered), than in the rest of the Sicilian region (68,3% of vessels corresponding to 7,7% of GT, 18,8% of kw engine power and 41,6% in terms of crew; see Table 1).

[1] The Maritime Directions are the following: Port Authority of Catania, County Maritime Office of Riposto, Maritime Local Office of Acicastello, Delegation of Santa Maria La Scala, Maritime Local Office of Pozzillo, Port Authority of Augusta, Port Authority of Syracuse, Maritime Local Office of Portopalo, Delegation of Marzamemi, Maritime Local Office of Giardini Naxos.

[2] Regional marine compartments represent a relevant productive area of the Italian fishery sector in terms of number of people employed (25%), units of fishing (23%), catches (18%) revenues (26%) (MIPAF-IREPA, 2012).

Fig. 2 –The study area (*)



The large number of fishing methods employed in relation to the different sea bottoms and currents as well as the seasonality is adapted to the variety of fish populations to optimize the catches. Therefore, the multipurpose fishing systems is used, which provide a wide set of catches such as tuna, swordfish, oily fish and shellfish (Forcada et al., 2010; Oliver, 2004).

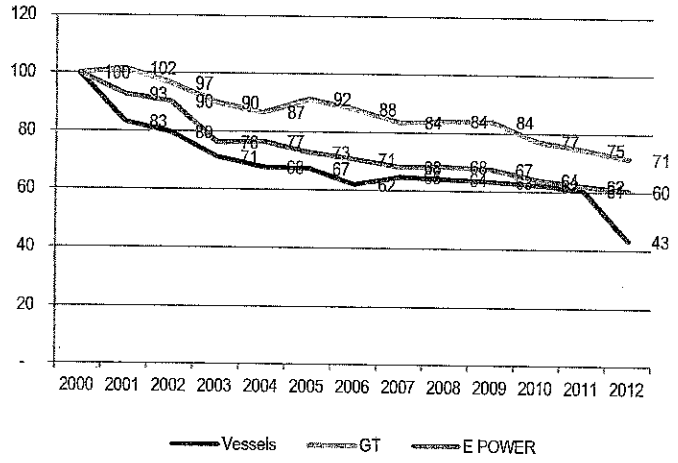
Table 1 – Technical characteristics of fishing fleet and employment by fleet segment, Sicily 2012 (*)

FleetSegment	*Vessels*		*Grosse Tonnage*		*Engine power*		*Crew*	
	n.	*%*	*GT*	*%*	*Kw*	*%*	*n.*	*%*
Bottom trawl	511	**17,3**	32.927	**66,8**	122.052	**50,5**	2.318	**31,5**
Purseseine	100	**3,4**	5.331	**10,8**	20.955	**8,7**	801	**10,9**
Small scale fishing	2011	**68,3**	3.788	**7,7**	45.496	**18,8**	3.061	**41,6**
Passive polyvalent	171	**5,8**	2.389	**4,8**	22.414	**9,3**	593	**8,1**
Longlines	153	**5,2**	4.842	**9,8**	30.612	**12,7**	583	**7,9**
Sicily	**2.946**	**100,0**	**49.277**	**100,0**	**241.529**	**100,0**	**7.356**	**100,0**

The SSF in the Jonian coastal area of Sicily have contributed to the improvement of the standard of human life and to the equilibrium between environment and territory. However, the anthropic pressure, consequent to the urbanization phenomenon in the coastal area, has determined a loss of biodiversity and the habitat degradation. From the economic point of view, they have experienced a steady decline reflecting the overall Mediterranean trend pushed down by several factors such as the increase in production costs, especially those related to the raise of fuel price, the fall in production as consequences of reduced catches and the lack of rational and efficient organization of the supply chain.

The decline of fishing activity can be shown in 2000-2012 period, given the regional fleet has fallen sharply in terms of vessels, gross tonnage and engine power. Meanwhile, the decline in the physical and economic productivity of the Sicilian small-scale fleet confirms the crisis of its fishing activities (Figure 3).

*Fig. 3 – Evolution of the Sicilian fishing fleet in terms of number of vessels, gross tonnage and engine power in Sicily (2000=100)**



(*) *Source*: Our own elaboration from data IREPA, 2012

Moreover EU fisheries policy has provided incentives for permanent cessation of fishing activities paid to the owners of fishing vessels according to the EU Reg.1198/2006. New restrictions imposed by the Mediterranean Regulation 1967/2006 – on mesh size, distance from the coast, minimum size of several fish species also have imposed changes in fishing activities with a direct impact on production.

4. Methodology

4.1. Data collection

Official fleet data of the vessels were obtained through the local marine offices. The fishing fleet in the study area consists of 631 vessels registered in 10 Maritime Directorates (Ports of Catania, Augusta, Siracusa, Riposto and Portopalo; and the small Ports of Acicastello, Santa Maria La Scala, Pozzillo, Marzamemi and Giardini Naxos). All the registered fishing boats have been classified according to their length: 51% (319 boats) belongs to the category of less than 10 meters, 41% (260 boats) to the category of 10-20 meters, 8% (52 boats) to category more than 20 meters. However, many other of the smallest boats even if are utilized for fishing, are not officially registered.

Questionnaires were used to secure prior knowledge on the local diversification fishery activities and their spatial distribution. Different types of diversification were detected and subsequently classified into three setting: the field of tourism (such as fishing tourism, sport tourism, itti-tourism, pleasure fishing), the field of products processing and selling (fish processing, tasting locally, direct selling to consumers and fishmongers) and the field of eco-activities (such as environmental monitoring, waste collecting, watch over sea environment).

Two different questionnaires have been administered in separate face-to-face interviews (n=67 respondent) in the areas of study in 2012/2013. The first was administered to individuals who were actively engaged in small scale fishing activities in all harbours (catching and commercial) (n=30) and to participants engaged in diversification activities and industry (n=25). The second questionnaire was administered to members of the public institutions and cooperatives: port authorities (n=5), members of the local fishery cooperative Ketos (n=1), experts on fishery sector (n=5), member of the Regional Fishery Department of Sicily (n=1).

The distribution of the licences registered on diversification activity (n=75) is spatially differentiated (Table 2). Tourist diversification is more practiced in Catania (n=12) and Portopalo (n=10); product processing and selling activities (manufacturing and processing of fishing products) are

diffuse in Syracuse, Augusta, Portopalo and Marzamemi, (n=13); eco-activities with specialized boats are practiced in Syracuse and Acicastello and in Marine Protected Areas (Cyclops Island and Plemmirio) (n=5).

Tab. 2 – Licences registered for fishery activities diversification in the study area (2012) (*)

Fishing Ports	*Fishery activitiesdiversification*		
	Touristic	*Product processing and selling*	*Ecological activities*
Giardini Naxos	5	1	-
Riposto	-	-	-
Pozzillo	-	-	-
Santa Tecla	2	-	-
Acicastello	8	1	2
Ognina	-	1	-
Catania	12	-	-
Augusta	7	2	-
Siracusa	9	3	3
Avola	-	-	-
Marzamemi	4	2	-
Portopalo	10	3	-
Total	**57**	**13**	**5**

(*) *Source*: Our own elaboration from data collected in the Maritime Directions of the study area

4.2. Cognitive mapping

In order to explore perspectives of the individuals engaged in such activities, participants have been invited to participate in open discussion and focus groups. The participatory research process took place from 2012 to 2013. This process has been carried out through eight main workshops, which were attended by 15-20 stakeholders each, and 3 smaller focus group on selected topics. The technique of cognitive map was used to work with groups of actors, experts and stakeholders active in local coastal areas. By groups open-discussions on major challenges and concerns, each participant was asked to express fundamental point of view and concerns that

could improve the adoption of diversification strategies. The practices, the logics and the constraints of diversification fishery activities have been explored making use of cognitive mapping technique with the aim to identify the key issues and strategic options. Cognitive maps express values and concepts of open-discussions as means-end relation between them. They aim at capturing personal subjective data and resulting in particular perceptions leading to determine whether action is required. The form of cognitive maps here used in based on Kelly's Personal Construct Theory (PTC) (Kelly, 1955) and developed by Eden and colleagues (Eden, 1988): maps are a representation of how an individual or group members perceive a situation.

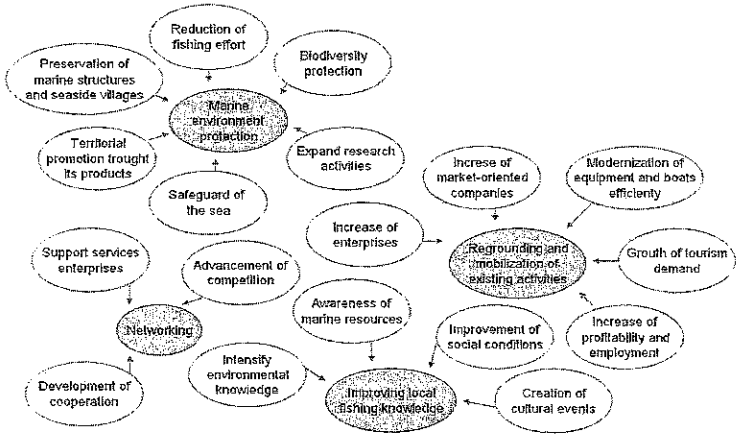
Using Decision Explorer software (Banxia, 1997), individual maps have been later congregated into an "aggregated map" (Eden and Ackermann, 1992). It represents the perception of participants interviewed on the adoption of diversification activities. Statements were analysed to identify primary assessment elements that the actors considered might impact their values. The relations of influence within the maps have been converted to a list of actions: incorporating the understanding of preferential judgement of the decision-maker (Keeney, 1992).

Identical concepts (i.e. similar wording, same context but different maps, or both) have been merged into the aggregated map by combining the wording used in individual maps. This process gave each person a sense of ownership of the map.

In the final step, we carry out several analyses to identify key issues. Cluster analysis was performed to find groups of closely linked concerns. Each cluster can correspond to one or more key issues according to some parameters introduced into the software, namely the target and the minimum size of the cluster.

The map provides an indication of perceived reasons of the adoption of diversification strategies and identifies some tentative objectives (Figure 4). Criteria have been identified on what stakeholders consider important. The options have been identified according to the existing activities in the area of study. According to Hirsh et al. (2010) the criteria for the adoption of focal topics used for the evaluation are representativeness, independence, early involvement and transparency. The following five issues were selected as focal topics for the participatory research process based on the diversification of fishing activities: promote alternative food network, enhance economic performance, preserve local knowledge and tradition, enhance long term sustainability and enhance flexibility to change.

Fig. 4 – Aggregated cognitive map



4.3. *Evaluation: the Analytic Hierarchy Process*

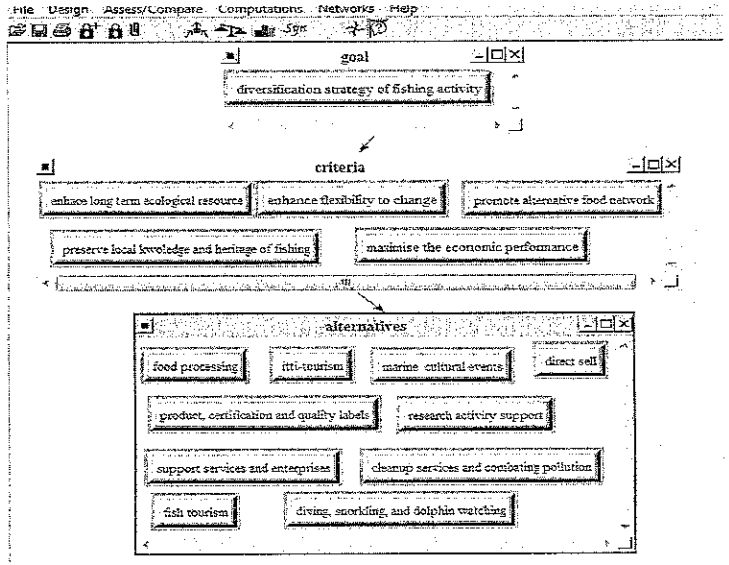
The Analytic Hierarchy Process (AHP) is a structured technique for dealing with complex decisions. It was developed by Thomas L. Saaty in the 1970s and has been extensively studied and refined since then. The AHP is a method for structuring, measurement, and synthesis; it allows individual preferences to be converted into ratio-scale weights. It is one of several multi-criteria decision making techniques available and provides a relatively simple and powerful means of deriving individuals' preferences for one objective over another (Nijkamp, Vindigni, 2000). It can incorporate qualitative/value judgements and allows the inclusion of any non-monetary benefits. The AHP provides a comprehensive and rational framework for structuring a decision problem, for representing and quantifying its elements, for relating those elements to overall goals, and for evaluating alternative solutions. Saaty define the AHP as having three basic principals: decomposition, comparative judgement, and hierarchic composition/synthesis of priorities.

Following previous studies the process of the construction of our model was undertaken starting from modelling the problem as a hierarchy containing the decision goal, the alternatives for reaching it, and the criteria for evaluating the alternatives. The application of the AHP requires to decom-

posing the decision problem into a hierarchy of or sub-problems, each of which can be analysed independently.

The problem under consideration can be represented in a hierarchical structure where the highest level of the hierarchy consists of a unique element that is the overall objective (goal). At the lower level, there are multiple criterion with relationship among elements of the adjacent element higher to be considered. Elements that lie at the upper level are called parent elements while those that lie at lower level are called child elements. Diversification activities (alternatives) are put at the lowest level of the hierarchy. In our case are three or four layers in the decision hierarchy. The first layer describes the overall goal which is determined as identifying diversification strategy of fishing activities. The second and third layers, respectively describes the criteria and activities (Figure 5).

Fig. 5 – Hierarchical structure: goal, criteria and alternatives



Once the hierarchy is built, the criteria weights for strategy identification have been calculated using Superdecison-Decision Support Software. It guides in judging, via pair-wise comparisons, the relative importance of the objectives and the preference for the alternatives that have been defined

(Baby, 2013). This procedure has been implemented through interactive exchanges of opinion on major challenges and concerns with the stakeholders interviewed. They were asked to express fundamental point of view that could promote the diversification of fishery activities. The AHP converts these evaluations to numerical values that can be processed and compared over the entire range of the problem. A numerical weight or priority is derived for each element of the hierarchy, allowing diverse and often incommensurable elements to be compared to one another in a consistent way.

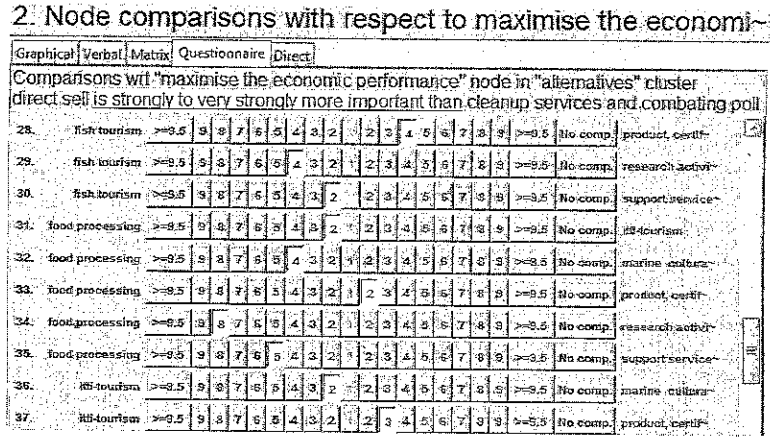
One of the major strengths of the AHP is the use of pair wise comparisons, which is the process of comparing the relative importance of two elements (for example, criteria) with respect to another element (for example, the goal) in the level above to establish priorities for the elements being compared. Pair wise comparisons are carried out for all the parent/children sets of nodes. The nodes, that are to be compared, are always all in the same cluster and are compared with respect to their parent element, the node from which they are connected (Table 3). Verbal judgements are used to compare factors using the words: Equal, Moderate, Strong, very Strong and Extreme.

Tab. 3 – The Saaty rating scale

Intensity of importance	***Definition***	***Explanation***
1	Equal importance	Two factors contribute equally to the objective
3	Somewhat more important	Experience and judgments slightly favour one over the other
5	Much more important	Experience and judgments strongly favour one over the other
7	Very much more important	Experience and judgments very strongly favour one over the other. Its importance is demonstrated in practice
9	Absolutely more important	The evidence favouring one the other is of the highest possible validity
2,4,6,8	Intermediate values	When compromise is needed

Numerical judgments are made in matrix (Table 4) using the nine-point scale that represents how many times one element is more important than another. Comparisons involve to ask questions such as "which is more important with respect to the criterion?" and "how strongly?".

Tab. 4 – Pairwise questionnaire comparaisons model



While performing the pair wise comparison for all the items, an inconsistency index is calculated and it has to be less than 0.1.

For example, to construct a value scale for the "maximise the economic performance" criterion, was asked to the working group to judge the differences in attractiveness between the various levels of its performance. Each judgement is entered in the matrix, and then its consistency with the judgements already inserted is checked. If an inconsistency is present, it is offered suggestion to overcome it. "Expert Panels" reflected on how each action would improve the achievement of each objective and selected the reference impact-level that in their opinion best appraises the perceived effect.

In the final step of the process, numerical priorities are calculated for each of the alternative activities. The results for the alternatives are obtained with the "Synthesis command" in the Main Model View (see Table 5). These results represent relative ability of the alternatives to achieve the overall objective (diversification fishery activities). The "Normal" column presents the results in the form of priorities. The "Ideal" column is obtained from the "Normal" column by dividing each of its entries by the largest value in the column.

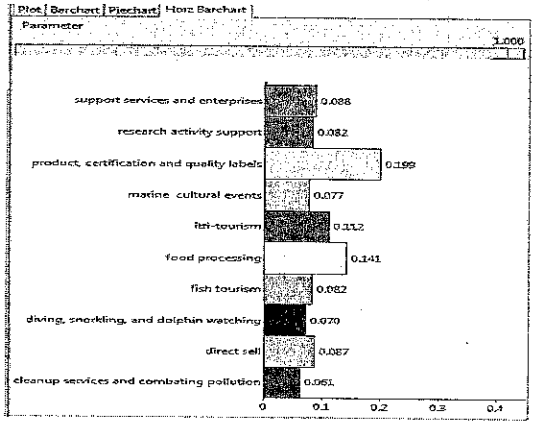
Tab. 5 – Overall priority

Alternatives	Total	Normal	Ideal	Ranking
cleanup services and combating pollution	0.0305	0.0610	0.3070	10
direct sell	0.0436	0.0873	0.4394	5
diving, snorkling, and dolphin watching	0.0351	0.0702	0.3532	9
fish tourism	0.0410	0.0821	0.4132	6
food processing	0.0705	0.1410	0.7099	2
itti-tourism	0.0561	0.1121	0.5644	3
marine cultural events	0.0387	0.0774	0.3898	8
product, certification and quality labels	0.0993	0.1987	1.0000	1
research activity support	0.0409	0.0818	0.4117	7
support services and enterprises	0.0442	0.0884	0.4451	4

These results show that the "certification and quality label" would be the best among diversification fishery activities considered. The other activities are in the same proportion as in "Normal" and are interpreted in this way: "food processing" is 70.9 % as good as "product, certification and quality label" and "ittitourism" is 56,4% as good as product, certification and quality label. They reflect the preferences of the person who made the judgments, incorporating their personal values and desires, and not an objective assessment of the relative value as a diversification of fishery activities.

In the final step the analysis of sensitivity has been performed using any elements in the model by changing the priority of the criteria. While analyzing for the numerical values, it was seen there are changes in the priorities among the different alternatives, but the change in priorities are not remarkable with great differences that can be seen in the graphic (Figure 6).

Fig. 6 – Sensitivity analysis for the node maximise the economic performance



6. Concluding remarks

A growing literature suggests that fishermen should adopt a portfolio of activities of diversification in response to the decline of the sector and to improve the SSF resilience.

In this paper have been investigated the possibilities and constrains to adopt an integrated participatory approach which can facilitate the assessment of different option of SSF diversification activities. This was done under the consensus of all the actors invited to take part in the process of evaluation. The participatory approach, developed in a multi-methodology framework, has provided an opportunity for involving in meetings and in discussions different actors, on the grounds that some of them are not generally included in policy-making. The AHP proved to be a powerful tool to help us in organise their ideas, criteria and objectives in a hierarchical structure. A possible drawback is the raise of misplaced expectations among actors involved that the outcomes of their interests, ideas and perceptions could be not transferred to higher levels of decision making. Finally, it should be remarked that this was a merely pilot study with a small sample. Consequently, the presented findings should be carefully interpreted and further empirical research seems appropriate.

The results clearly indicate that diversification trough a strategy which allows to increase the added value of fish products such as processing, direct sale and labeling tend to be considered the first additional opportunity for the integration of income. It has an important role to play within the context of coastal marine communities sustainable development, as an activity that contributes decisively to economic growth and employment. The empirical evidence suggests that most actor involved felt that adding value to the products, especially through certification and quality systems might reduce the lack of confidence of consumers toward fish products about its healthiness and quality. However, the setting up of certifications is achievable only if it is implemented in agreement with association of producers and in co-action of the structures along the whole productive chain, especially if considering brands associated to a geographical provenience (Carrà, 2011). In the area of study lack of agreements, both at horizontal level among producers and at vertical level along the productive chain, still represents a strong point of weakness for the development of common certification systems.

Tourism tends to be considered the second opportunity among the actors interviewed when considering options to diversify the local economy of costal fisheries areas. The productive flexibility of these micro enterprises can

encourage the adoption of this diversification strategy due the fact that they are of small dimension and with low management costs. In the Ionian coastal areas touristic services, direct on indirectly linked to fishing activity, appear to be fragmented, although spread in the all area. Isolated projects on fish tourism are unlikely to be successful if those not entail investments in infrastructure, animation-training culture in an integrating way. The lack of coordination among the different stakeholders reduces at the moment the opportunities of this income integration. The creation of networks for the whole demand and offer would guarantee a more rational management of the fish tourism. Tourism also has the potential to benefit remote regions and areas with otherwise limited economic activities. It is noteworthy that due to its dispersion and fragmentation, coastal tourism potentially poses significant problems in terms of environmental sustainability.

Only few respondents displayed a very great interest for ecological activities, because they felt that was unclear how the provision of ecological services could create new activities remunerated directly from the markets. Account should be taken in this regard of the necessary efforts for strengthening scientific cooperation with a view to further integrated sustainable fisheries management focusing on clearly identified locally relevant ecological objectives and looking at the economic benefits of investment. Such an approach requires involvement of fishing communities in decision-making and strategic management in supporting the provision of public goods and services.

By accounting for the full ranges of preferences of actors a diversification activity can be adopted, without introducing more levels of management and thus more bureaucracy and more management costs. It can be view as dynamic process that need a constructive development phase which include a long-term objectives.

To conclude, there are many possibilities to diversify fishery activities. The different strategies of diversification do not entail the same social or economic impacts to enhance social and economical sustainability of small-scale fishery. Finally, other conditions for a good result of the activity are, inter alia, the quality of complementary infrastructures and services, the skills available locally, the seasonality characteristics of demand and supply, and other key factors. To improve quality life of costal small fishery community is crucial that the process of diversification strategies is based on the combination of different activities and technologies (with key factors such as innovation, quality standards).

References

Allison E.H. (2003). Potential applications of a 'sustainable livelihoods approach' to management and policy development for European inshore fisheries. In Hart P., Johnson M. (eds.), *Who owns the sea*, Workshop proceedings, Tjarno Sweden, 24-27 June 2002: 53-99.

Allison E.H., Ellis F. (2001). The livelihoods approach and management of small-scale fisheries. *Marine Policy*, 25: 377-388, doi: 10.1016/S0308-597X (01)00023-9.

Baby S. (2013). AHP modeling for multicriteria decision-making and to optimise strategies for protecting coastal landscape resources. *International Journal of Innovation, Management and Technology*, 4(2): 218-227.

Banxia Software Lda (1997). *Decision Explorer User Manual.*

Barrett C.B., Reardon T., Webb P. (2001). Nonfarm income diversification and household livelihood strategies in rural Africa: concepts, dynamics, and policy implications. *Food Policy*, 26(4): 315-331, doi: 10.1016/S0306-9192(01)00014-8.

Borrelli I.P., Cesaretti G.P., Misso R. (2013). The Sustainability of well-being: A complex issue. *Rivista di Studi sulla Sostenibilità*, 1: 43-54.

Britton E., Coulthard S. (2013). Assessing the social wellbeing of Northern Ireland's fishing society using a three-dimensional approach. *Marine Policy*, 37: 28-36, doi: 10.1016/j.marpol.2012.04.011.

Brugère C., Holvoet K., Allison E.H. (2008). *Livelihood diversification in coastal and inland fishing communities: misconceptions, evidence and implications for fisheries management.* Working paper, Sustainable Fisheries Livelihoods Programme (SFLP). Rome, FAO/DFID. ftp://ftp.fao.org/fi/document/sflp/wp/diversification_june2008.pdf.

Carrà G., Peri I. (2011). Sicurezza alimentare e processi di integrazione della regolazione pubblica e privata. *Italian Journal of Agronomy*, 6(2s): 50-54.

Cognetti G., Sarà M., Magazzù G. (2008). *Biologia Marina*, Bologna: Calderini.

Coulthard S., Johnson D., McGregor A. (2011). Poverty, sustainability and human wellbeing: a social wellbeing approach to the global fisheries crisis. *Global Environmental Change*, 21(2): 453-63, doi: 10.1016/j.gloenvcha.2011.01.003.

D'Amico M., Coppola A., Chinnici G., Di Vita G., Pappalardo G. (2013). Agricultural systems in the European Union: an analysis of regional differences. *New Medit*, 4: 28-34.

Eden C. (1992). On the nature of cognitive maps. *Journal of Management Studies*, 29: 261-265, doi: 10.1111/j.1467-6486.1992.tb00664.x.

Eden C., Ackermann F. (1992). Strategy development and implementation - the role of a group decision support system. In Kinney S., Bostrom R., Watson R. (Eds.), *Computer Augmented Teamwork: A Guided Tour*, New York: Van Nostrand and Reinhold: 325-342.

FARNET (2011). *Diversification of fisheries areas*. European Commission, Directorate-General for Maritime Affairs and Fisheries, Director-General. https://webgate.ec.europa.eu/fpfis/cms/farnet/files/documents/FARNET_Magazine_04_EN.pdf.

Ferrol-Schulte D., Wolff M., Ferse S., Glaser M. (2013). Sustainable Livelihoods Approach in tropical coastal and marine social-ecological systems: A review *Marine Policy*, 42, November: 253-258, doi: 10.1016/j.marpol.2013.03.007.

Forcada A., Valle C., Sanchez-Lizaso J.L., Bayle-Sempere J.T., Corsi F. (2010). Structure and spatio-temporal dynamics of artisanal fisheries around a Mediterranean marine protected area. *ICES Journal of Marine Science*, 67(2): 191-203, doi: 10.1093/icesjms/fsp234.

Hirsch D., Abrami G., Giordano R., Liersch S., Matin N., Schlüter M. (2010). Participatory research for adaptive water management in a transition country – a case study from Uzbekistan. *Ecology and Society*, 15(3): 23.

Keeney R.L. (1992). *Valued-Focused thinking: A path to creative decisionmaking*, Cambridge, MA: Harvard Press.

Kelly G.A. (1955). *The psychology of personal constructs*, New York: Norton.

Macfadyen G., Salz P., Cappell R. (2011). *Characteristics of small-scale coastal fisheries in Europe*. Study, Directorate General for Internal Policies. http://www.europarl.europa.eu/RegData/etudes/etudes/join/2011/460059/IPOL PECH_ET(2011)460059_EN.pdf.

Malorgio G., Malazzani L. (2013), *Enhancing small-scale fisheries value chains in the Mediterranean and Black Sea*. Draft text, General Fisheries Commission for the Mediterranean First Regional Symposium on Sustainable Small-Scale Fisheries in the Mediterranean and Black Sea, St. Julian's, Malta, 27-30 November 2013.http://www.ssfsymposium.org/Documents/FullVersion/BPIV _Part1.pdf.

McGregor J.A. (2009). Building sustainable governance. Human wellbeing in fishing communities. Paper Prepared for *ESPA Workshop 1, Institute for Ocean Management*, Chennai, India, pp. 1-8, http://www.ids.ac.uk/idspublication/ human-wellbeing-in-fishing-communities.

MIPAF-IREPA (2012). http://www.irepa.org/it/sistan.html.

Nijkamp P., Vindigni G. (2000). Spatial Environmental Evaluation of Alternative EU Agricultural Scenarios for Mediterranean Countries. *Journal of Environmental System*, 28(1): 73-92.

OECD (2005). *Multifunctionality in Agriculture: What role for private initiatives?*, Paris: OECD.

OECD (2009). *The role of agriculture and farm household diversification in the rural economy: Evidence and initial policy implications*, Paris: OECD.

Oliver P. (2004). Which Fishery Policy for the Mediterranean Sea? *New Medit*, 4: 2-4.

Saaty T.L. (1980), *The Analytic Hierarchy Process*, New York: McGraw-Hill.

Symes D., Phillipson J. (2009). Whatever became of social objectives in fisheries policy? *Fisheries Research*, 95: 1-5, doi: 10.1016/j.fishres.2008.08.001.

Urquhart J., Acott T., Reed M., Courtney P. (2011). Setting an agenda for social science research in fisheries policy in Northern Europe. *Fisheries Research*, 108: 240-247.

Urquhart J., Acott T., Zhao M. (2013), Introduction: Social and cultural impacts of marine fisheries, *Marine Policy*, 37: 1-2.

Van Der Ploeg J.D., Roep D. (2003). Multifunctionality and rural development: the actual situation in Europe. In Van Huylenbroeck G., Durand G. (Eds.), *Multifunctional Agriculture. A new paradigm for European agriculture and Rural Development*, Burlington, VT (USA) e Aldershot (UK): Ashgate.

Vindigni G., Peri I., Urso A. (2013). Biodiversity and ecosystem approach as political discourse. *Quality-Access to Success*, 14, Suppl. 1, March: 11-17.

Abstract

The paper suggests that the diverse livelihoods could properly be taken into account to endeavour the effort for more sustainable, flexible and adaptive small-scale fisheries. Diversification contributes to increase income and well-being, thereby providing an adaptive model that is consistent with the concepts of empowerment and social inclusion. Strategies embedded in the regional/local situation could provide results in order to involve individuals, and groups of actors and stakeholders in a decision making process based on an operational approach. The study described in this article is aimed at encouraging and strengthening the diversification activities of small-scale fisheries in the Ionian coastal area of Sicily. The cognitive maps and the AHP method have been used to work with groups of actors, experts and stakeholders active in the local coastal area through a structured and personalized process aimed at creating a shared visions of strategic actions directed to the policy makers.

Key words: Small-scale fisheries; Diversification strategies; Sustainable wellbeing; Sustainability; Participatory approach; Cognitive map; Analytical Hierarchic Process.

Riassunto

Strategie di diversificazione dell'attività della piccola pesca: un approccio integrato multidimensionale

Il presente articolo suggerisce che la diversificazione dei mezzi di sostentamento potrebbe opportunamente essere considerata al fine di rendere la pesca su piccola scala più sostenibile, flessibile e adattativa. La diversificazione contribuisce anche ad aumentare il reddito e il benessere, fornendo in tal modo un modello adattativo coerente con i concetti di empowerment e di inclusione sociale. Strategie integrate localmente sono in grado di coinvolgere individui e gruppi di attori e stakeholder in un processo decisionale basato su un approccio operativo. Lo studio descritto in questo articolo è volto a favorire e rafforzare la diversificazione delle attività della piccola pesca nella zona costiera ionica della Sicilia. Le mappe cognitive e il metodo AHP sono stati utilizzati nell'analisi delle percezioni di gruppi di attori, esperti e stakeholder attivi nella zona costiera in esame attraverso un processo di valutazione strutturato e personalizzato che mira a creare una visione condivisa delle azioni strategiche rivolte ai responsabili politici.

Parole chiave: Piccola pesca; strategie di diversificazione; sostenibilità; benessere sostenibile; approccio partecipativo; mappa cognitiva; processo gerarchico analitico