

D4.3: “Stakeholder Visions and Perspectives on the Future from the Argentina Case Study”

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Executive summary

This document presents the third deliverable (D4.3) of Working Package 3 (WP3), entitled "Stakeholder Visions and Perspectives on the Future from the Argentina Case Study". This deliverable focuses on the identification of sustainable community based governance models for the management of natural resources that can respond to global environmental change. In this stage, we consider how the current system for governing and managing the natural resource in question can respond to potential changes in the future. Scenario Methods use the creativity of several plausible futures to explore possible strategies. The aim is to propose tools for a community-based sustainable management and governance models in marine and coastal systems and up-scaling the results to other areas.

The work carried out in COMET-LA has a clearly participatory approach, which involves actively different stakeholders and especially members of the communities in the entire process of data collection, systematization and analysis.

The research team followed the common scenario-planning methodology, but it was adapted where necessary to suit the needs of the case study. The methodology set out what data have to be collected at every stage; resulting in: a list of drivers and internal variables chosen by the researchers, a morphological analysis of driver impacts on these variables, field notes on the community's views on the morphological analysis, three narratives of the future derived using global archetypes validated by the community members, field notes on the community's views of the narratives, a list of possible response options, including existing response options, a matrix of how response options might respond in the scenario conditions, a matrix of how the response options might respond to shocks, a final list of robust response options and strategies, a list of the implications of the robust response options/strategies, a plan for taking these response options/strategies forward.

The scenario analysis was realized in four steps:

- Step 1: Exploration of how different key trends can affect the system in the future.
- Step 2: Construction of possible future scenarios using archetypes. Narrative writings. Validation of narratives by stakeholders (SHs).
- Step 3: Identification of possible responses
- Step 4: Implications of the responses on the local system management/governance.

The last workshop (July 7, 2014) coincided with the visit of the entire COMET-LA team and it took place at the IADO, Bahía Blanca.

Step 4 inquired about the implications and appropriateness of the responses obtained locally and identified possible strategies and future plans through specific actions. The strongest 5 recognized responses were analyzed one by one with respect to *what*, *who* and *how* they could each be carried out.

The meetings were always completed in an atmosphere of relaxation and warmth, with a coffee break and refreshments, that allowed the SH to meet, to talk to each other, to share problems and to increase the bonds of friendship generated along the three years of COMET LA activities. The SH repeatedly pointed out that, before the COMET LA project, they had not had enough time or environment to meet each other. Thus, one of the most important results of the COMET-LA Project was the creation of a space for exchanging ideas, discussing common problems and sharing knowledge and opinions with the scientists.

The main conclusions from this deliverable are:

- Argentina has a cultural focus on present problems and challenges; the conjuncture prevails over the future. Nevertheless, the outcome of the activity was constructive and promising.
- The SHs noticed the importance of their participation in all the actions aimed to construct their "future".
- More specifically, SHs considered that the more relevant issues for Community-based Management are: training and promotion of organizations, environmental education, information dissemination and the development of an appropriate, controlled and genuine legislation coming from their own common interests instead of the powerful interest groups.
- SHs mentioned that the interaction with other organisms such as IADO, UNS, INIDEP and Aquamarina is fundamental in order to improve the organizational functioning.
- SHs emphasize the need to properly define the chain of command and responsibilities, as well as "approximate" Sh to the levels of decision in the management of resources.
- SHs recognize certain "spontaneity" in many of the collective actions arising as a reaction to some specific conflicts, which they are not resulting from planned conscious strategies for addressing the future.
- Nevertheless, SHs consider that COMET-LA Project in Argentina is the starting point in the communitarian identity construction. The main fact is that a new space for dialog and interaction between SHs and decision makers appeared, in which community problems can be jointly discussed.

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List of abbreviations

| | English | Spanish |
|----------|---|--|
| COMET-LA | Community-based management of environmental challenges in Latin America | Gestión Comunitaria de los Desafíos Ambientales en Latinoamérica |
| IADO | Argentine Institute of Oceanography | Instituto Argentino de Oceanografía |
| INIDEP | National Institute of Fishery Research and Development | Instituto Nacional de Investigación y Desarrollo Pesquero |
| LNG | Liquid Natural Gas | Gas Natural líquido |
| NGOs | Non-governmental organizations | Organizaciones No Gubernamentales |
| PSA | Prospective Structural Analysis | Análisis Estructural de la Prospectiva |
| SHs | Stakeholders | Actores sociales |
| SES | Social-Ecological System | Sistema Socio-ecológico |
| UNS | National University of South | Universidad Nacional del Sur |

1 Introduction

The COMET-LA (Community based Management of Environmental challenges in Latin America) project uses a civic society-scientific partnership to identify sustainable community based governance models for the management of natural resources that can respond to global environmental change. The project focuses on developing and supporting locally owned solutions that are based on the down scaling and tailoring of global and regional strategies to the specific case studies.

The two previous stages of the project built on the initial characterization of the social-ecological system (SES) (see deliverable 4.1) and the analysis of problems and drivers using Prospective Structural Analysis (PSA) (see deliverable 4.2). In this stage, we consider how the current system for governing and managing the natural resource in question can respond to potential changes in the future.

Scenario Methods use the creativity of several plausible futures to explore possible strategies without becoming overly conditioned by the status quo. This allows a more inventive process that is less likely to be constrained by dependency of the path and vested interests. However, the outcomes of scenario building exercises have to be grounded on reality and provide a clear mechanism that will allow the communities to identify and adopt any new models for community based management and governance.

The issue of interest for community based natural resource management in the Argentina case study is the ocean and coastal zones resources systems. The aim is to propose tools for a community-based sustainable management and governance models in marine and coastal systems and up-scaling the results to other areas. The Bahía Blanca Estuary and Monte Hermoso - Pehuén Co area is located south of the province of Buenos Aires. The SES is characterized by a wide range of geomorphologic, physical and socioeconomic conditions. Resources are privately extracted and owned. The most important economic activities related with the use and management of resources are the artisanal fishery and tourism, both are involved into the private sector. Population in the area does not enjoy particular rights to the resources system and the community-based activities are rising. The legislation about the use and control of resources are made at national or provincial levels. Rules and norms are stabilized by unilateral process, with very scarce participation for the community.

Three different administrative units or municipalities integrate the area: Municipality of Bahía Blanca, including General Daniel Cerri and Ingeniero White, the municipality of Coronel de Marina Leonardo Rosales which includes Pehuén Co and Villa del Mar, and the Municipality of Monte Hermoso with its eponymous town. The area from General Daniel Cerri to Villa del Mar is characterized by an estuarine ecological system with extensive mudflats. The economy of the whole region is based on industrial and port activities, beside artisanal fishery. The zone between Pehuén Co and Monte Hermoso is a coastal area of sandy beaches surrounded by fixed and mobile dunes with an economy based on "beach and sun" tourism plus artisanal fishery.

The problem of coastal erosion is very relevant for Argentina, as coastal areas represents the 18.33% of the whole territory (514 621 km²) and the 36% of population. The anthropic actions

(reflected in relevant infrastructures, industries, commerce and financial centers) and non-anthropogenic effects (ex. climate variability) deepen the erosion problem. Pollution derived from the urbanization process and industry is another important issue in the Argentina case. In this context, the idea of Comet-LA project is to help the community to be prepared for global environmental change and to illustrate a route from existing arrangements to robust strategies in the future.

2 Collecting and Analyzing Data

The research team followed the common scenario-planning methodology as agreed at the February 2014 project meeting, but it was adapted where necessary to suit the needs of the case study. These adaptations and the generated learning are described in D1.3: Locally Adapted Scenario Building: Evaluation of Methods. The common methodology set out what data have to be collected at every stage; resulting in:

- A list of drivers and internal variables chosen by the researchers
- A morphological analysis of driver impacts on these variables
- Field notes on the community's views on the morphological analysis
- Three narratives of the future derived using global archetypes validated by the community members
- Field notes on the community's views of the narratives
- A list of possible response options, including existing response options
- A matrix of how response options might respond in the scenario conditions
- A matrix of how the response options might respond to shocks
- A final list of robust response options and strategies
- A list of the implications of the robust response options/strategies
- A plan for taking these response options/strategies forward

The following additional data were collected:

- Historical *mate* results¹
- Summary of current fishery situation: problems between the fishermen themselves as well as between fishermen and e government authorities occurred during the period in which the research team applied the proposed methodology. This may have affected the results.

¹The "mate" is an Argentine traditional hot-drink. The preparation of mate is a very simple process which consists of filling the gourd (called also *mate*) with *yerba*, pouring hot but not boiling water over the leaves, and drinking with a straw, the *bombilla*, which acts as a filter so as to draw only the liquid and not the yerba leaves. Mate has a strong cultural significance as both national identity and social gatherer, at the extent of being the national drink of Argentina. It has a historical relevance since it was inherited from *guaranies* aborigines. Along the history, drinking mate became in a common social practice, sign of union, friendship and talk.

Data were collected during workshops on April 3rd, May 22th and July 7th, 2014.

Following the methodology proposed by the JHI (see Deliverable 1.3), the scenario analysis was realized in four steps:

- Step 1: Exploration of how different key trends can affect the system in the future.
- Step 2: Construction of possible future scenarios using archetypes. Narrative writings. Validation of narratives by stakeholders (SHs).
- Step 3: Identification of possible responses.
- Step 4: Implications of the responses on the local system management/governance.

Next, the methodology used in each stage and the nuances of this specific study case are described. The results of each stage will be presented in the following sections.

2.1 Methodology of the first meeting with stakeholders (step 1)

The first meeting was held in the town of Villa del Mar. Representatives of all locations under study attended the meeting. There were artisan fishermen, provincial rangers, journalists and representatives of neighborhood associations. There were also decision makers at municipal level: delegates, councilors, the Director of the Office of Production and responsible of the Environmental area (Municipality of Monte Hermoso), the Director of the Development Office (Municipality of C. Rosales) and the Director of the Executive Technical Committee (Municipality of Bahia Blanca).

The objective of the first meeting was to develop the morphological analysis. Perceptions of SHs were analyzed regarding the impact that certain future external forces trends could have on the system. This work was articulated in terms of understanding the system (key variables, drivers, or external and internal forces) achieved in the previous phases of the project.

First, participants were introduced to the subject by a brief review of the work performed in previous steps and the outcomes achieved by COMET-LA. The distinction between internal variables and external factors which could act on the system and the key variables found during the PSA were reviewed.

Next, two working groups were formed with the only objective of optimize the working time². Both groups were previously selected by the researchers as to insure homogeneity, and equal representativeness from each locality and different activities (fishermen, traders, policy makers, among other).

To begin with, the workshops started with the so-called historical *mate* (Figure 1). This initiative of the Argentine group was employed to introduce the concept of "scenario". One of

² As it will be later explained, it was about comparing 10 internal variables with the action of 6 different drivers, each one with two possible states, which meant analyzing 120 crosses of variables. The division of the group was a practical solution, considering the idea that in certain activities it is better to work in groups not bigger than 10 members for getting each one's opinion (Godet, 2004).

the main difficulties to be faced by the researchers was to contextualize the participants in the desired time gap (20 years) given the poor perception of the future held by the SHs. The activity consisted in the generation of mini-debates aloud and in two stages prompt by specific questions, while rounds of *mate* were made³.

Figure 1. Historical Mate activity.



The moderator presented a flip-chart divided in two and initiated the discussion with the question: "What activities or tasks related to your activity were you or your family doing a day like today 20 years ago" (for visual impact, the date was written on the flip-chart: "April 3, 1994").

Comments emerged around memories, ideas, anecdotes, which were briefly listed on the flip-chart. After a few minutes, the following question was asked: "now, let's leave the past aside and think about the future, imagine what you or your family will be doing regarding your activity on this day, but in 20 years from now, this is April 3, 2034?" (The date was written on the flip-chart). The staff proceeded also to record responses in a summary form.

Once the discussion ended, the moderator explained to the SHs that the idea of the task was to introduce them into the analysis of the future use and management of resources related to their core activities. This task was made through the *morphological analysis*.

The moderator presented a clean flip-chart and the list of the five internal variables (each group worked with 5 of the 10 selected internal variables), recalling the definition of each one, according to the definition made by the SHs contained in Deliverable 4.2⁴. Then, they were presented with the drivers and their two states, one by one, with the aim of completing the morphological analysis based on the question: "What do you think it will happen in 20 years to "Variable1" if "Driver1" is in the state A? And if B what happens?" (Example: What do you think

³A round of *mate* (*ronda de mate*) consist of people sitting around the *cebador*, person who prepare the *mate* and continuously offers the drink to others, one by one. Argentinean people say that the *mate* is only an excuse to communicate and keep a conversation in a relaxed way.

⁴The detail of the selection of such variables and drivers can be seen in section 4.

it would happen to tourism in 20 years if the population increased by 20%? What if the population remained stable?)

From the discussion generated by the question, the effect of each driver on each of the variables for each state was completed based on a few concepts (e.g., unstable, remaining the same, endangered, etc.) (Figure 2). This work helped to shape the morphological matrix, as shown in Table 1 for the 10 variables and 6 drivers.

Each flip-chart was removed from the wall once the 2 states of the driver were completed for the 5 variables. As starting with the analysis of a new driver, a new clean flip-chart was used which helped in analyzing the effects of each driver independently.

A plenary session was held in order to close the workshop. The Argentinean team explained to the SHs that the information collected from the morphological analysis would be used to build future scenarios (narratives) and that SHs should validate (or not) these scenarios to consider possible response actions to an uncertain future in the next workshop.

The inputs and outputs of the stage 1 are shown in sections 3, 4 and 5.

Figure 2. Stakeholders in Morphological matrix debate.



Table 1. Morphological matrix obtained from the debate between the groups of stakeholders.

| | Driver 1 | | Driver 2 | |
|-------------|---------------------|---------------------|---------------------|---------------------|
| | State 1 | State 2 | State 1 | State 2 |
| Variable A: | It remains the same | Severely threatened | Severely threatened | Lightly threatened |
| Variable B: | It remains the same | Threatened | Severely threatened | It remains the same |
| Variable C: | ... | ... | ... | ... |

2.2 Methodology of 2nd meeting with stakeholders (steps 2 and 3)

The workshop corresponding to stages 2 and 3 was held on Thursday, May 22nd, in Pehuén Co. The mentioned steps were solved in the same workshop to limit the number of meetings for two reasons: first, to prevent SHs from moving too often during to the project; second, because a major new fishing dispute arose 3 weeks before, avoiding the realization of the planned workshop for stage 2. This conflict implied the confrontation between the different communities involved in the project (see Appendix II).

The resulting morphological matrix and the three narratives made by the researchers were presented to the SHs (see section 5) to be corroborated and/or corrected. The states used for the construction of the three scenarios were circled in color in the matrix: red for *barbarization* state, blue for *great transitions*, and black for *conventional world* (Hunt *et al.*, 2012; see section 6). Three volunteers were required to read the narratives aloud while the flip-charts exhibited the same key words for quick viewing of ideas (e.g., "temperature increases 2 °C"). Discussion continued and changes were written on the flip-charts. The results of this stage are in section 6.

In step 3, SHs were asked to reflect on possible plans, policies and actions that could be relevant in the future context. In other words, *what possible responses may achieve the desired goal⁵ against external agents?* Possible responses before the scenarios and their robustness were explored.

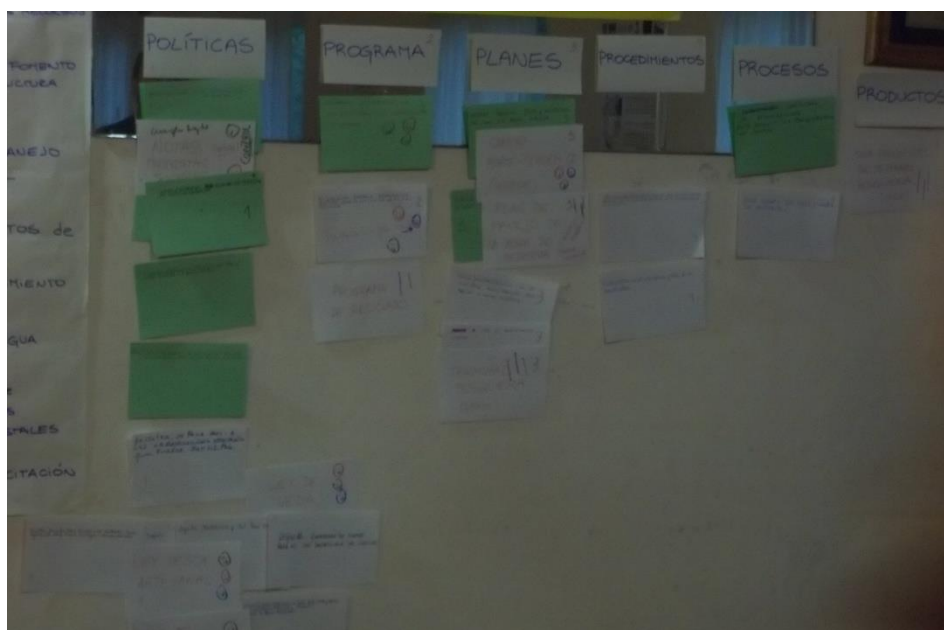
By Applying brainstorming techniques, SHs proposed specific actions to achieve the objective. The specific question that guided the brainstorming was: "what could be done to reach the goal of achieving sustainable management of coastal and fishery resources in a context of change and against the action of external agents?" The "seven P" (Policy, Programs, Plans, Procedures, Processes, Products and People) framework was used in order to provide some reference for developing ideas regarding possible responses. In this context,

⁵ In the Argentine case, the sustainable management of coastal and fishery resources in a context of change and against the action of external agents.

all the proposed actions could then be framed in the context of this framework (Figure 3). Trying to ease the understanding of the "seven P" meaning, each one was exemplified on a flip-chart.

Each participant had two cards (one green and one white). They were asked to write in the former what action they believed the community could take to achieve the goal of sustainable management. In the second, they should write an action that the government could do for the same purpose. Then the cards were collected and read aloud, grouping them with the help of the SHs under the column heading of one of the seven P. Finally, the ideas that referred to the same action were pooled. In several cases, they could be specified after certain discussion, because at first the range of responses did not seem very wide and SHs focused on very general issues rather than on specific actions.

Figure 3. Stakeholders development of the ideas for the group of the "seven P" (Policy, Programs, Plans, Procedures, Processes, Products and People)..



The strength of the responses obtained (actions) was evaluated. Some of them might have been more 'robust' than others in the sense that they would be beneficial to the greatest number of possible scenarios. The responses obtained in the previous step were confronted to each of the three scenarios. When one of the answers was listed as probable in some of those consulted scenarios, the card was marked with the corresponding color (red, blue or black for barbarization, great transitions or conventional world, respectively).

Finally, the group analyzed the strength of the responses to different shocks. When an action will still be likely to perform by SHs upon the occurrence of an extreme event, this response will be more robust than those which probably will not be made. Three shocks proposed by the researchers were presented:

1. Anthropogenic: regasification (LNG) tanker explosion in the estuary of Bahía Blanca.
2. Natural: a tropical storm or similar extreme event.
3. Positive: reduction in the levels of corruption and the government becomes altruistic.

The results of this stage are presented and discussed in section 7.

2.3 Methodology of 3rd meeting with stakeholders (review step 3 and step 4)

The last workshop, held on Monday, July 7, 2014 coincided with the visit of the entire COMET-LA team. It took place at the Instituto Argentino de Oceanografía (IADO, Bahía Blanca).

The proposed and validated scenarios were reminded using flip-charts as shown Figure 4.

Figure 4. Scenarios proposed and validated for SHs.



Some doubts emerged among the scientist group about the proper performance of the robustness analysis stage; therefore an extra activity for testing stage 3 of the methodology was performed. A “smiley matrix” with the results the SH understood in the previous meeting were presented to them. The actions considered plausible in each scenario were marked with a smiley face.

This second time, the actions were presented regardless of who would be responsible to perform them (whether the community or the government)⁶ and without considering the 7P to make the analysis easier. Again, we proceeded to ask what actions would be carried out under the assumption of each of the scenarios in 20 years in the future. Differences emerged with respect to the analysis of previous steps that allowed to correct the strength of the proposed responses and to highlight five of them as the strongest (results are presented in section 7). The step 4 of the methodology took into account only those most robust responses.

Step 4 inquired about the implications and appropriateness of the five responses obtained locally and identified possible strategies and future plans through specific actions. To this end, SHs were consulted on (i) what exactly mean the identified responses; (ii) who would be responsible for implementing them; and, (iii) how or through what specific actions could the objectives be reached.

The strongest 5 recognized responses were analyzed one by one with respect to *what*, *who* and *how* they could each be carried out. Table 2 illustrated the matrix of actions and strategies.

Table 2. Blank matrix of actions and strategies.

| STRONG ACTIONS | STRATEGIES | | |
|----------------|------------|------|------|
| | WHAT? | WHO? | HOW? |
| Action 1 | ... | ... | ... |
| Action 2 | ... | ... | ... |
| | | | |

The results of this phase allowed the community to develop some guidelines to elaborate a strategic plan for sustainable management of natural resources. The results are shown in sections 8 and 9. The meetings were always completed in an atmosphere of relaxation and warmth, with a coffee break and refreshments. The coffee breaks was a simple activity that allowed the SH to meet, to talk to each other, to share problems and to increase the bonds of friendship generated along the three years of COMET LA activities. The SH repeatedly pointed out that, before the COMET LA project, they had not had enough time or environment to meet each other. Thus, one of the most important results of the COMET-LA Project was the creation of a space for exchanging ideas, discussing common problems and sharing knowledge and opinions with the scientists.

⁶ As in the previous workshop, actions were written during brainstorming according to who could do them (either the community or the government), this also let us contrast certain coherence in the answers when evaluating strategies.

3 Discussing the idea of Scenarios for community-based management

The idea of *future scenario* was introduced from the historical *mate* explained above. The group of SHs had no previous background in scenarios analysis since none work of this type has been done previously in our community. Moreover, the time horizon is an obstacle to overcome, as the inhabitants have a rather short-term vision, making it difficult for the analysis of the future.

The researchers of the Argentine team have been studying the whole area of the project for more than 30 years. There is extensive literature studying the various factors both natural and anthropic that are affecting the area. Although through the years several members of the Argentine team have given conferences, wrote divulgation articles in local newspapers and have been interviewed by the local, regional and even national radios and TVs, they did not intervene in the discussion providing technical information that could mislead the answers of the SHs. Nevertheless, local knowledge provided by the SHs could be of use in future research initiatives by the researchers.

4 Drivers and Variables Selected

The COMET-LA scenario-planning process started by identifying some key drivers able to affect the local systems. Drivers of change are key external forces that can act upon a system. Because no one can predict the future, we do not know exactly how the drivers will act. However, we do know with certainty that these forces will have a large influence for future systems. Trying to consider the implications of these external forces is what differentiates scenario-planning from non-scenario planning. Methodology developed by JHI suggests that there should be at least one driver per each of the 5 main categories: Social, Technological, Economics, Environmental and Political – abbreviated to “STEEP”. Each driver is expected to have significant influences on the systems, but exactly how the driver will change (i.e., what state they will take) is unknown. It is necessary to describe not only what drivers are used (e.g. climate change, population change), but also what states they can take. We worked with two possible contrasting states for each of the drivers. By reviewing previous information gathered with SHs during the structural analysis phase, existing external drivers and internal variables were identified (see Deliverable 4.2).

The PSA allowed us to recognize 21 key variables. Only 7 of those 21 variables are external forces to the SES, which are plausible to be classified as environmental, economical and political forces. We did not find drivers in social and technological areas.

External variables were prioritized to obtain only one driver for each category related with the most important external force. The ranking was made using the influence/dependence matrix of the PSA (Table 3)⁷.

⁷ For more details see Deliverable 4.2.

Table 3. Values taken from MID. Source: Deliverable 4.2.

| N° | VARIABLE | SHORT LABEL | TOTAL NUMBER OF ROWS | TOTAL NUMBER OF COLUMNS |
|----|--|-------------|----------------------|-------------------------|
| 1 | Changes in climate patterns | ECO1 | 26 | 2 |
| 2 | Pollution | ECO2 | 40 | 15 |
| 3 | Organizations and fishery legislation | GS1a | 28 | 17 |
| 4 | Fishermen associations | GS3 | 30 | 40 |
| 5 | Lack of political interest in environmental sustainability | GS1b | 42 | 7 |
| 6 | Dredging and LNG Project | I4 | 30 | 16 |
| 7 | Changes in coastal environment and estuary | O2a | 23 | 26 |
| 8 | Overfishing | O2b | 26 | 11 |
| 9 | Wildlife Resource System | RS7 | 18 | 37 |
| 10 | Resource sustainability | O2c | 24 | 40 |
| 11 | Catches | RU5 | 20 | 40 |
| 12 | Seasonality | RU7 | 19 | 10 |
| 13 | Petroquemichal Industrial Pole | S1a | 40 | 8 |
| 14 | Tourism | S1c | 23 | 26 |
| 15 | Employment sources | S1b | 5 | 35 |
| 16 | Local market | S5 | 12 | 18 |
| 17 | Income | U2 | 14 | 43 |
| 18 | Artisanal fishery history | U3 | 23 | 33 |
| 19 | Community awareness | I8 | 26 | 30 |
| 20 | Conservation measures | I5 | 27 | 28 |
| 21 | Artisanal fishery | U9 | 34 | 48 |
| | Totals | | 530 | 530 |

The most representative variables are those who play a more prominent role in the system. They show a greater degree of dependence on the SES or they are very influential in the evolution of the system. It can be measured by the total values of influence / dependence on the matrix of direct effects of the PSA. Then, they were chosen Changes in climate patterns (environmental driver), Petrochemical Industrial Pole and Dredging (economic driver) and Lack of political interest in environmental sustainability (political driver).

Two clarifications are necessary: (i) although Petrochemical Industrial Pole and Dredging and LNG Project are two different variables in PSA, we consider them as an integrated driver since they are intrinsically related; (ii) the political driver was re-named as State of Environmental Regulation, since the SHs mentioned the absence of political interest, specifically, about

regulation. Moreover, it was sorted as a political / environmental driver since it has incidence in both spheres.

The community did not define drivers in the social and the in technological areas; therefore, drivers for the Latin American region employed in the Millennium Project 2010 were used (Population changes as social force and Technology for weather forecast and sailing and their access facilities as technological force)

In addition, a sixth political/economical driver was added for considering it extremely relevant: Changes in legislation of productive activities (given that Organization and fishery legislation was also relatively important in the PSA). The drivers and selected states are shown in Table 4.

Table 4. The drivers and selected states.

| Type of driver | Name of driver | State 1 | State 2 |
|-----------------------------------|--|---|---|
| Social | <i>Population changes</i> | Population keeps constant | Population increases 20% |
| Technological | <i>Improvements of forecasts of weather and navigation easily available.</i> | Improvements of forecasts of weather and navigation easily available due to costs reductions. | Little improvements in technologies with high costs of access and use. |
| Environmental | <i>Change in climate patterns</i> | Temperature rises slightly and rain and wind patterns keep constant. | Temperature raises 2 °C, average wind strengths increase and also increases the frequency of extreme events |
| Economic | <i>Petrochemical industrial Pole and dredging</i> | Five companies leave the Industrial Pole and only maintenance dredging is carried out. | Ten new companies arrive to the Pole. The dredging activities are deepened. |
| Politic/ Environmental | <i>State of Environmental Regulation</i> | Environmental regulation increases, as well as control activities. The sewage treatment plants already built begin to optimally operate and probably some new plants start to work. | The environmental regulation and control diminish. Pollution in water and air increases. |
| Politic/ Economic | <i>Changes in the legislation of productive activities</i> | Fishing areas and controls on them expand. Vehicular traffic becomes restricted on the dunes. | Situation remains unchanged. |

Of the remaining 14 variables of PSA (internal variables), those that had the greatest summations in rows and columns in the MDI and MII were selected. It was noted that the Local market and Seasonality variables have the least sum of effects in both arrays, so they were discarded. Then, the variable Employment sources was removed from the scenario analysis as it was the next smaller sum in MDI. Furthermore, based on the analysis of the importance given by the SHs, these variables were insignificant in previous discussions. All the following 11 variables had a summation of effects of dependence and influence considerably higher. The following variable with the fewer sums in rows and columns is Changes in coastal environment and estuary. Remove this variable seems to be unreasonable for Argentine team, who considered it as a relevant variable. Therefore, it was decided to take off the variable Artisanal fishery history. The justification for this elimination is the variable nature: the history of artisanal fishery can be understood as a flow variable, rather than stock, which will constantly evolve over the 20 years considered, but whose results can be understood in

the long term. When performing scenario analysis, probably changes from positive to negative situations will be perceived in the variable Artisanal fishery as an activity (and as stock variable), but we think it would be much more difficult for them to perceive the changes on the history of the activity. The history of artisanal fisheries will result from the changes brought along time on Artisanal Fisheries variable and probably, keeping both variables in the analysis may lead to confusion. The 10 variables defined as inner forces are presented in Table 5.

Table 5. Selected variables.

| N° | Variable |
|----|--|
| 1 | Fishermen associations |
| 2 | Changes in coastal environment and estuary |
| 3 | Wildlife Resource System |
| 4 | Resource sustainability |
| 5 | Catches |
| 6 | Tourism |
| 7 | Income |
| 8 | Community awareness |
| 9 | Conservation measures |
| 10 | Artisanal fishery |

5 Morphological Analysis discussion and historical *mate*

As mentioned above, prior to completing the morphological matrix space, an activity we called "historical mate" was performed. The idea was to analyze in retrospective what information about the community was important and, therefore, clearly remembered by the SHs from 20 years ago.

Some of the more relevant issues mentioned were:

- There was less concern about the environmental impact of human activities which was motivated by two issues: there was less knowledge of about the damages and less pressure on natural resources. The populations were smaller in the areas of Monte Hermoso and Pehuén Co. The Petrochemical Industrial Pole and the industry were not as well developed in the area of the estuary.
- Tourism was a highly seasonal activity. Today, mainly in Monte Hermoso, it is an activity that is maintained throughout the year, since it provides the higher revenues to the county but, in turn, it becomes an additional source of pressure on resources.
- Artisanal fishing mostly based in personal experience with little or no technological support. Telecommunications and satellite imagery to detect storms or other meteorological phenomena were not readily available to the fishermen. In addition, there were more artisanal fishermen, while fishing offered other jobs that do not exist today during the off season period (SHs remembered, e.g., workshops where they used to repair boats and nets).
- Some fishermen pointed out that 20 years ago was beginning the wider fishery ban for El Rincón area. This ban marked the start of the fight by the defense of the resource. Moreover, they remembered some periods of good harvest of some species

(shrimps, for instance) which nowadays are not so good. In all cases, the stakeholders showed some nostalgic feelings, as saying "the good old days" and were unhappy with the current situation.

Many of these responses were expressed in the context of nostalgia, as if "old days were better" and the present were the unwanted state of things.

Asking for the same exercise 20 years forward, some of the answers were the following:

- Lot of community projects will be carried out, as well as the domestic classification of solid waste in Monte Hermoso.
- There will be a higher community awareness regarding environmental degradation and the relevance of resource management. That will be the result of current transformations that involves a higher effort for education and information not only for current but also for future generations.
- New NGOs will emerge
- Artisanal fishermen will work in an orderly way. Fishery and Tourism will become sustainable activities. Other stakeholders predict that the number of active fishermen could decline due to the changes in harvest techniques and resource commercialization channels.
- The population growth will continue, carrying new problems and higher pollution levels, as well as a higher pressure on public services provision.
- Beaches will be narrower and used in a more intensive way, even when activities could be more sustainable (only pedestrian traffic, for instance).
- A poorest biodiversity and a different landscape are figured out.

In general terms, there is an optimistic and hopeful vision of the future, even when population is waiting for an unavoidable change on the environment. The historical *mate* activity allows to "waking up the senses" about the future. Afterwards, morphological analysis started. The resulting matrix is presented below.

Table 6. The result matrix.

| INTERNAL VARIABLES | DRIVERS | | | | | |
|---|---|--|---|---|----------------------------|---|
| | Population Change | | Improvements of forecasts of weather and navigation easily available | | Change in climate patterns | |
| | State 1 | State2 | State1 | State2 | State1 | State2 |
| Wildlife | Keep current trend | Severely Diminish | Unstable. The results will depend on both the use and application of the technology | Keep constant | Keep constant | Unstable. Changes and adaptation of species |
| Community Awareness | Improves as a result of the education of new generations | Different opinions. Unstable result. | Improves. Higher dissemination | Keep constant | Keep constant | Increases due to the experience of extreme events |
| Artisanal Fishery | Villa del Mar disappears as fishermen town. Rest of localities: sustainable | Villa del Mar disappears as fishermen town. Rest of localities with no great changes | Improves due to higher efficiency | Keep current trend (it could decrease). | Keep constant | Diminish and there will be changes. |
| Changes in coastal environment and estuary | Modifications according to the present trend are deepened | Severely Increase | Minor changes due to stronger controls | Keep current trend | Keep constant | Severely increased by erosion due to extreme events |

| INTERNAL VARIABLES | DRIVERS | | | | | |
|--------------------------------|---|--|--|---|----------------------------|--|
| | Population Change | | Improvements of forecasts of weather and navigation easily available | | Change in climate patterns | |
| | State 1 | State2 | State1 | State2 | State1 | State2 |
| Income | Ambiguous effect | Ambiguous effect | Increase | Keep constant | Keep constant | Diminish in case of fishery were affected |
| Tourism | Increase due to foreign visitors. Need for public works | Increase. Probably low sustainability due to the need for public works | Increase. More sustainable activities are developed. | Keep increasing trend since it is a service non technology- intensive | Keep constant | It will change depending on the exchange rate evolution |
| Resource sustainability | Keep constant | Diminish. Increase the risks and the pressure on resources | Improves | Diminish | Keep constant | Change and adaptation of wildlife |
| Fishermen associations | Keep constant | Increase | Improve organization and communication. Higher dissemination. | Increasing relevance due to social demand | Keep constant | Become stronger. Greater level of problematic generates more union |

| INTERNAL VARIABLES | DRIVERS | | | | | |
|-----------------------|--|--|---|--|---|---|
| | Population Change | | Improvements of forecasts of weather and navigation easily available | | Change in climate patterns | |
| | State 1 | State2 | State1 | State2 | State1 | State2 |
| Conservation measures | Keep constant | Increase as a reaction to minimize impacts | Improve. Higher waste treatment and materials progresses. | Diminish. | Keep constant | Increase due to the menace to extreme events |
| Catches | Keep constant or increase if new techniques appear | Keep constant or increase if new techniques appear | Increase. Better selection, localization and methods to chase damaging species away | Noticeably diminishes or does not change | Keep constant | It modifies, but the way it does is unknown: changes on species |
| VARIABLES | DRIVERS | | | | | |
| | Petrochemical industrial Pole and dredging | | State of Environmental Regulation | | Changes in the legislation of productive activities | |
| | State1 | State2 | State1 | State2 | State1 | State2 |
| Fauna (resources) | Increase or keep constant | Severely diminish due to pollution | Increase in richness and quantity | Diminish | Increase for less pressure on resource system | Diminish |

| INTERNAL VARIABLES | DRIVERS | | | | | |
|--|---|--|---|---|--|---------------------------|
| | Population Change | | Improvements of forecasts of weather and navigation easily available | | Change in climate patterns | |
| | State 1 | State2 | State1 | State2 | State1 | State2 |
| Community awareness | Keep constant | Increase | Increase due to the effects of implementation and dissemination of policies | Increase as a reaction to the bad situation | Increase due to the implementation of better measures | Increase or keep constant |
| Artisanal Fishery | Increase for less pressure on resource system | Diminish | Increase due to improvement on the resource | Diminish | Increase | Keep current trend |
| Coastal / estuary environmental modifications | Keep constant. Current impacts remains | Severely increase | Current trend would diminish. Erosion processes would stop | Severely increase | Current trend would diminish. Erosion processes would stop | Increase |
| Income | Increase due to the resources improvement | There are changes with unknown results | Increase | Diminish | Increase | Keep constant or diminish |

| INTERNAL VARIABLES | DRIVERS | | | | | |
|--|--|---|---|--|--|---|
| | Population Change | | Improvements of forecasts of weather and navigation easily available | | Change in climate patterns | |
| | State 1 | State2 | State1 | State2 | State1 | State2 |
| Tourism | Keep constant or could increase, depending on how much it affects | Could diminish, depending on the distance to the estuarine region | Increase. Services improve. | Diminish | It would not severely change | Unknown result regarding the number. The tourism will exert a higher impact |
| Resource Sustainability | Increase due to lower impacts | Severely Diminish. Ecosystem "breaks" | Increase | Diminish | Increase | Diminish |
| Fishermen and neighbors' associations | Become stronger and/or increase. Collective action against the potential effects of dredging activities goes on. New problems emerge | Become stronger and severely increase | Keep constant or become stronger. Associations acts as control agents | Become stronger and/or increase due to complains | It would not affect. It could generate other conflicts between fishermen | Higher participation as a reaction in front of statu quo |

| INTERNAL VARIABLES | DRIVERS | | | | | |
|-----------------------|-------------------|---|--|------------------------------------|--|--|
| | Population Change | | Improvements of forecasts of weather and navigation easily available | | Change in climate patterns | |
| | State 1 | State2 | State1 | State2 | State1 | State2 |
| Conservation measures | Keep constant | Severely increase as a reaction to conflict | Keep increasing | Increase as a reaction to conflict | Increase | Severely increase as a reaction to current situation |
| Catches | Probably increase | Severely diminish | Unknown result | Diminish | Increase or, at least, does not diminish | Could diminish. Deeper conflicts in MH y PC. |

6 Additional notes about the morphological analysis

An useful discussion about morphological analysis was maintained during the workshop. In order to enrich our morphological matrix, some comments are organized by drivers as follows:

6.1 Demographic change

Initially, SHs considered that the condition "population will be like today" was impossible, since they believe population will increase. Even if the local population is maintained, it will not necessary represent a positive scenario. Constant population could represent an economic and social delay rather than a positive scene. Then, the possible states described by the driver do not necessarily have a positive connotation.

Population growth could affect wildlife resources, but if the population is like today, these resources will be maintained as they are as today. Community awareness will improve if the population does not increase. Nowadays, the community had plans for environmental care and education programs which will be beneficial in twenty years. Also, the recent establishment of a natural reserve that includes the study area will contribute to community awareness. Population growth does not have clear effects: on the one hand, education would remain important and community awareness could be strengthened due to the generation of new conflicts (declining resources). On the other hand, if the new population was foreign and it had a different culture, the situation within the local community could be unstable. These topics were discussed at length due to the diversity of opinions.

Artisanal fishery disappears, since fishermen depend critically on resources whatever be the state of the human population. This variable will be considered sustainable in other locations if the population is at the current state. In the case that the population increase, Artisanal fishery will change (the percentage of population linked the activity is small). In fact, fish catches does not depend on population. They will remain unchanged, decrease or increase if other forms or alternative fishing techniques appear.

A little group of SHs thought that Changes in coastal environment and estuary are not linked to population growth. This could reflect that SHs perceives only a portion of anthropic effects on environmental conditions.

Tourism still increase with the stable population due to Monte Hermoso and Pehuén Co tourists come from the region. Tourism could increase because it depends on the actions of local people but mostly on touristic influx. Public services are the main concern of SHs and the resource sustainability could be affected by population growth. In the actual state, services are insufficient to support the tourism growth. For example, sewage is now discharged in the opencast. The treatment plant located in Punta Alta has not been working in the last two years. Infrastructures are required for touristic activity (population increase from 8,000 in low seasons to 100,000 inhabitants in peak seasons). Services and public works are drivers for the development of tourism.

Stakeholders mentioned that the population growth could be positive for Conservation measures. The environmental impact and the depletion of natural resources might enhance conservation measures which could be applied by the inhabitants themselves. Fishermen and neighborhood associations could increase due to the environmental pressures and the critical state of public services.

6.2 Improvements of forecasts of weather and navigation easily available

Improved technology and its access may not affect wildlife resources. They depend on technologies that promote conservation or intensive extraction. Community awareness would be better, if the communication helps to preserve the environment.

Artisanal fishery will be more effective. Also, technologies reduce the negative effects on Changes in coastal environment and estuary. The sustainability would be better due to diversification of activities. In addition, tourist inflow will be higher compared to the stage two.

Fishing and neighborhood associations will benefit in the stage one because the technology might improve materials and treatment plants. The latter needs expensive materials that affect their functioning. SHs also said that the technology could be applied in project related to the use of eco-friendly packaging.

Fish catches increase in stage one because better selection and placement of commercial species can be achieved. Also, the fishermen said that, with the adequate technology, it is possible to disperse harmful species (e.g., seals that break fishing nets).

6.3 Climate change

In the stage one, SHs said that the internal variables will be affected by this driver. In fact, well determined bans could improve the sustainability of wildlife resources. On the other hand, SHs expressed that species are already adapting to climate change. Two fish species, whiting and croaker, are appearing again after the extension of the ban. Therefore, the ecosystem readjusts to different adversities, including the conditions of climate variability.

In the stage two, wildlife resources could be affected in different forms. On one side, species condition have changed (e.g., different species or adaptations to new conditions, decrease in number and appearance of other commercial species); on the other side, if precipitations increase, species would be more numerous. Nevertheless, SHs considered that fishing will decrease.

In the case of tourism, SHs expressed that the raising in mean temperatures could increase the length of summers, although the intensification of the winds and more extreme events could reduce the number of tourists. On the other hand, SHs do not know what will happen with artisanal fisheries.

The effects on resource sustainability could not be determined by SHs. Future scenarios were difficult to predict. Despite the above, SHs were concerned about this situation. They said that

climate change will generate problems and risks in associations and increased conservation measures.

6.4 Industrial center and dredging

The location of each town is the most important topic to consider regarding the effects of the industrial center. Earnings generated due to industrial activity are not important to localities, at least directly. Still, this activity is an employment source. On the other hand, benefits from artisanal fisheries will increase in the stage one and will decrease strongly in stage two. Tourism gains, probably, are not modified in both stages because the industrial center is located in Bahía Blanca and tourism concentrates in Monte Hermoso and Pehuén Co.

Fish catches will decrease drastically due to the dredging. Fishes, particularly, shrimp and prawn "do not enter the estuary". SHs also asserted that catches could be affected by the water turbidity increase as well as by changes in water speed.

Stakeholders believe that there is more social resistance to dredging than installation of new industries. In addition, resources sustainability decrease in the stage two related with the severity of dredging. Industries pollute with heavy metals. This contamination is visible in the fishing nets because they change their color.

In stage one, the action of fishing and neighborhood associations will be strengthened if the dredging activities keep on menacing to both the local economic activity and the quality of life. At present, SHs consider that the dredging should be controlled by public organisms. A balance is needed between dredging and ecosystem because port activities are important for the region. The associations mentioned could function as controllers or regulators of industries that cause pollution. On the other hand, if the industries close, the economic effects will be significant. Unemployment, poverty and insecurity will rise as a result of this closure. For these reasons, the associations have an important social role.

6.5 Environmental stewardship

Stakeholders mentioned that the evaluation of environmental stewardship in the stage two (decrease in environmental regulation and controls, and increase in the levels of pollution in air and water) should be considered at present. To them, it is not necessary to reduce controls and regulations because the environment would be affected anyway. The present situation will take chaotic effects in twenty years.

SHs also indicated that the wildlife resources, the artisanal fishery, the erosion and the resources sustainability will decrease in case of a decrease in environmental stewardship occurs, mainly due to the reduction of controls. This situation will generate a higher level of pollution and pressure on natural resources. Otherwise, in stage one; this driver will be a good topic to improve the environmental variables.

Community awareness and different types of association increase in both cases analyzed. There are some differences. In the stage two, these variables increase due to the lack of

government controls. In the stage one, community awareness will implement and disseminate sustainability policies, while the associations would become controllers of these new directives. SHs emphasized that the regulation must be associated with business and community awareness. Also, new NGOs will be formed to educate the public about environmental care.

6.6 Change in the law of productive activities

Extension of the fishing zone is not an adequate measure for fishermen since there is no need for that. However, improvement of the control over zones where banning of trawling fleets has been imposed by law is more important and desirable.

Traffic on the beach should be different in order to promote tourism activities without damaging the beaches (e.g., restricted area set for ATVs). In addition, fishermen must have a sector on the beach to launch their boats without affecting the touristic activities and the natural reserve.

Increasing participation of people should have a positive effect on community awareness and associations. In the good stage, community awareness might be better due to the control policies and associations might have more ways to operate.

Fishermen mentioned that the fishing areas need a better policy control. This condition might help to have a new organization and the prominence of associations. New conflict may arise but mostly due to external influence. The knowledge of this conflict might help the community to improve their spatial organization. The actual law does not protect tourism and does not promote a sustainable tourism. In the stage two, the greatest impact will be on natural resources.

7 Down-scaled Narratives of the Future

As we mentioned in the item 2, researches wrote three narratives. They were presented to the SHs for their validation during the 2nd meeting. The researchers marked with colour circles the information needed to construct the stage. Written narratives are given below:

7.1 Conventional world

A possible scenario is one in which the population grows by 20%, increasing risk and pressure on resources. Mean temperatures increase by 2 °C; also wind intensity and frequency of extreme events increase. In this context, erosion is higher and flora and fauna are modified.

Weather forecasts and navigational technology advances is open access, improving the selection and location of species in the ocean and helping to shoo harmful species. Treatments of higher volumes of waste generated by population growth are easy due to better materials and processes. The number of firms in the Industrial Pole is reduced and only maintenance dredging is performed, leading to a probable increase in catches.

Regulation and legislation help offset the negative effects of population growth and climate changes: more regulation and controls restricting vehicular traffic on the dunes stopped the coastal erosion process. The expansion of fishing areas and more controls, with better resource management, increases the volume of catches and incomes from artisanal fisheries.

The tourism industry also benefits from these positive changes in regulation, improving services and incomes. New technologies also allowed the process to be accompanied by the strengthening of community awareness, conservation measures and, more organized and better connected neighborhood and fishermen associations.

7.2 Great Transitions

A possible future is one in which the population preserves its current growth rate. Advances in technology lead to a better community awareness especially in environment care and education. Forecasting data and navigation real-time open access technology generate more efficient artisanal fisheries. Better selection and easy location of commercial species increase catches.

Fishermen's and neighborhood associations brings together a larger number of people and the larger gatherings through social networks allow them to improve their organization. Environmental regulation and controls increase and treatment plants start operating properly. NGOs related with environmental awareness arise. New materials and recovery plant effluents lead to better conservation measures. Controls on fishing areas are more stringent and trawl fleets are forbidden to enter the artisanal fishing zone. The coastal traffic is regulated and controlled and is prohibited in the beach area while internal circuits are established for ATVs. Also, fishermen are assigned a certain beach sector for launching their boats. These regulations involve an increase in wildlife, fisheries and resource sustainability. Thus, better control of fishing areas generates an increase in the number and/or actions of fishermen's associations. Technology advances combined with environmental regulation stop coastal erosion processes and reduce coastal/estuary environment. Tourism increase, service quality improves and there is a diversification towards more sustainable activities.

7.3 Barbarization

A possible future is one in which the population increase by 20%. Wildlife severely drop and leading to the disappearance of Villa del Mar as artisanal fishing village, since villagers depend on the resource. This demographic change brings in severe coastal environment changes, accentuated by absence of legislation improvements, as well as higher risk and pressure on resources. Environmental sustainability also decreases because of limited progress and high access costs to new navigation and weather technologies, and declining conservation measures.

Higher mean temperatures, wind intensity and extreme event frequency increase erosion. Ten new industries are installed in the Industrial Pole, dredging goes deeper and further inside the estuary leading to irreversible changes to the ecosystem with consequent wildlife reduction and drastic catches decline. Also environmental regulation and controls decrease, leading to

increasing air and water pollution. All these factors and absence of changes in productive activities legislation enhance the reduction in wildlife already generated by population growth.

The absence of legislation changes generates tourism development without controls, with greater environmental impact, and promoting proliferation of fishery conflicts. As a result, incomes from both activities decrease.

The narratives were constructed from the three general statements mentioned by Hunt *et al.* (2012): "conventional worlds"; "large transitions" and "barbarization". The researchers explained to SHs what these terms meant, giving a general idea of what is represented from the archetypes.

Throughout this and the next meeting, different scenarios were mentioned under the names "stable" or "mean" (referring to the "conventional " state); "Sustainable" (instead of "large transitions"); and "chaos", "barbaric" or "bad scenario" (when referring to "barbarization"), to facilitate understanding and stimulate the exchange of ideas with SH.

In the validation process, SHs agreed with the narratives content. Only two issues were remarked and were introduced in flip-charts representing each of the scenarios using different color markers:

1. The SHs showed strong disagreement on the **time horizon**. Specifically, they mentioned that present fishing conflicts make the current situation already a **barbarization scenario**⁸.
2. Regarding the larger transitions scenario, they emphasized the importance of social networks and the need for strengthening partnerships, mainly in Bahía Blanca.

Even though the narrative methodology was carried out smoothly and with a good understanding by SHs, they did not show high interest on this stage. Most likely because the barbarization scenario was obvious and already present, while the large transitions scenario was too utopist for the magnitude of the actual conflict in the fishing community.

8 Robust Response Options including Test for Shocks

As mentioned in section 2, step 3 was performed applying the technique of brainstorming. The results are presented in Table 7.

⁸In their own words, SHs mentioned things like "Wrong things are today"; "The future has rushed on us"; "The dynamics (of the facts) is unexpected: in the previous workshop we mentioned that four ships were coming (mentioning the trawlers) and then it was a fact. The exercise as was planned fell short (referring to time) "

Results:

- The subproduct of the fishing terminal known as "product" emerged as a result of the fishing terminal development; then, the two actions can be grouped into one. Similarly results with the personal action of "educate and inform" in relation to community education and training programs
- The development of a coastal management plan emerged as a responsibility from both the community and government. Both groups of actors working together seems to be right way to achieve it.
- Monte Hermoso - Pehuén Co road construction, require permits and legal action. However, it is a response that should perform community, because it has been requested many times to the government with no response. According to the SHs it is: "another old history project".

Table 7. Responses arising from brainstorming.

| OBJECTIVE: "Achieve sustainable management of coastal and fisheries resources in a context of change and against the action of external agents" | | |
|---|--|--|
| | What should be done by? | |
| 7 P | The comunity | The government |
| Politics | | - Legislation (Ban law; Artisanal Fisheries law, Coastal Management law). |
| Programmes | - Capacity and promotion of SH associations. - Community programs for environmental education and information | - Recycling programs (3R). |
| Plans | - Development of a fishery terminal - Coastal and Natural Reserves management plans | - Establishment of road linking Monte Hermoso and Pehuén Co - Coastal and Natural Reserves management plans |
| Procedures | | - Control of the operation and productive activities. |
| Processes | - Social unrest (complains actions to require compliance with standards, roadblocks). | |
| Products | - Subproducts of the fishing terminal. | |
| People | - Educating and informing ourselves. | - Lower levels of corruption. |

Currently the government is working on two of the mentioned legislation projects.

1. **Artisanal Fisheries Law:** modification in boat length. In Buenos Aires Province the present law defines a maximum length of 13 m, whereas the new law will limit the size to 10 m. A problem with this new law is that most of the present day artisanal fishing boats are over 10 m. There is an obvious need to review this issue in the new law
2. **Ban Law** is a project in which the community is working. As fishermen expressed at the workshop, it is framed in Provincial Law 208. In 2000, they began working towards the trawling boats ban. In 2004, they managed to

obtain that the Provincial Fishery Authority declare a 9 months ban within the Bahía Blanca Estuary and 6 months in El Rincón area. Furthermore, a restricted area was also achieved which extends from Cristiano Muerto (Claromecó, Buenos Aires Province) southward over a diagonal line, reaching the 50 m isobath. Before the current conflict, 86 trawling boats over 25 m in length with capacity for 15 thousand fish boxes were forbidden to fish in the area. The most important application of this law is that spawning fish is protected, ensuring reproduction and resource sustainability.

Moreover, SHs pointed out that there are conflicts between actions: fishermen from Mar del Plata have been asking the provincial authority to reduce the ban to 3 months (currently 6 months), to reduce the restriction area and to allow trawling fishing techniques within 5 nautical miles.

For SHs, social protests appear as a necessary action for against application of the new law, because they note that many Argentine case study conflicts do not arise from the absence of regulation, but the lack of application and control. Therefore, they stressed the importance of the dissemination activities, education and training of organizations members.

The answers seemed quite general at first and the researchers asked to SH whether they could provide more specificity. Their answer was that it was difficult to think concrete actions. Even when they were asked to describe what actions the community should do, many of them were "demanding that the government do ..." and "denouncing what the government did not do."

The 7P methodology was not well accepted by the SHs as they found it rather confusing, probably because they were not used to the terminology. The complexity of this framework could be showed when some actions overlap (e.g., education and development with the fishing terminal).

The next step was to analyze the robustness of the previous answers. The SHs agreed that all actions proposed were applicable to all scenarios, except for "recycling programs" and "social protests" because in the large transitions scenario they would not be necessary.

Finally, the three shocks proposed by the investigators were presented to the SH: 1) Anthropogenic: explosion of the liquid-natural gas conversion (LNG)vessel; 2) Natural: tropical storm or extreme event; and 3) "Positive Political": lower corruption levels. SHs were asked which of stage 2 actions would still be valid to these shocks. No action was dismissed or rejected, although the perception of the researcher was that this occurred because the shocks were seen as something fictitious or forced due to the current conflicts. Two of the actions were labeled as more relevant to shocks, so they are the most robust in this analysis:

- Stakeholders are agreeing about the importance of the legislation, since no matter which the scenario and the predominant shock, "the laws have to exist". Policy actions are always needed because they define a social order, but in the case of chaotic event such as a tropical storm or LNG vessel explosion, they become even more necessary. Also SHs indicated that even in a scenario without corruption, all new legislation on

fisheries and coastal management and its implementation is still necessary, because a legal system is always important.

- Also community outreach and education programs were noted as very necessary in cases of extreme events, such the LNG vessel explosion since information is extremely necessary when facing adverse effects.

Since SHs in the results of the robustness analysis appeared poor to the researchers, it was decided to attempt the corroboration of the results in a later workshop. Thus, as noted in section 2, a method of "Faces matrix" was presented (Table 8). Also SHs were reminded that they should answer the question "Being 20 years into the future in sustainability (stable or chaos) scenario, do you believe that the realization of social protest would be required? For each action and every state: Current problems made difficult to set a future vision as something different from the actual scenario. Hence, it was necessary to repeatedly emphasize "let's think we actually are" on a sustainability (or stable or chaotic) stage.

Table 8. "Faces matrix" presented at the beginning of workshop.

| ACTIONS | SCENARIOS | | |
|---|----------------------------------|--------|-------|
| | SUSTAINABLE | STABLE | CHAOS |
| Social Protest | <i>It would not be necessary</i> | ☺ | ☺ |
| Train and promote organizations | ☺ | ☺ | ☺ |
| Educate and inform about the environment | ☺ | ☺ | ☺ |
| Develop the fishing terminal | ☺ | ☺ | ☺ |
| Perform a coastal management and reserves area plan | ☺ | ☺ | ☺ |
| Legislate the ban, artisanal fisheries and coasts | ☺ | ☺ | ☺ |
| Make recycling programs | <i>It would not be necessary</i> | ☺ | ☺ |
| Build the Monte Hermoso - Pehuén Co coastal road | ☺ | ☺ | ☺ |
| Control the development of productive activities | ☺ | ☺ | ☺ |
| Work for lower corruption levels | ☺ | ☺ | ☺ |

Most of the SHs agreed that the social protests would not be necessary in a sustainable scenario. Nevertheless, some of them mentioned that those social protests could be caused

by other kind of problems, different from the current ones. Those problems could be employed as “corrections from deviations” from the sustainable state.

The actions to train and promote the organizations and the actions to educate and inform about the environment were considered as fundamental for the three scenarios. In the former, the actions are oriented to conserve the sustainability and, in the latter to correct the current problems.

The existence of management plans and the development of the fishery terminal are included in a sustainable scenario. In this sense, control and management policies would be more relevant.

Table 9. “Smiley matrix” modified by the SH.

| ACTIONS | SCENARIOS | | |
|---|---|--------|-------|
| | SUSTAINABLE | STABLE | CHAOS |
| Social Protest | <i>It would not be necessary</i> | ☺ | ☺ |
| Train and promote organizations | ☺ | ☺ | ☺ |
| Educate and inform about the environment | ☺ | ☺ | ☺ |
| Develop the fishing terminal | <i>Already made</i> | ☺ | ☺ |
| Develop a coastal management and reserves area plan | <i>Already made</i> | ☺ | ☺ |
| Legislate the ban, artisanal fisheries and coasts | ☺ | ☺ | ☺ |
| Make recycling programs | <i>Maybe there is a need to adequate them</i> | ☺ | ☺ |
| Build the Monte Hermoso - Pehuén Co coastal road | <i>Already made</i> | ☺ | ☺ |
| Control the development of productive activities | ☺ | ☺ | ☺ |
| Work for lower corruption levels | ☺ | ☺ | ☺ |

Legislation also was highlighted as necessary and relevant for all scenarios. The SHs recognized that chaos and stable scenarios as the most probable if every aspect of the present would not change in the future⁹. For this reason, the legislation would always be necessary. In

⁹There is an absence of legislation, such as Fishery Artisanal Law or the Coastal Law, or deficient legislation, such as the case of veda season.

a sustainable scenario, a continuous update of the legislation also would be required because activities and SES evolve.

The SHs could not agree about the existence or not of recycling programs. Some of them suggested changing the materials that require a recycling or proposing new ways to recycle. Other SHs mentioned that training and education would be enough, because the recycling rules would be more respected.

The creation of Monte Hermoso-Pehuén Co road was discussed. The park rangers expressed their worry about the zones of the archaeological reserve. For them, "sustainable" would be the transit along the National Route 3, which is far away from the proposed road between the coastal cities. In this sense, the construction of this road could not be considered in the three scenarios. Nevertheless, most of the SHs agreed that this road is important from a strategic, economic and social point of view. The road would benefit the fishery and tourist activities. In a sustainable environment the road would exist for some of SHs, but not for other members of the group. The SHs expressed that the last two actions of the matrix are important in all scenarios.

9 Implications of adopting Robust Response Options

A list of robust responses was made through step 4 of the methodology, which included the recognition of social, economic and environmental implications of specific tasks for the identification of an action plan (Table 10).

Table 10. The most important robust responses identified by SHs.

| ROBUST RESPONSES | | | |
|--|--|--|--|
| | WHAT? | WHO? | HOW? |
| Train and promote organizations | <ul style="list-style-type: none"> - To give knowledge to leaders of organizations about legal framework, technical issues, etc. - Dissemination the ideas. - To recognize the existed organizations. - To multiply the number of NGOs. | <ul style="list-style-type: none"> - Who integrate the NGOs (“we have to be protagonists”). - Experts / technicians. - Interaction with the government (regional and local). - University/ CONICET/ other academic and scientific organisms. | <ul style="list-style-type: none"> - Through the communication and meetings. - Workshops and courses to analyze important subjects defined by SHs. - Diffusion through particular actions like recitals on the beach or events. - Creation of social networks. |
| Educate and inform about environment | <ul style="list-style-type: none"> - To give knowledge at schools about environment. - To teach children about the benefits of a sustainable world. - To inform about environmental rules and punish adults who do not comply the norms. - To share knowledge. | <ul style="list-style-type: none"> - Schools. - Families. - NGOs. | <ul style="list-style-type: none"> - To invite participants to community activities. - Joint work. - Field work and workshops (more practice in dynamics) - To train educators and teachers. |
| Legislate about veda, artisanal fishery and coast | <ul style="list-style-type: none"> - To write or update the laws. - Creation of regulations. | <ul style="list-style-type: none"> - SHs through law projects. - Political representatives at 3 levels: local, provincial and national. | <ul style="list-style-type: none"> - Making law projects agreed - Diffusion (media) - Political contacts. - Social protests. |
| Control of productive activities | <ul style="list-style-type: none"> - To determine limits over the use and management of resources and the application of the normative. - Oversight of regulations. | <ul style="list-style-type: none"> - Coastguard - SENASA / Bromatology - Different municipal organisms. - Provincial level: OPDS - SHs, through the construction of networks and complaint presentations. | <ul style="list-style-type: none"> - Complaints - More resources for controlling organisms (more persons and resources in order to monitor) - Fines and collective responsibility. |
| Descent of the corruption levels | <ul style="list-style-type: none"> - Minor corruption levels. | <ul style="list-style-type: none"> - All social levels (internal and external SHs) | <ul style="list-style-type: none"> - Increase community conscience. - Strict fine (“easy come, easy go”) - Justice / Jail |

The training and promotion of organizations was one of the most robust actions. This action depends on the SHs (*"we must be protagonists of this action"*). They recognized that they need the support of the Government and other organisms to make it reality. The construction of networks and the interrelation with other actors and institutions (NGOs, organisms of State, universities and specialists) would be the correct way to provide "tools" to social organizations as well as the knowledge to make a better use of natural resources.

The SHs recognized the need that, besides the local organizations, national and international organisms could participate and give their knowledge to profit in the synergies that could be developed. The procedure to follow would be¹⁰: 1) To define the relevant subjects to promote the trainings; 2) Depending on the subject, contact the organisms that could provide the specialists; 3) To determine which kind of event would be suitable to promote the training (e.g., workshops, courses. The SHs even suggested the organization of thematic recitals or the use of social networks) and 4) Diffusion and communication to the SHs that could be interested.

The development of education and environmental information is an action directed to young people and visitors. This is especially important in Monte Hermoso and Pehuén Co where the tourist, in many opportunities, make damaging actions to the environment due to ignorance or lack of interest. For this reason it is necessary *"to give and share the specific knowledge"*. The SHs mentioned the importance *"to teach children about what is sustainability, up-scaling the complexity levels depending on the age, helping to act over the adults through their sons and daughters"*. The school and community participation is fundamental for this strategy.

In education, the most specific activity would be *"to go to the field"* according to the SHs. In this way, children and adults would know *"how to care a tree, how to recycle the trash and where to leave it"*. The SHs mentioned also as essential the teachers training and a higher level of commitment by all the community.

The legislation was also noted as a necessary action. The creation of new laws is as important as the regulation, implementation and updating of the existent ones. The SHs also mentioned the lack of police actions and controls that help the compliance of the existing laws.

In our governance system, the creation of laws is depending of national and provincial governments. Nevertheless, the SHs recognized that they could participate through presentation of law projects with their political representatives. The contact and meeting points with the political representatives and the use of media in order to introduce the society into the discussion are necessary for the SHs. The most difficult barrier to break for them is the way how the government implements the rules, in many cases; they mentioned that they felt to be "out of decision systems".

¹⁰This order was proposed by the investigation group in order to make an organized exposition of the ideas.

Besides, SHs told that the legislators should use the knowledge of the community to define the norms. The projects would have better acceptance if they are discussed before with the local and regional SHs, The control of the application of the law is essential besides establishment of rules by themselves.

The control of productive activities should be done after certain limits are given in the use and exploitation of the resources, having in mind the benefit to the users, but no affecting other users or the environment. This control must include an oversight of the existing rules. The problem is to define the responsibility chain because the institutional framework has always influence over the productive activities and resources¹¹. The SHs recognized that sometimes the controlling organisms have good intentions but lack of instrumental and human resources to fulfil their responsibilities. For this reason, more resources must be assigned to oversight activities.

The SHs mentioned that when controls are not effective by corresponding organisms, the people reacts. Nevertheless, an additional problem occurs when the community itself try to avoid the controls. In fishery, for example, some years ago the provincial Production Secretary defined a closed season for certain species from 1st October to 1st January. The largest control was done by fishermen themselves, who restarted their activity in the established date. Today, this situation changed completely. The veda was extended for 6 months (until 1st April) and some fishermen do not respect the rule. Park rangers and fishermen coincided that their difficulty is that they do not have police power or are legally allowed in order to control the activities that official organisms should make.

More severe fines and a societal responsibility may help in respecting the rules. For example, if a law for trucks to carry a determined amount of tons exists, and this law is not respected, the fine would go to the driver, the person who do the cargo, but also to who receive the goods. This situation could force a cross control

The action to reduce the corruption levels must be done for all the internal and external SHs related to the SES. The SHs recognized that this action is strongly related to the previous one: "who does not control an activity and knows the damage that could cause, is because that person receives a benefit, an additional incentive. This situation is seen as corruption when it goes against community interests and social welfare. The SHs expressed that corruption will always be present because individuals have their own rationality and interests. They know that the reduction of corruption and its control are imperative. One way to solve this would be through community awareness and strong penalties, like jail or severe economic fines. Although, the bureaucratic process for punishments should be more agile.

An interesting corollary appears from the comparison of the analysis of the brainstorming made in the stage 3 with the analysis of the strategies from the robust answers during stage 4. The brainstorming was made considering which actions the SHs believe the government and community should do. The answers of this activity were shown in section 7. Nevertheless, the

¹¹Some specific organisms are cited in table 10. See Deliverables 4.1 and 4.2 for more details.

following analysis of robustness and strategies made in the last workshop was made without taking into consideration the last issue. In other words, the researchers did not mention to the SHs the responsibilities initially assigned by them.

It is remarkable to observe that when they analyzed the strategies deeply and with more detail, the SHs noticed the importance of their participation in all the actions; even in some actions that they had exclusively assigned to the government in the previous stage. They also recognized their participation in the creation of rules and laws. For instance, to generate protagonism in structuring the rules by submitting a project was an idea that received complete consensus that prevailed during the discussion. Similarly it occurred when they discussed the responsibility of performing control procedures over productive activities. While spontaneously in the brainstorming they had attributed this responsibility to the government, in the second workshop the SHs understood they should commit, in part, to the task. In this sense, they recognized that lower the levels of corruption is something that affects all levels of SHs, not just external to the SES or decision makers, as when internal mechanisms of social control are often not met by improper behaviour of the SHs involved in the same activities.

10 Fit with existing governance and community development processes

The training and promotion of the organizations, environmental education and information and the development of an appropriate legislation have been the most mentioned and defended actions by the SHs as necessities in all possible scenarios and shocks. As appropriate legislation SHs understand controlled and genuine norms coming from their own common interests and not from the interest of the power groups. The strategy, which involves the five actions developed, has a fundamental aim: the recognition of the participation of all actors in the management and control process of natural resources and the organisation of institutional networks to strengthen the governance. The arising of organizations started with a process that could be defined as spasmodic. As we mentioned in previous deliverables, many organizations were born from a social protest against an existing conflict; while others entered in a lethargy process once the conflict was silenced (which does not mean “solved”).

The artisanal fishermen organization was born in a spontaneous way because their joint activities facilitated the access to the resource and reduced the risks of the activity. They normally agree on fishery zones, maintained communications with municipal and provincial government, but they said that they have to *“take action against decisions already taken at other levels”*. Those decisions are referred to laws that regulate the management and extraction of the resources. When these regulations bring relevant environmental, social and economic consequences, such as the decisions that caused the last fishermen conflict, the joint actions of the chambers and associations of fishermen are transformed in protests (e.g., cut of routes, complaints, claims) and institutional actions like legal presentations against governmental organisms. The SHs recognized the organization as a fundamental way to have a representation facing the governmental institutions.

The SHs mentioned that the interaction with other organisms such as IADO, UNS, INIDEP and Aquamarina is fundamental to improve the organizational functioning, development of activities and education of future generations. They know that this situation involves a "mutual learning". They recognized and value the scientific and professional knowledge, but they expressed that many times the practical knowledge ("*the learning of the sea*") is not heard by the other parts.

The strengthening and feedback of learning arena is another necessary step to reach a sustainable scenario desired by all the community. Especially because those actions are closely linked to the others: education, diffusion of information and training are important tools to improve the self-control, management of the resources and citizenship participation in the establishment of rules.

Furthermore, extending the environmental education and information with respect to the productive actions and the benefits of maintaining an activity under sustainable techniques increases the commitment of all the community (indirect or direct users of the resource). The learning and understanding of a problem generates community awareness, one of the first variables recognized by the SHs as vital to SES characterization (See Deliverable 4.2). In the later times, the fishermen of Monte Hermoso have seen how other SHs unrelated to the fishery community inform against the presence of foreign ships in infraction or warn fishermen about boats with possible problems.

Therefore, in developing a community-based management of the resources, a sense of belonging to the place is an important aspect to generate in all SHs which allows to experience as their own the environmental and social problems. Bahía Blanca inhabitants "look to the continent, to the rural area rather than to the coast", which represent a disincentive in building collective action. The sense of belonging becomes difficult to attain. The lack of interest towards coastal and marine resources (many times motivated by ignorance) and their conservation are the principal cause of inexistence of "spontaneous supervisors". The COMET-LA Project in Argentina has given a fundamental step in the strengthening of a community identity because it developed a space for dialog and interaction between SHs and decision makers. The identification of community problems (lack of fishery resource, coastal erosion, cross political interest, etc.) is the seed that will allow the strengthening of institutional networks and the possibility to concrete the five actions proposed (Zilio, *et al.*, 2013; Rojas *et al.*, 2014; Perillo *et al.*, 2014).

11 Conclusions on the using Scenarios for Community Based Natural Resource Management in the Argentine case study

Using scenarios for Community Based Natural Resource Management in the Argentine case study was a defiant methodology, not only for the scientific team but also for the stakeholders involved in the activity. Argentina has a cultural focus on present problems and challenges; the conjuncture prevails over the future. Nevertheless, the outcome of the activity was constructive and promising.

As we remarked above, the SHs noticed the importance of their participation in all the actions aimed to construct their “future”. In particular, they recognized the relevance of their own participation in the creation process of rules and laws, also understanding that they could be involved in several activities for controlling resource management. In this sense, they recognized that corruption is present at all levels of decision related to the use and management of resources. Hence, lowering the levels of corruption should be a goal for both external and internal SHs.

More specifically, SHs considered that the more relevant issues for Community-based Management are: training and promotion of organizations, environmental education, information dissemination and the development of an appropriate, controlled and genuine legislation coming from their own common interests instead of the powerful interest groups. Once again, the recognition of the participation of all actors in the management and control process of natural resources and the organization of institutional networks to strengthen the governance was pointed out.

In this context SHs mentioned that the interaction with other organisms such as IADO, UNS, INIDEP and Aquamarina is fundamental in order to improve the organizational functioning. The positive feedback between the common and the scientific and professional knowledge was recognized. For this reason, the strengthening of a learning arena is another necessary step to reach the sustainable scenario desired by the whole community.

In relation with the new definition of the SES with regard to the community-based management, it is important to remark the complexities and difficulties that the Argentine case implies for such objective.

On one hand, there is a clear perception that deepening network building among the various stakeholders (both inner and outer). The challenge heretofore is to articulate the activities of governmental organizations, NGOs and the community with the end of reaching the proposed objectives under coordinated actions. The absence of permanent elements of liaison or meeting points which are stable and accepted by the communities has been one of the major deficiencies when defining a local governance system was required. Similarly occurred with the lack of bottom-up politics and consensus, which reduced the likelihood of inner control in the use and management of the natural resources.

The present governmental system, defined in Deliverable 4.2, deepens the complexity of the problem due to the large bureaucracy generated around the creation of laws and control in the use of resources. The different levels (local, provincial and national) of competition often have overlapping functions and areas of intervention, extending the information bias and uncertainty received by the SHs. Therefore, we emphasize once again the need to properly define the chain of command and responsibilities, as well as "approximate" Sh to the levels of decision in the management of resources.

An additional problem may be found within the SES itself. SHs recognize certain "spontaneity" in many of the collective actions arising as a reaction to some specific conflicts, which they are not resulting from planned conscious strategies for addressing the future. A

certain transformation of the social capital can be added to the problem, which can be seen, for instance, in the current fishing conflict. Several years ago, SHs related to the use of the resources were less, the communities smaller and resource abundance was not a conflict. Competition for its use was cordial, emphasizing the coordination of actions and internal control of production activities. The growth of the communities of Monte Hermoso and Pehuén Co, and the higher level of industrialization in Bahía Blanca, resulted in the introduction of new players, a change in resource exploitation patterns and increased external pressures (as pollution and overfishing by external fleets). This reduced collective action, trust and communication and linkages among the various inner SHs.

All this shows that the formation of a community-based management system is not an easy challenge to face. However, we want to be optimistic to the future actions. The SHs consider that COMET-LA Project in Argentina is the starting point in the communitarian identity construction. The main fact is that a new space for dialog and interaction between SHs and decision makers appeared, in which community problems can be jointly discussed.

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Annex I. List of workshops participants

| NAME | OCUPATION | 1° workshop | 2° workshop | 3° workshop |
|-----------------|--|-------------|-------------|-------------|
| Miguel Ficoseco | Fishermen (VM) | X | X | X |
| Andrés Sánchez | Fishermen (VM) | X | X | |
| Enrique Russo | Fishermen (IW) | X | | |
| Ruben González | Park ranger (PC) | X | X | |
| María Carbajo | Representative of civil society (PC) | X | X | X |
| José L. Díaz | Delegate (VM) | X | X | |
| Cesar Pérez | CTE (Municipality of Bahía Blanca) | X | X | X |
| Leandro Lucchi | CTE (Municipality of Bahía Blanca) | X | X | X |
| Cristina Rubio | City councillor (Municipality of PA) | X | | X |
| Jorge Botana | City councillor (Municipality of PA) | X | | X |
| Mario Salman | Director of Development (Municipality of PA) | X | | X |
| Jorge Carballo | Journalist (PC) | X | X | X |
| Lucrecia Díaz | Park ranger (IW) | X | | X |
| Cora Puleston | Director of Environment (Municipality of MH) | X | X | X |
| Federico Seleme | Director of Production (Municipality of MH) | X | X | X |
| Eduardo Flores | Fishermen (MH) | X | X | X |
| Ester Fernández | Resident (PC) | | X | |
| Alfredo Nardini | Delegate (PC) | | X | X |
| Héctor Martínez | Businessman (PC) | | X | |
| Edgardo Jofino | Fishermen (PC) | | X | |
| Darío Ramírez | Periodista (PC) | | X | |
| Eloy Flores | Fishermen (MH) | | X | X |

CTE: Technical Executive Committee

IH: Ingeniero White

MH: Monte Hermoso

PA: Punta Alta

PC: Pehuén Co

VM: Villa del Mar

Annex II. Press information by AquaMarina



BAHIA BLANCA, May 2014.-

PRESS INFORMATION

More is taken from where ever less is left. There is still time to change the fishing pattern, to get rid of such irresponsibly that is threatening the ecological balance of the seas.

The current local fisheries situation with temporary or non effective solutions, overlapping interests, meetings, wrong decisions and corruption show once again that we do not learn from our mistakes.

The **AquaMarina Foundation**, member of the Forum for the Conservation of the Patagonian Sea and Areas of Influence, maintains a strategic relationship with the U.A.P.A. – Argentina Artisan Fishermen Union, and has been involved in various activities and issuing opinions on the various aspects involved in the artisanal and recreational fisheries, and the sustainability of marine resources in the **Marine Coastal System El Rincón**.

Thus, we have witnessed inconveniences along recent years that have occurred in different parts of the region and have affected local fishing communities.

As first antecedent, we can mention the field of *Bahía Anegada*, highlighting three cores artisanal fisheries developments: one to the north called Riacho Azul and two to the south in the towns of Los Pocitos and San Blas Bay. This established a serious conflict with artisanal and recreational fishermen for several years. Although is partially solved today, the conflict seems to be latent at least in two of this fisheries.

On the other hand, in places like Claromeco, Marisol and Orense, there have been several reports on the presence of trawlers near coast, with neither proper controls nor permissions, nor care for resources. Conflicts have been forgotten and artisanal and recreational fishermen, tourism operators, businessmen and scientists have rarely been listened.

Also, over the last few years on the coast between Monte Hermoso and Pehuen-Co there have been several issues such as lack of resources, reports on the presence of foreign trawlers near the coast, and few and inefficient controls among others. Fishing is carried out in small boats that leave from the beach. Artisanal fishermen in this region have always moved against the trawling fleet from Mar del Plata, one of the most important fishery harbors in the country. Fishermen's associations from these sites have been traditionally united or separated from Ingeniero White community depending on times and level of conflicts. They have been for example together through conflicts such as transit on beaches, paleontological sites impact, and killing of sea lions.

Once inside the Bahía Blanca Estuary, we find artisanal fishing communities and spaces for recreational fishing in *Puerto Rosales*, *Arroyo Pareja*, *Villa del Mar* and *Punta Ancla* that have traditionally claimed different problems. For example, sewage is dumped in the open sea. The Punta Alta treatment plant has not been working for years. Another problem is that material from dredging is thrown at the mouth of the Canal del Embudo and carried by tides into the channel, which is the best fishing area for shrimp and prawn. There were also records of trawlers arrivals from Mar del Plata, with obvious resistance from local fishermen.

The artisanal fishing sector involves numerous families from *Ingeniero White* engaged in the extraction, processing and marketing of fishing products. Approximately 130 fishermen are members of the House of Bahía Blanca Estuary Fishermen (CREEBBA). According to different enquiries, all actors involved in local artisanal fisheries agree on two important issues: Firstly is that the activity is going through a deep economic crisis, and secondly that the main problem is the shortage of fishery resource within the estuary. The answer to these workers' concerns are not yet certain.

After serious incidents in 2009, along with pollution, resource shortages, retirements, permits, fleet conversion and subsidies as relevant issues, Bahia Blanca Fishermen Association reported in 2012 that dredging was being carried out in buoy pairs 23, 24, 25 and 26, and the dredged material was being thrown directly in the fishing area called "Riacho Puesto" located between buoy 20.5 and "Channel Funnel" entrance almost in front of Puerto Rosales. Research and relevant studies on biomass, pollution, or other environmental impact have never been systematically conducted as would be in the area.

It is noteworthy that there are different and logic interests presented by the social actors in this vast region under study. So, on the one hand, there are environmental concerns led by changes in weather patterns, species and pollution, some economic forces from the Bahia Blanca Petrochemical Pole, overfishing, dredging, cold storage and chambers among others.

There are good examples of complaints from fishermen in general, either on their own or grouped in different fishing chambers along a broad coastal sector, and recurring for many years; where issues have only worsened, have been partially solved, or have been ignored.

Currently, the subject refers to what may be irreversible for the ecosystem and for the artisanal and recreational fishing in the area. Trawling is unsustainable, invasive, and a destructive fishing technique, which is one of the greatest threats to biodiversity in the sea.

It consists of the use of fishing nets of large size and weight, which are dragged along the seabed to capture various marine species living close to the bottom and middle waters. Being in direct contact with the bottom, the nets stir it up, crushing and destroying habitats that are home to a large number of organisms. These fleets have more autonomy, technologically equipped and other facilities compared with local fishermen. Also, the possibility of allowing

trawling outside the Coastal Marine System El Rincón is being considered, although in the surrounding area the impact would be the same or even worse. It should be noted that this environment includes wetlands, salt marshes, tidal flats, crab lands, sandy beaches, pelagic and benthic environments. There have been recorded 26 species of seabirds, 17 of marine mammals, 3 of turtles and more than 30 species of fish, many of them of commercial and recreational value. *Trawling, limited enforcement, overfishing, habitat destruction, bycatch, and discard are just some of the current local problems.*

We believe it is necessary to reduce the current level of conflicts between the various fishing communities and internal entities that make them up. It is urgent that all these conflicts are attended by all involved sectors (stakeholders?) No political meetings are useful without the representative participation of the local fishermen. In the Marine Coastal System El Rincón there are several actors who profit from the environment in different ways, and would be considered when an economic plan for the fisheries is established. Mistakes due to negligence rather than misunderstandings, and attempts to assert individual interests rather than genuine community ones have addressed many of the wrong taken decisions to date. It would be time to stop making the same mistakes. There is also a law proposed to ban fishing for five years at El Rincón. Without proper consultation within stakeholders, it could be another wrong decision, as well as approving a new fishing gear or new licenses. Each one of the current problems cannot be solved partially. There is a general conflict that requires interdisciplinary analysis and full participation for effective solutions.

A global trend is food sovereignty as "the right of people to healthy and culturally appropriate food, produced through sustainable and environmentally friendly way, and the right to define their own food and productive systems giving priority to local economies and national markets granting priorities, for example, to artisanal fisheries.

For these reasons we must learn from our past mistakes, and create tools and approaches for conservation, planning, and sustainable use of ecosystems and their services. It is suggested the application of the ecosystem approach, marine spatial planning, environmental impact studies, implementation of mitigation measures to reduce the negative impact of commercial fishing and other human activities.

The management of these approaches should be based on a transparent, participatory and responsible management of marine natural resources.

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