

# THE ROLE OF EXPERIENTIAL KNOWLEDGE IN RISK MANAGEMENT OF COASTAL LANDSCAPES

## *A case study in the Mediterranean Basin*

### **Abstract**

Coastal areas are among the landscapes facing the greatest challenges. Traditional coastal management approaches to face with risks, based on hard approaches, have proved unsuccessful and inefficacious. They need to be combined with soft approaches, based on nature-based solutions, and on management strategies that include experiential knowledge. Focusing on an Italian coastal landscape, risk perception was investigated using the method Scenario Workshop to understand the level of awareness that different actors have on coastal erosion and associated risks. The study highlighted the necessity to create a diverse, interdisciplinary and scientific knowledge base, combined with an interface improvement between knowledge creation and decision-making, in which local actors can interact and participate into the management processes. In this sense, the production of shared knowledge on phenomena, processes and related risks would help to define appropriate forms of landscape management.

**Keywords:** coastal risks, participation processes, scenario workshop, integrated coastal zone management

### **Introduction**

The European Landscape Convention (ELC), adopted in 2000, identifies landscape as the territory as a whole, which represents an asset regardless of its intrinsic value [1], [2]. Aiming at promoting the protection, management and planning of the European landscapes [3], [4], it recognizes landscape as a good of the community, which deserves to be protected and enhanced in every case and place, even if degraded or lacking in particular qualities [3]. ELC acknowledges the political nature of landscape and supports principles of landscape governance that actively involve the entire population [1], [5]. In this sense, the Convention gives an active role to people in the perception of their living environment and commits the competent public authorities to involve them deeply and continuously in the interpretation of landscape values and in the definition of objectives for the quality, preservation and management of landscapes [6]. Furthermore, participation must include not only the general public, but also local and regional authorities and other stakeholders in the implementation of landscape policies [5]. Coastal areas are among the landscapes facing

the greatest challenges, such as tackling the issue of coastal risks exacerbated by climate change. During the twentieth century, both population and activities have increased dramatically, producing widespread conversion of natural coastal landscapes, overexploitation of resources, and the increase of coastal systems vulnerability [7]. Moreover, such systems are under ever-increasing threat deriving also from their mismanagement [8]-[10] and they are prone to tensions and conflicts between different actors with contrasting interests in such territories [11], [12]. The complexity of such landscapes requires approaches able to address the different technical, regulatory, economic, social, cultural and management dimensions of problems that characterize them. The traditional coastal management approach to face with risks, based on hard approaches, consisting essentially in hydraulic engineering works and used for many decades as the only way to handle them, have proved unsuccessful and inefficacious [13]-[15].

Thus, the hard approaches need to be combined with soft approaches, based on nature-based solutions, such as nourishments and dune stabilization, and on the implementation of management strategies that include the knowledge of policy makers, stakeholders and the public at large, so called experiential knowledge. As a matter of fact, the comprehension of coastal risks requires not only a deep understanding of the main physical phenomena to be addressed, but also acknowledgment about stakeholders' and local communities' knowledge, role, objectives, interdependencies, and network of interactions [16].

The combination of hard approaches with soft approaches have long been recognized as essential by official documents on coastal zone management. In particular, the Integrated Coastal Zone Management (ICZM) protocol, the first, and as of today the only international legal instrument specifically addressing coastal zones management, aims to connect and systematize protection actions, risk reduction, reestablishment of environmental balances by framing them in the long-term planning and requiring "appropriate involvement" of stakeholder [17].

In line with this, new planning strategies and management activities are required by means of a reliable, understandable, and timely knowledge of processes affecting coastal hazards, getting decision makers, stakeholders and local

communities involved [16].

Within the Mediterranean Basin, Italy, with its almost 7.500 km of coastline, is the second longest in the Mediterranean, after Greece [18]. The management of Italian coastal landscapes is characterized by a marked division of competences between the state, regions, and municipalities as well as different sectors of the public administration.

The Italian Code on Cultural Heritage and Landscape (L. 42/2004), while strengthening the importance and extension of planning for the protection and regeneration of coastal areas, neglected management issues as well as the involvement of people in decision-making and implementation strategies [6].

Moreover, even though Italy has signed the Mediterranean ICZM Protocol in 2008, this has not been ratified. As a matter of fact, a clear policy on the application of ICZM has not yet emerged, so each Region is providing autonomous strategies [19].

This paper focuses on an Italian coastal landscape, the small coastal town of Margherita di Savoia (Puglia Region, Southern Italy), among the most exposed to the risk of erosion and flooding in Italy, also due its particular urban form and the close dependence on the sea of its economy. Margherita di Savoia is a narrow strip of land 18km long, enclosed between the sea and the saltworks. Its economic base is centered on agriculture, port activities, salt pans, seaside tourism and related activities. During the last decades, several mitigation measures, based merely on engineering works, have been built to manage the problem of coastal erosion, shifting the erosive process to the west without any significant benefits. As already stated, it is important to include experiential knowledge into risk assessment and landscape management strategies. In this sense, risk perception has been investigated using the method Scenario Workshop to understand the level of awareness that different actors have on coastal erosion processes and associated risks.

### **Methodology**

The Scenario Workshop is an adapted version of the Future Workshop approach (Jungk and Müllert, 1987). It is an approach aiming at changing or transforming the actual situation of a system through three main phases, as described in Table 1. The method is based on the activation of the intuition of individuals, synergy effects in groups and critical potentials that can contribute to the creation of alternatives [20].

Critique phase	Fantasy phase	Implementation Phase
Generate and collect critique issues (brainstorming)	Imaginative warm-up (fantasy plays, storytelling, games, meditation...)	Evaluate the registered ideas
Structuring (clustering of ideas using Mind Mapping)	Turn critique into the opposite (negation of negation)	Formulate in concrete terms the best ideas
Evaluation, Focusing, Prioritization	Generate ideas (brainwriting)	Choose the very best ideas (prioritizing)
	Analysis and elaboration of great ideas	
	Register the ideas in a bank of ideas.	

Tab. 1. Structure of the Future Workshop approach

Thus, starting by a critical understanding of actual problems and following different phases of individual reflection and group interaction, participants point out shared desirable future visions and ways to move from the actual situation to a preferable one. The Future Workshop is a particularly adaptable approach, which can be used in different forms depending on the research context, the issues to be investigated and the results to be obtained [21], [22].

The Scenario Workshop has been designed starting from the Future Workshop approach, modifying its structure to reach the objectives set of the case (as described in Fig. 1). It aimed at understand the perceptions that policy makers and stakeholders have about problems related to the coastal area of Margherita di Savoia and their points of view about the possibility to overcome such problems and to imagine future scenarios for the area by 2040. Representatives of policy makers and stakeholders have been invited to participate in the Scenario Workshop. They were selected according to the criteria of the broadest representation of the interests involved. It was decided to involve different actors, from representatives of policy makers, to technicians of all levels (from local to the national one), as well as representatives of the economic fabric and local environmental association (Tab. 2).

Institution
Municipality of Margherita di Savoia - Mayor
Municipality of Margherita di Savoia - Technical Office (urban planning)
Municipality of Margherita di Savoia - Technical Office (heritage and environment)
Municipality of Margherita di Savoia - Tourism Office
Puglia Aqueduct (AQP)
Port Authority
Basin Authority
Province of Barletta-Andria-Trani - Sector of urban planning
Puglia Region - Maritime public domain
Touristic Information Office (I.A.T.)
Association of beach concessionaires of Margherita di Savoia (A.S.B.A.)
Torre Pietra Association of local farmers
La Nuova Arenaiola Agriculture cooperative
Fare Natura Pro Natura Association
Legambiente Association

Tab. 2. Selected actors for the analysis.

The Scenario Workshop took place on the 9th May 2019 in the Municipality of Margherita di Savoia from 10 am to 6 pm.

Not all the preselected actors participated in the workshop. Indeed, the Basin Authority, Port Authority and Legambiente Association did not show up.

As shown in Fig. 1, it has been conceived and structured in three phases: i) identification of problems and resources; ii) vision; and iii) scenario building and implementation.

In line with the method requirements specified in literature [23]-[25], which suggests that groups do not exceed ten participants in order to enable the work to proceed smoothly, participants were divided into two groups, each of which representing as much as possible the heterogeneous structure of decision-makers and stakeholders. The two groups worked in parallel and in some phases of the workshop exchanged ideas on the results achieved.

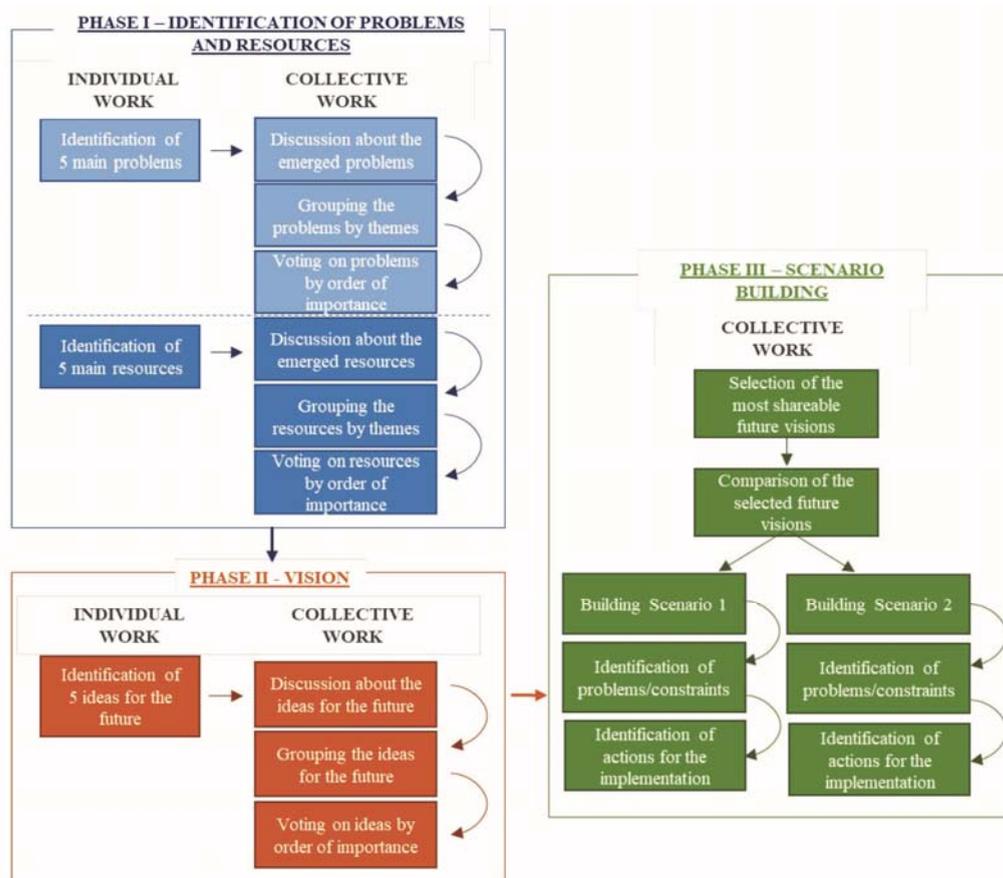


Fig. 1. Structure of the Scenario Workshop.

After this second phase, the two groups of participants were united and asked to select the most shared and desirable future visions of the previous phase, to compare them and to build two scenarios.

The first phase of the work aimed to identify the most relevant problems (criticalities) and resources (opportunities) affecting the coastal area of Margherita di Savoia. Firstly, participants were asked to individually identify the five problems that they considered to be the most significant for the coastal area of Margherita di Savoia and to post them on a panel. Secondly, the posted problems were discussed collectively to eliminate redundancies and to group them into thematic areas. Finally, stamps were given to the participants for voting the posted problems by order of importance.

After that, the same procedure was performed for the resources concerning the coastal area of Margherita di Savoia. Once the problems and resources had been defined, the second phase was moved on, with the aim of creating visions of the future of Margherita di Savoia and its coast by the year 2040. Participants were asked to individually indicate five future ideas of Margherita di Savoia and its coast by 2040. As in the first phase, the visions were then posted on a panel and discussed collectively to eliminate redundancies and to group them into thematic areas. Finally, they were voted by order of importance with the use of stamps. After this second phase, the two groups of participants were united and asked to select the most shared and desirable future visions of the previous phase, to compare them and to build two scenarios. Finally, they identified the problems/constraints for the two scenarios and the implementation strategies necessary to overcome them.

## Results and discussion

### Perceived problems

As possible to see in Table 3, participants looked very aware about the problem of coastal erosion characterizing Margherita di Savoia and the ineffectiveness of the existing coastal erosion defense measures and their role in worsening the coastal area situation. Furthermore, they perceived the presence of illegal buildings as a huge problem as well. As a matter of fact, illegal buildings along Puglia coast is a serious problem, as demonstrated by different quantitative analysis, as in [26]. However, although participants perceived it as a huge problem, Margherita di Savoia is not subject to much building illegality. Moreover, actors perceived the presence of illegal buildings as strictly connected with the absence of spontaneous vegetation, typical of the coastal areas, which has been destroyed by overbuilding. Another perceived problem is the difficulty in reaching the beach because of the many tourist facilities and illegal buildings present in the coastal area. This overexploitation of beaches has led to a general disinterest in free beaches, causing them to become increasingly deteriorated. However, even though participants are aware about the problems of coastal erosion, they do not perceive the problem of flooding, even though is known that it is an existing problem.

Perceived problems	Level of importance*
Coastal erosion	4
Illegal buildings	4
Coastal erosion mitigation measures	3
Difficult public access to the beach	2
Absence of spontaneous vegetation	2
Lack of enhancement of free beaches	1
Absence of coastal monitoring	1
Excessive anthropic pressure on the coast exerted by tourist facilities	1

\* level of importance: from 1 (low importance) to 4 (very important)

Tab. 3. Perceived problems for the coastal area of Margherita di Savoia.

### Perceived resources

As possible to see in Table 4, all actors recognized the presence of sandy and equipped beaches as an important economic resource for Margherita di Savoia.

Resources	Level of importance*
Sandy, equipped beaches	3
Saltworks	3
Environment and biodiversity of the Ofanto River	3
SPA	2
Valuable agricultural production	1
Fishing	1
Clean sea water	1

\* level of importance: from 1 (low importance) to 4 (very important)

Tab. 4. Perceived resources for the coastal area of Margherita di Savoia.

Moreover, saltworks were recognized as an essential element of the local identity, as well as the presence of interesting environment and biodiversity of the Ofanto River for the development of a more environmental-friendly tourism. As a matter of fact, also SPA was recognized as a resource for the touristic point of view but with the necessity to be more valued. Finally, a certain level of importance was given to the valuable agriculture production of the territory and the fishing activities that could be improved also for the clean sea water.

From the analysis of the resources it emerged that policy makers and stakeholders have a good knowledge of the resources present in their territory and the potentials that these resources may have.

### Scenario building

Firstly, to define the two scenarios, actors imagined the most shareable and desirable visions for the coastal area of Margherita di Savoia. Furthermore, they choose the scenarios names and they defined problems and constraints for each scenario and finally actions to deal with the desirable futures. The first scenario, called *The city of Water* and shown in Table 5, highlighted the recognition of the importance of the inhabitants' local identity, based on the strong connection that their territory has with the water.

For this reason, they believe there is the need to rethink the ways in which the water could be used as a key element for the area. The city should be open to its territory because there is the necessity to reestablish a relationship with the saltworks because, currently, just linked to the sea. In this sense, they recognized the potential that saltworks still have for the development of their area also from a touristic point of view. They imagine Margherita di Savoia based on a naturalistic tourism and not only on beach tourism.

Moreover, many obstacles and constraints that prevent the implementation of the scenario City of Water were identified, related to three aspects. The first concerns the privatization of saltworks. This has made saltworks completely inaccessible increasing the distance between this resource and the local community. The second refers to bureaucracy, because it is complex and long-lasting, and it usually prevent the possibility to propose innovative interventions for the development of the area. The third refers to obstacles and constraints for

fishermen. On the one hand, the port is not suitable for them because the seabed is not deep enough for allowing the ships to enter. On the other hand, the rules imposed by the European policies are too restrictive regarding the sizes of the nets meshes that are too large for the catches of this territory. Another aspect recognized to be an obstacle is the presence of "hard" defense systems for the protection from coastal erosion.

The participants identified a second scenario called *The city of Health* (Tab. 6). In this scenario, participants imagined three same desirable visions as for the Scenario 1: Margherita di Savoia to be a city open to the territory, for a more naturalistic tourism and to have a multifunctional and documentary center of the history of the saltworks.

The City of Health has imagined as a city where SPA, sports, hobbies, and wealth are predominant. Moreover, they imagine a coastal area accessible for everyone with no obstacles for the access to the sea. Finally, a valorization of the typical agriculture resources with more interest from young people is seen as a willingness to maintain alive one part of local identity of this territory. Regarding to this scenario, participants identified many obstacles and constraints related to urban planning and to the lack of land owned by the municipality. In both scenarios, the landscape, understood as built by the indissoluble relationships between natural elements and cultural factors in the long history, is identified as a central element. Finally, participants identified some actions necessary to build a strategy to address the desirable futures and to counter the fearsome futures for Margherita di Savoia and its coastal area. The analysis of the proposed actions reveals a high level of awareness of the complexity and fragmentation of the multilevel and multisectoral governance that characterizes not only Margherita di Savoia, but the management of coastal areas throughout Italy. Furthermore, policy makers and stakeholders think that this problem could be solved through participatory planning strategies and through giving more competencies to municipalities. As the matter of fact, although strategies for more effective coastal management should be based on integrated strategies built between different policy levels (from national to local) to avoid a higher fragmentation, local authorities would need more competences to better manage their coastal landscapes, because of the many differences and specificities of such territories.

### Visions

The city open to the territory
Margherita, city of naturalistic tourism: creation of cycle-pedestrian routes with Ofanto, Ofantino and Aloisa mouths
Saltworks village and Torre Pietra multifunctional and documentary center of the Lake Salpi
Saltworks important resource with advanced technology and reduced unemployment
Saltworks back to saltworkers
Sea landing and stop of the sea subway
Naturalistic restoration of the western coastal dune for the coastal ecological network
Saltworks as public space of the calm waters

Tab. 5. Shareable and desirable visions for Scenario 1 "The city of Water".

## Visions

The city open to the territory

Margherita, city of naturalistic tourism: creation of cycle-pedestrian routes with Ofanto, Ofantino and Aloisa mouths

Saltworks village and Torre Pietra multifunctional and documentary center of the Lake Salpi

Attractor node of the Adriatic ridge for the functions of "City of Health"

Margherita becomes a barrier-free tourist destination (accessible to children, elderly, disabled)

Recovery of the relationship of continuity between the city and the sea without more physical obstacles

Margherita a marine fishing area

Margherita di Savoia "City of Health" (SPA, sport, leisure, wellness)

Margherita, capital of water sports in Puglia

Margherita, city of sport

Local and non-local young people interested in agricultural works

Creation of urban parks on the urban perimeter of the saltworks with urban cycle/pedestrian routes

Tab. 6. Shareable and desirable visions for Scenario 2 "The city of Health"

## Conclusions

The Scenario Workshop allowed to understand if the actors perceive the problems and related risks affecting Margherita di Savoia and its coast and to find out their level of knowledge about possible strategies for action to overcome the critical situation of such territory. As participants represented specific categories, they had an initial inclination in looking out for their own interests. Despite this initial drawback, the overall process was constructive, and the participants' attitude was proactive, and they were interested in the constructive exchange of ideas.

They recognized participatory planning as a strategy to overcome the predefined problems and to build the desirable scenario they have imagined for their coastal area. Despite the predominant coastal risk affecting this area is the erosion, participants do not identify strategies to face with it.

Therefore, to analyze and manage coastal landscapes in an effective way, firstly there is the necessity to create a diverse, interdisciplinary, and scientific knowledge base, due to the inclusion of different actors with different backgrounds. This should be paralleled by an improvement of interfaces between knowledge creation and decision-making in which stakeholders and local society can interact and participate into the management processes. In this sense, the production of shared knowledge on phenomena, processes and related risks would help to define appropriate forms of landscape management.

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