

Issues identified by the international panel evaluating the series of three Forte dei Marmi Forums (2014, 2015, 2016)

The Municipality of Forte dei Marmi, in collaboration with the Universities of Pisa and Ferrara and local stakeholders, held a series of three annual meetings named *Forte dei Marmi International Forum of the Sea and the Coast*. This series of events addressed issues related to the management, development, and preservation of beaches in areas under pressure from tourism, where shoreline erosion processes have an immediate impact on the local economic and social structure. The forum provided the opportunity for national and international experts to focus discussion on issues of importance to the Apuo-Versiliese Coastal System, which corresponds to the coastal cell from the mouth of the Magra River to the Livornesi Mounts. The focus also included using the region as a natural laboratory for discussion of coastal erosion problems facing scientists and managers in other locations throughout the world. This report provides an evaluation of the outcomes of all the events held in Forte dei Marmi during these years. The first year (2014) identified the dynamic processes of shoreline erosion and accretion and ways of monitoring and evaluating shoreline change. The second year (2015) addressed shore protection designs, including hard structures, and beach (re)nourishment. The third year (2016) examined how the many facets of the coastal environment can be best managed in integrated programs. This initiative is especially timely because of the tremendous value of the community structures and economy to the region.

Presentations at all three meetings revealed that the local management issues are those commonly faced by many managers elsewhere, including (1) diminution of sediment resources because of reduced river inputs and trapping by shore protection and port facilities; (2) fragmentation of responsibilities and resources between government departments; and (3) competing stakeholder interests and perceptions about use of resources and appropriate strategies, especially for locations suffering from shoreline erosion. Sediment transport alongshore creates littoral cells comprising sediment sources and sinks. Attempts to address erosion in one location can have a profound effect on another, requiring solutions for sediment sharing that address the needs, **and eventual contributions**, of all municipalities. The local focus of the forum is the shoreline south of the Magra River, but consideration of the regional sediment transport system requires evaluation of the shoreline also south to the mouth of the Arno River comprising the entire Apuo-Versiliese Coastal System.

An international panel was invited to provide perspective on the presentations at the meeting and the discussion periods following the presentations. Attention was focused on identifying the stakeholder concerns and information gaps that should be addressed in subsequent meetings. Recommendations were made in the four general areas summarized below.

Governance

- It was evident in the recent past that there is too much fragmentation of competences among and within the provinces in this region. With the new governmental framework in place there is an opportunity for closer coordination in coastal issues that transgress community boundaries and to operate with the entire coastal cell in mind.
- We also recommend that the Regional Authority creates an operational Coastal Observatory with the goal of promoting adaptation and resiliency of the entire Apuo-Versiliese Coastal System to vulnerability to climatic change and human impacts. The Apuo-Versiliese Coastal Observatory should be dedicated to databasing both existing data (historical shorelines, sand deposits, etc)

collected through the years in the provinces and to serve as a clearinghouse for new observations, systematic monitoring in the area, dissemination of information and education. This database should be placed in a publically accessible WebGIS system.

Coastal Management

- We recommend that the Regional Authority draws up an integrated coastal management plan for the entire Apuo-Versiliese Coastal System from the Bocca di Magra to the Livornesi Mounts, including the catchments and the inner shelf. In this management plan, the coastal Risks (who runs the risk of coastal flooding, sea level rise, climate change and shoreline erosion), the Rewards (who reaps the rewards of coastal actions), Resources (inventory of the sand, who has the knowledge and tools, who has the data) and Responsibilities (who has accountability for action) need to be identified and defined.
- This coastal management plan needs to be developed with involvement of all stakeholders (e.g. beach concessionaires and citizens associations, tourism industry, chamber of commerce, river basin authorities, fishermen, environmental agencies, etc.) through participatory workshops.
- As a consequence of the results obtained by the previous actions in the area, we recommend that there be a moratorium on new coastal structures and development projects over the next five years while a comprehensive management plan is established.

Coastal Risk Assessment

- We recommend that an economic valuation of the Apuo-Versiliese Coastal System be carried out to quantify what infrastructure is at risk.
- Little attention is paid at present to coastal risk evaluations as required by the EU Flood Directive, especially concerning coastal storms. We recommend this topic is taken up as soon as possible.
- Over the short-term the current erosion of the shoreline must be addressed.
- Medium long-term preparations must directly consider the impact of sea level rise and climate change.
- More involvement is needed for these assessments by the public community and commercial operators.
- There is a need to carry out cost-benefit analyses in the Apuo-Versiliese Coastal System for different kinds of coastal actions. This involves insight into the value of the hinterland to be protected and future trends in sea level rise and climate change.

Short-term Actions

- We recommend that any short-term actions should be guided by the philosophy of being flexible, sustainable, and with minimum impact of future resiliency of the Apuo-Versiliese Coastal System.
- We reaffirm that sediment management of the Apuo-Versiliese Coastal System functions within the framework of a single physiographic unit as a cell between the mouth of the Magra River and the Livornesi Mounts.
- Rational sediment management within the Apuo-Versiliese Coastal System should be accomplished through redistribution of sediment, modification of existing structures and the creation of sand dunes.

- Comprehensive monitoring of any coastal management activities (before, during, and after) should be conducted and coordinated through the Coastal Observatory as evinced by the recent consortium of Tuscan universities (Pisa, Florence, and Siena).

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