



<b>Benchmarks network achieved by NIRDEP-NIMRD, November 2014</b> <i>(Danut Diaconeasa, Silica Petrisoiaia, Alina Daiana Spinu, Vasile Patrascu)</i>	<b>“Cercetari Marine“</b> <b>Issue no. 44</b>  <b>Pages 180-189</b>	<b>2014</b>
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## **BENCHMARKS NETWORK ACHIEVED BY NIRDEP-NIMRD NOVEMBER 2014**

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In order to minimize coastal erosion, increase the value of coastal zone and create new tourist beach areas, during 2005 - 2013 were developed the scientific and technical documentations for the development of a Master Plan of the Romanian coastal zone of the Black Sea based on two projects:

- “Study on the Protection and Rehabilitation of the Southern Romanian Black Sea Shore“ (2005 - 2007, JICA) and
- “Technical Assistance for the Preparation of Projects under Priority Axis 5. Implementation of adequate infrastructure of natural risk prevention in the most vulnerable areas. Major intervention domain 2 - Reduction of coastal erosion“ (2010 - 2013, beneficiary ABADL Constanta).

The Master Plan provides the strategic vision of Romanian Black Sea management, providing a prioritized, sustainable, long-term approach, oriented to manage and fight erosion consequences and implications on the environment, marine ecosystems, economic and social values of the coastal area.

In these projects, a plan to protect the coast was drawn-up, consisting in protection measures for short, medium and long term, which will run for more than 30 years. These works include measures to reduce wave energy (height) that reach on the shore, silting of beach with dams for sand stability (spurs) and measures to retain sand on the beach (by building new dams, repairing the existing “wave breaking” dikes and construction of dikes perpendicular to the shore).

On short term, five priority projects were planned in the southern Romanian coast, in order to reduce the risk of coastal erosion and rehabilitation for 7.1 km of shore in the next location: South Mamaia, North Tomis, Tomis Center, South Tomis and North Eforie. The beach area expected to be created will be about 33.7 ha.

An important component of the Master Plan is the local strategic monitoring for the collection of data and information on coastal work performance. The monitoring is essential for the maintenance and optimization required during the lifespan of these projects (approx. 50 years) and the substantiation of studies and new works projects for coastal protection. It will also be necessary to monitor the environmental impact both during construction and during operation of these coastal protection measures.

One requirement of the strategic monitoring program is to measure the beach profiles with biannual frequency (summer and winter). These measurements should be realized periodically to allow a complete understanding of coastal processes and shoreline changes.

In the study developed during 2005 - 2007 (JICA, 2007), the large scale measurements executed by NIMRD were considered absolutely necessary, to ensure the successful implementation of the project and achieve good results after implementation. The elements of the monitoring program cover a set of new benchmarks for research of beach profiles. On this line for Navodari, Mamaia, Constanta, North and South Eforie areas was made a proposal for an outline map with the location of 31 benchmarks (Fig. 1).

The location of the benchmarks on the beach sectors is as follows:

- Navodari - Mamaia beach, 15 benchmarks (MM-MM-1 ÷ 15);
- beaches between the dams for cliff protection in Constanta, 4 benchmarks (T-1 ÷ T-4);
- beaches between the dams for cliff protection in Eforie North, 5 benchmarks (EN-1 ÷ EN-5) and
- Techirghiol sand barrier, 7 benchmarks (EF-1 ÷ Ef-7).

During 1980-2007, NIMRD conducted assessments on geomorphological changes of emerged beaches with annual frequency on the north unit in approx. 42 sections and biennial frequency for the southern unit of the coast, on approx. 34 sections.

To continue the monitoring of coastal erosion in the protection dams sectors planned on the short-term, in November 2014, NIMRD designed the locations for 51 benchmarks assigned across the following beach sectors (Fig. 2):

- Navodari beach, adjacent north of the tourist beach of Mamaia resort - 6 benchmarks (R.14 ÷ R.19);
- center and north of Mamaia beach, medium term protection measures -7 Benchmarks (R.7 ÷ R.13);
- Mamaia South beach, short term protection measures - 6 Benchmarks (R.1 ÷ R 6);
- Tomis North beach, short term protection measures - 6 Benchmarks (CT.12 ÷ CT.17);
- Tomis Center beach short term protection measures - 5 Benchmarks (CT.7 ÷ CT.11);
- Tomis South beach, short term protection measures - 6 Benchmarks (CT.1 ÷ CT.6);
- Eforie North beach, short term protection measures - 7 Benchmarks (EF.17 ÷ Ef.23);
- Techirghiol sand barrier beach, bordering the waterfront south area of Eforie North - 8 Benchmarks (EF.9 ÷ EF.16).

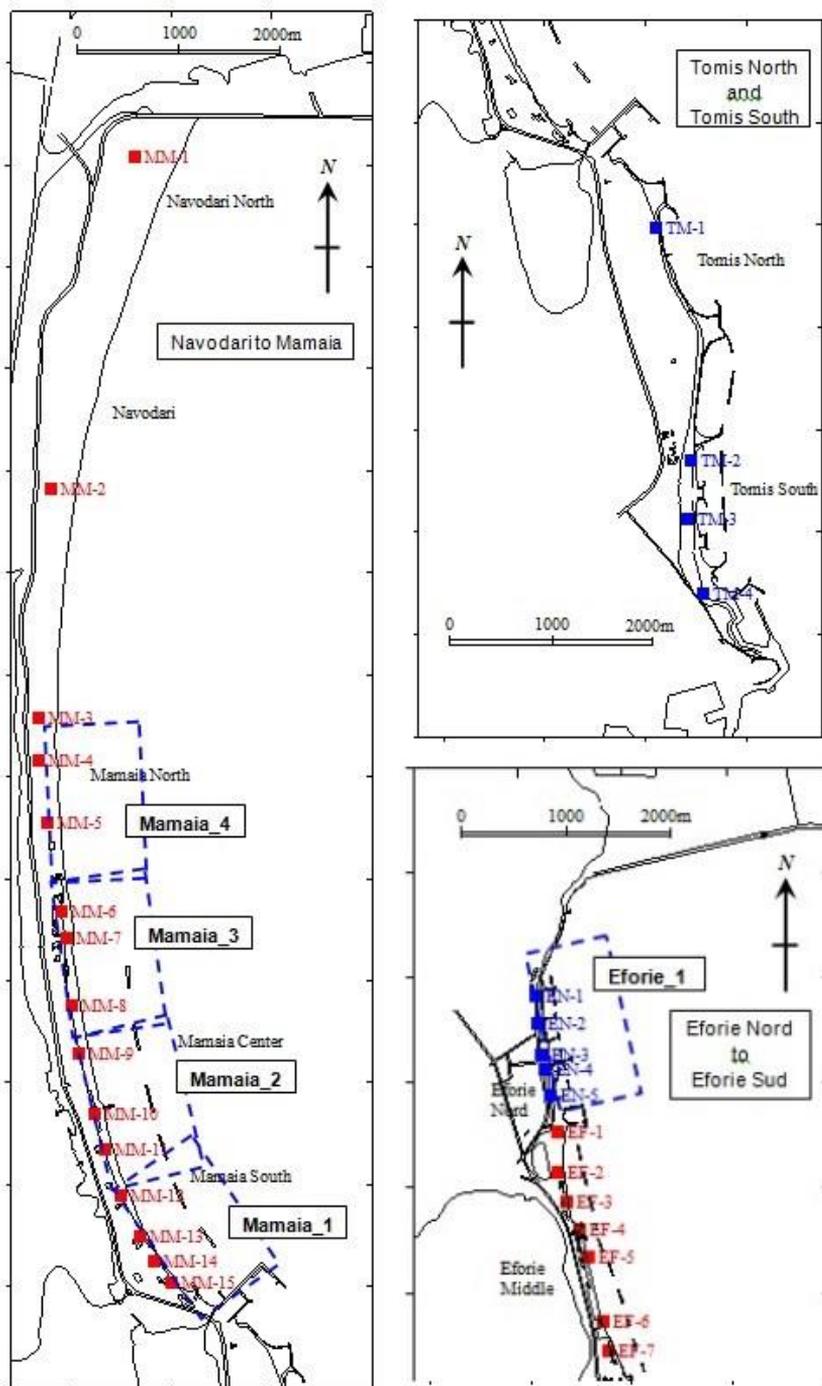


Fig. 1. Outline of the proposed locations of benchmarks - JICA project (2007)

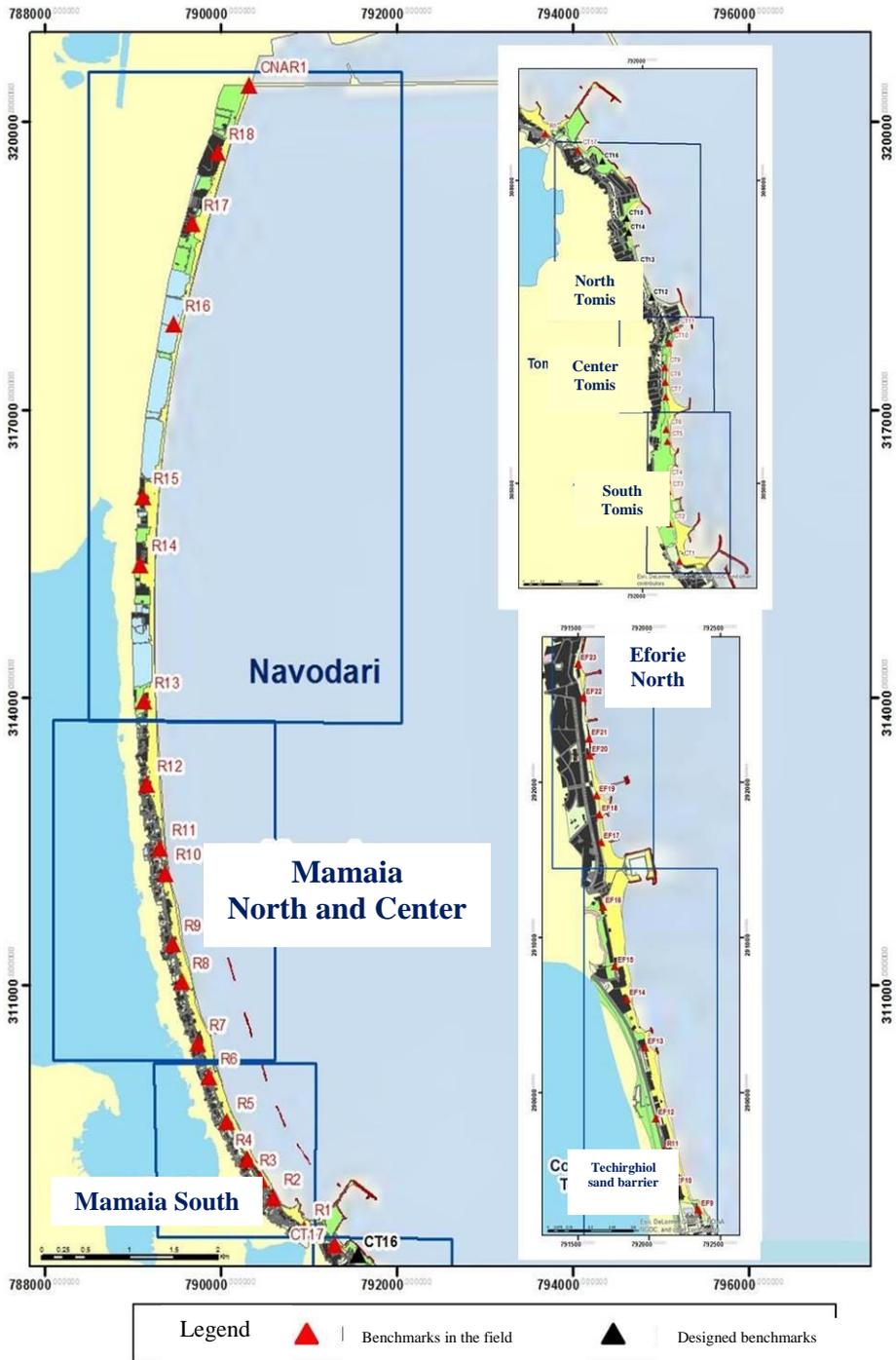


Fig. 2. Outline of benchmark locations achieved by NIMRD - November 2014



For each benchmark, the section of the emerged beach perpendicular on the shoreline was set, together with sketches, photos and specific measurements for the register of the benchmarks network.

Geomorphological measurements on sections, perpendicular on the beach shoreline, were made in specific points: benchmark, line of vegetation limit, base of the cliff, berm, scarp, storm surge limit, the limit of waves advancement and withdrawal, texture of superficial sediments, accumulations of bivalves. Sea level variations were analysed using values recorded at the sea level station from Constanta port. Wave height was determined visually on each section of measurements, approx. 100 m distance from the shoreline.

Topographic land surveying marks were set on the field with steel bolts. The benchmark coordinates (x, y, z) and beach profiles were measured with specific topographic equipment (GPS).

The information regarding the benchmarks network, together with the geomorphological measurements conducted in November 2014 can be considered as background data sets for monitoring the coastal protection measures and beach behavior in the context of coastal protection works in the Mamaia - Constanta - Eforie North and adjacent sectors.

Note that some landmarks have been designed on the orthophotomap because some sectors are currently under construction (facilities of access roads), consequently, after completion, they will be placed at fixed locations.





# BENCHMARKS NETWORK 2014 TOMIS NORTH SECTOR



**Legend**

- Benchmarks 2014 (in the field)
- Designed benchmarks 2014



# BENCHMARKS NETWORK 2014 TOMIS CENTER SECTOR



## Legend

▲ Benchmarks 2014 (in the field)

792000

792400

792800



# BENCHMARKS NETWORK 2014 TOMIS SOUTH SECTOR

305500

305000

304500

305500

305000

304500



CT6



CT5



CT4



CT3



CT2



CT1



## Legend

▲ Benchmarks 2014 (in the field)

792000

792400

792800

0 0.05 0.1 0.2 0.3 0.4 m

