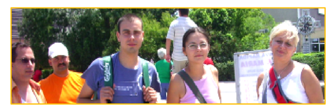


The Romanian littoral – coastal geomorphologic changes during the last half of Century (1961-2011); its impact on the coastal development and solutions for protection and rehabilitation

Razvan Doru Mateescu (1), Daniel Peptenatu (2), Alina Spinu (1), Mihaela Laurenta Alexandrov (1),

1 - I.N.I.M.R.D. "Grigore Antipa", Blvd. Mamaia, no.300, Constanta, code 900581, ROMANIA, *E-mail:* razvan_doru@yahoo.com, laurenta@alpha.rmri.ro

2 - University of Bucharest, Faculty of Geography, Bd. Nicolae Balcescu no.1 Sector 1, code 010041, Bucharest, ROMANIA

NIMRD / INCDM

European Geosciences Union General Assembly 2011

INTRODUCTION

NIMRD - National Institute for Marine Research and Development "Grigore Antipa" is the leading marine research institution in Romania, as well as national coordinator and focal point with respect to international research tasks and responsibilities in the field of marine sciences.

The Institute operates under co-ordination of the Ministry of Environment and Water Management and its research activities are mainly oriented towards supporting adequate marine and coastal environmental management and protection.

NIMRD undertakes fundamental, applied and technological development research in oceanography, marine and coastal engineering, ecology and environmental protection and management of living resources in the Black Sea and other ocean areas. *Being the technical operator of the marine monitoring network (physical, chemical and biological) and for coastal erosion survey,* NIMRD hold a comprehensive volume of marine data and information which are exchanged in the framework of several international projects, recently starting with SeaSearch, in present: SeaDataNet and Black Sea Scene and some other international programs and projects.

ROMANIAN COAST OF THE BLACK SEA

Over 244 km length (between Musura Branch si Vama Veche). It represents 6% of total length of Black Sea shore.

Geographically is formed by:

- Natural shore (beach and cliffs – ≈ 84%)
- Artificial shore (ports, coastal structures for protection - ≈ 16%)

The charactheristical zones of the shore are divided in two geomorphological units:

Northern unit **(the Danube Delta and the Razim-Sinoe Lagoon complex), stretching on 170 km, from Ucraina border to Midia and consists on shore with deltas, lagoons and levees, been formed of marine-river accretions, recent shells sands, desposed under shapes of beach and litoral belts with relative low cota, often less than 2m;**

Southern unit **(Cap Midia - Vama Veche, at Bulgarian border), with a approximately length of 74 km, it is a relative high shore, with cliffs, mostlly active, of maximum high is ≈ 35 m. and small beaches at basis.**

MAIN THREATS
in the Romanian coastal zone

Coastal erosion / floods

threatens most at:

- Northern sector:
  - Section between Sulina & St. George and south of St. George
- Southern sector:
  - Mamaia
  - Constanta
  - Eforie Nord
  - Eforie Sud
  - Costinesti
  - Olimp to Mangalia

Pollution

caused by:

- Non-point sources (agriculture)
- Point-sources (ind.+ mun. waste water)
- Potential water shortage in North of Constanta County

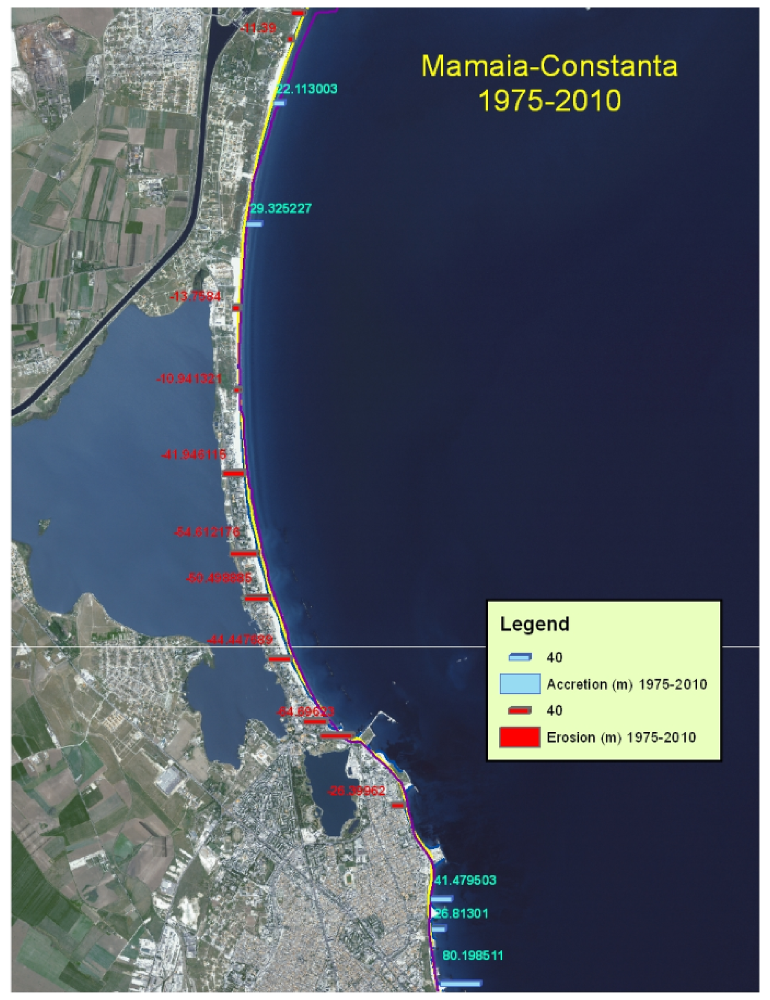
Land use

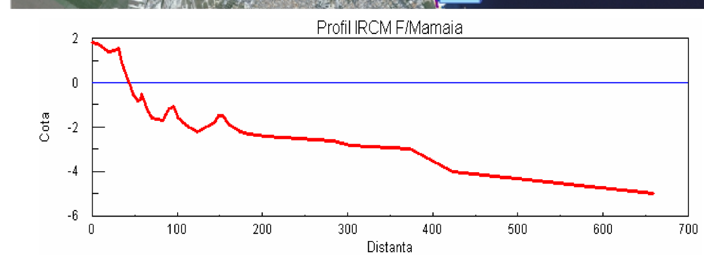
Potential land-use conflicts due to:

- increasing land demand due to urban growth.
- increasing land demand for tourism development
- increasing land demand for industrialization close to urban centers
- unplanned settlements

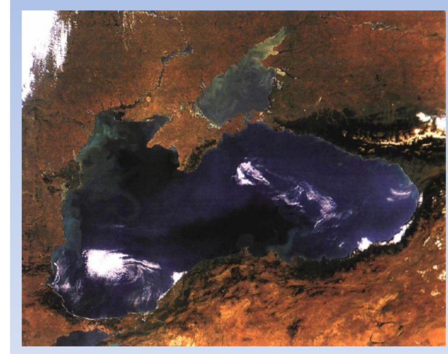
ACTUAL STATE OF ROMANIAN LITTORAL

COASTAL DELINEATION





BLACK SEA BASIN



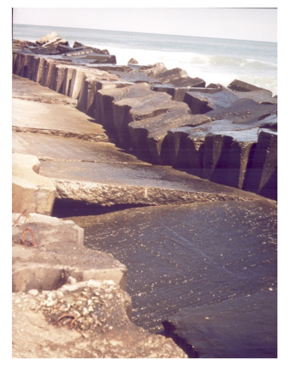
- Total area: 4.2 x 105 km2
- Total water volume: 547,015 km3
- Maximum depth: 2,212 m
- Drainage basin: > 2 million km2
- Shoreline length: > 4,100 km
- Population: > 160 million people
- Riparian countries: 6 (Bulgaria, Georgia, Romania, Russian Federation, Turkey, Ukraine)

COASTAL DELINEATION STUDIES using GIS&RS - data

DAMAGING OF COASTAL PROTECTION WORKS

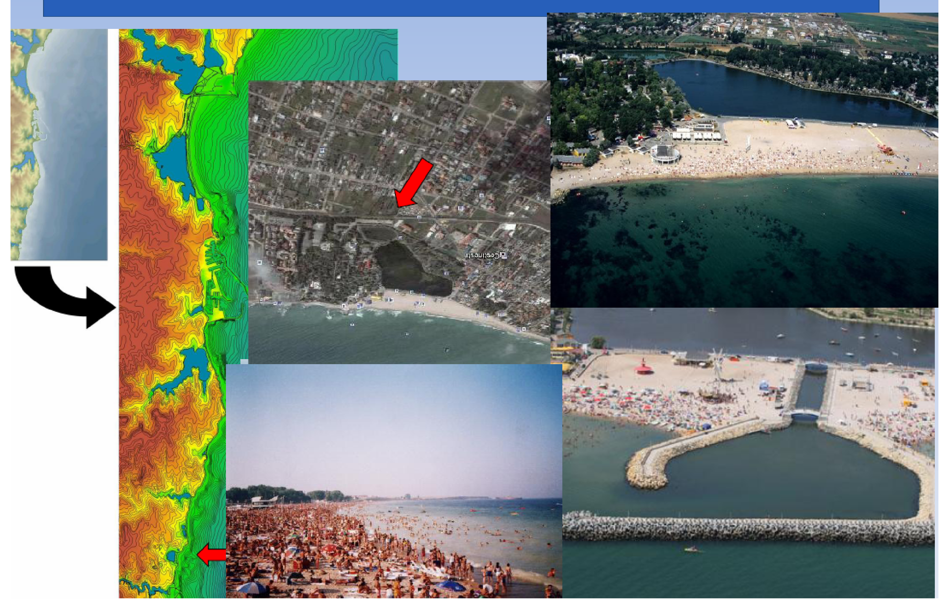
Mamaia

Eforie



Jupiter

COASTAL FLOODINGS



ASSESSMENT OF COASTAL EROSION / VULNERABILITY

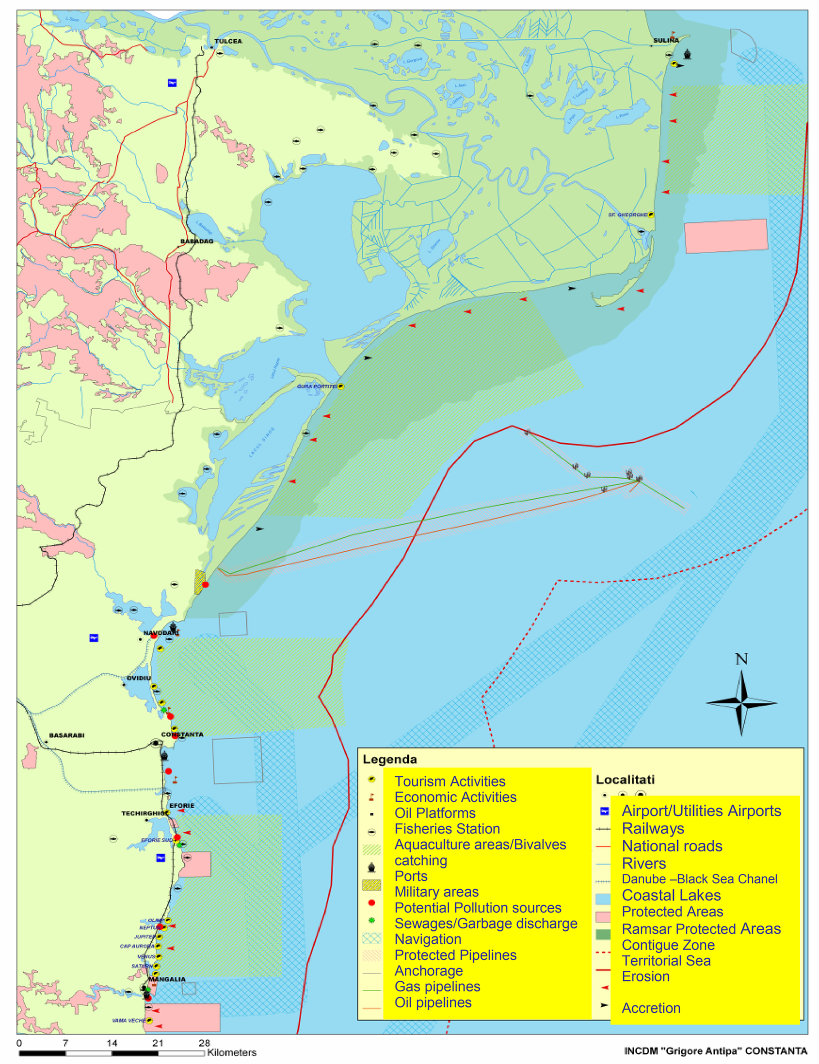
The shore of southern sector (Midia - Vama Veche) due to geological structure, and mostly to the hard substrate of calcareous platform, as well as local hydro-meteorological conditions have been suffered intense modifications, thus:

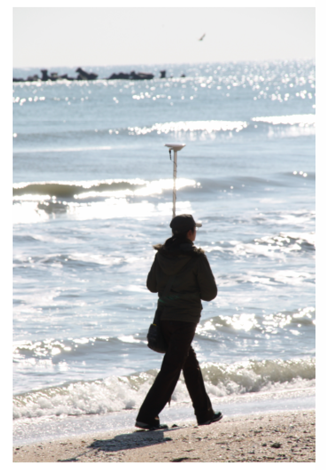
- **The southern sector of Mamaia resort was retreat with circa 50 m (1990-2003);**
- **The International Camp Beach (Eforie Sud) was retreat with 50 m (1981 - 1998);**
- **The area of Neptun Beach had registered more than 24 m loss(1981 - 1992);**
- **The Venus - Saturn Beach was retreat with 36 m (1983 - 1992);**
- **The northern area of Costinesti's cliff were retreated with more than 40m (1988-2002).**
- **Also, due to absence of maintenance actions, from the constructive point of view, the groins state emphasized 45% good stage, 25% medium stage of altering and 30% accentuated stage of deterioration.**

The Hamangia Thinker and His Wife

The area is located since the oldest times

The main coastal activities and uses





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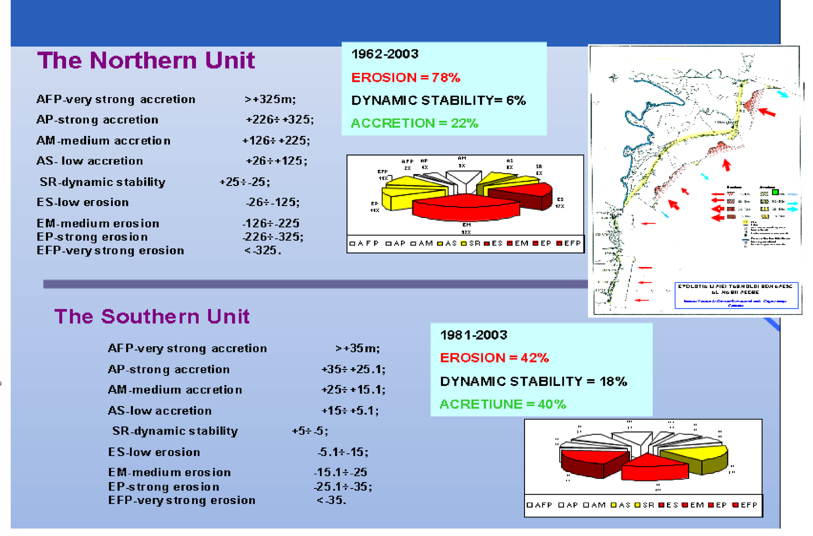
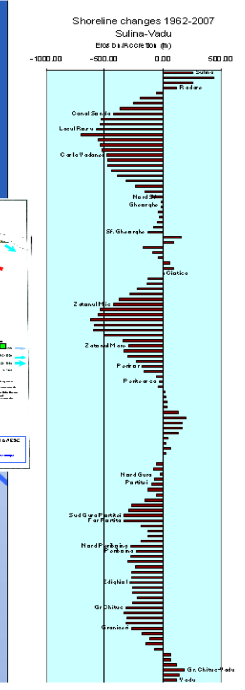
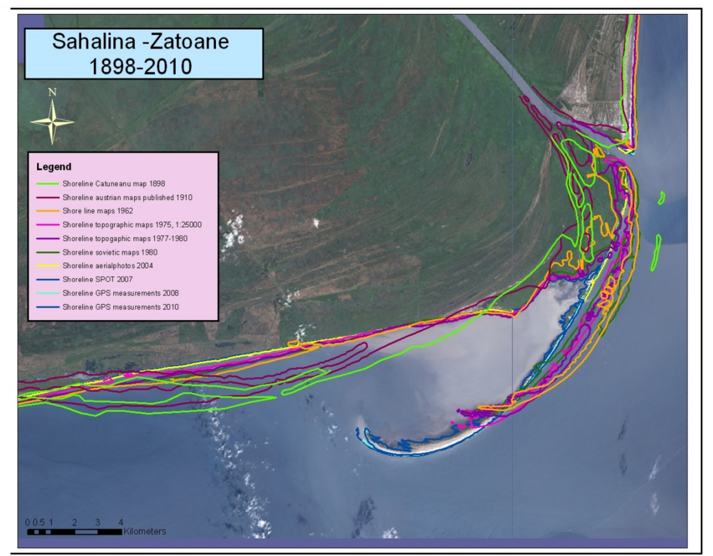
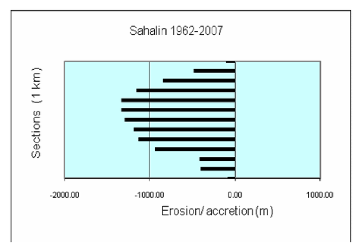
SHORELINE MAPPING

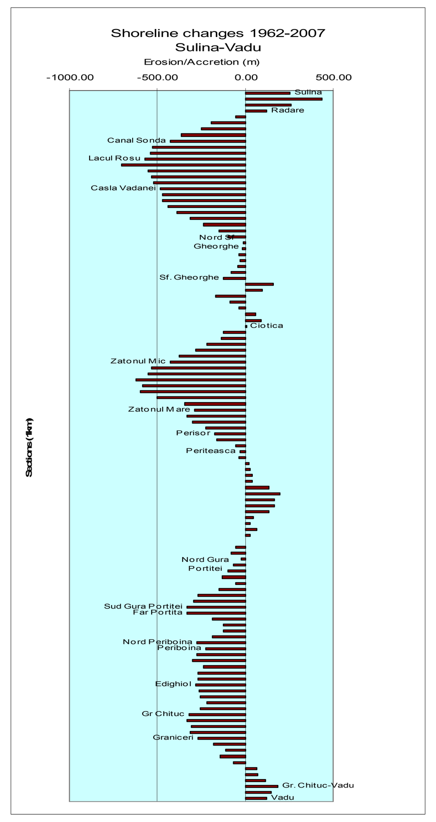
SHORELINE CHANGES









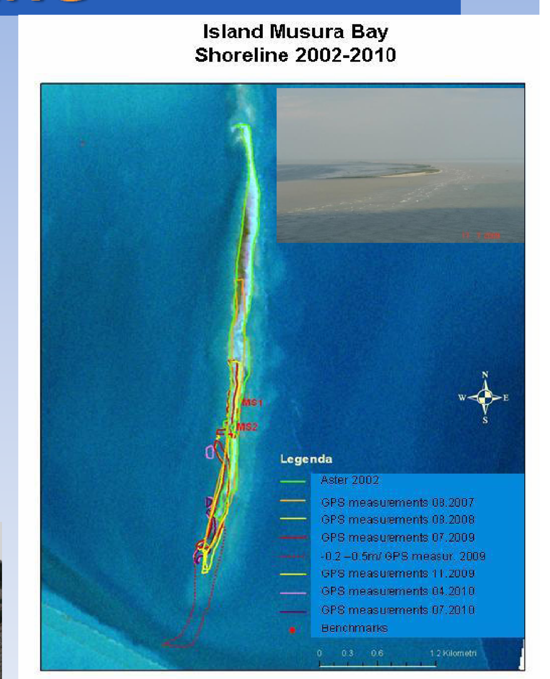


SHORELINE MAPPING

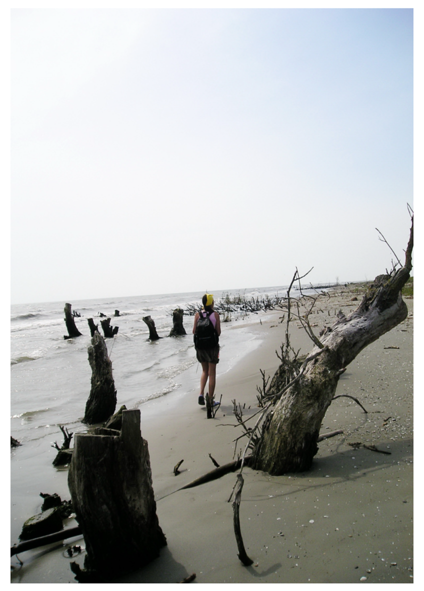
- GPS measurements

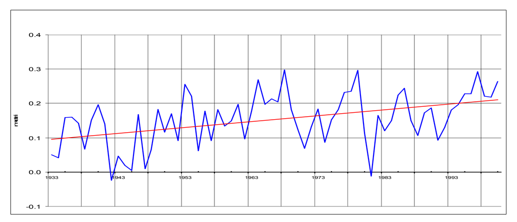
Sand-belt closing Musura bay:

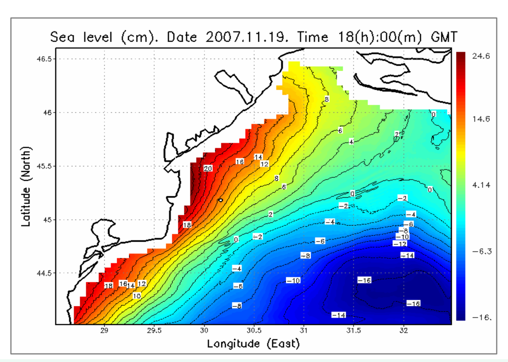
2010, 2009, 2008, 2007, 2002



GIS & Remote sensing – COMPONENT Role within implementation of the ICZM and Maritime Integrate Spatial Planning







Analysis of model-data misfits reveals differences between the water mass properties/3D, permitting/resolving general circulation models against marine hydrologic observations

- Romanian coastal area is confronting with
- a significant issues toward European WFD/ICZM/MSPD's Implementation and also
- Implementation of the national coastal law/ICZM rules and regulations

Erosion control

- In the near future, the adoption and the optimisation of **the conservation-rehabilitation measures *(including complementary soft protection methods)*** for the southern sector will have to include a better regional management of sediments transported by the Danube river into the coastal zone of the Danube Delta, recovery of beach surfaces with sedimentary deficit

Floods control

- Developed monitoring-modeling-management systems / tools for flood control
- Changing the vision: redesign the polders / retention basins / levees

Conclusions

- **Implementation of CZ/ICZM policies has great socio-economic importance for coastal stakeholders and contributes to the CZ protection and management.**
- **EU integrated MARITIME Spatial Planning / ICZM policy to supports the coastal delimitation/delineation policy and also contributes to the sustainable development of the CZ.**
- **The new setbaks limits & resettlement have an important role in CZ protection and management but it may create a further population / investment pressure on the Romanian BSCZ**
- **The CZ's ecological&physical condition: not optimal for the ecological integration and it is crucial to consider the ecosystem based practices for Romanian BSCZ.**

WEB Site: http://www.rmri.ro