

## Technical and administrative support for the joint implementation of the Marine Strategy Framework Directive (MSFD) in Bulgaria and Romania

*Under Framework contract for services related to coordination between the different marine regions in implementing the ecosystem approach.*



Imagine the result

**1<sup>st</sup> CBE Meeting**  
**21-22 January 2014, Constanta**



# STATUS & MAIN ISSUES MONITORING ROMANIA

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## Introduction

### ➤ RO monitoring program

- ✓ quite well advanced
- ✓ based on a long history: first regular monitoring activities date from 1959 for shallow coastal waters (reference station – Mamaia, daily) and 1963 for marine waters (transect Constanta-East, weekly) and were carried out by RMRI (former name of NIMRD)
- ✓ Black Sea Monitoring System, including land-based point sources discharges, is legally regulated and organized since the early 1980s and improved considering the EU Directives since 2000
- ✓ current implementation is reflected in numerous measures taken to improve the environment and various types of monitoring providing data/information needed for science-based management of environmental protection to the decision-makers.
- ✓ RO environmental legislation related to monitoring activities is fully harmonized with EU regulations/directives
- ✓ an inventory of monitoring-related national legal/policy documents in Romania is given in Diagnostic Report II (prepared under MISIS project)

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## Authorities responsible for RO coastal and marine waters monitoring

- **Ministry of Environment and Climate Change** (former Ministry of Environment and Forests) – main organization responsible for MSFD implementation in RO
  - Romanian Waters National Administration (with Dobrogea-Litoral Water Basin Administration)
  - National Agency for Fisheries and Aquaculture
  - Environmental Protection Agency
- **Ministry of National Education**
  - NIMRD
  - GEOECOMAR
- **Ministry of Health**
  - Constanta County Department of Public Health
  - Tulcea County Department of Public Health
- **Ministry of Transport**
  - "Maritime Port Administration" National Company
- **Constanta City Hall**
  - "Water Supply Company RAJA Constanta

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## RO monitoring operators; type of monitoring; parameters; spatial-temporal coverage

- **NIMRD**
  - Surveillance monitoring: coastal (including reference sites) and shelf waters; physical, physical-chemical, biological parameters, microbiology, pollutants, morphology; frequency: daily (reference site), seasonally, 2/year.
- **Romanian Waters National Administration (with Dobrogea-Litoral Water Basin Administration)**
  - Compliance and surveillance monitoring; coastal waters; physical-chemical parameters, pollutants, biological parameters; frequency: 2/year.
- **GEOCOMAR**
  - Surveillance and operational monitoring: RO shelf waters; physical, physical-chemical, biological parameters, pollutants, green-house gases, geology, bathymetry; frequency: 1-2 cruises/year, near real-time.
- **National Agency for Fisheries and Aquaculture**
  - Implementation of the National Data Collection Programme 2011-2013

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## RO monitoring operators; type of monitoring; parameters; spatial-temporal coverage

- **Environmental Protection Agency**
  - Surveillance monitoring; coastal waters (Constanta area); global beta specific activity, specific activity of gamma emitting radionuclides; frequency: weekly
- **Constanta County Department of Public Health**
  - Surveillance monitoring; coastal waters (Navodari-Vama Veche); physical-chemical parameters, pollutants, microbiology; frequency: 2/month
- **Tulcea County Department of Public Health**
  - Surveillance monitoring; coastal waters (Sulina, Sf. Gheorghe, Portita); physical-chemical parameters, pollutants, microbiology; frequency: 2/month
- **National Company "Maritime Port Administration"**
  - Compliance monitoring; Constanța port area (on coast); physical-chemical parameters and pollutants; frequency: from monthly to every 6 months
- **Water Supply Company RAJA Constanța**
  - Compliance monitoring; waste water discharges (physical-chemical parameters, microbiology).

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## Other RO data providers

- **Romanian National Meteorological Administration** – operational monitoring: meteorological data
- **SC AQUASERV SA Tulcea** – compliance monitoring: the Danube area: water discharges; physical-chemical parameters; pollutants.
- **Constanta Maritime Hydrographic Directorate** – noise
- **Romanian Space Agency** – operational monitoring
- **Private companies**
  - Companies carrying out offshore activities (ExxonMobil, OMV Petrom) – compliance monitoring; marine waters; pollutants (mainly)
  - Companies carrying out oncoast activities (S.C. Uzina Termoelectrică Midia S.A.) – compliance monitoring: water discharges, coastal waters (Midia harbour)
- **NGOs**
  - Mare Nostrum – environment routine monitoring; litter (beaches); marine mammals (dolphins) observations; Midia – Vama Veche

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## QA/QC

### QA/QC in monitoring is quite well approached

- Many manuals and guiding documents are available for most parameters (sampling, processing, uncertainty estimation, etc) (listed in Diagnostic Report II – MISIS project);
- Inter-comparison exercises between laboratories
  - more in chemistry (nutrients, pollutants), less in biology (only chlorophyll regular)
  - most of the organizations attend (in most cases annually) – Quasimeme (NIMRD), IEAE (NIMRD, GEOECOMAR, EPA), QUALCO - VITUCI BUDAPEST program (Dobrogea-Litoral), joint cruises (SESAME, MISIS), etc.
- Inter-comparison exercise in terms of sampling procedures (most of them organized under the framework of different projects such as SESAME (NIMRD and GEOECOMAR), MISIS (NIMRD, GEOECOMAR and Romanian Waters National Administration))

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## Monitoring data reporting

- Data are reported to various end-users, but many monitoring operators keep data for internal use
- Data are reported to:
  - Authorities (ministries or national agencies)
  - International organizations (BSC, EEA, UNEP/FAO, etc)
  - Projects databases (SeaDataNet, BlackSeaScene, SESAME, HYPOX, COCONET, MISIS)
- The most common format is Excel, but the projects develop their own formats
- Most organizations have their own formats for data storage

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## Data management

- Databases of most RO organizations are not free (few exceptions: NATO, BSODB)
- On-line databases (SeaDataNet) contain meta data, which is not regularly updated and contain little information which would be useful for most of the MSFD descriptors and parameters
- Data must be used to generate valuable products and provide information to both research community and policy makers
  - ✓ Trends (different statistical softwares, techniques)
  - ✓ Models: Regional model for Western Black Sea (based on Princeton Ocean Model) – outputs: sea level (at the 2.5 meters considered sea surface), currents, temperature and salinity (from 2.5 down to 2000 meters).
  - ✓ thematic maps, automatic categorization, thematic layers of land cover, vegetation indices, etc. derived from satellite observations (ROSA)
- ✓ Reports – most of them accessible for any end-users

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## Progress made in RO monitoring program

- ✓ Preparation of IA and GES reports (NIMRD)
- ✓ Improving operational monitoring
- ✓ Improving monitoring infrastructure (vessels, laboratories, etc)
- ✓ Improving monitoring in terms of D3
- ✓ Revision of the MSFD reports (in progress) due to a better understanding of GES, targets; lessons learnt from other projects (holistic assessment tools, BEAST)
- ✓ Slight progress in harmonisation of methodology at national and regional level (ex. MISIS project)
- ✓ Slight progress in data products
- ✓ Slight improvement in attending trainings (generally related to other past or ongoing projects; very few organized in the RO organizations)
- ✓ Slight progress related to MPAs (project COCONET)
- ✓ Increased involvement in projects related to monitoring activities

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## Gaps in RO monitoring program

- poor financial assistance
- poor usage of the capacities of all organizations dealing with monitoring (including monitoring infrastructure sharing)
- overlapping of activities and efforts
- poor (or very poor) monitoring activities related to D10 and D11
- still poor coverage (especially spatial – open sea waters)
- very poor ecotoxicological monitoring
- quite few inter-comparison exercises for biology
- data accessibility (no on-line databases at national and regional levels)
- no mechanism for data/information exchange between various organizations managing environmental data
- few data products resulting from monitoring activities
- very poor QA/QC of data

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## NIMRD monitoring program

- Will be presented by Dr. Eng. Simion Nicolaev

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## Romanian Waters National Administration monitoring program

- Will be presented by .....

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# GEOECOMAR monitoring program

## Type

### ❖ Surveillance

#### ▪ Spatial coverage

the Romanian shelf waters

○ 5 transects (Sulina, Sf. Gheorghe, Portita, Constanta, Mangalia)

○ 45 stations, bottom depths within 15 – 200 m

#### ▪ Temporal coverage

○ 1-2 cruise/year (since 2006), occasionally more, but under the framework of other international projects (e.g. HYPOX)

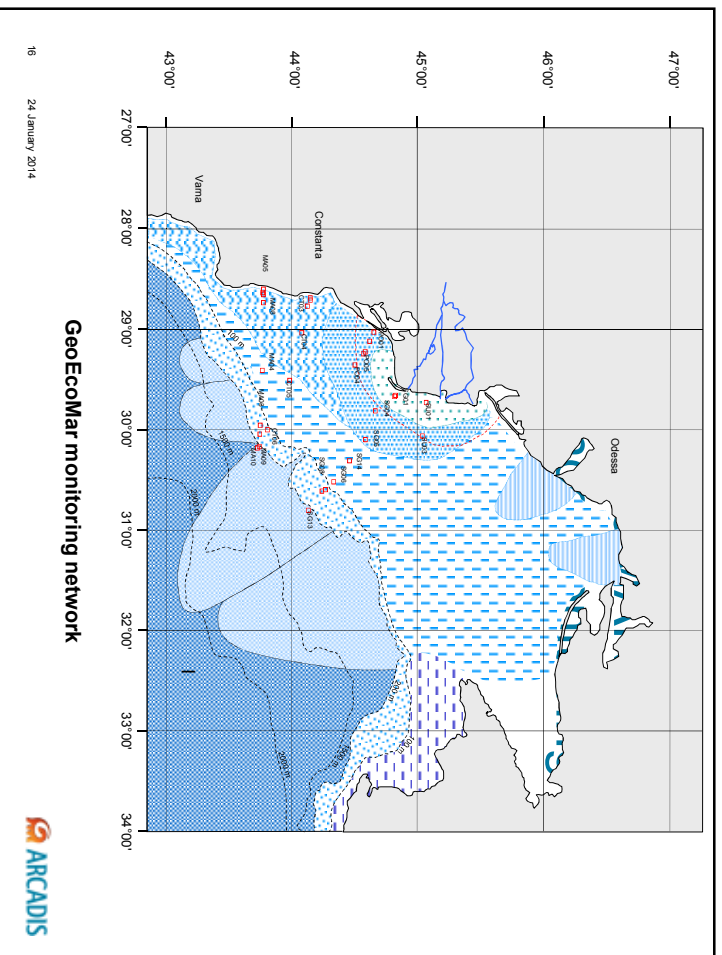
### ❖ Operational

○ 3 offshore moored observatories (bottom depths between 72 and 90 m) - functional from the end of 2013

○ near-real time data

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# GEOCOMAR surveillance monitoring

## Logistics:

### R/V *Mare Nigrum* - technical

#### characteristics:

- total area ~ 200 m<sup>2</sup>
- 3000 t displacement;
- 81.94 m length;
- 13.60 m width;
- 5.20 m draught;
- main propulsion: 2 SKL 8 NVD 48A-2U from 1160 HP each;
- main power: 2x320 kVA, 1x350 kVA, 1x50 kVA;
- telecommunications: NERA Fleet 55 satellite communication; Inmarsat C - GMDSS by VHF radiotelephone FM 8500 and facsimile Furuno D Fax;
- navigation systems - Kelvin-Hughes 5000 t 6000 A and Nucleus 5000 radar-two units; gyrocompass Vega 2 M; log Furuno DS70; echosounder LAZ50; Ninas integrated navigation system.



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# GEOCOMAR surveillance monitoring

## Onboard Laboratories

- Wet lab
- Hydrology
- Geophysics
- Biology
- Geochemistry
- Computer room
- Seismo-acoustics
- Tomography
- Photo

## Personal onboard

- crew: 25 persons
- scientists: 20 persons

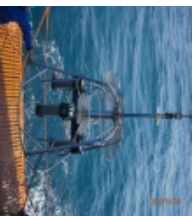


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## GEOCOMAR surveillance monitoring

### Marine equipments:

- Multibeam bathymetric system SEABEAM 1050 Elak Nautik;
- Seismo - acoustics CHIRP Star Full Spectrum;
- Magnetometer Geometrics G-87;
- On-board (GMNKM) and bottom (GDK) gravimeters;
- ROV (1000 m water deep);
- Sub-bottom profiler;
- Side Scan sonar
- 2D seismics.



### Geochemical, Geocological and Sedimentological equipments:

- CTD SBE 25 Sealogger with Rosette sampler (12/ five liters Niskin bottles);
- Gravity corers;
- Multi-corer Mark II-400;
- Grab sampler (collecting surface of 0.14 m<sup>2</sup>;
- Nets for biology.



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## GEOCOMAR surveillance monitoring

### ➤ Geochemical, Geological and Sedimentological Department - Constanta

#### ✓ GEO-ECOLOGY AND GEOCHEMISTRY SECTION

#### Equipment

- SOLAAR 939 E Atomic Absorption Spectrometer (AAS) – with flame and graphite furnace
- VRA 30 XRF sequential spectrometer
- Agilent 7890A Gas chromatograph, with quadrupole mass spectrometer
- Berghoff MWS-2 Microwave Digestion System
- DIONEX ASE 200 Solvent Extraction System
- UV VIS Perkin Elmer Lambda 35 Spectrophotometer
- Zeiss Stereomicroscope with digital camera
- Motic Stereomicroscope with built-in digital camera
- HACH DRELL 2000 kit
- WTW Oxyeters, WTW Multi-parameter device, WTW pH/Oxi Set
- Digital thermometer
- Computing equipment, accessories and specialized software.

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## GEOCOMAR surveillance monitoring

### ➤ Geochemical, Geological and Sedimentological Department - Constanta

#### ✓ GRAIN SIZE SECTION

Grain size analysis of unconsolidated sediments (clay, mud, silt, sand, gravel).

#### Equipment

MASTERSIZER 2000 E, Hydra 2000 MU, laser particle size analyser (laser diffraction system from Malvern Instruments);

Sieve equipment – with mesh diameters ranging range from 0.063 to 2 mm;

Electromagnetic vibrator;

Sartorius analytical balance type BP 210S;

Computer, computer accessories and specialized software programs;

#### ✓ MINERALOGY SECTION

Mineralogical analyses of unconsolidated sediments (sands), sedimentary rocks (conglomerates, sandstones) and other sedimentary deposits (soils, loess, etc.).

#### Equipment

FRITZ Magnetic separator

Carl Zeiss Jena Polarizing microscope

Stereomikroskop



## GEOCOMAR surveillance monitoring

### ➤ Marine Geology and Sedimentology Department - Bucharest

#### Equipment

DIGESDAHL HACH mineralization device;

SONOMATIC 375 ultrasonic cleaning bath (Langford Electronics Ltd);

Refrigerated thermo-incubator (Vindon Scientific Ltd);

Computers and accessories;

Computing equipment, accessories and specialized software.



# GEOCOMAR surveillance monitoring

## Parameters monitored:

### > Physical-chemical:

- o pressure/depth, temperature, conductivity/salinity, sigma theta, dissolved oxygen/oxygen saturation, pH, Eh, light, transmission/absorption, fluorescence (chlorophyll a), turbidity - in situ (CTD sensors);
- o conductivity/salinity, dissolved oxygen/oxygen saturation, pH, ORP – on board
- o nutrients (onboard or in laboratory), H<sub>2</sub>S (onboard)
- o major and minor components (CaCO<sub>3</sub>, Fe<sub>2</sub>O<sub>3</sub>– total, TiO<sub>2</sub>, MnO)

### > Pollutants (in sediment)

- o trace elements (Ba, Sr, Rb,Zr, Co, Ni, Cr, V, Cu, Pb, Zn, Cd)

### > Biological

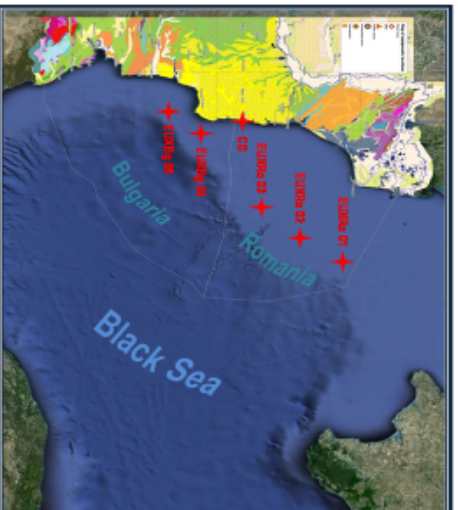
- Chlorophyll a
- Phytoplankton (occasionally)
- Mesozooplankton (occasionally)
- Meiofaenthos and Macrozoobenthos (diversity, abundance)



# GEOCOMAR operational monitoring

## > Black Sea Security System (BSSS) -

- 5 offshore moored observatories - functional from the end of 2013
- 3 in Romanian waters: EUXR001 (79.3 m), EUXR002 (90.3 m), and EUXR003(72.1 m); each consists in surface relay buoy (SRB), instrumented moored line (IML), and underwater tsunami module (UTM);
- 2 in Bulgarian waters: EUXBg04 (76 m) and EUXBg05 (77 m); each consists in surface relay buoy (SRB), instrumented moored line (IML), and underwater tsunami module (UTM);
- 1 coastal measuring station (CG), in the Mangalia area, Romania (15 m); consists in surface relay buoy (SRB).



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## GEOCOMAR operational monitoring

### ➤ **Black Sea Security System (BSSS)**

- SRBs of the observatories EUXR001, EUXR003, CG, and EUXBg05 - equipped with a weather station (parameters measured: wind speed and direction, temperature, pressure, relative humidity)
- SRBs of each observatory - equipped with an environmental monitoring instrument pack (Doppler current meter, DO, Turbidity, Chl a, conductivity, temperature, pressure sensors) allowing full control of the buoy from a nearby ship, Iridium link with antenna for satellite data transmission to the coordination centres, active and passive radar reflectors, IALA signalling light and four solar panel for recharging the batteries
- A second instrument pack is mounted on the moored line of each observatory, at 20 m above the bottom of the sea (Doppler current meter and classic CTD sensors
- tsunamis underwater module is equipped with a high resolution pressure sensor mounted in a titanium housing with pressure port at sea.

Each underwater instrument pack has an acoustic communication system for transmitting the data to the SRB. From SRB the data are retransmitted to two interlinked coordination centres, located in Constanța (Romania) and Varna (Bulgaria).

