

Szczecin Lagoon Research at the Institute of Marine and Coastal Sciences University of Szczecin

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**From 1992 to 01 September
2008:**

University of Szczecin

Faculty of Natural Sciences

Institute of Marine Sciences

Since 01 Sep. 2008:

University of Szczecin

Faculty of Geosciences

Institute of Marine and Coastal Sciences

Geological and geomorphological research

Geology and Palaeogeography Unit

prof. Ryszard K. Borowka

Marine Geology Unit

prof. Ryszard Kotliński

Marine Geomorphology Unit

prof. Stanisław Musielak

Palaeoceanology Unit

prof. Andrzej Witkowski



Geological and geomorphological research

Evolution of natural environment of Western Pomerania in Cenozoic, especially in Late Glacial and Holocene

Research on bioindicators and their importance for reconstruction of changes of palaeoenvironmental conditions.

Sedimentology and geochemistry of Quaternary limnical, lagoonal and marine sediments

Present status of the Baltic Sea marine coastal zone and forecasting its development

Analyses of present status and trends of changes of as well as possibilities to protect the natural environment of Western Pomerania in the light of intensifying human impact.



Meteorological and hydrological research

Climatology and Marine Meteorology Unit
prof. Czesław Koźminski

Hydrography and Water Management Unit
prof. Józef Girjatowicz

Physical Oceanography Unit
prof. Bernard Wiśniewski



Meteorological and hydrological research

Influence of atmospheric circulation on hydrometeorological and bioclimatic conditions over the Polish coast of the Baltic Sea.

Physical, biological and chemical exchange processes between the sea and the atmosphere

Ice phenomena and processes and their relationships with hydro- and meteorological factors

Oceanographic and hydrometeorological research in the Polish nearshore zone of the Baltic Sea and Szczecin Lagoon for the needs of navigation and water management

Short-term, seasonal and long-term variation of sea level changes in the Southern Baltic and coastal lagoons.

Remote environmental researches

Remote Sensing and Marine Cartography Unit

prof. Kazimierz Furmańczyk

Remote sensing of the landscape and coastal dynamics analysis in the Pomeranian Bay for the needs of the Integrated Coastal Zone Management.

Prediction of the coastal development in the light of the sea level rise.

Identification of optimal parameters for coast classification in terms of landscape valuation



Research in socio-economic geography

Urban and Regional Studies Unit

prof. Marek Dutkowski

Human Geography and Spatial Organization Unit

dr Igor Kavetsky

Leisure Studies Unit

dr Ewa Szczepanowska

Tourism Studies Unit

prof. Czesław Koźmiński





Research socio-economic geography

Natural and spatial conditions of the Polish coastal zone development and mechanisms controlling its economic development.

Effects of Poland's accession to European Union on economic and social conditions and the importance of Baltic cooperation for development of the Polish coastal zone.

Social processes and structures in the settlement system of the Western Pomeranian region.

Coastal zone tourism development.



Recent research projects (1)

Lithogenesis and geochemistry of sediments of the Szczecin Lagoon bottom and shores

Commissioned project, Ministry of the Environment, National Fund for Environmental Protection and Water Management;

Duration: July 2007 – June 2009

Institute of Marine and Coastal Sciences (Palaeoceanology Unit, Geology and Palaeogeography Unit, Marine Geomorphology Unit, Marine Geology Unit,)

Principal Investigator: Professor Andrzej Witkowski, Ph.D., D.Sc.

Project Manager: dr Artur Skowronek



MINISTERSTWO
ŚRODOWISKA





Co-operation:

- **Adam Mickiewicz University in Poznań (radiocarbon dating)**
- **University of Gdańsk (palynology)**
- **University of Wrocław [hydrogeology, ground-penetrating radar (GPR), light isotope analyses]**
- **Gdańsk University of Technology (ecotoxicological tests)**
- **Warsaw University of Technology (mineralogical and microstructural tests)**
- **University of Agriculture in Szczecin (heavy metals speciation)**
- **WESSLING laboratories (laboratory analyses)**
- **Sozolog - Studio of Environmental Analyses (magnetic susceptibility tests)**

Primary goals :

- To elucidate the lithology, origin, stratigraphy and geochemistry of sediments of the Szczecin Lagoon and its shores;
- To evaluate the environmental status of the Szczecin Lagoon and the proceeding hydrochemical and lithogenetic processes;
- To assess the degree of sediment pollution;
- To evaluate the water regime (surface and ground water) of the Lagoon system and to estimate ground water reserves under the Szczecin Lagoon bottom.

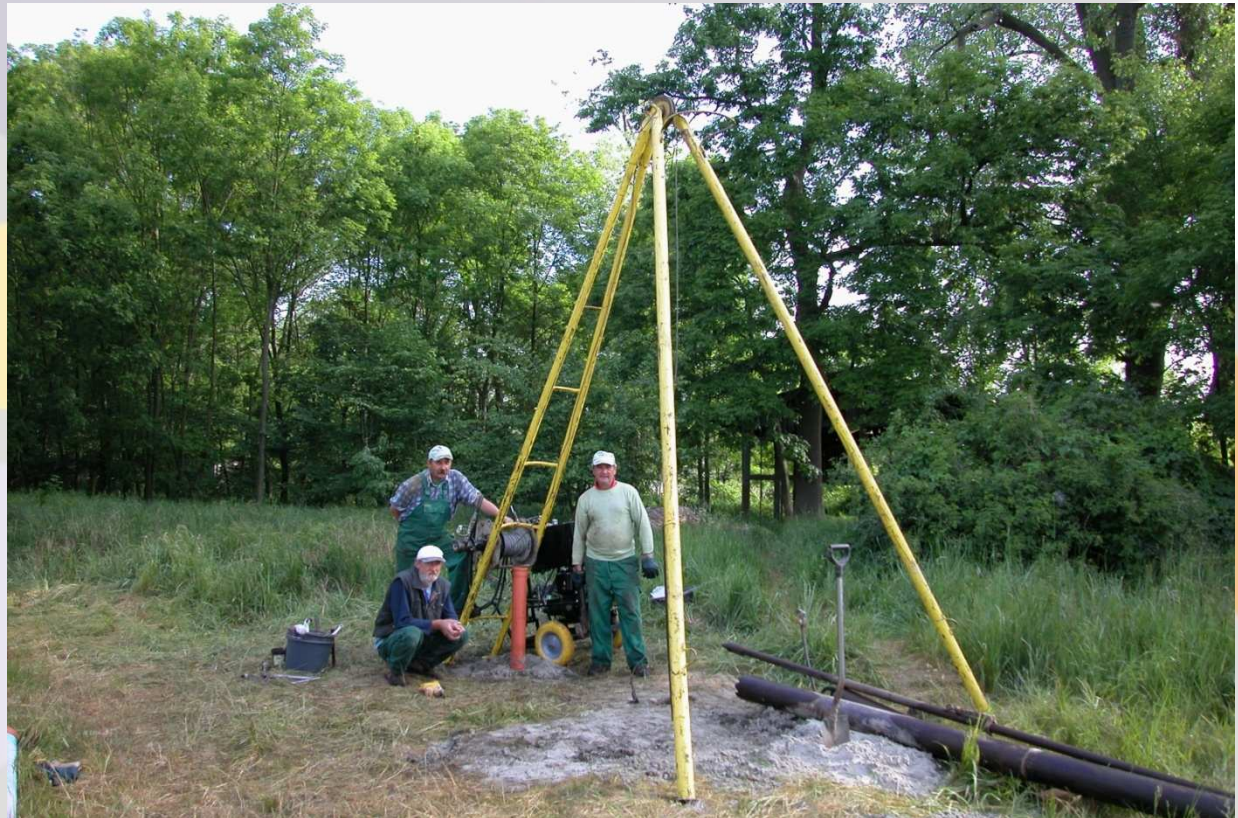
Field work (1):

- **On-water drilling**
 - 19 cores (total length 411.2 m)
 - maximum depth 30 m below the bottom.
- **Gravity corer**
 - 142 cores (total length 320.4 m);
 - 211 cores collected with „Instorf” corer (total length 95.5 m).



Field work (2):

- **On-land drilling**
 - 13 cores (total length 215.9 m);
 - 509 cores on the shore



Field work (3):

- **Cliff profiling for the development of the Szczecin Lagoon shore geodynamics map (total area 1030.2 m²)**





ARTWEI: Szczecin Lagoon Workshop, 23 June 2010

Geophysical work (1):

Echo sounding (737 km)

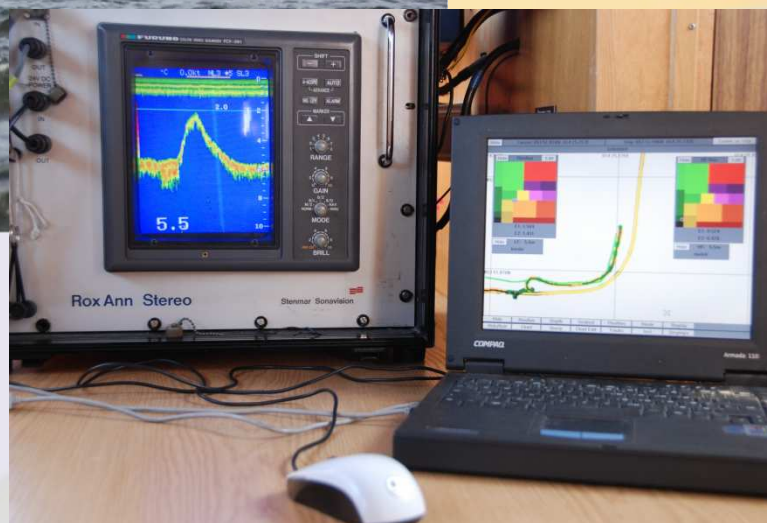


Photo: A. Osadczuk

Laboratory work (1)

- **Geochemical analyses:**
 - major elements and heavy metals (16 952 analyses);
 - organic compounds (6093 analyses).
- **Hydrochemical analyses** (67 samples);
- **Ecotoxicological tests;**
 - *Vibrio fischeri* (200 samples)
 - *Heterocypris incongruens* (200 samples)
- **Radiocarbon dating (C^{14})** (100 samples);
- **Mineralogical and microstructural examination** (200 samples);
- **Magnetic resistivity tests** (500 measurements);
- **Analysis of variation in the isotope ratio** (163 analyses)

Laboratory works carried out (2)

- **Sediment analyses;**
 - grain size (1514 analyses)
 - petrography (36 analyses)
- **Biostratigraphic analyses;**
 - Diatoms (199 analyses)
 - Palynology (202 analyses)
 - Molluscs (396 analyses)
 - Ostracods (416 analyses)
- **Analysis of heavy metals speciation (Cd, Pb, Cu, Zn, Cr, Ni) (100 samples);**

Data processing (1)

- **Documentation map I:** location of cores, and sampling sites, and transects;
- **Documentation map II:** echo sounding, seismoactivity, seismic and georadar transects;
- **Geochemical hazards map** (1 : 50 000);
- **Geochemical atlas** (1 : 100 000);
- **Maps of 3 sedimentary series thickness** (1 : 50 000);
- **Lithological map** of the Szczecin Lagoon bottom sediments with shore geodynamics (1:50 000)

Data processing (2)

- **Bathymetric Map (1 : 50 000);**
- **Transects – 6 maps (1 : 50 000);**
- **Documentation of shore drilling and geodynamic maps of the Lagoon shore cliff section: 6 maps (1 : 10 000);**
- **Drilling and sounding documentation (lithostratigraphic profiles);**
- **Water environment monitoring and hydrogeological modelling of Szczecin Lagoon region (hydrogeological model);**
- **ArcGIS digital database.**

Recent research projects (2)

Dynamics of sedimentary environment communities in Szczecin Lagoon under the influence of pelagic phytal material sedimentation: contemporary and historical aspects.

Ministry of Science and Higher Education grant;
Duration: 2010-2013
Palaeoceanology Unit
Principal Investigator: dr Brygida Wawrzyniak-Wydrowska

Questions asked:

1. **Do, how, to what extent, and with what time lag benthic communities (meio- and macrobenthos) respond to changes in sedimentary environment properties induced by sedimentation of phytal organic matter from the water column? Possible outcomes: clear response or no response (accommodation to long-lasting phytodetrital input)**
Methods: monthly analyses of water column and sediment parameters (with a particular attention to plant pigment contents), monthly analyses of benthic fauna (with a particular attention to ostracods and nematodes)
2. **When did the phytodetritus input to the sediment become intensified ?**
Methods: analysis of sedimentological, biogeochemical, and micropalaeontological parameters (multi-proxy analyses) of the Lagoon sediment



Latest research projects (3)

MICORE – Morphological impacts and coastal risks induced by extreme storm events.

EU 7 Framework Programme

(Remote Sensing and Marine Cartography Unit, 2008-2010)

Holocene palaeohydrological changes in the Szczecin Lagoon in the light of bottom sediment research.

Supported by the Polish-German Co-operation Fund

(Geology and Palaeogeography Unit, Marine Geology Unit, Palaeoceanology Unit)



Latest research projects (4)

Development of an operating system for forecasting hydrological conditions in the Szczecin Lagoon.

2002 – 2004

(Physical Oceanography Unit)

Geochronology of lagoonal, lacustrine, and marsh deposits in the River Odra mouth area

Supported by the Polish-German Co-operation Fund

(Geology and Palaeogeography Unit, Institute für Geographie Universität Greifswald)

Recent research projects (5)

Changes of diatom species composition in the Szczecin Lagoon as a result of the long-term inflow of water pollutants from the Odra/Oder.

(Palaeoceanology Unit)

Molluscan taxa in the Odra mouth Holocene deposits in relation to environmental changes.

(Palaeoceanology Unit)

Międzyzdroje Marine Station (Baltic Sea) (work in progress)

Geological Museum

Research boat SNB-US-1

