



SPICE II



BACKGROUND

The Indonesian Archipelago consists of about 17,500 islands and has a coastline of 81,000 km. The region is a centre of biodiversity with highly productive ecosystems such as coral reefs, mangroves and seagrass meadows. These ecosystems stabilize the coastlines, are repositories of significant genetic and biological information, and play a vital role in the lives of coastal population as a source of food, energy and income. Over 60% of the Indonesian population live on the coast. Today the coastal ecosystems are under enormous pressure from rapid social and economic changes and many of their natural resources are under threat due to overuse and environmental degradation.

The SPICE initiative was developed under the agreement on scientific and technological cooperation between Indonesia and Germany. It addresses the scientific, social and economic issues related to the management of the Indonesian coastal ecosystems and their resources. Scientists from research institutions of the Helmholtz Association, the Leibniz Association and several universities participate in the SPICE Programme. The overall coordination is with the Center for Tropical Marine Ecology (ZMT). The Federal Ministry of Education and Research (BMBF) supports the SPICE Programme in its second phase with EUR 6m.



GENERAL OBJECTIVES

- Strengthen existing data bases on coastal ecosystems
- Enhance our understanding of the impacts of natural changes and human interventions on Indonesian coastal ecosystems
- Provide a Decision Support System (DSS) for the conservation and sustainable use of coastal resources and services by strengthening existing data bases on coastal ecosystems
- Promote capacity and infrastructure building in the marine sector in Indonesia and Germany
- Establish a network to promote and strengthen public-private partnerships in the management of coastal resources

SPICE: THE TWO PHASES

The SPICE Programme was initiated in 2003 with the first phase carried out in 2003-2007. It provided significant information on the structure and functioning of coastal ecosystems covering mangroves, coral reefs, coastal pelagic systems and peat swamps, and on their alterations due to human interventions. These results have already found their way into management strategies being developed by the regional planning authorities. For example, Phase I has provided the scientific data base for the development of strategies for sustainable use in the Segara Anakan Lagoon in South Central Java and of a management plan for the Siak River in East Sumatra, as well as for the design of marine protected areas in the Sulawesi region.

Phase II started in 2007 and will last until 2010. Based on the information and experience gained in the first phase, the focus on natural sciences is complemented by social science. The aims are to better understand the social dimension of coastal ecosystem changes, to analyse social-ecological dynamics and to improve the links between research and decision making.

CAPACITY BUILDING

Capacity building is an important component of the SPICE Program. PhD, Master and Bachelor students from Indonesia, Germany and other countries participate in the research activities and are supervised by scientists from German and Indonesian research institutions. Joint summer schools are organized as an accompanying measure within the projects.



PROJECT STRUCTURE

In its second phase the SPICE program consists of six clusters with research activities focussing on regions in Java, East Sumatra and South Sulawesi.

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CLUSTER 1 Coral Reef-Based Ecosystems and Resources

Development of adequate research and management strategies towards understanding resilience, mitigating the current anthropogenic and natural pressure, reducing or reversing negative impacts and thus achieving long-term sustainability for the reef-based ecosystems and resources.

Subject 1: Resilience of coral reefs to disturbances. (CCRR, ZMT)

Subject 2: Gene expression and population analyses for coral reef organisms using molecular markers. (CCRR, UFT)

Subject 3: Influence of disturbances on the functional integrity of tropical seagrass meadows and their material and organismal exchange with neighbouring coral reefs. (AWI, CCRR)

CLUSTER 2 Understanding ecological and socio-economic dynamics and their interaction in the Segara Anakan Lagoon

Producing a knowledge base of the ecosystem structure and functions and of the interaction with the social and economic dynamics of the region in order to develop measures towards a sustainable use of the lagoon's living resources.

Subject 1: Understanding the dynamics of ecosystem processes in response to human-induced environmental change in the Segara Anakan Lagoon and its hinterland. (BPKSA, BPPT, UNDIP, UNSOED, ZMT)

Subject 2: Development of a risk classification system of ecosystem health based on the use of bioindicators for application in natural systems and mariculture facilities.

(ABC, PTNAK, UNSOED, ZMT)

Subject 3: Analysis of social-ecological system (SES) functions of the Segara Anakan region in order to contribute to the improvement of the governance and management approaches.

(BRKP, IPB, UNSOED, ZMT)

Science for the Protection of Indonesian Coastal Marine Ecosystems



GEFÖRDERT VOM



Bundesministerium für Bildung und Forschung

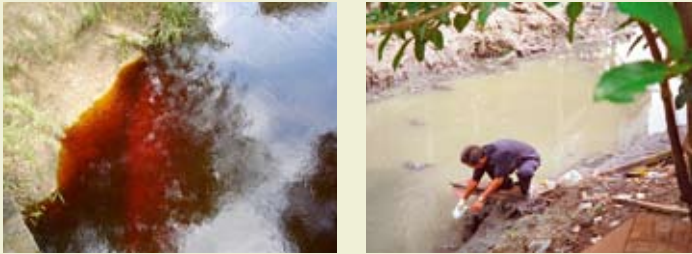
zmt Leibniz Center for Tropical Marine Ecology

CLUSTER 3 Ecology and Aquaculture

Development of tools and methods for sustainable management of mariculture.

Subject 1: Development of an integrated decision support system (DSS) for the management of sustainable fish farming in Indonesia incorporating environmental and socio-economic aspects. (DKP, DUAG, FTZ, GRIM, ITB)

Subject 2: Rapid diagnostics and monitoring of shrimp diseases and shrimp pathogens in natural and culture environment and facilities. (DKP, HKI)



CLUSTER 4 Coastal Ecosystem Health

Assessment of the impact of land-sea fluxes from major rivers of East Sumatra on coastal ecosystem health: quantification of pollutant loads (oxygen consuming substances, heavy metals, pesticides, PAH); evaluation of their transport and fate by hydrodynamic modelling and remote sensing.

Subject 1: Anthropogenic impacts by heavy metals and polynuclear aromatic hydrocarbons on the health of East Sumatran coastal environments. (RIIF, UnivB-FB2, UNRI-Ch, UNRI-FMS)

Subject 2: Riverine, industrial and urban discharges of natural and anthropogenic particulate organic material in East Sumatra, Indonesia. (CvOU, RIIF, UNRI-Ch, UNRI-FMS)

Subject 3: Riverine, estuarine and near-coastal transport and transformation of organic matter and nutrients: impacts on water quality and coastal ecosystems. (RIIF, UNRI-Ch, UNRI-FMS, ZMT)

Subject 4: Simulation of hydrodynamic processes and of related transport of suspended particulate matter (SPM) and contaminants in the East Sumatra waters, Indonesia. (IfM HH, RIIF, UNRI-Ch, UNRI-FMS)

Subject 5: Investigation of coastal discharge of the main rivers in Southeast Sumatra using ocean colour satellite data and in situ measurements. (LOW, RIIF, UNRI-Ch, UNRI-FMS)

CLUSTER 5 Marine Geology and Biogeochemistry

Exploration of the Indonesian Seas for their non-living resource potential; deciphering of their regulatory role on global and regional climates as well as development and deployment of technologies for their exploration and monitoring.

Subject 1: Biogeochemical Fluxes in the Indonesian Seas – Phase II: Global change studies, especially those related to the impact of major climatic features and phenomena such as the monsoons and El Niño on marine ecosystem functioning. (BPPT, ZMT)

Subject 2: MADURA-Monitoring: Water quality management in tropical coastal regions by means of environmental technology and assessment of impacts of nutrient and organic matter inputs from the Brantas River on water quality and biogeochemistry of Madura Strait coastal waters. (BPPT, DINAS PU, GKSS, ITS, JTP, 4HJ, ZMT)



CLUSTER 6 Governance and Management of Coastal Social-Ecological Systems

Analysing coastal social-ecological systems at multiple spatial and institutional scales in order to develop system understanding of integrated human-nature dynamics and to test assumptions and develop strategies for adaptive governance and resilience management.

Subject 1: Social-ecological systems analysis (SES) to increase resilience/reduce vulnerability. (BRKP, IPB, ZMT)

Subject 2: Analysis of coastal governance and management regimes. (BRKP, IPB, ZMT)

PARTICIPATING UNIVERSITIES & RESEARCH INSTITUTIONS

GERMANY

Ministries and Other Funding Agencies

Federal Ministry of Education and Research, Bonn (BMBF)

Universities and Research Institutions

Bremen

University of Bremen

Department of Marine Chemistry (UnivB-FB2)

Center for Environmental Research and

Sustainable Technology (UFT)

Bremerhaven

Alfred-Wegener-Institute for Polar and Marine Research (AWI)

Geesthacht

Research Centre Geesthacht (GKSS)

Hamburg

University of Hamburg

Institute of Oceanography (IfM HH)

Jena

Leibniz Institute for Natural Product Research and

Infection Biology (HKI)

Kiel

Christian-Albrechts-University of Kiel

Research and Technology Centre Westcoast (FTZ)

Oldenburg

Carl von Ossietzky University (CvOU)

Warnemünde

Leibniz Institute for Baltic Sea Research (IOW)

Private Sector

Alpha Biocare Company, Düsseldorf (ABC)

4H Jena Engineering Ltd., Jena (4HJ)

Deutsche Umwelt AG, Kiel (DUAG)



Photos: E. Borell, S. Eickhoff, G. Heiss, T. Rixen

INDONESIA

Ministries, Government Departments, and Funding Agencies

Indonesian Ministry of Marine Affairs and Fisheries, Jakarta (DKP)

Ministry for Research and Technology, Jakarta (RISTEK)

Agency for the Assessment and Application of Technology (BPPT)

Directorate General of Higher Education, Jakarta (DIKTI)

Coordinating Ministry for Peoples Welfare, Jakarta (KESRA)

Regional Agencies and Sponsors

Segara Anakan Management Agency, Cilacap (BPKSA)

East Java Province Environmental Agency, Surabaya (BAPEDALDA)

Jasa Tirta Public Corporation, Malang (JTP)

Water Quality Laboratory, East Java Province Government,

Sidoarjo (DINAS PU)

Universities and Research Institutions

Bandung

Technology Institute Bandung (ITB)

Bogor

Agricultural University (IPB)

Gondol

Research Institute for Mariculture (GRIM)

Jakarta

Research Center for Marine and Fisheries Product Processing

and Biotechnology (BRKP)

Makassar

Hasanuddin University

Centre for Coral Reef Research (CCRR)

Palembang

Research Institute for Open Water Fisheries (RIIF)

Pekanbaru

University of Riau

Department of Fisheries and Marine Sciences (UNRI-FMS)

Department of Chemistry (UNRI-CH)

Purwokerto

Jenderal Soedirman University (UNSOED)

Semarang

University of Diponegoro (UNDIP)

Surabaya

Institute for Technology (ITS)

Private Sector

PT. Nuansa Ayu Karamba, Jakarta (PTNAK)