LAND-OCEAN INTERACTIONS IN THE COASTAL ZONE

June 2003 http://www.nioz.nl/loicz/ No. 27

LOICZ NEWSLETTER

DINAS-COAST:

Developing a Method and a Tool for Dynamic and Interactive Vulnerability Assessment

Jochen Hinkel and Richard J.T. Klein
Potsdam Institute for Climate Impact Research

1. Introduction

Human-induced global climate change and associated sea-level rise can have major adverse consequences for coastal ecosystems and societies. The Third Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) projects an increase in globally averaged surface temperature of 1.4 to 5.8°C over the period 1990 to 2100. Based on these projections, global mean sea level is estimated to rise by 9 to 88 cm in the same period, with a central value of 48 cm, which is 2.2 to 4.4 times the observed rate over the 20th century. Even with drastic reductions in greenhouse gas emissions, sea level will continue to rise for centuries beyond 2100 because of the long response time of the global ocean system. An ultimate sea-level rise of 2 to 4 metres seems possible for atmospheric CO_2 concentrations that are twice and four times pre-industrial levels, respectively (2).

In the 1990s, a large concerted effort was made to assess the implications of sea-level rise on coastal countries. Many studies have been carried out on local, national and regional scales. These studies have shown that most coastal areas are vulnerable to the adverse consequences of sea-level rise, although there is considerable variation in possible impacts (3, 4; see also http://www.survas.mdx.ac.uk/).

Global vulnerability assessments carried out in 1993 and 1995 (5, 1) suggest that some 189 million people presently live below the once-per-1000-years storm-surge level. They estimate that, under present conditions, an average of 46 million people per year experience storm-surge flooding. This number would double if sea level rises 50 cm (92 million people/year) and almost triple if it rises one metre (118 million people/year). Between 86% and 92% of these people would experience flooding even more than once a year. These projections do not take into account any further population growth, changes in storm frequencies and intensities or adaptive responses.

These global vulnerability assessments have been the key sources of quantitative information on the potential impacts of sea-level rise on regional and global scales and fed into the preparation of the World Coast Conference 1993 and several IPCC reports. They have also been used extensively for further academic analyses, including integrated assessment modelling. However, with the widespread use of the existing global vulnerability assessments, their limitations have become increasingly apparent including:

1. the obsolescence of underlying data sources;
3. the reliance on sea level as the only climate variable that determines coastal vulnerability;
4. the static, one-scenario approach of instantaneously raising sea level on today's world;
5. arbitrary assumptions regarding socio-economic development and adaptation.

Whilst recently some of these problems have been tackled (6), opportunities have arisen to combine data, scenarios and assessment models into a new integrated modelling activity. The EU project DINAS-COAST (Dynamic and Interactive Assessment of National, Regional and Global Vulnerability of Coastal Zones to Climate Change and Sea-Level Rise; http://www.dinas-coast.net/) builds on a range of methods and expertise from multiple scientific-technological disciplines to develop an innovative, interdisciplinary methodology. The aim of the three-year project is to develop a dynamic, interactive and flexible CD-ROM-based tool that will enable its users to produce quantitative information on a range of coastal vulnerability indicators. Underlying are user-selected climatic and socio-economic scenarios and adaptation policies on national, regional and global scales, covering all coastal nations. This tool is called DIVA, **D**ynamic and **I**nteractive **V**ulnerability **A**ssessment, and is centred around a simulation model that integrates knowledge of both natural and social sciences.

This is the twenty seventh newsletter of the Land Ocean Interactions in the Coastal Zone (LOICZ) International Project of the IGBP. It is produced quarterly to provide news and information regarding LOICZ activities

Whilst integrated models have been built before, DIVA addresses two new challenges:

- it must be designed to be made available to a broad community of end-users;
- it must be developed by a geographically distributed group of scientists;

The first challenge requires a powerful yet user-friendly graphical user interface, GUI, and a computationally efficient (i.e. fast) model. The second challenge calls for an innovative, modular approach to model development. Individual partners in the DINAS-COAST consortium independently develop modules representing processes of natural and social coastal subsystems, which are then "plugged" together to form one integrated model. Efficient means of communication, methods to harmonise concepts and an intuitive way to express knowledge from different disciplines are essential to facilitate this process.

2. The DIVA Method

An efficient way of developing an integrated model would be to define specialised interfaces between the individual modules. However, a distinguishing feature of interdisciplinary research is that interactions between subsystems are usually not fully understood at the start of the project; instead, such understanding is a result of the project itself. Thus, general interfaces are required, leaving the developers of modules with more freedom to define subsystem interactions. The flexibility offered by general interfaces is essential for taking advantage of the interdisciplinary learning process. General interfaces also have implications for the development process. Whilst specialised interfaces would not require extensive collaboration between partners developing the individual modules, general interfaces do, asking for a rigorously defined process of model development.

Applying this philosophy to DIVA results in two products: a generic method, called the *DIVA method*, which organizes the development process, and the actual DIVA tool, which is currently being built using this method. Whilst the *DIVA tool* is specific to DINAS-COAST, the *DIVA method* could easily be reused in other contexts with similar requirements. Figure 1 presents the *DIVA method* and shows the iterative process involved.

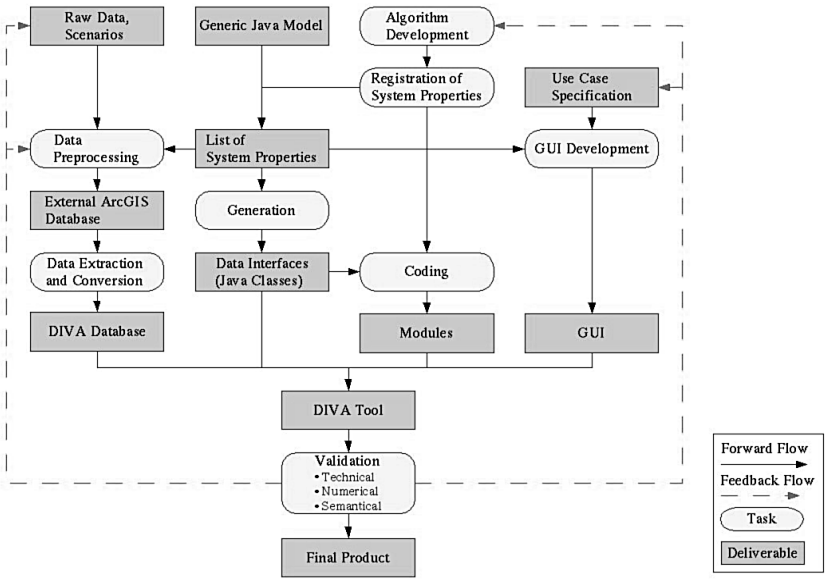


Figure 1 *– The DIVA method.*

Writing a single model with a group of experts requires a common conceptualisation of the system to be modelled. For a dynamic system like the coastal zone, the conceptualisation includes two parts: i) a data model to represent information about the system and ii) a common terminology for modelling. The first part represents static information about the system; the second is needed to express system dynamics. Since modelling terminology differs widely across and within natural and social sciences, it is necessary to agree on strict definitions of modelling terms, such as driver, parameter and variable.

The chosen data model follows the Open-GIS Abstract Specification of the Open GIS Consortium (http://www.opengis.org/ techno/abstract.htm), where geographic information is represented as collections of geographic *features*. A feature is an abstraction of a real-world phenomenon or entity. The actual information about a feature is represented as *properties* associated to the feature, where each property can be thought of as a triple of name, data type and value. A specific *feature type* is then defined by all properties associated to the feature, e.g., the feature type country could be defined by the properties area, GDP per capita, population, etc. (see also Section 3).

The combination of the data model and the modelling terminology results in a list of *system properties* that contains the feature types, their properties and the role those properties play in the dynamics of the system (e.g., the property "area" of the feature type country is most likely to be static, whereas the property "population" might be a dynamic driver of the system). The compilation of the list of system properties is a joint responsibility of the project consortium. The list serves as the common vocabulary when discussing the modelled system. Only one copy of the list exists, which is always available to all partners. Once the list has been set up a tool generates one Java class for each feature type (e.g., class Country).

The project partners can then express their knowledge about the coastal subsystems by formulating "sentences" in Java using the generated Java classes as their vocabulary. This is the process of writing algorithms. The algorithms are grouped into modules that represent knowledge domains or scientific disciplines. For example, a social scientist could write a module called Country Dynamics, which simulates how the properties of the feature "country" evolve over time. This approach provides the algorithm developers with a powerful but rigorous and intuitive interface to express their scientific knowledge. The interface is powerful because it uses the full Java functionality. It is intuitive because the modelled world is represented as naturally perceived in the form of geographical features rather than abstract data structures. Finally, it is rigorous because algorithms can only refer to the features' properties that have been defined in the list of system properties, thus ensuring consistency between the algorithms and the data model.

A documentation system accompanies the development process to keep track of what a module does and how the data

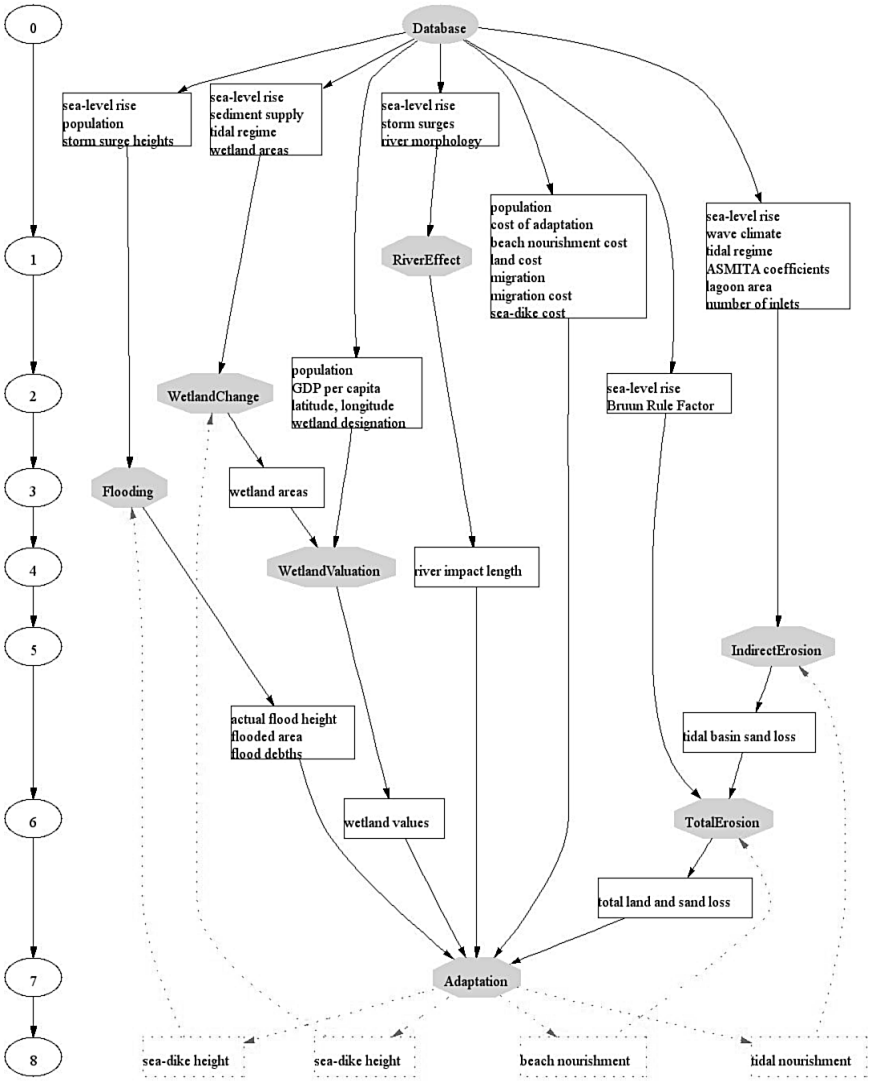


Figure 2 *— Module linkages in the DIVA tool as of June 2003. This diagram is automatically generated by the DIVA documentation system. Ovals represent the modules, boxes represent data, the drawn through arrows represent the flow of data during one time step and the dotted arrows represent the data fed into the next time step.*

flows through the model. It generates documentation about the features, the system properties, the modules and the input and output files in various formats (HTML, XML, CSV and PDF), and makes them available on the web. It also generates a diagram that shows the data flows (Figure 2). The documentation system is fully automated and all documents are always up-to-date and consistent with the current list of system properties and algorithms.

Knowledge about the modelled system only enters the development process at two points: via the list of system properties, which defines the vocabulary, and via the modules, which express the functional relationships between the system properties. New knowledge may create the need to change existing algorithms or develop new ones, with the consequent need to update the list of system properties and/or the functional relationships. Each of the steps described above and shown in Figure 1 can be repeated as many times as necessary.

3. The DIVA Tool

The *DIVA tool* is made up of three major components:

1. a coastal database;
2. an integrated model, based on modules containing both natural and social science knowledge on coastal subsystems;
3. a graphical user interface (GUI) for selecting data and scenarios, running model simulations and analysing the results

The DIVA database is a collection of data and coverage files within a file system. It is generated from an external Arc-GIS database. To minimise the execution time of the *DIVA tool*, all GIS operations necessary to convert the raw input data into the DIVA database are performed as pre-processing steps using Arc-GIS. The pre-processing involves converting all raw data into properties of one of the following five feature types: coastline segments, administrative units, countries, rivers and tidal basins. The major type, on which most algorithms operate, is the coastline segment. Therefore, the world's coastline was "intelligently" decomposed into variable-sized segments that are homogenous in terms of impacts and vulnerability to sea-level rise, although they vary in size with some 70 km coastline as an average. This segmentation was performed on the basis of a series of physical, administrative and socio-economic criteria, producing 12,148 coastline segments in total.

The integrated model is developed following the iterative *DIVA method* and consists of a number of modules. The modules are developed by various project partners and compute the impacts of sea-level rise on natural and human systems, as well as the effects of human response to these impacts. Table 1 *(following page)* shows the current list of DIVA modules

The modules are invoked sequentially in the order of their cause-and-effect relationship. The model is driven by sea-level rise scenarios produced with the climate model of intermediate complexity CLIMBER of the Potsdam Institute for Climate Impact Research, and by socio-economic scenarios produced by Hamburg University. The first modules to be invoked compute geodynamic effects of sea-level rise on coastal systems, including direct coastal erosion, erosion within tidal basins, changes in wetlands and the increase of the backwater effect in rivers. This is followed by an assessment of socio-economic impacts, either directly due to sea-level rise or indirectly via the geodynamic effects. The last module is the adaptation module, which implements adaptation measures based on preset or user-defined decision rules. These adaptation measures then influence the calculations of the geodynamic effects and socio-economic impacts of the next time step.

The graphical user interface is the interface by which the end-user interacts with the model and the data. It is based on a component framework for Windows called Delft Tools (http://www.wldelft.nl/

Table 1 *— The DIVA modules as of June 2003. The linkages between these modules are shown in Figure 2.*

Module Name	Author	Description
River Effect	Rob Maaten	Calculates the distance from the river mouth over which variations in sea level are noticeable.
Wetland Change	Loraine McFadden	Calculates area change in km^2 due to sea-level rise for seven types of wetlands.
Flooding	Robert Nicholls	Calculates flooding due to sea-level rise and storm surges.
Wetland Valuation	Luke Brander	Calculates the value of different wetland types as a function of GDP, population density and wetland area.
Indirect Erosion	Luc Bijsterbosch, Zheng Bing Wang	This is a reduced version of the Delft Hydraulics ASMITA model. It calculates the loss of land, the loss of sand and the demand for nourishment due to indirect erosion in tidal basins.
Total Erosion	Robert Nicholls	Calculates direct erosion based on the Bruun rule. Adds up direct erosion and indirect erosion in tidal basins.
Adaptation	Richard Tol	Calculates socio-economic impacts of the geodynamic effects, taking into account preset and/or user-defined adaptation options.

soft/tools/), which allows the user to select scenarios, edit input data, trigger a model run and analyse the results in the form of maps, charts and tables. The Delft Tools have been developed and applied for decision support and mapping applications and optimised over many years. This experience makes the graphical user interface user-friendly and efficient.

4. Conclusions and Next Steps

The *DIVA method* is an innovative method for building an integrated model by geographically distributed partners. It provides scientists with different backgrounds with a way to harmonise their conceptualisations of the system to be modelled and an intuitive interface to express their knowledge about it. The process of model development is well defined and automatically documented. As a result, the status quo is constantly available on the web, providing a basis for efficient communication between project partners.

In DINAS-COAST, the *DIVA method* has been developed and applied to build the *DIVA tool*. This first application, with which the end-user can assess coastal vulnerability to sea-level rise worldwide, is aimed primarily at the climate change research and policy communities, in the same way as the Global Vulnerability Assessment did in 1993 (5). However, the user will have much greater flexibility and be able to produce results based on more realistic scenarios, a range of scenarios and a much more detailed database. Obviously the interest in this tool goes beyond the coastal research community, although with an average coastline segment length of about 70 km, the current resolution of the *DIVA tool* is likely to be too coarse in many cases to provide decision support to coastal planners and managers.

Having almost completed the development of the *DIVA tool,* the DINAS-COAST consortium expects to produce and publish a wide range of results in the next few years. Publications will cover the *DIVA method*, the database and model design, the individual algorithms, as well as model results. Meanwhile, application and improvement of both the *DIVA tool* and the *DIVA method* can go hand in hand. The global scientific and policy relevance of DIVA have already been recognised and collaboration on a range of initiatives is anticipated, including the EU ICZM Strategy, IHDP and contributing against the new LOICZ Science Plan. Improvements on the current *DIVA tool* could include a module for coral reefs and atolls, considering consequences of climate change other than sea-level rise, refining the adaptation module and increasing the spatial resolution of the analysis, thus increasing DIVA's usefulness to coastal management. In addition, it is conceivable to develop regional versions of the *DIVA tool*, such as a DIVA-Europe or a DIVA-India. Thus, the consortium will endeavour to keep the DIVA spirit alive, based on new project ideas, new collaborative research and new sources of funding. The DINAS-COAST consortium will continue to use the LOICZ Newsletter and web-site to keep the coastal research community informed about new developments.

References

1. **Baarse,** G., 1995: *Development of an Operational Tool for Global Vulnerability Assessment (GVA)-Update of the Number of People at Risk Due to Sea Level Rise and Increased Flooding Probability.* CZM Centre Publication No. 3, Ministry of Transport, Public Works and Water Management, The Hague, The Netherlands, 17 pp.
2. **Church,** J.A., J.M. Gregory, P. Huybrechts, M. Kuhn, K. Lambeck, M.T. Nhuan, D. Qin and P.L. Woodworth, 2001: Changes in sea level. In: *Climate Change 2001: The Scientific Basis*, J.T. Houghton, Y. Ding, D.J. Griggs, M. Noguer, P.J. van der Linden, X. Dai, K. Maskell and C.A. Johnson (eds.), Contribution of Working Group I to the Third Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge, UK, pp. 639–693.
3. **De la Vega-Leinert,** A.C., R.J. Nicholls and R.S.J. Tol (eds.), 2000a: *Proceedings of the SURVAS Expert Workshop on European Vulnerability and Adaptation to Accelerated Sea-Level Rise*. Hamburg, Germany, 19–21 June 2000, Flood Hazard Research Centre, Middlesex University, Enfield, UK, viii+152 pp.
4. **De la Vega-Leinert,** A.C., R.J. Nicholls, A. Nasser Hassan and M. El-Raey (eds.), 2000b: *Proceedings of the SURVAS Expert Workshop on African Vulnerability and Adaptation to Accelerated Sea-Level Rise*. Cairo, Egypt, 5–8 November 2000, Flood Hazard Research Centre, Middlesex University, Enfield, UK, vi+104 pp.
5. **Hoozemans,** F.M.J., M. Marchand and H.A. Pennekamp, 1993: *Sea Level Rise: A Global Vulnerability Assessment-Vulnerability Assessments for Population, Coastal Wetlands and Rice Production on a Global Scale*. 2nd revised edition, Delft Hydraulics and Rijkswaterstaat, Delft and The Hague, The Netherlands, xxxii+184 pp.
6. **Nicholls,** R.J., 2002: Analysis of global impacts of sea-level rise: a case study of flooding. *Physics and Chemistry of the Earth, Parts A/B/C*, **27(32–34),** 1455–1466.

DINAS-COAST is an IGBP-LOICZ Regional Project, funded by the EU Directorate-General Research under project number EVK2-CT-2000-00084. Projectleader: Dr Richard J.T. Klein, Potsdam Institute for Climate Impact Research (Germany; partners: the Flood Hazard Research Centre of Middlesex University (UK), WL|Delft Hydraulics (The Netherlands), the Centre for Marine and Atmospheric Sciences of the University of Hamburg (Germany) and the Institute for Environmental Studies of the Vrije Universiteit Amsterdam (The Netherlands). (see also http://www.dinas-coast.net/ or contact richard.klein@pik-potsdam.de).

ARCTIC COASTAL DYNAMICS - a new LOICZ Regional Project

Arctic **C**oastal **D**ynamics (ACD) is a multi-disciplinary, multi-national project of the **I**nternational **A**rctic **S**ciences **C**ommittee (IASC) and the **I**nternational **P**ermafrost **A**ssociation (IPA). Its overall objective is to improve our understanding of circum-Arctic coastal dynamics as a function of environmental forcing, coastal geology, cryology and morphodynamic behavior. The project consists of two interrelated components: (1) a series of coordinated, synthesis activities, and (2) focused research projects and long-term observations. A first detailed introduction of the project is planned for LOICZ Newsletter No. 29 (Dec. 2003).

The ACD secretariat is located at the Potsdam Branch of the **A**lfred **W**egener **I**nstitute (AWI), assisted by an International Steering Committee consisting of Feliks Are (St. Petersburg State University), Jerry Brown (International Permafrost Association, Woods Hole), Georgy Cherkashov (VNIIOkeangeologia, St. Petersburg), Mikhail Grigoriev (Permafrost Institute, Yakutsk), Hans-Wolfgang Hubberten (AWI, Potsdam), Johan Ludvig Sollid (Oslo University) and Steven Solomon (Geological Survey of Canada, Dartmouth).

ACD Project Leader:
Volker Rachold
Alfred Wegener Institute,
Research Unit Potsdam
Telegrafenberg A43,
14473 Potsdam, Germany
vrachold@awi-potsdam.de
Tel.: +49-331-288-2174
Fax: +49-331-288-2137
http://www.awi-potsdam.de/www-pot/geo/acd.html

Scientific Committee on Oceanic Research, SCOR, a new funder for LOICZ targeted scientific research

International Council for Science
Scientific Committee on Oceanic Research

At the most recent SCOR General Meeting in October 2002 in Sapporo, Japan, LOICZ was given the opportunity to present the key features of its ongoing Synthesis and Futures process, including an advanced draft of the new science plan. This was in response to LOICZ' request for SCOR to consider ways of co-sponsoring the new phase of LOICZ.

We are very glad that the SCOR Executive Committee indicated at the IGBP SC Meeting in Punta Arenas, Chile, in early 2003, its willingness to support the new LOICZ science and agreed to consider approaches for co-sponsorship. At the 14th LOICZ SSC Meeting held in Banff, Canada, in June 2003, Ed Urban, the SCOR Executive Director, pointed out that their support will focus on those activities of the "New" LOICZ in which SCOR has expertise, namely the future theme 3 *"Fate and transformation of materials in coastal and shelf waters"*, which is currently revised in the drafting process of the new Science Plan. Also included will be activities where SCOR can assist improving the operational links and joint activities with related IGBP and IOC projects such as SOLAS, GLOBEC, IMBER (ex OCEANS) and the Global Ecology and Oceanography of Harmful Algal Blooms (GEOHAB) project. SCOR funding will be contingent upon opportunities to raise such funds from other national and international agencies and organisations.

This new relation between SCOR and LOICZ looks back to past successful association, e.g., through the joint Working Group (112) on Submarine Groundwater Discharge. Currently under consideration for co-funding is a new working group on "Mechanisms of Sediment Retention in Estuaries" which is seen to provide good opportunities for both organisations. SCOR will ultimately decide in September and the LOICZ SSC has agreed that it would also allocate a certain amount to this joint activity. Currently, SCOR is supporting participation of two young scientists from developing economies at the International NASA, LUCC, LOICZ Colloquium "Studying Land use Effects in Coastal Zones with Remote Sensing and GIS", Kemer, Turkey, 13-16 August.

The Chair, the SSC and IPO are grateful for SCOR's encouraging decision and we expect to be able through this targeted support to generate strong momentum in the complex field of shelf research, including processes across the multiple interfaces of the coastal systems.

IPO NOTES

CALL FOR ACTION LOICZ Research Projects

To all Project Leaders of Core, Regional or Relevant LOICZ Projects: It is time to send us your annual update. Please visit the Research Project pages on our web-site and check the status of your project. If an update is necessary please send an e-mail to: loicz@nioz.nl.
For New Projects: If you want your project listed in the LOICZ Project Database and on the LOICZ web-site, please go to the Research Project pages on our web-site and complete the pro-forma to submit your project.

LOICZ 14th SSC Meeting and 3rd IGBP Congress

Associated to the 3rd IGBP Congress the 14th LOICZ SSC meeting took place in Banff, high up in the Canadian Rocky Mountains. More than 50% new members were welcomed to this first SSC meeting of the "New" LOICZ. A priority task was to design the roadmap for the next decade of LOICZ as a key partner within the widened context of the Earth System Science Partnership. Major challenges to be met in this new decade are to become a responsive and flexible continued learning mechanism rather than just a scientific program. The SSC and observers from IHDP and IGBP discussed which ways LOICZ should follow to accomplish this goal including a true integrative approach jointly with the Human Dimensions Science Community.

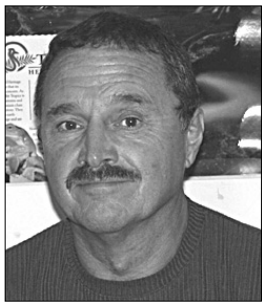
In the next newsletter we will communicate in detail, which changes in the LOICZ SSC, the IPO structure and the implementation approach have been decided and how they are expected to assist the SSC in implementing the "New" LOICZ. This includes the multiple collaborations and mutual agendas with other IGBP and ESSP projects and the IHDP. The overall goal will be to make LOICZ a continuously rolling synthesising mechanism, which while improving our knowledge of coastal system changes and interactions within the Earth system aims to be close

to the issues of the "coastal people" and to be product oriented.

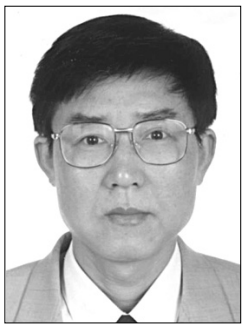
In the following all our new SSC members will be introduced, who together with the "old" members form a critical mass of scientific expertise providing a widespread disciplinary and geographical coverage. Most of them can look back to some earlier practical experience in LOICZ related work and we are looking forward to work with them on the future of the "New" LOICZ:

Prof. Maria Snoussi has received her PhD in Geology from the University of Bordeaux I (France) in 1986, and has been working as a professor since 1990 at the University of Rabat (Faculty of Sciences). She is responsible for the Education and Research Graduate Unit "Integrated Coastal Zone Management" at the Department of Earth Sciences, and her research focuses mainly on the multiple interactions between the river basins and the coastal zone. This includes estimation of sediment and water fluxes, analysis of land use change, damming and climate change impacts. Prof. Snoussi is a Member of the Med-GOOS and GOOS-Africa Co-ordinating Committees, as well as a member of the STAP Roster of Experts of UNEP. She also acted as a consultant for the Moroccan Ministry of Environment.

Dr Laura T. David obtained her PhD in Marine Science-Physical Oceanography from the University of South Carolina. Currently she is a Faculty and Deputy Director for Instructions at the Marine Science Institute, University of the Philippines. She also heads and manages the RS-GIS Laboratory. She is currently pursuing oceanographic studies in the Philippines and surrounding waters with focus on utilising satellite-derived data to link ocean productivity and physics. Her academic interests also include developing simple analytical tools that resource managers can use for assessment and decision support specifically for coastal issues, as well as, developing environmental educational materials for secondary school and mass media consumption. Since 1999 Dr David has been serving continuously as a resource person for LOICZ biogeochemical budget workshops and capacity building. She was part of the team that developed the related LOICZ-CABARET software and the Biogeochemical Budgeting Procedure Tutorial. Currently she is member of the Coastal Oceans Observations Panel (COOP) under the Global Ocean Observing System (GOOS) of UNESCO/IOC.

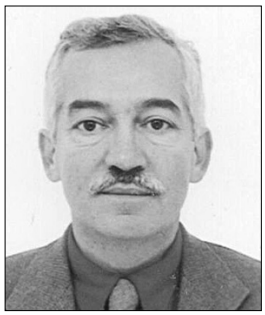


Prof. Anthony "Ticky" Forbes is a full Professor in the School of Life and Environmental Sciences at the University of Natal, Durban, South Africa. He received his PhD from Rhodes University, South Africa in 1974 for a study on the ecology of estuarine crustaceans. His research interests include the ecology of estuarine macro-invertebrates and the interactions of catchment events, particularly water run-off, with estuarine and inshore marine processes. He contributed to the recent volume Estuaries of South Africa. He is present Chair of the South African Prawn Fisheries and Development Association, a government recognised body set up in 1996 to bring together the fishing industry, mariculture, research and conservation sectors. He is an acknowledged South African authority on the penaeid prawns, presently producing a synthesis on the southern African status, fisheries and aquaculture of these species. Further recent involvement includes biological impact assessments of harbour developments, coastal mining and the construction of large dams. He was reviewer and co-editor in the preparation of the Coastal Management Policy Programme, which was the basis of subsequent national legislation on coastal management. As founding member of the South African Consortium for Estuarine Research and Management he contributed in the development of decision support systems for estuarine management including the assessment of the requirements, significance and effects of variations in freshwater input into estuaries. He has led various adult education courses. His involvement in LOICZ related activities in the last three years mainly focused on aspects of river catchment, coastal management and research, including the AfriBasins assessment and synthesis project, issues and modelling of coastal metabolism and the Synthesis and Futures process of LOICZ conducted at various locations in Africa, America and Europe. In November 2002 at the First Conference of the Indian Ocean Global Ocean Observing System (IOGOOS – 1) he became elected officer to the programme representing southern Africa and also joined the Coastal IOGOOS Development Committee. He also took on the Chairmanship of the Coastal Fisheries Group.

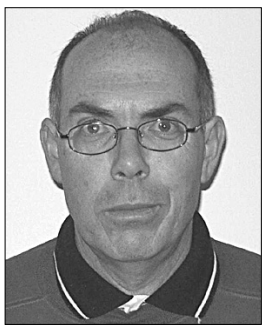


Dr Weigen Huang is director of the Centre for Marine Remote Sensing and Numerical Modelling, deputy director of the Laboratory of Ocean Dynamic Processes and Satellite Oceanography, and Principal Research Scientist at Second Institute of Oceanography, State Oceanic Administration, P. R. China. He received his PhD in marine remote sensing from the University of Dundee, UK. Dr Huang is project co-ordinator of IOC/WESTPAC and member of the OMISAR Steering Committee for the APEC region. He currently serves on the editorial board of four academic journals. Dr Huang has undertaken the basic and applied research in marine remote sensing techniques and satellite oceanography. In addition to his research duties, he teaches marine remote sensing

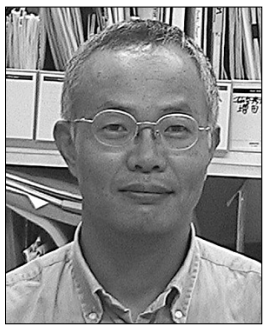
technique and applications at the University of Zhejiang and the Ocean University of Qingdao, China.



Dr Michel Meybeck is a research scientist at the French CNRS in the Sisyphe laboratory, University of Paris VI. From 1967 to 1991, he has been a faculty at this university at the Earth Science department. His first scientific interest has been on river inputs influence on Lake Geneva then on Quebec lakes. Subsequently he concentrated on estuarine geochemistry in France and abroad (Zaire, Tagus, Huang He). Since 25 years he specialised in river inputs to the oceans (major ions, organic carbon, metals, nutrients) and global scale comparison of river systems. Over the last decade he also addressed human impacts on river basins particularly on the Seine River and in Europe in general. He has been a scientific adviser to UNESCO, UNEP and WHO in the field of river quality, and a member of the Scientific Council of the International Lake Environment Committee. Since 1995 he has been involved in IGBP as a BAHC-SSC member and as an IGBP-SC member promoting inter-core projects on continental waters.



Dr John Parslow is a research scientist at CSIRO Marine Research in Hobart, Australia. Since obtaining his PhD from the University of British Columbia in 1981, he has been involved in research into nutrient and carbon cycling in coastal and open ocean environments. During the early 1990s, he led the Australian JGOFS research program, and served on the JGOFS SSC and JGOFS Remote Sensing, Modelling and Synthesis Task Teams. He has contributed to ocean colour algorithm development, cal-val and applications in Australia, and co-authored IOCCG report chapters on ocean colour sensors and applications. From 1990 to present, he has participated in a series of major coastal environmental studies in Australia, and played a leading role in the development and application of integrated physical-biogeochemical-ecological models for estuaries, embayments and continental shelf systems. These models have been used to address interactions among catchment management, river runoff, point source loads and offshore ocean forcing, and their impacts on coastal water quality and ecosystem health. He is actively involved in the application of adaptive management approaches and principles to coastal zone management.



Dr Yoshiki Saito is leader of the Coastal Environment Research Group of the Institute of Marine Resources and Environment of the Geological Survey of Japan/AIST. He also holds a guest professorship at the Ocean University of China and the First Institute of Oceanography of SOA, China. He received his DSc from Kyushu University in 1993 in sedimentary geology. Dr Saito is co-leader of the IGCP-475 project, entitled "Deltas in the Monsoon Asia-Pacific Region", DeltaMAP, (2003-2007) and co-PI of the APN Mega-Delta project (2003-2004). His recent interest is the coastal zone from a sedimentology viewpoint, particularly regarding coastal evolution, coastal sedimentation, sediment budgets, sequence stratigraphy, and human influence on coastal and shelf systems and impacts on deltas. His geographical focus is on Asian deltas, and their rapid changes driven by human activities during the "Anthropocene" particularly. As a PI he has several on-going bilateral research programs with Asian countries aiming to improve our understanding of the dynamics of millennial to decadal changes of Asian deltas.

Prof. Luiz Drude de Lacerda got his PhD in Biophysics at the Universidade Federal do Rio de Janeiro in 1983. Prof. de Lacerda has been working on the biogeochemistry of tropical ecosystems for 17 years, in particular on the role played by tropical vegetation, such as mangroves, on the cycling of pollutants in coastal areas. He has publish over 120 papers and eight books with Springer Verlag on mercury and trace metal biogeochemistry in tropical environments. L.D. Lacerda has co-ordinated a few international projects on mangrove conservation and sustainable management, mostly as Council Member of the International Society for Mangrove Ecosystems, Okinawa, Japan, and has acted as co-ordinator of the SAmBas (South American Basins sub-program of LOICZ Basins). He is Titular Professor at the Universidade Federal Fluminense, Rio de Janeiro and Visiting Professor at the Universidade Federal do Ceará and at the Université de Toulon et du Var, France. Since 1983 he is a Senior Researcher from the National Research Council of Brazil.

HAVE YOU SEEN

Coastal Panel at the 2003 Open Meeting of the Human Dimensions of Global Environmental Change, Montreal, Canada, 16-18 October 2003: "GEC and Coastal Systems – A Microcosm of Coupled Human-Environmental Systems" a joint activity by (in alphabetic order) GECAFS, GECHS, GLOBEC, IDGEC and LOICZ. The preliminary program is now online at: http://sedac.ciesin.columbia.edu/openmeeting/

WHAT'S ON THE WWWEB

Integrated Strategic Design Plan for the Coastal Ocean Observations Module of the Global Ocean Observing System

(GOOS Report No. 125) is available on the GOOS web-site through: http://ioc.unesco.org/goos/docs/GOOS_125_COOP_Plan.pdf

MANTRA-East Newsletter No. 5 can be downloaded from the MANTRA-East web-site at: www.mantraeast.org/newsletter.php

PUBLICATIONS

LOICZ R & S volumes are downloadable from the LOICZ web-site. For hard copies (as long as stocks last) e-mail: loicz@nioz.nl

Miliman, John D, Editor. Guest editors: S. Tsunogai, K. Iseki, M. Kusakabe, Y. Saito. Deep-Sea Research Part II-Topical Studies in Oceanography-Biogeochemical cycles in the East China Sea: MADSFLEX program, volume 50, No.2, 2003. Pergamon. www.elsevier.com/locate/dsr2

Furnas, Miles, Australian Institute of marine Science, 2003: Catchments and Corals: Terrestrial Runoff to the Great barrier Reef.
To order visit: www.aims.gov.au
or fax:+61 (0) 7 4771 6138

Geo-Marine Letters: An International Journal of Marine Geology is an international, peer reviewed journal focussing on the rapid publication of concise original studies and reviews dealing with processes, products and techniques in marine geology, geophysics and geochemistry. Editor-in-Chief: Burg W. Flemming. For immediate on-line publication go to: http://link.springer.de, to order by fax; +49-(0)6221 345 4229

European Information Service (EIS) features the report "A Pan-European Strategy for the Environment: The Kiev Conference-May 21-23, 2003", which gives a detailed overview of the EU's new environmental strategy . For information and ordering please visit: www.eis.be Oceanography and Marine Biology: An Annual Review-Volume 41. Edited by R.N. Gibson and R.J.A Atkinson. September 2003, Taylor & Francis, London, UK. www.tandf.co.uk
or fax: +44 (0)7842 2300.

CALENDAR

For a complete list of future meetings and regular updates visit our web-site at http://www.nioz.nl/loicz and click on 'Calendar'

4-6 September, Amsterdam, The Netherlands: The Centre for Marine Research (MARE) announces 2nd International Conference: People and the Sea II-Conflicts, Threats and Opportunities. Visit: www.marecentre.nl

15-18 September 2003, St.Michielsgestel, The Netherlands: Information to support sustainable water management: From Local to Global Levels. For information visit: www.mtm-conference.nl or e-mail: MTM@riza.rws.minvenw.nl

22-26 September 2003, San Jose, Costa Rica: X Latin American Congress on Marine Science, X Colacmar.
Contact: ioicos@una.ac.cr or
Visit: http://www.una.ac.cr/Xcolacmar/

28-30 September 2003, San Servolo, Venice, Italy: 2nd SedNet Conference: Sustainable solutions for sediment management at river basin scale.
Visit: www.sednet.org/intermediate.asp

7-11 October 2003 Ravenna, Italy: MEDCOAST 2003: 6th International Conference on the Mediterranean Coastal Environment.
Visit: http://www.medcoast.org.tr.

16-18 October 2003 Genova, Italy: ICCOPS/GISIG 5th International Symposium on GIS and Computer Cartography for Coastal Zone Management: CoastGIS '03.
Visit: www.gisig.it/coastgis or e-mail: gisig@gisig.it or info@iccops.it

12-14 November, 2003, UNESCO, Paris, France: The Global Conference on Oceans, Coasts, and Islands. Conference secretariat: Catherine Johnson at: johnson@udel.edu. or Stefano Belfiore at: sbelf@udel.edu. For information about local facilities at UNESCO contact Julian Barbiere at: j.barbiere@unesco.org

17-21 November 2003, Moscow, Russia: Joint XV International Conference on Marine Geology and IV LOIRA Workshop. Deadline for abstract 30 September 2003.
Contact: Dr V.V. Gordeev, Institute of Oceanology, 36, Nakhimovsky Prospect, 117997, Moscow, Russia.
Fax: ++ 7-095-124 59 83 or
e-mail: gordeev@geo.sio.rsso.ru or school@geo.sio.rssi.ru

18-21 November 2003 Bangkok, Thailand: EMECS 2003: " Comprehensive and Responsible Coastal Zone Management for Sustainable and Friendly Coexistence between Nature and People", 18-21 November 2003 Bangkok, Thailand.
Visit: http://www.emecs2003.com

8-12 December 2003, Kuala Lumpur, Malaysia: GEF/UNDP/IMO Partnerships in Environmental Management for the Seas of East Asia (PEMSEA)-The East Asian Seas Congress 2003.
Visit: http://wat.to/seascongress

19-23 April 2004, Hobart, Tasmania, Australia: Coast to Coast '04: The Second Decade-Coastal Planning and management in Australia towards 2014.
Visit:
www.cdesign.com.au/coast2coast2004

IPO STAFF

Hartwig Kremer
Executive Officer

Hester Whyte
Office Manager

LOICZ International Project Office
Royal Netherlands Institute for Sea Research
PO Box 59
1790 AB Den Burg - Texel
The Netherlands

Phone: +31-222 369404
Fax: +31-222 369430
E-mail: loicz@nioz.nl

www.nioz.nl/loicz/