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The New LOICZ

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Abstract

During the last decade, the international programme of LOICZ (Land-Ocean Interactions in the Coastal Zone) has concentrated on classical biogeochemical research. Considerable achievements have been gained concerning the classification of the world's coastal zone and the identification of major threats to the coast. The New LOICZ aims to overcome disciplinary fragmentation and to treat coastal systems as a whole, including the human dimension. Therefore, New LOICZ is not only a core programme of the International Geosphere-Biosphere Programme, but also of the International Human Dimension Programme, IHDP.

1 Introduction

The world's coastal zone forms a long narrow boundary between land and ocean that is highly valued by human societies. Global Environmental Change (GEC) is the set of biophysical transformations of land, oceans and atmosphere, driven by an interwoven system of human activities and natural processes. Since 1993 the Land-Ocean Interactions in the Coastal Zone (LOICZ), a core project of the International Geosphere-Biosphere Programme (IGBP) on Global Change, has studied this heterogeneous, relatively small but highly productive, dynamic and sensitive area of the earth's surface. The LOICZ International Project Office is hosted by the Royal Netherlands Institute for Sea Research (Royal NIOZ) and funded by the Netherlands government. Major questions that LOICZ addresses on a global scale are:

- Is the coastal zone a sink or source of CO_2?
- What are the mass balances of carbon, nitrogen and phosphorus in the coastal zone?
- How are humans altering these mass balances, and what are the consequences?
- How do changes in land use, climate and sea level alter the fluxes and retention of water and particulate matter in the coastal zone and affect coastal morphodynamics?
- What is the role of the coastal zone in trace gas (e.g., DMS, NO_X) emissions?
- How can knowledge of the processes and impacts of biogeochemical and socio-economic changes be applied to improve integrated management of the coastal environment?

In this report we look back on the LOICZ programme in the context of ES and IGBP development and achievements of the first LOICZ phase, and look forward to the contribution the "New" LOICZ will make to Earth System research and dissemination.

2 The Goal of the "New" LOICZ Approach

An outcome of the first 10 years of LOICZ is recognition of the growing importance of the relationship between coastal zone science and coastal zone management, and this reflected in the development of the scientific themes for the "New" LOICZ. The new Science Plan seeks to articulate not only the research that LOICZ will engage with in the next 10 years, but also the strategy for strengthening operational links with relevant institutions, for instance the National Institute for

Coastal and Marine Management (RIKZ), The Hague, and relevant partners within and beyond the Earth System Science Partnership of IGBP, IHDP, WCRP and DIVERSITAS.

The New LOICZ project aims to overcome traditional disciplinary fragmentation. Therefore the **primary goal** that the New LOICZ II will lead to is:

> *"to provide a framework for integrated analysis of existing information and to act as a means to focus on key issues concerning human activity and resource use in the coastal zone (including to apply the full catchment scale as part of the water-continuum and extending it to include the EEZ)"*

To achieve this goal, the New LOICZ will be required to identify and promote ways to transfer information to and from stakeholders about what needs to be answered by science and what is being learnt from the science. This will include a need to establish and continuously engage in "science – policy – public" dialogue fora and employ early consultation mechanisms addressing key issues of coastal change and use in light of future scenarios of human activity and environmental state change as well as related scientific information needs including implementation issues.

The "New" LOICZ will seek to further the successful collaboration with its existing research community that encompasses a globally distributed network of coastal zone researchers that has grown from about 400 scientists, involved in developing the first Science Plan published in 1993, to a network that now extends to 2,500 scientists in 130 countries. However, the New LOICZ will also seek to engage a wider community of scientists and user groups who can make use of the LOICZ outputs and inform the questions addressed by LOICZ science. To better help promote and co-ordinate LOICZ global research on regional and local scales, the New LOICZ aims to establish a distributed IPO structure with Regional Thematic IPO Research Nodes. Located in different global regions, they are expected to not only increase the visibility and effectiveness of the future LOICZ, but also offer greater opportunities and support of research and increased networking within the regions.

3 LOICZ in the context of ES science and IGBP II

The "New" LOICZ will be one of the six projects that form the core of the second phase of the IGBP – IGBP II (Figure). IGBP II expands on the success of the past decade of intensive research that has led to a comprehensive picture of the mechanisms that determine the fate of Earth and the extent of the impact of human's activities on the Earth system. However, the linked challenges of confronting and managing the consequences of global environmental change whilst addressing and securing a sustainable future remain. To meet these challenges, IGBP II will strengthen and expand its relationship with IHDP, WCRP and DIVERSITAS, as part of the Earth System Science Partnership (ESSP), to provide a more integrated approach that inculcates human aspects within the traditional analytical methods of disciplinary studies that form the backbone of the scientific agenda. Within IGBP II, the major challenge in this new phase is to develop an integrative global change science that assembles research activities in innovative ways to understand the interacting dynamics of the Earth's life support systems. This will also focus on how humans impact and are supported by the planetary system, and policies and practices that will be required to ensure the sustainability of this system. These aims are reflected in the IGBP II Scientific Objective:

> *To undertake a systems analysis of planetary composition and dynamics, focusing on the interactive biological, chemical, geological and physical processes that define Earth System dynamics, the changes that are occurring in these dynamics, and the role of human activities in these changes.*

This objective is synergistic and, complementary to the IHDP, aims to describe, analyse and understand the human dimensions of global environmental change guided by four overarching questions:

- **Vulnerability/Resilience** - What factors determine the capacity of coupled systems to endure and produce sustainable outcomes in the face of social and biophysical change?
- **Thresholds/Transitions** - How can we recognise long-term trends in forcing functions and ensure orderly transitions when thresholds are passed?
- **Governance** - How can we steer tightly coupled systems towards desired goals or away from undesired outcomes?
- **Learning/Adaptation** - How can we stimulate social learning in the interest of managing the dynamics of tightly coupled systems?

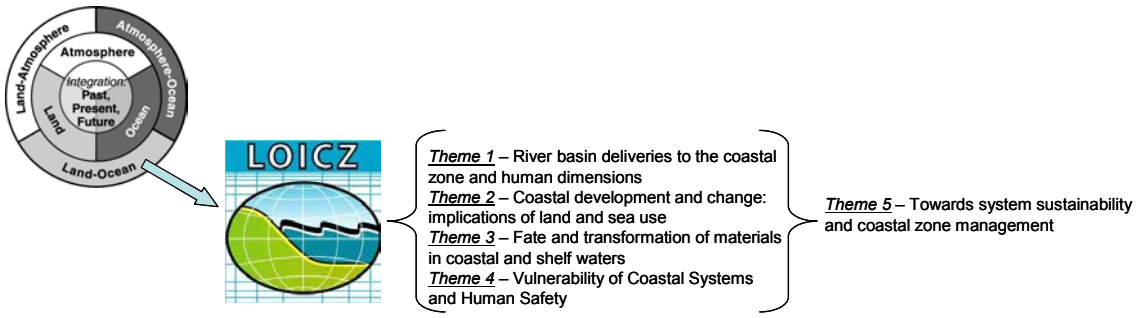

Figure 1: The New LOICZ and IGBP II with the 4 Theme structure of science activities that will be integrated within an overarching Theme to engage in a science-policy-public dialogue.

LOICZ has already begun to introduce the objectives and aims of IHDP into its development through increasingly engaging with the human dimensions community in developing a "Futures" discussion document that has informed this Science Plan. This Science Plan aims to identify the key issues and to develop a new Science Plan, which meets the requirements of the new program. A number of relevant new issues have been identified through recent workshops led by IOC, IHP, SCOR and the European Community; LOICZ SSC members and regional workshops and the Synthesis and Futures Meeting held in Miami in 2002 have provided further suggestions. Funding and core project structures are required to support the "New" LOICZ.

4 The New LOICZ - Statement of Objective

The IGBP Phase II will involve projects dealing with three Earth System compartments (air, land, ocean), three interfaces (land-ocean, land-atmosphere, ocean-atmosphere), and three framework activities (GAIM, PAGES, START). Joint projects (currently water, carbon, and food systems) will be further developed with WCRP (earth climate, mainly physics/chemistry core activities) and IHDP (earth human dimensions, mainly socio-economics). Links to DIVERSITAS are being discussed between the programs. "Futures" think-tank activities are identifying questions and objectives (2000-2002) and a number of themes and questions will feed into the New LOICZ development from "oceans" (IGBP, SCOR) and "terrestrial" (IGBP, IHDP, WCRP, Millennium Ecosystem Assessment) futures working groups.

The original LOICZ science plan is now more than 10 years old and reflects the ideas, concepts and needs prevalent more than a decade ago. Over the past years it has become clear that there have been human-induced changes at the global level and a major increase in human demands on the coastal zone: Concomitant to this is that continued human habitation and exploitation of the coastal landscape and resources is under an ever increasing risk and threat. Examples are major changes in hydrology on global scales, the increase or decreases in fluxes of materials to the coastal zone from river catchments, induced by erosional processes or damming, respectively, but all affecting the coastal ecosystem. Exploitation of its natural resources for food, as well as use of the coastal landscape for human habitation and/or economic activities, such as mineral exploitation, tourism and traffic, poses additional pressures on the coastal system.

LOICZ already plays a crucial role in relating the results from global system research to the regional/national scale and characterising the tapestry of small-scale variability and non-linearity of system functioning which links with larger trans-boundary and regional interconnection processes. LOICZ has made its work available to stakeholders, for example, coastal zone managers (Figure). The human dimension is crucial in modifying directly and indirectly the coastal system as, individually and collectively, humans respond to these and "natural" changes in order to mitigate or resolve problems. We have developed an understanding that human dimensions and natural systems closely interact and are intimately bound together in the various pressures and resultant state and state changes of the coastal domain. At a limited scale, tools have been developed to translate this understanding to management and policy. There is, however, still a lack of both, understanding and tools for a clear differentiation and quantification of these anthropogenic drivers and global environmental pressures. This is crucial information in order to see how they take effect on regional and global scales versus those drivers which are exclusively regional or national in nature: a distinction essential for appropriate coastal zone management.

With these points in mind, the New LOICZ project aims to overcome traditional disciplinary fragmentation. The primary goal is to provide a framework for integrated analysis of existing information and to act as a means to focus on key issues concerning human activities in the coastal zone (including applying the full catchment scale as part of the water-continuum and in the EEZ). Closely related will be the goal to identify and promote ways to transfer information to the stakeholders about what is being learned from the science, and to identify what needs to be answered by science. This will include establishing and continuously engaging in "science – policy – public dialogue fora and employing early consultation mechanisms addressing scientific information needs as well as implementation issues.

To reflect the vulnerability of human uses emanating from the coastal zone, the objective of the New LOICZ is:

"to assess, model and predict the change in adaptive capacity of the global coastal zone as an integral part of the Earth System under multiple forcing, including the contribution of, and consequences for, human activity"

5 LOICZ Project rationale and scope

5.1 The Challenge – The Coastal Zone

The coastal zone of the Earth System is a dynamic area of natural change and of increasing human use. Coastal zones occupy less than 15% of the earth's land surface, yet accommodate between 20.6 and 37% of the world population in the bands of the nearest 30 km and 100 km respectively (estimated in 2002) and roughly 50% i.e. 3.1 billion people in the 200 km range. With three-quarters of the world population expected to reside in the coastal zone by 2025, human activities originating from this small land area will impose an inordinate amount of pressures on the global system. As such it faces the challenge of maintaining the continuity of its goods and services for and of the ecosystem and human society. These interacting changes are threefold:

- global changes which are natural changes, such as climate, and those due to changes in the global economy/trade and policy;
- regional (trans-boundary and supra-national) changes as a result of regional and national drivers and pressures in the coastal zone; and
- regional changes at the river catchment level which affect the downstream coastal zone and in the Exclusive Economic Zone.

Our current limited understanding and uncertainty of regional and global changes that impact coastal systems hamper addressing this challenge.

In comparison with the relatively uniform environment of the photic zone of the open ocean, or the rapidly mixed environment of the atmosphere, the spatial and temporal heterogeneity of the world's

coastal zones is considerable. As a consequence, there are considerable methodological problems associated with developing global perspectives of the role of this compartment in the functioning of the total Earth system. Identifying and quantifying this role and developing scenarios of change in the coastal compartment of the Earth system under anthropogenic and geocentric driving forces of change requires a considerable body of research, as well analysis and interpretation that crosses the interface of natural and socio-economic sciences.

Unlike many of the other Core Projects of the IGBP, LOICZ deals with a specific domain rather than a process and that domain is spatially extremely heterogeneous. To achieve the overall goals and objectives a truly global network of coastal scientists has been developed including the active participation of scientists from developing countries that is vital to the ultimate success of this project: Some funding and other support is provided through the Core Project to foster research undertaken in such countries since their coastlines encompass the bulk of the world's tropical shores and encompass areas where the rates of anthropogenically driven change are considerable.

Whilst the objective of LOICZ is not to undertake coastal zone management it is appropriate that LOICZ seeks to provide a sound scientific basis for the future sustainable use and integrated management of these environments, under conditions of global change.

5.2 LOICZ I - The Results to Date: LOICZ Achievements

Between 1993 and 2002 LOICZ has made major advances in our understanding of the biogeochemical and physical role of the coastal zone in global cycles and change by addressing the following major questions on a global scale:

- Is the coastal zone a sink or source of CO_2?
- What are the mass balances of carbon, nitrogen and phosphorus in the coastal zone?
- How are humans altering these mass balances, and what are the consequences?
- How do changes in land use, climate and sea level alter the fluxes and retention of water and particulate matter in the coastal zone and affect coastal morphodynamics?
- What is the role of the coastal zone in trace gas (e.g., DMS, NO_X) emissions?
- How can knowledge of the processes and impacts of biogeochemical and socio-economic changes be applied to improve integrated management of the coastal environment?

The focus of LOICZ research has been on horizontal material fluxes and combining natural and social sciences to elucidate the causes for alterations in these fluxes. Understanding the relationships between scales and integration across scales (see Figure) is an important and challenging part of this combined approach. LOICZ depends on national programmes of research and contributions from individual scientists, and has worked with hundreds of researchers from more than 100 countries to develop collaborative and multidisciplinary projects to meet these goals.

A globally distributed network of coastal zone researchers is carrying out much of the LOICZ research. From about 400 scientists involved in developing the first Science Plan published in 1993, this network now extends to 2,500 scientists in 130 countries. National LOICZ Contacts have been identified in many countries to provide a linkage between national and international LOICZ research activities. These people provide a first point of contact for those interested in getting additional information on local and national LOICZ research. Consequently a major portion of LOICZ global research is and will be carried out by local and regional research projects. More than 1500 peer-reviewed publications have resulted from the LOICZ project, and a first synthesis of work on global change in the coastal zone is being completed for publication. This synthesis will include information for management and will address policy issues. Examples of achievements include:

A. Nutrients fluxes and cycling to address the role of the coastal zone in global cycling
   - Establishment and implementation of “common methodologies” to allow scaled spatial inter-comparisons for first-order estimation of net C, N and P metabolism of the near shore coastal sea, using existing data. At local to regional scales waste and load estimates have been derived; systems metabolism has been estimated; tools and a data base of more than 200 coastal sites

have been developed; data, information and synthesis continues to be made accessible through a dedicated public website (http://data.ecology.su.se/MNODE).

- With the Joint Global Ocean Flux Study (JGOFS), LOICZ established a joint Continental Margins Task Team (CMTT) to evaluate the role of ocean margins in global carbon flux. A regional and global synthesis "Carbon and Nutrient Dynamics at Oceanic Margins" is in progress (LOICZ Newsletter 26, March 2003).

B. The flux of materials to the coastal zone is strongly influenced by changes in river catchments which are mainly human induced but may also be caused or enhanced by global change. Several parts of the LOICZ program have addressed material fluxes.

A "common methodology" was established and implemented to estimate human pressures on material fluxes and changes in river catchments affecting the coastal seas. This has been applied from catchments to continental scale – Africa, Europe (http://www.iia-cnr.unical.it/EUROCAT/project.htm, http://danubs.tuwien.ac.at, www.catchment2coast.org), Asia, South America, Caribbean, Oceania; data and the resulting information and synthesis are available through a new website (http://w3g.gkss.de/projects/loicz_basins); methods have been adopted by other international programs; new regional-scale projects are being derived.

The extent of groundwater flux and its dissolved constituents were largely unknown at the beginning of the LOICZ program. The establishment of targeted research (with SCOR, IOC, IHP) on submarine groundwater discharges, to evaluate their global significance and changes, has resulted in increased awareness of its importance. A global review has been prepared within the limits of existing information; a methodological inter-calibration field campaign is in progress to provide a basis for uniform measurement of groundwater fluxes (for details see LOICZ Newsletter 26, March 2003 and http://www.iugg.org/iapso/grdwater_seawater02.html).

A sediment discharge inventory and database (GLORI) was established during the first five years of LOICZ and is currently being extended. Global sediment transfer functions and processes, and change have been reviewed and target research priorities identified. The databases are increasingly utilized as they are expanded.

Assessment of trace gases (non-CO_2) fluxes and their significance in the coastal zone has highlighted the importance of this transfer and identified key areas for assessment and research.

C. The combination of natural and social science to address the human dimensions of change in the coastal zone has from the beginning been one of the focal points of LOICZ

The DPSIR concept of the OECD was modified and employed as a framework for integration of human dimensions with natural system and resources assessments. Guidelines have been developed and applied in B3 above (LOICZ Reports & Studies No. 11);

A pilot study of integrating natural and social sciences, developed to link the protocols of LOICZ foci 1-4 in South East Asia (SARCS WOTRO LOICZ, SWOL-project, see http://www.nioz.nl/loicz/) has yielded a simple model and emphasized scaling mismatches and potential for new approaches.

D. A typology system of the coastal zone was made operational to meet the needs of the global research community

This typology system is Web-based (http://www.kgs.ukans.edu/Hexacoral) and comprises a global coastal zone database (half-degree resolution; 140-plus variables) linked to an assessment/visualization tool for classification (typology) and scaling (http://palantir.swarthmore.edu/loicz). It is linked to IGBP-BAHC and other terrestrial, coastal and ocean databases. All data and methodologies are website accessible, and the tools and information are being applied within and beyond LOICZ. Research assessments with these tools are linking human dimension and natural systems, and pressures parameters to evaluate change at regional and global scales.

E. LOICZ has not only been an activity focussed on a core research community but has paid much attention to science dissemination through training and capacity building

   Capacity building continues through training workshops (in collaboration with START, IHDP, IOC, UNEP and other agencies) on biogeochemical modelling, typology applications, river basins assessments and coastal zone management. Research assessment tools (electronic and printed), manuals and guidelines are website-accessible (http:/www.nioz.nl/loicz). Regional collaboration of scientists underpins training and application of knowledge.

F. Of the numerous other activities, we mention two in particular:
   - Novel sea level research is being instituted with IGBP-PAGES and a "standard methodology" for global assessment of vulnerability to sea level change has been implemented by the EU-supported SURVAS task (http://survas.mdx.ac.uk). Further developments are a subject of the DINAS Coast project (see LOICZ Newsletter 27, June 2003 and www.PIK-Potsdam.DE/~richardk/dinas-coast/).
   - A working group of scientists and managers under the leadership of the LOICZ Liaison Officer at the Coastal Zone Management Centre of the Royal Dutch Institute for Coast and Sea, RIKZ, The Hague is currently synthesising an evaluation of changes and effectiveness of management in major delta regions of the world: Information is website accessible (http://www.deltasnetwork.nl).

An overarching outcome of the LOICZ work and achievements to date are that there are three major conclusions that can be drawn from the LOICZ research;

1. The coastal realm is both the most dynamic part of the global ecosystem and the most subject to natural and anthropogenic induced global change.
2. A much broader perspective on the critical importance of ameliorating anthropogenic impacts on hydrologic systems, sediment and materials fluxes and energy transfers within catchments is required to:
   - avoid irreversible degradation of coastal systems and reduction of ecosystem functions that help to regulate carbon cycles, material fluxes and energy budgets;
   - reduce the rate of increase in vulnerability of human societies located within coastal regions to natural and man induced hazards.
3. There are specific actions that can be taken within the coastal realm to ameliorate anthropogenic influences on global climate change.

6 The New LOICZ

The aim of a New LOICZ is to draw on the achievements and outcomes from the "Old" LOICZ to further understand horizontal material fluxes and scaling processes in the World's coastal zones through environmental and socio-economic sciences in the context of the revised and up-dated goals of the ESSP and IGBP II.

The challenge of a "New" LOICZ is to improve our understanding of complex coastal change and response options in the context of the Earth System including human society and to assist in the management of these changes, to ensure the continuity of goods and services provided by the coastal zone. To fulfil this role, a future LOICZ will strongly interact with IHDP for the human dimensions aspects and within IGBP with the land system component. The coastal zone, being the interface between the land and the ocean, LOICZ will serve within IGBP as the primary interface between the land and marine and water programmes. Outputs from the New LOICZ will contribute to GAIM (Global Analysis, Integration and Modelling) that explores how the dynamics of the Earth System be better understood through modelling studies, and the analysis and interpretation of the results and of global data? With GAIM, the New LOICZ will work closely with all Core Proejcts of IGBP, and build increasing linkages with the World Climate Research Programme (WCRP) and the International Human Dimensions Programme on Global Environmental Change (IHDP) on the development and

analysis of integrated data sets and linked models. The challenge that the New LOICZ will contribute, along with GAIM and its colleagues throughout IGBP, and in the WCRP and IHDP, is to develop and apply a suite of Earth System models spanning a range of complexity that integrates the roles and interactions of physical climate, ecological systems, and human systems.

Discussions on the scientific themes in a new LOICZ within and beyond the LOICZ community has also taken into consideration a sub-set of the "Hilbertian" questions posed in the IGBP-GAIM program. They are shown here following a brief description of what might be expected from the new LOICZ (in bold):

- GAIM question 7: Which are the most vulnerable coastal regions under global change?
- LOICZ Expectation: **A typology of coastal vulnerability to global change on various spatial and temporal scales**
- GAIM question 8: How are abrupt and extreme events processed through nature-society interactions?
- LOICZ Expectation: **Description of the impact on and reaction of the environment and society (as co-evolving systems) to spontaneous and hazardous extremes**
- GAIM question 14: What are the most appropriate methodologies for integrating natural-science and social-science knowledge?
- LOICZ Expectation: **Meeting the general challenge to find ways for successful integration between natural and social sciences and to overcome the traditional disciplinary divide**
- GAIM question 15: What are the general criteria and principles for distinguishing non-sustainable and sustainable futures?
- LOICZ Expectation: **Identification of criteria to distinguish, and consequently the indicators to measure, key parameters of sustainable and less sustainable future developments**
- GAIM question 18: What kind of nature does modern society want?
- LOICZ Expectation: **Elucidation of the question of social choice and people's preferences regarding environmental conditions and standards of living**
- GAIM question 21: What is the optimal decomposition of the planetary surface into nature reserves and managed areas?
- LOICZ Expectation: **Identification of key proxies for land use and cover change that are reflected in coastal functioning and change and thus provide advice on optimal decomposition of the planetary surface into nature reserves and managed areas** and
- GAIM question 23: What is the structure of an effective and efficient system of global environment and development institutions?
- LOICZ Expectation: **Investigation of the institutional dimensions of coastal change, teleconnections and impact-response relationships to provide a scientific basis for advise on effective and efficient systems of global environment and development institutions.**

6.1 The New LOICZ Strategy

In order to act across the broad scale outlined and to become increasingly interdisciplinary the New LOICZ will need to provide a high level of responsiveness through issue-driven science. It is crucial to provide answers to questions in a reasonably short time, which may not allow waiting for results from highly sophisticated new models. However, in acceptance that the objective of a New LOICZ should be to provide both, i) scientific information for advanced Earth System analysis and modelling and ii) better science for better management, implementation of the project will have to provide the mechanisms to satisfy short-term information needs and backing them by in-depth sophisticated interdisciplinary science. This also means that major coastal change issues should play the leading role in driving the science and the new LOICZ needs to capitalize on the gains/success of the first phase of collaborative research by:

- maintaining and enhancing the networks of scientific contributors and peers, which bring different cultural perspectives, science priorities and funding options;

- building on the typology approach/tools to guide questions and actions including statistical analysis regionally and to visualise and map change, vulnerability and risks;
- consolidating knowledge gained at planetary and regional scales (e.g., the biogeochemical budgets);
- applying the full catchment scale in assessment, synthesis and upscaling and identifying those management units (and their key environmental system functions) where intervention (response) can best be implemented;
- pursuing compelling topics (e.g., restoration, mitigation, thresholds, carrying capacity and links to biogeochemical cycles) and move forward to in-depth consideration of different of pressure/impact scenarios;

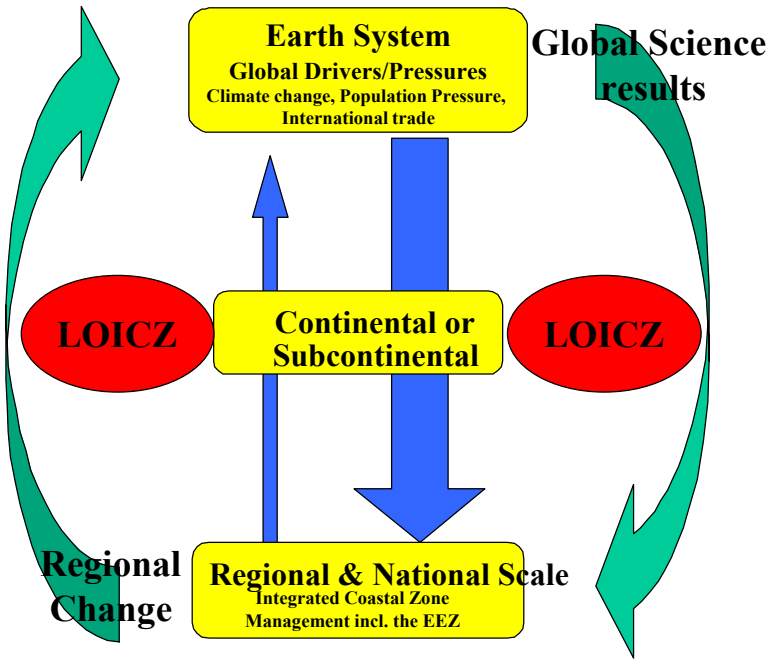

Figure 2: The LOICZ role in integrating regional and national coastal change and use (incl. the EEZ) to the Earth System level and relating global science results for management of the coastal zone.

In general terms this means that the new LOICZ needs to become adaptive in its scientific context and promote this 'adaptive science' to interact with and develop adaptive management options. Therefore the new LOICZ has to improve its user interface by strengthening its outreach. Participatory approaches have to become an integral and up-front part of scientific projects. They serve as the fora where issues and scientific information needs on "desirable future scenarios" in the context of strong and weak sustainability models can be brought to each other's attention. The way will be to foster the development of a "Science/Society/Policy Partnership" with a New LOICZ taking a neutral platform position for brokering the issues, the development of science and on which to generate joint ownership of these issues and activities.

Particular efforts have to be directed towards improved involvement of developing economies. Strengthening the regional collaboration and institutional networking will be facilitating the necessary data and information exchange and lead to inner and cross regional flow of expertise and capacity building. The New LOICZ can support this structurally and provide the platform for regional scientists to play a leading intellectual role here. Scientific agendas relevant for all regions but in particular for developing economies, *inter alia,* need to address topics where International Conventions oblige countries to take action (e.g., Climate Convention, Biodiversity Convention, Wetlands Convention). The Climate Convention, UNFCCC, for example, involves effects of sea-level

rise, CO_2 and methane emissions. LOICZ may take on the role of an active partner in the Conventions, helping to foster political will and financial support to resource necessary scientific efforts directly or via regional "aid" organisations. This might have potential to generally advance LOICZ's networking and information transfer.

6.2 Linkages

LOICZ has experienced an increasing demand upon, and recognition of, the project as a source of regional-global expertise and information on the science of the coastal. Maintaining and enhancing the ability of the project to respond to the needs of the scientific and user community is an important consideration in future planning. To fulfil this role, the New LOICZ will strongly interact with IHDP for the Human Dimension aspects and within IGBP with the LAND program and its system components. The coastal zone, being the interface between the land and the ocean, the New LOICZ will serve within IGBP as the primary interface between the land and ocean programmes. The rationale of the New LOICZ plan includes:

- Strong/collaborative links established with IHDP in order to develop the "people dimension" and foster joint tasks, access to expertise, and development of encompassing activities. Human activity in the coastal zone and EEZ need even more attention than in the past. In response the "New" LOICZ will continue and even enhance to bridge the gaps between biogeochemistry (IGBP), coastal system functioning, and the human dimension (IHDP). A partnership between LOICZ and the IHDP has been agreed on by the parties at the recent 14th SSC Meeting held in June 2003, in Banff, Canada.
- Global and regional scale projects are in place which complement and can draw from the LOICZ scientific program, for example, UNESCO-IOC's ICAM & Coastal-GOOS monitoring programs; UNEP-sponsored GIWA, the upcoming Global Marine Assessment, GMA, and EU initiatives in particular the Water Framework Directive (2000/60/EC) and the Water Initiative and the Common Strategy for an Integrated Coastal Zone Management. Dialogue with designers and activities of these programs/activities provide an effective science-user dimension – we have taken steps to consolidate these relationships which should be further strengthened in the "New" LOICZ towards an extended network of operational partnerships.
- LOICZ will continue and improve its close cooperation with the research community and policy-makers at the national level. This can be greatly assisted through the wider establishment of national LOICZ committees, and to have the added effect of attracting more national experts to work under the LOICZ umbrella. A distributed IPO and restructured SSC (see section 5.2) is expected to provide increasing support for improved regional and national performance.
- Communications and transfer of information to targeted agencies and forums are fundamental operational concerns to LOICZ. This requires a funded, operational task team of necessary skills to assist in planning and implementation of a communication strategy, to promote access and use of the resultant coastal science information. Measures are continuously being taken and reviewed to address this within LOICZ and in particular in cooperation with the IGBP.

Clear goals, objectives and thematic priorities have been shaped through extended iterative consultation by the SSC with a broad range of scientific experts involving in particular the Human Dimensions community, agencies and stakeholders since 2001. This includes the Synthesis and Futures Meeting, Miami 29 May - 01 June 2002 and the recent IGBP Congress "Connectivities in the Earth System", Banff, Canada, 20-23 June 2003.

Through its extensive regional network, the New LOICZ will extend this capability to be able to identify regional and national changes in the coastal system, integrate them at a global level and make the results and information available to managers and decision-makers. The magnitude of the task is challenging, especially in making the link between human dimensions and the natural processes.

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