

# LOICZ NEWSLETTER

## Coastal biogeochemistry at the EGS-AGU-EUG Joint Assembly, Nice, France, 6-11 April 2003

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During the EGS-AGU-EUG Joint Assembly held in Nice, France, 6-11 April 2003, a special session was devoted to *Coastal biogeochemistry* and its response to anthropogenic perturbations: inputs, gas exchange, carbon and nutrient cycling. The session, which was co-sponsored by LOICZ and PNEC, the French Coastal Oceanography Program, focussed on the wide field of coastal biogeochemistry and provided both detailed insights into the state-of-the-art science as well as an excellent overview of achievements and open questions in this field. The session comprised 61 contributions, of which 23 were presented orally. A suite of presentations opened the session by positioning coastal biogeochemistry into the global carbon cycle and moreover, indicating the need to develop tools for the extrapolation of results from regional studies onto the global scale. The majority of the contributions were devoted to regional experimental and modelling studies reporting results from most of the coastal regions of the world ocean. All relevant questions of coastal biogeochemistry were addressed such as the quantification and qualification of riverine inputs into and the impacts on the coastal zone; carbon and nutrient transports across boundaries and interfaces (atmosphere and sediments) and the impact of anthropogenic perturbations on the ecosystems. For example, observational evidence was provided for various regions that relative changes of nitrogen, phosphorus and silicate inputs to the coastal zone may alter algal communities and thus carbon



This is the twenty eighth 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

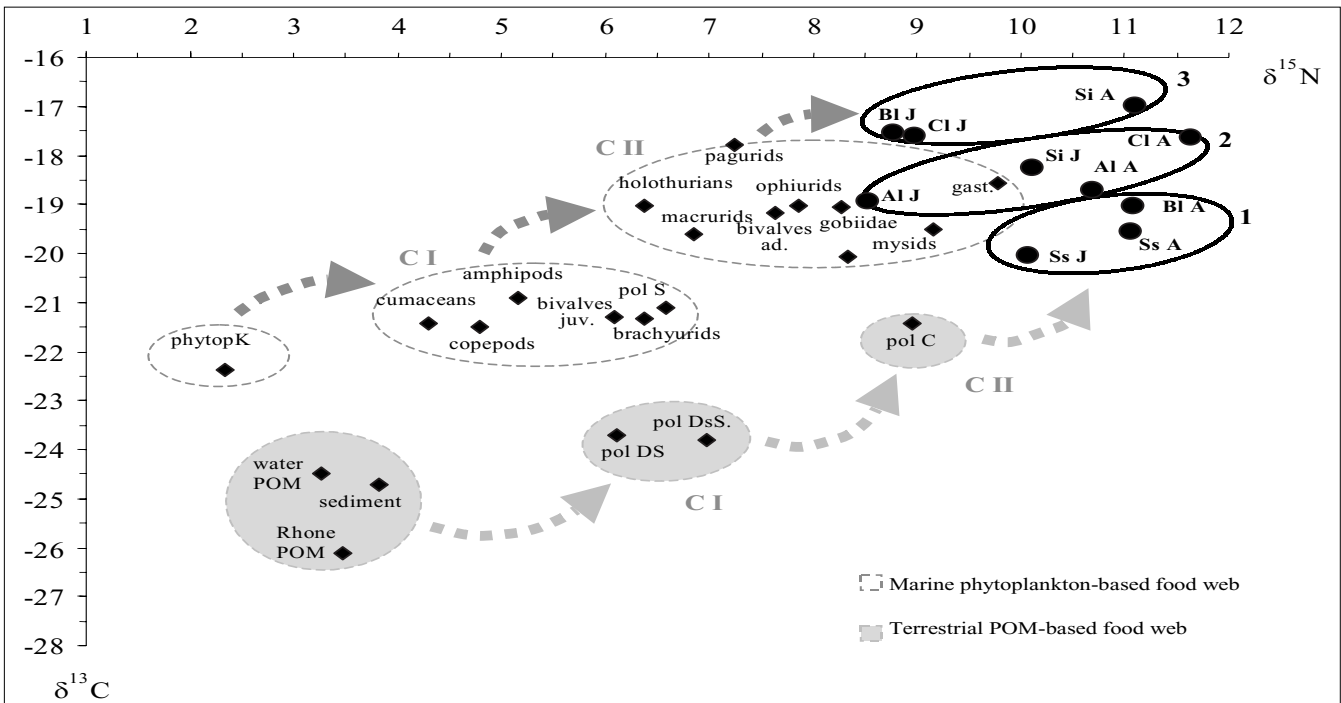
cycle metabolisms. These findings were complemented by modelling studies investigating mechanisms and temporal variability of such processes. The session's abstracts can be reviewed at [http://www.cosis.net/members/meetings/sessions/accepted\\_contributions.php?p\\_id=45&s\\_id=664](http://www.cosis.net/members/meetings/sessions/accepted_contributions.php?p_id=45&s_id=664).

Three individual presentations, taken as representatives for the overall session, are summarised below.

Darnaude et al. (abstract no. EAE03-A-02518) provided evidence of the immediate interaction of *land* and *oceans* in the coastal zone, investigating the incorporation of terrestrial organic matter into the marine food web in the delta region of the Rhone River, NW Mediterranean Sea. Relying on the isotopic signature of carbon ( $\delta^{13}\text{C}$ ) and nitrogen ( $\delta^{15}\text{N}$ ) of particulate organic matter (POM) from terrestrial and marine origin and of marine benthic organisms on the one

hand, and on the diet of various flatfish types living off the Rhone delta on the other hand, an attempt was made to identify dependencies of the growth and reproduction of economically relevant flat fish on the different, i.e., marine and terrestrial, food sources.

The riverine supply of dissolved organic matter and nutrients continuously enhances primary production off the Rhone delta, but the amount of POM released to the sea is directly related to the river discharge, which shows large year-to-year fluctuations. The riverine POM is mainly deposited in the surface sediments of the prodelta where its incorporation into marine benthic food webs plays a major role in determining the macrobenthic communities fluctuations. This in turn is assumed to cause significant temporal variations in the population size of some benthic top predators as demersal fishes. In order to estimate the potential responses of the five main flatfish species living off the Rhone delta (*Solea solea*, *S. impar*, *Buglossidium luteum*, *Arnoglossus laterna* and *Citharus linguatula*) to variations in river discharge, carbon ( $\delta^{13}\text{C}$ ) and nitrogen ( $\delta^{15}\text{N}$ ) isotopic signatures were analysed in the five fish species and their main benthic preys. These were related to the  $\delta^{13}\text{C}$  and  $\delta^{15}\text{N}$  signatures of the two main organic matter sources: the riverine POM and the marine POM from phytoplankton production, since the carbon isotope signatures of these two POM pools are significantly different. This allows to identify two main food sources for primary consumers: one of marine origin (marine phytoplankton), and one of terrestrial origin gathering the Rhone POM in the plume water and the surface sediment. These two primary food sources fuel two distinct food webs: one essentially based on phytoplankton (supplying most benthic preys), and the other (deposit-feeding and carnivorous polychaetes) on terrestrial organic



**Figure 1** - Structure of the benthic food webs of the juveniles (J) and adults (A) of five flatfish species (**Ss** = *Solea solea*, **Si** = *Solea impar*, **BI** = *Buglossidium luteum*, **AI** = *Arnoglossus laterna*, **CI** = *Citharus linguatula*) studied off the Rhone river. C I = primary consumers, C II = secondary consumers, Gast. = gastropods, phytopK = phytoplankton, POM = particulate organic matter, pol = polychaetes (C = carnivorous, DS = surface deposit feeders, DsS = sub-surface deposit feeders, S = suspensivorous). Numbers in bold indicate the 3 groups of fishes individualised according to fish diet: **1** = fishes mainly feeding on CI and/or CII from the terrestrial POM-based food web; **2** = fishes principally eating CI and/or CII from the "marine" food web + variable amounts of CI and/or CII from the terrestrial POM-based food web; **3** = fishes mainly (or exclusively) feeding on "marine" CI and/or CII.

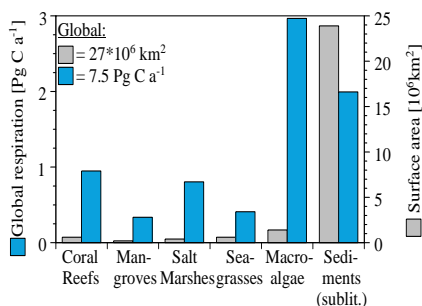
matter. Accordingly, terrestrial POM enters marine benthic food webs mainly via deposit-feeding polychaetes and is transferred to fishes by the ingestion of these prey organisms or other benthic consumers that feed upon them. The results allow to separate the above 5 species into three groups (Fig. 1). The first group feeds almost exclusively on preys from the terrestrial POM based food web. The second one feeds mostly on preys coming from the marine food web but ingest small amounts of preys from the terrestrial food web. The third group feeds almost exclusively on preys from the marine phytoplankton-based food web. The exploitation of terrestrial POM is maximal for *S. solea*, in which both juveniles and adults essentially depend on the terrestrial POM-based-food-web for their growth [Darnaude et al., 2003]. According to these results, the Rhone river floods should differently affect the fish population size of these 5 species, since the impact of an increase in terrestrial food availability on the fish population size will be different for the individual species and their life stages. If the continental inputs are exploited during the juvenile stage, Rhone river floods can enhance post larvae growth and survival and thus directly increase fish recruitment success. When the continental inputs are exploited at the adult

stage, Rhone river floods intensity can increase both growth and condition of mature females and, through an increase in reproduction success, also have an impact on fish recruitment. In this last case, the positive impact will be delayed but it can last for several years through the successive breeding of the positively influenced adults. For the 5 species studied, the authors predict little effect of Rhone river floods on *C. linguatula* and *S. impar* populations, but a high and long lasting effect on the 3 other species. This effect should be maximal in the common sole, *Solea solea*, which has strong implications for the local fishery management of this high value fish [Darnaude, 2003; Salen-Picard et al., 2002].

Middelburg et al. (abstract no. EAE03-A-03923) provided a global compilation of benthic organic carbon respiration in the coastal zone. Benthic coastal communities are highly diverse and include systems, in which biological entities are a structuring factor (e.g., coral reefs, mangroves, seagrass beds) as well as those, in which physical features and processes determine the landscape (e.g., rocky shores, rippled sandy sediments). Moreover, metabolism in shallow sediments depends on whether they extend within or below the euphotic zone. Benthic communities often dominate

ecosystem processes and metabolism, particularly in shallow coastal waters, such as reef lagoons, and are important sites for carbon cycling and bacterial activity, and are all potentially important contributors to ecosystem respiration. Hitherto, no comprehensive evaluation of the respiration rate of benthic coastal ecosystems exists, so that their contribution to the respiration of the global ocean remains undetermined. Middelburg et al. derived a global estimate for respiration in coastal benthic communities from various regional studies covering all relevant benthic ecosystem types such as coral reefs, mangroves, salt marshes, seagrasses, and sublittoral sediments. Considering the areas covered by these ecosystems a bottom-up extrapolation of the corresponding benthic respiration rates was performed (Fig. 2). Accordingly, the respiration in benthic coastal ecosystems constitutes a major part of total coastal ocean respiration. The authors' estimate of benthic coastal respiration of 7.5 Pg C a<sup>-1</sup> is well above earlier estimates based on published global coastal carbon budgets (~1.8 Pg C a<sup>-1</sup>), but similar to top-down estimates of coastal respiration by heterotrophs based on the balance between net primary production and river inputs on the one hand, and sediment burial on the other (~7.5 Pg C a<sup>-1</sup>). The authors argue that

the excellent agreement of the bottom-up and community-production top-down approaches should not be overemphasised, since both approaches are subject to serious uncertainties.



**Figure 2** - Global and specific respiration in coastal benthic ecosystems and corresponding surface areas.

The uncertainties of the bottom-up approach presented here are related to the diversity of benthic communities, aggregation problems necessary for upscaling, limited availability of data and large variability within and among ecosystems. Compared to a recent world ocean respiration estimate of 66 Pg C a<sup>-1</sup> (del Giorgio and Duarte, 2002) the relevance of coastal seas, covering about 7% of the world ocean's surface, in the global carbon cycle is evident, since they would contribute for approximately 11% to the world ocean respiration. Note that this estimate does not account for pelagic respiration in the coastal seas [Middelburg et al., 2004].

Thomas et al. (abstract no. EAE03-A-01736) established carbon budgets for the North Sea and the Baltic Sea, both located in NW Europe and connected via the Skagerrak. The carbon budgets of both seas were used to establish two different operational modes of the continental shelf pump, which is thought to transfer atmospheric CO<sub>2</sub> to the open oceans and might be seen as a biological carbon pump. Phytoplankton produces POM, which partly settles out to the subsurface layers. Here, the POM is remineralised to dissolved inorganic carbon, (DIC) and nutrients. If these subsurface waters are circulated to the open ocean the above DIC will be exported as well. The efficiency of the continental shelf pump is controlled by biological processes as well as by the hydrography and the bottom topography of the individual coastal sea, causing different operational modes of the continental shelf pump.

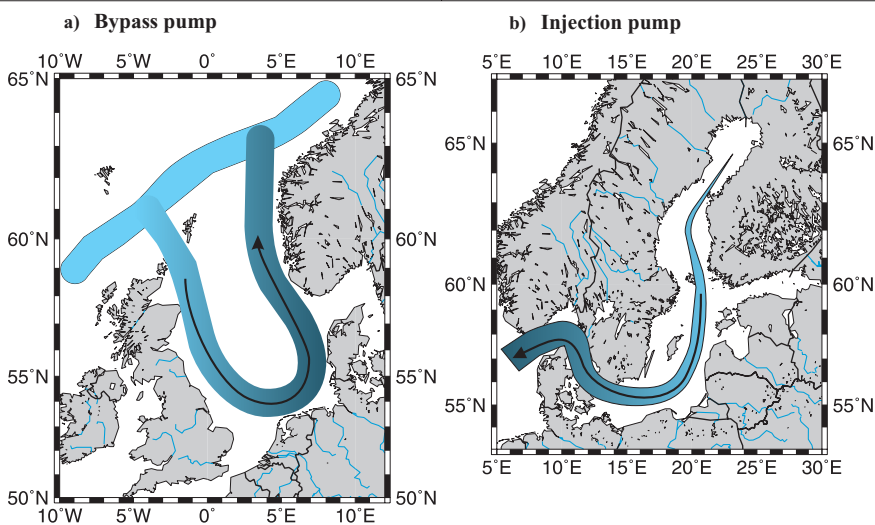
The carbon budget describes the North Sea as an overall autotrophic semi-

enclosed sea. The dominant feature is the circulation of Atlantic Ocean water through the North Sea entering at its Northwestern boundary and leaving through the Norwegian Channel. The DIC transport by this circulation constitutes the major (gross) player of the carbon budget, however without relevance for the netbudget. During the transport through the North Sea the DIC concentrations of the Atlantic Ocean water are increased. Major sources increasing the carbon contents of the Atlantic Ocean water are the Baltic Sea and rivers (providing 73% of the net carbon import to the North Sea) and the atmosphere (27%). The uptake of atmospheric CO<sub>2</sub> by the North Sea amounts to 1.3 mol C m<sup>-2</sup> a<sup>-1</sup> and is maintained by the above biological pump. The short flushing time and the bottom topography prevent almost entirely the final burial of POM (3% of net export) and the entire CO<sub>2</sub> draw-down caused by biological activity is available for export to the Atlantic Ocean (97% of net export) being the ultimate driver for the CO<sub>2</sub> uptake. This process is supported by the above short flushing times constituting an efficient DIC removal out of the North Sea to the Atlantic Ocean. Thus, the North Sea can be seen as a bypass pump (Fig. 3a), which increases the carbon content of Atlantic Ocean while it is circulated (bypassed) through the North Sea.

In comparison, the water budget of the brackish Baltic Sea is mostly controlled by riverine inputs and to a lesser extent by water exchange with the North Sea. Together both processes result in water renewal times of about 25 years. This circulation pattern and the bottom topography with several deep basins allow sedimentation of the POM produced by

phytoplankton production in the euphotic zone. The annual CO<sub>2</sub> uptake from the atmosphere is thus driven by the carbon export to the deeper basins (60%), since it replenishes the exported carbon. Only part of the CO<sub>2</sub> taken up from the atmosphere by biological processes is available for export to the North Sea (40%). For the efficiency of the continental shelf pump in the Baltic Sea this means that despite large net carbon exports (from terrestrial sources) to the North Sea, the Baltic Sea acts as a weak continental shelf pump, since a major part of the atmospheric CO<sub>2</sub> is transferred to the sediments, whereas in the North Sea it is almost entirely exported to the North Atlantic Ocean. A mechanistic reason for this is given by the circulation pattern, since the water is slowly transported through the Baltic Sea while seasonal recycling and sedimentation processes counteract high export rates of "atmospheric" carbon to the North Atlantic Ocean. The Baltic Sea thus serves as a collecting basin for fresh water and terrestrial carbon, which finally is injected via the Skagerrak to the North Sea (injection pump, Fig 3b), however the efficiency of the continental shelf pump here is much lower than in the North Sea, where the export is controlled by the rapid circulation and shelf-type bottom topography [Thomas et al., 2002 a, b]

We will continue to address latest advancements in *Coastal biogeochemistry* in a special session during the 1<sup>st</sup> EGU General Assembly to be held in Nice, France, 26-30 April 2004. For further information please visit: <http://www.copernicus.org/>.



**Figure 3** - Different operational modes of the continental shelf pump in the North Sea (a) and the Baltic Sea (b).

**References:**

Darnaude, A.M. (2003). Apports fluviaux en zone côtière et réseaux trophiques marins benthiques: transfert de matière organique particulaire terrigène jusqu'aux poissons plats au large du Rhône. PhD Thesis, Université Aix-Marseille II: 373 p.

Darnaude A.M., Salen-Picard C., Polunin N.V.C., and Harmelin-Vivien, M.L. (2003). Transfer of terrestrial organic matter into marine coastal food webs through depositivorous polychaetes elucidated by stable isotopes off the Rhone River delta (Gulf of Lions, NW Mediterranean). *subm. to Oecologia*.

delGiorgio, P.A., and Duarte, C.M. (2002). Total respiration and the organic carbon balance of the open ocean. *Nature*, 420: 379-384.

Middelburg, J.J., Duarte, C.M., and Gattuso, J.-P., 2004, Respiration in coastal benthic communities. pp. xxx-yyy. In P.A., del Giorgio, and P.J. le B., Williams, [eds] "Respiration in Aquatic Ecosystems", OUP, Oxford.

Salen-Picard, C., Darnaude, A.M., Arlhac, D. and Harmelin-Vivien, M.L. (2002). Fluctuations of macrobenthic populations: a link between climate variability, run-off and coastal fisheries. *Oecologia*, 133: 380-388.

Thomas, H., Bozec, Y., deBaar, H.J.W., Elkalay, K., Frankignoulle, M., Kühn, W., Lenhart, H.J., Moll, A., Pätsch, J., Radach, G., Schiettecatte, L.-S. and Borges, A. (2002b). Carbon and nutrient budgets of the North Sea and

Thomas, H., Pempkowiak, J., Wulff, F. and Nagel, K. (2002a). Carbon and nutrient budgets of the Baltic Sea. Both in: L. Atkinson, K.K. Liu, R. Quinones, L. Talaue-McManus (eds.). Carbon and nutrient fluxes in global continental margins, Springer, New York, accepted.

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**"Catchment2Coast" linking coastal resources variability and river inputs in Africa**

*Pedro Monteiro\* and Sue Matthews*

Catchment2Coast is an interdisciplinary, multi-institutional modelling research project, which aims to improve the scientific understanding of the linkages between river catchments and their associated coastal environments. Supported by EU-INCO it took off in October 2002.

The general objective of Catchment2Coast is to design, implement and validate a generic integrated planning and management support system for linked catchment-coast systems in southern Africa, which can also be implemented beyond the region. This project aims to adopt a systems thinking approach as the basis for a set of diagnostic and predictive tools with explicit dynamic capabilities in respect of the aquatic environment. These capabilities will promote sustainable resource management on a whole catchment basis, specifically including the coastal zone. This project also aims to i) strengthen the regional aquatic system scientific capabilities; ii) strengthen the links between aquatic scientists and resource economists; and iii) strengthen collaboration between scientific institutions in South Africa, Mozambique and Swaziland supported by specialist interactions with European partners.

The project uses as a case study the Maputo Bay-Incomati river system in Mozambique. The case study focuses on the shrimp industry, which supports the livelihood of some 3000 artisanal and semi-industrial fishers (value of catches estimated to equal US\$ 3.5 million in the early 1990ies). The focus will be on the influence of runoff and material loads from the Incomati and Maputo river catchments on shrimp production in the bay. The project comprises three phases, the first of which sets up numerical platforms using existing data sets to constrain model parameters, boundary conditions and process calibration. Each of the modeling platforms will then be used to undertake sensitivity analyses to identify the most important gaps in data and understanding. Following will be a co-ordinated field measurement program, together with the platforms using scenarios defined at stakeholders' workshop. The data collected over three seasons will be used for verification, and

sensitivity analyses will be undertaken on the basic scenarios. By the end of the third phase, in which all analytical exercises thus far will be integrated, the modeling platforms will be linked. It should then be possible to identify the most important forcing factors in biophysical functioning of the catchment that affect the economics of shrimping in Maputo Bay.

The complexity of the approach can be seen in the various modeling platforms involved:

- River hydrology and water quality – aims to simulate the impacts of land-use changes and catchment management on hydrology and water quality;
- Groundwater hydrology and water quality processes in the Incomati estuary – aims to reveal the influence of groundwater quantity and quality on the estuarine mangrove habitat;
- Coastal-estuarine hydrodynamics and physical processes in Maputo Bay – aiming to capture the interaction of river flow regimes with coastal water stratification and effects on coastal resources;
- Sediment and water column biogeochemistry in Maputo Bay
- Mangrove ecosystem-habitat health and function in the Incomati estuary – tries to use a mangrove ecosystem model (including the nursery functions for shrimp stocks) as the receiving module for other outputs aiming to estimate shrimp production under different catchment management scenarios
- Ecology of commercially exploited shrimp resources in Maputo Bay – linking above information to estimate maximum sustainable yield and recruitment;
- Resource economics modeling of shrimp production in Maputo Bay – aims to estimate and express coastal ecosystem and resource goods and services variability in monetary terms
- Integration of models and systems analysis – aims to provide a cost effective tool deriving from the links between the model platforms and enabling a number of scenarios that will provide information on impacts and critical flows for sustainable goods and services of the coastal ecosystem. This is the part where the policy and management interface will be located nourished by scientifically underpinned recommendations. Transferability to other tropical regions is anticipated.

Catchment2Coast relies on a partnership between six institutions in southern Africa and three centres in Europe. Those are the CSIR South Africa, University of Cape Town and Natal University from South Africa; University Eduardo Mondlane and the Fisheries Research Institute-IIP from Mozambique; and the University of Swaziland. The European partners are Delft Hydraulics, the Netherlands, the University of Wales' School of Ocean Sciences, United Kingdom, and the Institute of Marine Research, Portugal.

While African partners will conduct most of the work, exchange with the European collaborators will add specialised capabilities in process understanding and modelling. Capacity building and training of project members and postgraduate students form a key component. A rather modern feature of the project, paralleling other international efforts such as Euro-Cat and daNUbs, is to strengthen the links between aquatic scientists and resource economists, and on the regional scale, to encourage institutional collaboration in the SADC region. The project aims to engage an active media strategy allowing to communicate the findings on various levels including the stakeholder community (see also <http://www.catchment2coast.org/>). The project will showcase the need for high-quality biophysical understanding, at the water-continuum scale, in developing ecosystem-based policy to sustainably manage the interaction of river catchments, coastal zones and their resources. This includes promoting more equitable water allocation, taking account of renewable resources that depend on water flow and quality.

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**On the way to synthesis:  
Humans, hydrology and coastal  
nutrient loading – some key  
results of the LOICZ global  
budgeting effort**

*Stephen V. Smith*

Most modern estimates of nutrient delivery to the oceans can be traced back to Michel Meybeck's (1982) estimates based on approximately 30 large rivers. His estimates are for the period of the early 1970's. As part of the LOICZ

efforts to budget nutrient fluxes in coastal water bodies (see for example NL 4, 10, 21 and LOICZ R&S 24), we have derived an extended database of approximately 165 sites for which dissolved inorganic nutrient delivery to the coast can be estimated nominally, for the late 1990's. For both dissolved inorganic nitrogen (DIN) and dissolved inorganic phosphorus (DIP), the logarithm of yield (that is, delivery/area of catchment) can be estimated as functions of the logarithms of population density and runoff/area. While other, more detailed regression models for nutrient delivery have been developed, this one can be readily applied to the 0.5 degree gridded data available in the LOICZ typology database (see NL 3, 19 and R&S 24). It thus provides an estimate of the geographical distribution of nutrient delivery from land to the ocean.

The ratio of DIN:DIP delivery globally is rather constant, with a delivery ratio of about 18:1. This conclusion is consistent with Meybeck's analysis. The global loads for DIN and DIP are estimated to be about 1300 and  $70 \times 10^9 \text{ mol y}^{-1}$ . These fluxes are about three times as large as Meybeck's estimates for the early 1970's and about five times his estimates of "pristine flux." While some of this difference might be methodological, the observed direction of the difference (i.e. higher fluxes now than in the past) would be expected to occur in response to growing pollution from agriculture and other human activities.

This leads to two further observations. First, while there are places of very high nutrient delivery per unit area to the ocean, much of the world coastline still receives relatively low delivery. Second, even though high delivery does occur in response to various pollution sources, most nutrient mobilization on land (fertilizer application, domestic waste, etc.) does not reach the ocean and can be said to be assimilated on land.

These and related results are presented in more detail in the following publication:

S. V. Smith, D. P. Swaney, L. Talau-McManus, J. D. Bartley, P. T. Sandhei, C. McLaughlin, V. C. Dupra, C. J. Crossland, R. W. Buddemeier, B. A. Maxwell, F. Wulff. 2003. Humans, hydrology, and the distribution of inorganic nutrient loading to the ocean. *BioScience*. 53(3):235-245.

An electronic version of the paper can be found at: <http://ecologia.cicese.mx/archi/svsmith-01.pdf>.

In addition to this publication, information related to these results was presented at the American Society of Limnology and Oceanography (ASLO) meeting in Salt Lake City in February and at the Estuarine Research Federation (ERF) meeting in Seattle in September 2003.

**Transiting towards a  
"New" LOICZ  
- outcomes of the 14<sup>th</sup> SSC  
Meeting held in Banff, Canada,  
19 and 24 June 2003 -**

Facing the manifold challenges of a successful transition from a classical scientific project towards an integrated, flexible and truly interdisciplinary research frame the LOICZ SSC in this 14<sup>th</sup> Meeting, the first one of the "New" LOICZ, has approved a set of major changes. Decisions made encompass its own set up, restructuring of the IPO, collaboration with sponsors and parentship within the ESSP (Earth System Science Programme) and in particular the operational approach of the "New" LOICZ in dealing with scientific issues. The aim is to make LOICZ a rolling synthesis mechanism with continuous delivery of scientific products. They will be derived from a regularly reviewed and flexible agenda within a frame of five overarching themes. The massive mountains and the full kaleidoscope of landscape and climatic features including shifts from 28 degree C down to summer snowstorm conditions provided an inspiring platform for discussions among our old and new member, who we had the pleasure to introduce in NL 27.

The new approach is expected to foster fast delivery and responsive input to an advanced understanding of the Earth System and its functions and processes as well as to the management and policy relevant issues of the coastal people. This means to identify those priority issues under each theme calling for immediate analysis and synthesis in a regular review with the SSC, the wider LOICZ network and stakeholders and to address them in a meaningful sequence – also subject to availability of capacities – per time. The SSC will be asked to identify (a) champions for an individual topic and jointly find a way to lead it to a product within some 2 or 3 years.

QWaMPA is a rather simple and product oriented set of supporting questions to be applied for each of the topics individually.

They will assist in identifying the appropriate owners/stakeholders of a certain coastal change issue and the critical mass of scientific disciplines needed to provide the answers to both, the Earth System Science community and the science users. The goal is to enable integrative science to underpin the decisions needed for better management. The QWaMPA questions are:

What is the **Question**?

**Who** has the questions and **Why** (and **Who** should be involved to answer it)?

What is the state of the art **answer** to the questions? (does it need more scientific attention? and if:)

What's the best **Method** to address the questions and get a more elaborate answer? (this includes approaches, techniques, and tools needed)

What are the **Products** to be expected?

What's the final **Answer** to the original question and how best to communicate it?

The 5 guiding themes presented earlier (NL 24) have been subject to iterative scientific and institutional review involving an active exchange with and input from the human dimensions community in a joint LOICZ/IHDP "science plan scoping team". In Banff the following version was approved, putting theme 5 "Towards system sustainability and resource management" in the position of an overarching platform cutting across all the other four:

Theme 1 – *River basin deliveries to the coastal zone and human dimensions*

Theme 2 – *Coastal development and change: implications of land and sea use*

Theme 3 – *Fate and transformation of materials in coastal and shelf waters*

Theme 4 – *Vulnerability of Coastal Systems and Human Safety*

This restructuring underlines that the scientific community has given priority to the sustainability and management related research topics interfacing with the human dimensions (see Figure ).

Collaboration with other projects is an obvious need and will be tailored according to the requirements per topic. IMBER, SOLAS, GLOBEC, and the HD projects are appreciated and obvious partners, so will be LAND; others will be considered on a case by case basis. Joint working groups, such as the recently approved SCOR/LOICZ group on sediment retention processes in estuaries (see next NL 29) and joint task

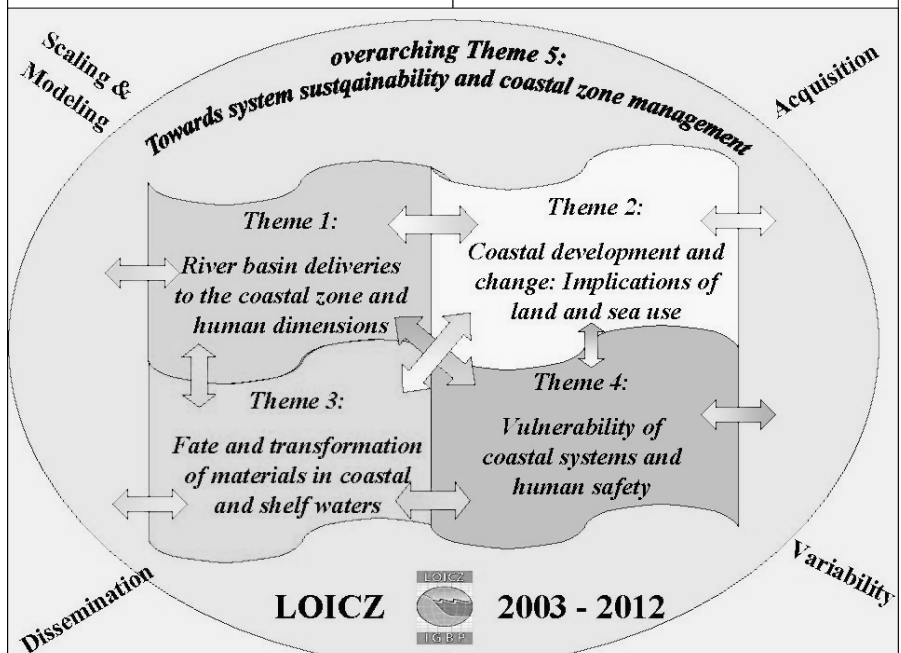
teams are appropriate to enable fast track targeted synthesis and product provision in a reasonable time frame. They benefit from co-sponsoring and extended scientific networking.

The SSC will be expanded to a maximum of 25 full Members in order to provide for the appropriate disciplinary and geographical coverage needed to handle an extended and flexible scientific agenda. It will operate on the basis of an Executive Group of 7-8 people incl. theme champions, the chair and vice chair and a member likely to be appointed from IHDP. Recognising that core funding from parentprogram/s will remain on past levels, annual SSC Meetings will invite only up to 15 members including the Executive Group. An additional selection of 7 to 8 SSC Members to reach the 15 can be invited in a flexible fashion. This will allow us to generate the appropriate critical mass of related scientific expertise needed for addressing the priority agenda items. Thus the extended SSC of 25 full Members will provide much better flexibility and improved regional engagement. 4 Members are expected to be recommended by IHDP. An unlimited group of "Corresponding Members" can be invited upon recommendation of the SSC and those earlier involved can get an "Ex Officio" Status. This new structure has been agreed on at the SSC in consulting with IGBP.

Discussions with IHDP on a parentship agreement with LOICZ and the joint "science plan scoping team" are considered to be a very positive development, although final formal agreements will be subject to internal IHDP SC decisions in 2004. For the immediate future we have agreed on a "semi"-parentship enabling

engagement on an operational and exchange of knowledge base. A liaison for LOICZ at the IHDP office has been appointed.

The LOICZ-IPO will maintain responsibilities comparable to the situation during the first decade (LOICZ Implementation Plan 1994 pp. 199-200). An earlier recommendation to establish a distributed IPO has been confirmed by the SSC and IGBP. This option is currently being explored in light of sponsorship opportunities and sponsors' comments. A distributed IPO with 3 to 5 nodes located in different countries is expected to not only increase the visibility and effectiveness of the future LOICZ in particular on regional scale, but to offer greater opportunities in accessing regional funding. Each node is represented by a Project Officer (expected to be allied to at least one particular global theme of LOICZ) and receives office support. An Executive Officer and project Administrative Manager will be located at one of the nodes. The Executive Officer has responsibility for the IPO as a whole. It is proposed that this structure will be achieved during the transition phase, 2003-5. A Deputy Executive Officer function to support this transition will soon be established at the central IPO node on Texel. Since mid 2003 a first regional/thematic IPO node has been established and started operations at the Nanyang Technological University, Environmental Engineering Research Centre (Prof. Lawrence Koe, (ccckoe@ntu.edu.sg); further options are explored among other countries in particular Germany, Australia, the USA, China and Sri Lanka. An extended generous funding agreement with the



Dutch sponsors enables LOICZ to maintain the central IPO at the Royal Dutch Institute for Sea Research on Texel until the end of 2005 after which this office will have to move elsewhere. IGFA has been informed and agreed to address this critical issue accordingly to seek a solution. The SSC and IPO expect that with these decisions a solid foundation supporting the transition towards the "New" LOICZ can be established.

## IPO NOTES

### ⚡ Important announcement ⚡ NEWSLETTER READER SURVEY

To investigate the involvement of the LOICZ Newsletter readers, a survey was conducted as part of NL 25 with a second call in NL 26. From the results we can conclude the following: about 17% (some 450) of the readers have responded which indicates that they are active and interested in LOICZ. Newsletter information is used for individual LOICZ related research or teaching purposes. Some very constructive suggestions were made to increase the effectiveness and usefulness of this medium. For instance increasing the attractiveness and using the newsletter as a showroom for science highlights and as an enabling mechanism for better global networking. **We wish to express our gratitude to those of you who have taken the time to respond and make these meaningful suggestions.**

However, we know there are a lot more of active LOICZ scientists out there, who unfortunately may not have had a chance to respond. To seriously improve our product and optimise the involvement of our readers we provide this final opportunity for all these readers to do so now! Since the "New" LOICZ will attract a whole group of scientists from new disciplines and regions we wish to narrow down the database to our active readers and give the new entries the opportunity to become part of such an active group of responding scientists. Obviously the newsletter will remain available on our web-site for all others, so a widespread global community will be reached.

**Therefore the IPO and SSC Chair decided that the first newsletter of 2004 (NL 30) will only be sent to those readers who either have already**

**replied to us by using the reader survey or who will do so after this issue of the LOICZ newsletter. The reader survey is still available on our web-site at <http://www.nioz.nl/loicz/firstpages/fp-newsletters.htm>. Of course it is also possible to send us an e-mail and inform us whether you would like to keep receiving the newsletter as a hard copy.**

We anticipate that the future mailing database will thus be improved to function as a growing platform of actively involved scientists, policy-makers, managers and people with a general interest in LOICZ activities.

**Action to be taken by you, THE READER:** if you haven't responded yet, please download the reader survey and send it back to us, or send us an e mail!

**Action to be taken by LOICZ:** as of next year's first newsletter (No. 30), all individual members (**excluding institutions and sponsoring organisations**) who have not approached us will automatically be removed from the mailing database.

**USE THIS OPPORTUNITY - LET  
US KNOW NOW!**

## HAVE YOU SEEN

**Call for nominations: Dr A.H. Heineken Prize for Environmental Science 2004** (\$150.000,-). Every other year the Royal Netherlands Academy of Arts and Sciences (KNAW) awards this prize for outstanding scientific achievements in the field of environmental research. Scientists as well as scientific institutions can nominate candidates who have made a major contribution towards the improvement of the relation between man and his environment within the field of the natural, technical or social sciences. Please visit: [www.know.nl/heinekenprizes/prizes\\_env.html](http://www.know.nl/heinekenprizes/prizes_env.html)

**3 June-1 July 2004, Rhode Island, USA:** Summer Institute in Coastal Management 2004. Contact: Kimberly Kaine ([kkaine@gso.uri.edu](mailto:kkaine@gso.uri.edu)) and/or visit: <http://www.crc.uri.edu>

**Funding Opportunity from European Science Foundation (ESF).** More information can be found on the EFS web-site: [www.esf.org](http://www.esf.org)

## WHAT'S ON THE WWWEB

*Web-sites on Biogeochemical Budgets and Modelling, Typology, the typological clustering tool LOICZView, Basins, Deltas Management & South-Asia Coastal Fluxes are accessible via the LOICZ web-site: [www.nioz.nl/loicz](http://www.nioz.nl/loicz)*

New/useful information on IGCP-475 activities and meetings related to shallow marine sedimentology provided by the **Asian Deltas Project of GSJ/AIST Home Page:**

[http://unit.aist.go.jp/mre/mre-cev/ADP/ADP\\_en/a\\_index\\_en.html](http://unit.aist.go.jp/mre/mre-cev/ADP/ADP_en/a_index_en.html)

## 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](mailto:loicz@nioz.nl)*

**Collaborative Learning Initiatives in Integrated Coastal Management.** Nickerson, Donna and Stephen B. Olsen. 2003. Coastal Management Report # 2239.

Available electronic at: [www.crc.uri.edu](http://www.crc.uri.edu). For more information contact: Coastal Resources Center, University of Rhode Island, Narragansett Bay Campus, South Ferry Road, Narragansett, Rhode Island 02882 USA. Tel: (+1-401) 874 6224. Fax: (+1 401) 798 4670. E-mail: [communications@crc.uri.edu](mailto:communications@crc.uri.edu)

The Special Issue of Fisheries Oceanography, including a selection of papers presented at the 2<sup>nd</sup> GLOBEC Open Science Meeting, Qingdao, October 2002, is published as Volume 12: Issue 45, September 2003.

Full contents of the issue available at <http://www.blackwellpublishing.com/journals/fog/>

## LOICZ/IGBP/IHDP CALENDER

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

**2-5 December 2003 Morelia, Mexico:** Land Open Science Conference. The science plan and implementation strategy for the new LAND project of IGBP and IHDP will be presented and

discussed. A Preceding Global Change and Terrestrial Ecosystems (GCTE) Symposium will be held on the 1<sup>st</sup> of December. For more information visit <http://www.oikos.unam.mx/landOSC> and the web-sites of GCTE: <http://www.gcte.org> and Lucc: [www.geo.ucl.ac.be/LUCC/lucc.html](http://www.geo.ucl.ac.be/LUCC/lucc.html)

**18-20 October 2004 Dunedin, New Zealand:** Making Connections: Cross-boundary Coastal Management. The 2004 Annual Conference of the New Zealand Coastal Society. Incorporating a LOICZ workshop in association with the New Zealand IGBP Committee, 'The Impact of Major Dams, Diversions and Water Abstraction on Coastal Sedimentation in New Zealand'. Conference Web-site: [www.coastalsociety.org.nz/conference2004.htm](http://www.coastalsociety.org.nz/conference2004.htm)

### OTHER MEETINGS

**27-30 October 2003, Kiev, Ukraine:** 30<sup>th</sup> Pacem in Maribus - A Year after Johannesburg. Ocean Governance and Sustainable Development: Ocean and Coast - a Glimpse into the future. Conference of the International Ocean Institute. For information visit: <http://www.30pim.sevinfo.net>

**4-7 November 2003, Port Macquarie, Australia:** 12<sup>th</sup> NSW Coastal Conference. Visit: <http://www.hastings.nsw.gov.au/coastalconference>

**10-14 November 2003, St. Petersburg, Russia:** 4<sup>th</sup> Arctic Coastal Dynamics Workshop: Coastal Geology, Cryology, Morphodynamics, and Biodiversity. Visit: [www.awi-potsdam.de/www-pot/geo/acd.html](http://www.awi-potsdam.de/www-pot/geo/acd.html) or e-mail Volker Rachold at: [vrachold@awi-potsdam.de](mailto:vrachold@awi-potsdam.de)

**3-6 December 2003, Rome, Italy:** Joint Commission on groundwater-Seawater Interactions Executive meeting during the Basis of Civilization Water Science Symposium. For information please contact Annette Kimmich at [kimmich@bluwin.ch](mailto:kimmich@bluwin.ch)

**15-20 December 2003, Wollongong, Australia:** International Geological Correlation Programme (IGCP)-project #464-3<sup>rd</sup> Annual Conference: Continental Shelves during the Last Glacial

Cycle. Visit: <http://www.gns.cri.nz/news/conferences/igcp/> or contact: Francesco Chiocci, [francesco.chiocci@uniroma1.it](mailto:francesco.chiocci@uniroma1.it) or Allan Chivas, [toschi@uow.edu.au](mailto:toschi@uow.edu.au)

**13-18 January 2004, Bangkok, Thailand:** Fifth International Conference on Asian Marine Geology. (ICAMG-V). The first circular of the IGCP-475 and the second circular of ICAMG-V are available from <http://www.gsj.jp/HomePage.html>.

**15-20 January 2004, Bangkok & Ayutthaya, Thailand:** Joint International Conference and First Annual Meeting of IGCP-475 DeltaMAP and APN Project on the Mega Deltas of Asia. For both conferences the deadline for registration, pre-payment of registration fee, excursions, hotel reservations and abstract submission is: **1 November 2003.**

**15-20 February 2004, Honolulu, Hawaii:** ASLO/TOS Ocean Research Conference. With special attention for the following Special Session: **SS5.15: Biogeochemical Processes Within Freshwater Influenced Coastal Systems.** Organizer: Joseph E. Salisbury, University of New Hampshire ([joe.salisbury@unh.edu](mailto:joe.salisbury@unh.edu)). For information visit: <http://aslo.org/honolulu2004/submission.html>. Deadline for submission of abstracts: **1 October 2003**

**19-21 May 2004, Singapore:** 2<sup>nd</sup> International Conference and Exhibition on Ballast Water Management (ICBWM) organised by the Institute of Environmental Science & Engineering (IESE). Visit: [www.iese.ntu.sg/ballast2004](http://www.iese.ntu.sg/ballast2004)

**30 May-4 June 2004, Honolulu, Hawaii:** The Eleventh Pacific Congress on Marine Science and Technology, PACON 2004 (20<sup>th</sup> Anniversary): New Technologies, New Opportunities. Visit: [www.hawaii.edu/pacon](http://www.hawaii.edu/pacon)

**20-25 June 2004, Ballina, Australia:** ECSA 37 - ERF 2004 Conference: Estuaries and Change. Second Announcement and Call for Abstracts. For more information please visit: <http://scu.edu.au/ecsa37erf2004conference>

**20-28 August 2004, Florence, Italy:** The 32<sup>nd</sup> International Geological Congress. For information about the congress visit <http://www.32igc.org/>.

Call for Papers: General session **G-21.04 Coastal and Deltaic Depositional Systems.** Contact Prof. A. Colella at [albinacolella@virgilio.it](mailto:albinacolella@virgilio.it) or fax: +39 0971 206077.

**25-28 August 2004, Stockholm, Sweden:** Euroscience Open Forum. For an introduction, background and intentions go to <http://www.esf.org/generic/598/esof.pdf>. For more information and updates please visit: [www.esf2004.org](http://www.esf2004.org)

**12-16 October 2004, Nanjing, China:** The 3<sup>rd</sup> International Nitrogen Conference. Deadline for abstracts December 2003. Visit: [www.issas.ac.cn/n2004](http://www.issas.ac.cn/n2004) or e-mail: [n2004@ns.issas.ac.cn](mailto:n2004@ns.issas.ac.cn)

**1-3 September 2004, Bergen, Norway:** Open Science Conference Bjerknes Centenary 2004: Climate Change in High Latitudes. Visit: <http://www.bjerknes.uib.no/conference2004/>, inquiries: [conference2004@bjerknes.uib.no](mailto:conference2004@bjerknes.uib.no)

**4-9 September 2004, Christchurch, New Zealand:** 8<sup>th</sup> International Global Atmospheric Chemistry Conference. Visit: [www.IGACConference2004.co.nz](http://www.IGACConference2004.co.nz).

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