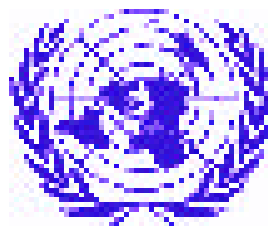
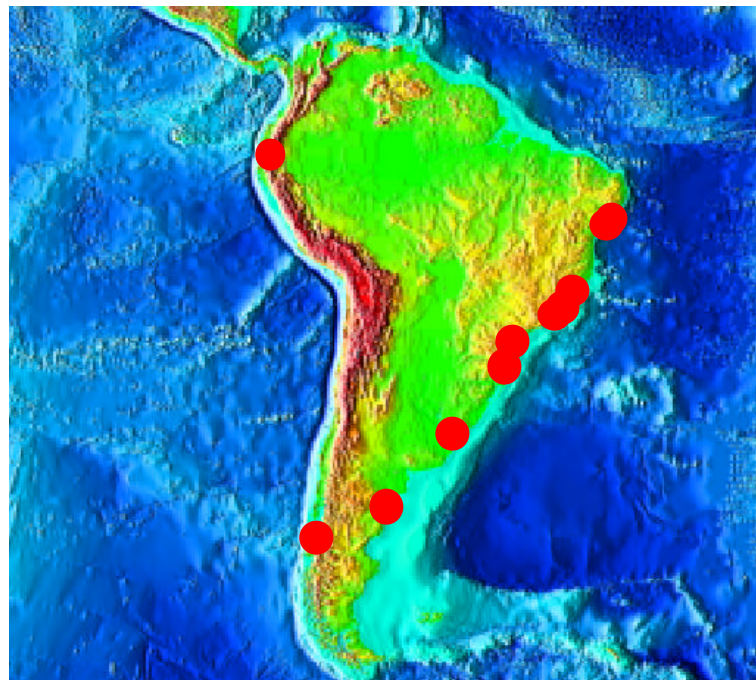


**LAND-OCEAN INTERACTIONS IN THE COASTAL ZONE (LOICZ)**  
Core Project of the  
International Geosphere-Biosphere Programme: A Study of Global Change (IGBP)

and

**UNITED NATIONS ENVIRONMENT PROGRAMME (UNEP)**  
Supported by the Global Environment Facility (GEF)



**ESTUARINE SYSTEMS OF THE SOUTH AMERICAN REGION: CARBON,  
NITROGEN AND PHOSPHORUS FLUXES**

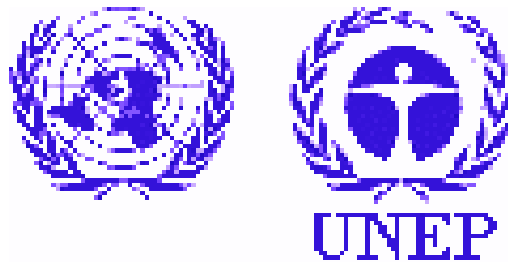
*Compiled and edited by V. Dupra, S.V. Smith, J.I. Marshall Crossland and C.J. Crossland*

**LOICZ REPORTS & STUDIES No. 15**

**ESTUARINE SYSTEMS OF THE SOUTH AMERICAN REGION: CARBON,  
NITROGEN AND PHOSPHORUS FLUXES**

*V. Dupra & S.V. Smith  
School of Ocean and Earth Science and Technology  
Honolulu, Hawaii, USA*

*J.I. Marshall Crossland & C.J. Crossland  
LOICZ International Project Office  
Texel, The Netherlands*



United Nations Environment Programme  
Supported by financial assistance from the Global Environment Facility

**LOICZ REPORTS & STUDIES NO. 15**

Published in the Netherlands, 2000 by:  
LOICZ International Project Office  
Netherlands Institute for Sea Research  
P.O. Box 59  
1790 AB Den Burg - Texel  
The Netherlands  
Email: loicz@nioz.nl

---

The Land-Ocean Interactions in the Coastal Zone Project is a Core Project of the “International Geosphere-Biosphere Programme: A Study Of Global Change” (IGBP), of the International Council of Scientific Unions.

The LOICZ IPO is financially supported through the Netherlands Organisation for Scientific Research by: the Ministry of Education, Culture and Science (OCenW); the Ministry of Transport, Public Works and Water Management (V&W RIKZ); and by The Royal Netherlands Academy of Sciences (KNAW), and The Netherlands Institute for Sea Research (NIOZ).

This report and allied workshops are contributions to the United Nations Environment Programme project: The Role of the Coastal Ocean in the Disturbed and Undisturbed Nutrient and Carbon Cycles (Project Number GF 1100-99-07), financially supported by the Global Environment Facility, and being implemented by LOICZ.

---

**COPYRIGHT** © 2000, Land-Ocean Interactions in the Coastal Zone Core Project of the IGBP.

Reproduction of this publication for educational or other, non-commercial purposes is authorised without prior permission from the copyright holder.

Reproduction for resale or other purposes is prohibited without the prior, written permission of the copyright holder.

**Citation:** Smith, S.V., V. Dupra, J.I. Marshall Crossland and C.J. Crossland 2000 Estuarine systems of the South American region: carbon, nitrogen and phosphorus fluxes. LOICZ Reports & Studies No. 15, ii + 87 pages, LOICZ, Texel, The Netherlands.

**ISSN:** 1383-4304

**Cover:** The cover shows an image of South America (GTOPO30 elevation map), with the budgeted estuaries circled.

**Disclaimer:** *The designations employed and the presentation of the material contained in this report do not imply the expression of any opinion whatsoever on the part of LOICZ, the IGBP or UNEP concerning the legal status of any state, territory, city or area, or concerning the delimitations of their frontiers or boundaries. This report contains the views expressed by the authors and may not necessarily reflect the views of the IGBP or UNEP.*

---

The LOICZ Reports and Studies Series is published and distributed free of charge to scientists involved in global change research in coastal areas.

<b>TABLE OF CONTENTS</b>		<b>Page</b>
<b>1.</b>	<b>OVERVIEW OF WORKSHOP AND BUDGETS RESULTS</b>	1
<b>2.</b>	<b>BRAZIL COASTAL SYSTEMS</b>	6
2.1	Rio Sergipe Estuary, Sergipe State <i>Marcelo F. Landim de Souza</i>	6
2.2	Piaui River Estuary, Sergipe State <i>Marcelo F. Landim de Souza, V.R. Gomes, S.S. de Freitas, R.C.B. Andrade, B.A. Knoppers and S.V. Smith</i>	10
2.3	Marica-Guarapina coastal lagoons, Rio de Janeiro State <i>Ermindia da C.G. Couto, N.A.C. Zyngier, V.R. Gomes, B.A. Knoppers and M.F. Landim de Souza</i>	18
2.4	Piratininga-Itaipu coastal lagoons, Rio de Janeiro State <i>Ermindia da C.G. Couto, N.A.C. Zyngier and M.F. Landim de Souza</i>	22
2.5	Paranagua Bay estuarine complex, Parana State <i>E. Marone, Eunice C. Machado, R.M. Lopes and E.T. Silva</i>	26
2.6	Camboriu River Estuary, Santa Catarina State <i>Jurandir Pereira Filho and C.A. Schettini</i>	33
2.7	Araruama Lagoon, Rio de Janeiro State – a hypersaline lagoonal system <i>Weber F. Landim de Souza and B.A. Knoppers</i>	37
<b>3.</b>	<b>URUGUAY ESTUARINE SYSTEMS</b>	40
3.1	The Frontal Zone of the Rio de la Plata <i>Gustavo J. Nagy</i>	40
<b>4.</b>	<b>ARGENTINA ESTUARINE SYSTEMS</b>	44
4.1	Bahia Nueva, Golfo Nuevo, Patagonia <i>Monica N. Gil and J.L. Esteves</i>	44
<b>5.</b>	<b>ECUADOR ESTUARINE SYSTEMS</b>	51
5.1	Gulf of Guayaquil <i>Isabel Tutiven U.</i>	51
<b>6.</b>	<b>CHILE ESTUARINE SYSTEMS</b>	55
6.1	Aysen Sound <i>Nelson Silva S., Dafne Guzman Z. and Alexander Veldenegro M.</i>	55
<b>7.</b>	<b>REFERENCES</b>	65

<b>APPENDICES</b>		<b>Page</b>
Appendix I	CABARET – Laura T. David	70
Appendix II	Typology and Budgets/Budget Sites Information – Robert W. Buddemeier	76
Appendix III	Workshop Report	78
Appendix IV	Participants and Contributing Authors	80
Appendix V	Agenda	83
Appendix VI	Terms of Reference	85
Appendix VII	Glossary	87

*Note: Where there is more than one author, the underlined name indicates the workshop participant.*