

**Vulnerability
assessment of two
major wetlands in the
Asia-Pacific region to
climate change and
sea level rise**



**edited by RA van Dam,
CM Finlayson & D Watkins**



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Contents

Project description	1
<i>CM Finlayson & RA van Dam</i>	
1 Introduction	1
2 Program	1
3 Process	2
4 Workshops	3
5 Outcomes	3
References	4
 Vulnerability assessment of the Yellow River Delta to predicted climate change and sea level rise	 7
<i>Li Peiying, Yuan Jun, Liu Lejun & Fu Mingzuo</i>	
Executive summary	7
1 Introduction	9
2 Description of the YRD	12
3 Identification of forcing factors	36
4 Vulnerability assessment	49
5 Current responses to existing forcing factors	57
6 Future responses to climate change and sea level rise	60
7 Major conclusions	65
Acknowledgments	67
References	68
 Vulnerability assessment of Olango Island to predicted climate change and sea level rise	 75
<i>Amuerfino Mapalo</i>	
Executive summary	75
1 General introduction	78
2 Introduction to vulnerability assessment	79
3 Approach of the assessment	81
4 Climate change and sea level rise	83
5 Description of Olango Island	89
6 Identification of current forcing factors and their impacts	114
7 Assessment of vulnerability	117

8	Current responses to coastal hazards	130
9	Future monitoring requirements and management strategies	137
10	Links to regional and national policy	138
11	Identification of information and research gaps	138
12	Conclusions	140
	Acknowledgments	140
	References	141
	Appendices	145

Project description

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1 Introduction

The major wetlands of the Asia-Pacific region provide many values and benefits (*sensu* Finlayson 1996) to humans. Foremost amongst these are the supply of water, the production of food, and the amelioration of floods (Scott 1992). In addition, the wetlands are major conservation zones for plants, fish and migratory birds (Scott 1989, Scott & Poole 1992, Jaensch 1996, Gopal & Krishnamurthy 1993). In recent decades the pressure on these habitats has increased as human populations have expanded and sought more land for urban and agricultural usage and development. This has brought production activities into conflict with conservation and resulted in the loss of the habitats concerned. Further, these pressures and conflicts are manifest in wetlands of the coastal zones of many countries (Finlayson et al 1992, Khoa & Roth-Nelson 1994, Leatherman & Nicholls 1995, Hollis 1998).

In addition, wetlands in the coastal zone are vulnerable to flooding, siltation and erosion from global climate change and sea level rise (Leatherman & Nichols 1995, Watson et al 1996). In the worst cases, many of the essential features of the coastal wetlands that provide immense value and benefit to society (*sensu* Ramsar Wetlands Convention, Finlayson 1996) could be lost due to such change.

As an example of the rapidity and extent of potential loss due to climate change and sea level rise, an analysis of the wetlands in Kakadu National Park in northern Australia indicated that many of the existing high value coastal freshwater wetlands could be replaced by saline wetlands within 30 years (Bayliss et al 1997, Finlayson et al 1997, Eliot et al 1999). Given that the biodiversity resource of these wetlands has been afforded extensive value and protection by the Australian government (Finlayson 1990, Bayliss et al 1997, Johnston & Needham 1999, Johnston & Prendergast 1999) this level of habitat change (loss) could be seen as catastrophic.

Not only do the Kakadu wetlands provide a striking example of the potential loss or change that could occur, but they are linked with others across the Asia-Pacific region through the East Asian-Australasian Flyway (Anon 1996, Shorebird Working Group of Wetlands International–Asia Pacific 1999). Thus, the value and management of the Kakadu wetlands is not separable from the value and management of wetlands across much of eastern Asia.

2 Program

Given the importance of coastal wetland habitats in Asia-Pacific to both people and for biodiversity it was proposed to undertake vulnerability assessments of two major wetlands in the Asia-Pacific region, beginning with sites in the Philippines and China. Support for these

assessments was provided by the Asia-Pacific Network for Global Change Research (APN; www.apn.gr.jp).

The sites chosen were the Yellow River Delta in China and Olango Island in the Philippines. These have recognisable value for both people and for biodiversity, with both sites being listed under the East-Asian Australasian Shorebird Reserve Network and Olango Island being listed as an internationally important wetland under the Ramsar Wetland Convention.

The assessments were undertaken in collaboration with relevant conservation management authorities. For the Yellow River Delta this included the State Oceanic Administration, while for Olango Island the Department of Environment and Natural Resources (DENR) was the major collaborating agency. The assessments were based on the model provided by the Kakadu study (Bayliss et al 1997) using a procedure presented by Kay and Waterman (1993) and Waterman (1995) and included the following steps:

- Collation of information on major land uses, conservation values and management threats and issues
- Analysis of the major values and benefits derived from the wetland
- Development of a bibliography
- Analysis of the vulnerability of the major wetland habitats to climate change and sea level rise
- Comparison of the relative threat imposed by climate change and sea level rise and identification of possible management responses
- Development of a research and monitoring strategy to provide further management guidance
- Identification of necessary training for local conservation personnel

3 Process

The project was coordinated by the Environmental Research Institute of the Supervising Scientist (*eriss*), a governmental research institute based in Jabiru, northern Australia. *eriss* conducts an international wetlands research and monitoring program which includes the above mentioned Kakadu vulnerability assessment (Bayliss et al 1997) and further coastal monitoring in the same region (Eliot et al 1999). It was joined by the Oceania (Canberra) and China (Beijing) offices of the international non-governmental organisation Wetlands International to develop collaborative processes with relevant national conservation agencies and choose the sites for the vulnerability assessment.

The project emphasised wetland sites that had been identified by governments as part of the *Asia-Pacific Migratory Waterbird Conservation Strategy: 1996–2000*. Specifically, sites along this Flyway are subject to an Action Plan for the Conservation of Migratory Shorebirds in Asia-Pacific (Shorebird Working Group of Wetlands International – Asia Pacific 1999). The Action Plan was launched with the support of Recommendation 6.4 from the 6th Meeting of the Conference of the Contracting Parties to the Ramsar Wetlands Convention (Ramsar Convention Bureau 1996; www.ramsar.org).

This APN project supported the migratory shorebird initiative by developing standard habitat assessment and data handling procedures to provide a basis for further assessments and training of local personnel to undertake these.

4 Workshops

A workshop was held in each country during the latter stages of the project to discuss the project or, specifically, the issue of climate change and sea level rise, the process of coastal vulnerability assessment and the actual assessment of the respective wetland site. The proceedings of the workshops have been summarised (Vulnerability assessment of major wetlands in the Asia-Pacific region 1999), while van Dam (1999) outlines the coastal vulnerability assessment framework used for the project. Where possible, comments from the workshops were addressed and incorporated into the final report.

5 Outcomes

The report from the site assessments will be forwarded to relevant national agencies and other interest groups. In this manner it is anticipated that national and local planning agencies will have access to the most recent information on the vulnerability of the wetlands to climate change and sea level rise. Further, this will be presented within a context of human usage and the maintenance of the biodiversity of the sites, as per the philosophies agreed under both the Convention on Wetlands of International Importance (www.ramsar.org) and the Convention on Biological Diversity (www.biodiv.org).

It also anticipates that the assessments will be useful as inputs to various global research programs, such as those conducted through the auspices of the International Geosphere-Biosphere Programme (eg Land-Use and Land-Cover Programme (LUCC), Land-Oceans Interactions in the Coastal Zone (LOICZ), and Global Change and Terrestrial Ecosystems (GCTE); www.igbp.kva.se) and also important for science policy links under other international environmental treaties (eg Framework Convention on Climate Change; www.unfccc.de). It will also specifically address management and research issues of direct relevance to the *Asia-Pacific Migratory Waterbird Conservation Strategy*. The latter is important as the initial program for this strategy does not extend greatly beyond the identification of sites of importance for migratory waterbirds and the development of a network of contacts (Shorebird Working Group of Wetlands International–Asia Pacific 1999).

The assessment processes will provide input to the development of common methodologies for vulnerability assessment being developed under the Intergovernmental Panel on Climate Change (IPCC; Waterman 1996). As such they will also be considered in future updates of the IPCC Scientific-Technical Analyses of the impacts, adaptations and mitigation of climate change (Watson et al 1996).

The collaborative processes that underpin the project will ensure that local capability is enhanced and training provided, standard data management practices are agreed, communication between research institutions is developed and links made to science policy. This will assist the APN and others in the region who are increasingly showing interest in coastal zone vulnerability which includes wetland processes as a major component. The outcomes can be used as a basis for further coastal zone management and an extension of the assessment methodology to other sites along the migratory bird flyway.

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