internal report **316**

Vulnerability assessment of major wetlands in the Asia-Pacific region

eriss

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supervising scientist

Vulnerability Assessment of Major Wetlands in the Asia-Pacific Region

Summary Report on the Project Workshops for Olango Island and Yellow River Delta

ERISS

This report presents the Summary Reports for the workshops held in the Philippines and China as part of the project, *Vulnerability Assessment of Major Wetlands in the Asia-Pacific Region.* The workshops were held in order to increase the awareness of local managers and decision makers about the potential impacts of climate change and sea level rise on coastal wetland ecosystems. In addition, it was anticipated that the workshops would enable feedback on the draft Vulnerability Assessment reports for the two wetland sites under investigation: Olango Island, The Philippines, and Yellow River Delta, China.

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Workshop 1

Vulnerability of Olango Island to Climate Change and Sea Level Rise

Costabella Tropical Beach Resort, Mactan Island, Philippines

9-10 December 1998

1 Workshop 1

1.1 Introduction

1.1.1 Background of the project

ERISS received funds from the Asia-Pacific Network for Global Change (APN) for a project titled "*Vulnerability assessment of major wetlands in the Asia-Pacific region*". The project involved assessing the vulnerability of two important coastal wetland sites to climate change and sea level rise. The two sites chosen were Yellow River Delta, China, and Olango Island, Philippines. The project involved a researcher from both sites working at ERISS (Jabiru, northern Australia) for one month to learn about vulnerability assessment procedures and to commence the vulnerability assessments for the China/Philippines sites. The assessments were to be completed upon returning to the respective countries, following a workshop to explain and discuss the methodology and results to relevant local and national agencies/organisations. This report summarises the proceedings and outcomes of the Olango Island workshop, held on Mactan Island, Central Visayas, Philippines, on December 9-10 1998.

1.1.2 Description of Olango Island

Olango Island is a coral reef island situated in close proximity to the urban centre comprising Cebu City, Mindaue City and Lapu Lapu City, in the central Visayas of the Philippines. It covers an area of approximately 1041 ha. The coastline is a mixture of rocky cliffs, sandy beaches, mangrove communities, seagrass beds and mud flats. At the southern end of Olango is a large inter-tidal bay that is a Sanctuary and has been declared a Wetland of International Importance under the Ramsar Convention on Wetlands. The bay is an important stop-over site for migratory shorebirds, with the mangroves providing good shelter and the exposed mud flats a plentiful supply of food, and accordingly is included in the Shorebird Reserve Network of the East Asian - Australasian Flyway. A Nature Centre, boardwalks and three bird hides for visitors/tourists have been established on the eastern side of the Sanctuary.

Olango does not exhibit distinct wet and dry seasons, although the majority of rain falls during November-December. The island is exposed to both the north-east and south-west

monsoons, each bringing with them winds and rain from the respective directions. Typhoons are a hazard during November and December. El Niño had a major effect on Olango during 1997-98, with little rain and subsequent freshwater supply problems.

Olango Island has an estimated human population of 20,000. The population exerts severe pressure on Olango's natural resources. The local fishery resources have suffered through over-fishing and illegal fishing methods (dynamite and cyanide fishing) forcing the local fishermen to travel long distances in order to obtain sufficient fish catch. Other livelihoods include shell and shellfish collecting, seaweed harvesting, and mangrove cutting and forestation.

Olango's freshwater supply comes solely from a groundwater aquifer, which receives re-charge during the wet season. However, the freshwater from the various wells often becomes brackish during high tide, while in recent years over-extraction of groundwater during the dry season has seen the water become almost permanently brackish, prior to wet season re-charge. No sewage system exists on Olango, raising the possibility of potential contamination of the groundwater. Power is supplied to only parts of the island from three non-continuous generators.

Olango is governed by eight local councils, termed Barangays, all of which are overseen by the Lapu Lapu City Government.

Olango Island is one of six sites in the Philippines chosen for the USAID funded Coastal Resource Management Program (CRMP). This is a five year program aimed at promoting, developing and implementing coastal resource management plans for each site. An area profile, describing the major attributes and coastal hazards and developing plans to reduce the impacts of the hazards, has just been completed. The program's success relies heavily on the participation of the local people and their willingness to learn and adapt.

1.2 The Workshop

1.2.1 Major objectives

- Increase awareness of local and national decision makers about the potential impact of climate change and sea level rise;
- Present the preliminary results of an assessment of the vulnerability of Olango Island to climate change and sea level rise;
- Obtain feed back on the assessment;
- Identify information gaps;
- Discuss potential management strategies to respond to climate change and sea level rise; and
- Identify mechanisms to incorporate potential strategies into coastal planning in the Philippines.

1.2.2 Venue and arrangements

The workshop was held on 9-10 December 1998 at Costabella Tropical Beach Resort, Mactan Island. Primary coordination and secretariat functions were provided by the Philippines

Department of Environment and Natural Resources (DENR), Region 7. The workshop facilitators were Amuerfino (Momoy) Mapalo (DENR), Rick van Dam (ERISS, Jabiru, Australia), Doug Watkins (Wetlands International, Canberra, Australia).

1.2.3 Participants

The workshop participants included local Barangay captains from several of Olango's Barangays, representatives of the Lapu Lapu City Government, the DENR, the Philippines Tourism Association (PTA), the University of San Carlos, the Philippines Coastguard, the Philippine Atmospheric and Astronomical Services Administration (PAGASA), the Department of Public Works and Highways (DPWH), and the CRMP. Of the 45 participants invited, 38 attended (see Attachment 1.1).

1.2.4 Structure and content

The workshop schedule is described in detail in Attachment 1.2.

Opening addresses were heard from a representative of the Mayor of Lapu Lapu City, and from Jeremias L. Dolino, the Regional Executive Director of DENR Region 7 (Attachment 1.3).

Each participant and the organisation they represented were introduced. The facilitators then gave an overview of the project, describing how and why it was established, why Olango was chosen, and the expected outputs of both the project and the workshop.

Following this, keynote presentations were given:

- CRMP Concerns and Approaches in Olango Island, presented by **Dr Catherine Courtney**, CRMP Chief of Party:

  (focussing on work done on a coastal environmental profile, alternative livelihood options, development of a GIS and a resource map for Olango)

- Coastal vulnerability assessment: assessing vulnerability to climate change and sea level rise, presented by **Dr Rick van Dam**, ERISS (van Dam 1999):

  (focussing on the process of coastal vulnerability assessment, with a simplified example from the Alligator Rivers Region, Australia)

- Predicted regional climate change and sea level rise scenario, presented by **Mr Momoy Mapalo**, DENR:

  (focussing on predicted effects of global warming globally, in tropical Asia and for small islands; introducing the predicted sea level rise of 30 cm by year 2030 and 95 cm by 2100, for Olango Island)

- Likely impacts of climate change and sea level rise, presented by **Dr Rosa Perez**, PAGASA:

  (focussing on climatological data; introducing the proposed National Action Plan for climate change and sea level rise; effective in raising the participants' awareness of the problems that climate change and sea level rise could pose)

The remaining day and a half was allocated to discussion of the preliminary vulnerability assessment.

- Discussion on attributes of Olango and relevant forcing factors:

  Mr Mapalo outlined the major attributes of Olango Island, grouped as i) geophysical, ii) biological and iii) socio-economic, cultural and political. Several more were added to this list following discussion. He then outlined the major natural and anthropogenic *forcing factors* (coastal hazards) acting upon these attributes. Again, following discussion, particularly with people familiar with Olango Island, several other anthropogenic forcing factors were added. The majority of these dealt with unsustainable natural resource utilisation, and will be grouped under such a heading in the final project report. Along with the predicted climate change scenario outlined earlier in the day, this summary provided the foundation for the sessions to assess the vulnerability of Olango Island to current forcing factors and predicted climate change and sea level rise.

- Discussion on current vulnerability and vulnerability to climate change and sea level rise:

  The participants divided into three groups according to their expertise and were assisted by the facilitators. Each group was to discuss and assess vulnerability to either the geophysical, biological or socio-economic and cultural attributes of Olango Island. The most common approach, given the limited time frame, was to construct a matrix of forcing factors versus attributes, and to rank each attribute's susceptibility to each forcing factor. This provided a preliminary indication of what attributes were going to be more vulnerable to i) current forcing factors or ii) climate change and sea level rise. The outcomes of each group discussion were presented to all of the workshop participants by a nominated group leader.

- Identification of current response to coastal hazards on Olango Island:

  The aim of this discussion was to identify all major planning and policy documents, infrastructure and monitoring programs that exist for Olango Island which in some way serve to minimise or address current issues/coastal hazards. In detail, the purpose was two-fold:

  - to identify mechanisms for incorporating management responses to climate change and sea level rise; and
  - to identify whether or not some current responses already help to protect various attributes of Olango from impacts of climate change and sea level rise (eg. formation of a buffer zone around the Ramsar-listed sanctuary would also serve to protect parts of the island from increased storminess and storm surge).

- Development of possible management responses to climate change and sea level rise:

  The participants again divided into the three groups. The idea was to focus on those attributes that had been determined the previous day to be most vulnerable to climate change and sea level rise. For the geophysical group this involved focussing on topography and hydrology. The other two groups (biological and socio-economic and cultural) had considerably more attributes to consider. The discussion lasted approximately 90 minutes. A plenary session was held to hear the group output presentations.

- Presentation of each group's proposed management strategies:

  These involved identification of mitigation/adaptation/protection measures, monitoring requirements, and in some cases, responsible agencies. Each presentation was followed by approximately 20 minutes of discussion on the

outcomes and their feasibility and practicality. The outcomes of this final session will be used to construct the latter sections of the vulnerability assessment of Olango Island.

The workshop was formally closed at around 4 pm on 10 December.

A field trip to Olango Island was undertaken by several participants on 11 December. This provided opportunities to view migratory shorebirds, local people harvesting natural resources and mangrove plantations and to better appreciate many of the issues raised during the workshop.

1.3 Outcomes and products from the Workshop

1.3.1 Current vulnerability and vulnerability to climate change and sea level rise (see Attachment 1.4)

For the geophysical group, the major attributes of concern were topography and hydrology. Both were considered extremely vulnerable to climate change and sea level rise, while hydrology was considered to be more vulnerable to current forcing factors than topography. Topography would be altered by sea level rise and coastal erosion from more intense storminess and storm surge. Hydrology was vulnerable due to saltwater intrusion of the groundwater lens as a result of sea level rise and storm surge, but also through over-extraction. A potential positive benefit of climate change (increased rainfall) was an increase in the fresh groundwater lens, and therefore, water supply. The biological group considered mangrove communities, coral reefs and fish communities very vulnerable to climate change and seal level rise. They also raised the issue of terrestrial vegetation being at risk due to saltwater intrusion of the groundwater. Hydrology/groundwater issues crossed all three boundaries of attributes. Freshwater supply, fishing and other livelihood activities were seen to be the most vulnerable socio-economic attributes of Olango, both currently and to predicted climate change and sea level rise.

1.3.2 Identification of current response to coastal hazards on Olango Island

The major government and non-government agencies involved with Olango Island are Lapu Lapu City Government DENR, CRMP, University of San Carlos, the Philippines Coastguard and the Department of Education, Culture and Sport (DECS). Lapu Lapu City Government outlined its draft management plan for Olango Island, with particular emphasis on land use, and the CRMP outlined its proposed management plan for sustainable management of the coastal resources. DENR presented its plans for management of the Sanctuary. Other major documents, programs and agencies were identified

1.3.3 Presentation of proposed management strategies (see Attachment 1.5)

These involved identification of mitigation/adaptation/protection measures, monitoring requirements, and in some cases, responsible agencies. Each presentation was followed by approximately 20 minutes discussion on the outcomes and their feasibility and practicality. There was a definite emphasis on monitoring programs to better understand many of the natural processes (eg. sand movement, water currents, vegetation dynamics) occurring on and around Olango. The major issue of concern appeared to be that of fresh water supply and

measures that could be taken to minimise both current pressure on the groundwater lens and also that potentially imposed by climate change and sea level rise. In some cases there was conflict or potential conflict between plans; potential solutions were discussed.

1.3.4 Major outcomes

- The participants, incorporating people from a wide range of relevant councils/agencies/organisations, developed an exceptional understanding of the concepts of climate change and sea level rise, and coastal vulnerability assessment. It is hoped that they will be able to apply this knowledge in further projects of a similar nature in the future.
- There was an overall acceptance that the issue of climate change and sea level rise is in fact real, and that it needs to be incorporated into decisions about the future management of Olango Island.
- The CRMP is keen to incorporate the findings of the Olango Island vulnerability assessment into its larger coastal resource management plan. Thus, there is a means by which the issue of climate change and sea level rise will continue to be addressed and considered.
- PAGASA is keen to utilise the Olango Island vulnerability assessment as an example of a small-scale local assessment, in its National Action Plan for climate change and sea level rise. It recognises the need for more such assessments.
- The workshop participants provided a great deal of information that will be incorporated into the final vulnerability assessment report. Thus, the vulnerability assessment will reflect the concerns of those who best know, and care most for, the study area.
- The final vulnerability assessment should be able to serve as a good model for other such assessments throughout the Asia-Pacific region.

References

Van Dam, R. 1999. Coastal vulnerability assessment: assessing vulnerability to climate change and sea level rise. ERISS Internal Report 313, Jabiru, Australia.

List of Attachments

1.1 List of participants

1.2 Workshop program

1.3 Opening address of J. Dolino (DENR)

1.4 Outputs from breakout groups: forcing factors versus attributes

1.5 Outputs from breakout groups: proposed management strategies to mitigate impacts

1.6 Newspaper articles in connection with the workshop

Workshop 2

Vulnerability of the Yellow River Delta, China, to Climate Change and Sea Level Rise

Beijing Grand Hotel, Beijing, China

22 January 1999

2 Workshop 2

2.1 Introduction

2.1.1 Background of the project

The Asia Pacific Network for Global Climate Change Project titled "Vulnerability Assessment of Major Wetlands in the Asia Pacific to Climate Change and Sea Level Rise" is coordinated by the Environmental Research Institute of the Supervising Scientist (*eriss*), an Australian government research institute based in Jabiru, northern Australia, and Wetlands International – Oceania, a NGO based in Canberra.

The project has included two sites: the Yellow River Delta, China and Olango Island, Philippines. The China State Oceanic Administration and Wetlands International – China Program are responsible for the coordination and implementation of the sub-project Vulnerability Assessment of the Yellow River Delta. The draft report on the vulnerability assessment of the Yellow River Delta (YRD) was available at the end of December 1998.

The vulnerability assessment emphasized the likely impact of global change issues, especially those associated with climate change and sea level rise, and provided input to a number of global research programs and links to national science policies. The aim of this project was to develop an approach to link the research, planning and environmental management requirements for the coastal areas of the YRD that could be affected by climatic change and sea level rise.

The recommendations and suggestions from the report will provide a sound basis for governmental agencies and community groups to be effectively involved in coastal zone management in the future.

2.1.2 Description of the Yellow River Delta

The Yellow River Delta (YRD) is located in the northeast Shandong Province (118°03′E to 119°20′E and 37°20′N to 38°20′N), facing the Bohai Sea in the north and bordering the Laizhou Bay in the east. Dongying Municipality, Shandong Province, is located within the YRD, although the delta covers an area larger than the Dongying municipality.

The study area for the project is the "modern" YRD within the Dongying municipality. It has an area of about 6,000 km^2, and a population of 1.64 million (at the end of 1995). The climate is warm-temperate continental monsoonal, with an average annual temperature of 11.9°C.

With its vast area, abundant wetland vegetation and aquatic organisms, as well as a relatively sparse human population, the YRD provides good habitat for breeding, migrating and wintering birds. Waterbirds include: 37 species of shorebirds with annual numbers of around 300,000, plus 10 species of cranes, including 2000 individuals of Common Crane (*Grus grus*) and 200 over-wintering individuals of Red-crowned Crane (*Grus japonensis*). In total, 30 species of Anatidae with a wintering Whooper Swan population of 2000 individuals from mid-November to mid-April and 30 species of other waterbirds have been recorded.

2.2 The Workshop

In accordance with the project workplan, a workshop on Vulnerability Assessment of the Yellow River Delta was successfully held at the Beijing Grand Hotel on 22 January, 1999. It was co-organized by Wetlands International-China Program and the China State Oceanic Administration.

2.2.1 Major objectives

The main objectives of the workshop were to:

- Increase awareness of local and national decision-makers of the potential impact of climate change and sea level rise;
- Introduce the process of coastal vulnerability assessment to local and national decision-makers;
- Present and disseminate the results of assessment of the vulnerability of the yellow river delta to climate change and sea level rise;
- Obtain feedback on the vulnerability assessment from the workshop participants.

2.2.2 Venue and arrangements

Following discussion between the Wetlands International-China Program and the State Oceanic Administration, the workshop venue was identified as the Beijing Grand Hotel, 20 Yumin Dongli, Deshengmenwai, Xicheng District, Beijing.

The preparation for this workshop started in early December 1998. As a Chinese government agency, the State Oceanic Administration was responsible for sending the workshop notification to all the Chinese participants who had been identified jointly by the State Oceanic Administration and Wetlands International – China. Wetlands International – China Program, undertook all logistic arrangements.

The workshop program was developed upon consultation between the State Oceanic Administration, Wetlands International – China and – Oceania Programs and ***eriss***, and is shown in Attachment 2.1.

A summary of the workshop expenditure is provided in Attachment 2.2.

2.2.3 Participants

Thirty-seven participants attended the workshop (see Attachment 2.3). The participants represented the State Oceanic Administration, State Forestry Administration, Chinese Academy of Sciences, Ministry of Agriculture, State Environmental Protection Administration, China Meteorological Administration, research institutions, Wetlands International, as well as the Nature Reserve and local government agencies in the YRD.

2.2.4 Structure and content

The morning session was chaired by Mr. Sun Shuxian, Deputy Director-General, Department of Sea Management, the State Oceanic Administration. Mr. Lu Shouben (former Director-General, Department of Sea Management, the Sate Oceanic Administration), Dr. Rick van Dam (Research Scientist from ***eriss***)(see Attachment 2.4), Mr. Chen Kelin (Coordinator, Wetlands International-China Program) made opening speeches.

Dr. Rick van Dam then gave an excellent and very impressive lecture to the participants on the project background, the Olango Island Vulnerability Assessment Workshop, the current workshop objectives, the general process of coastal vulnerability assessment, and the experience of the Alligator Rivers Region (Australia) Vulnerability Assessment. After tea break, Mr. Li Peiying, a researcher from the First Institute of Oceanography, introduced the YRD Vulnerability Assessment project report details to the participants.

The afternoon session was chaired by Mr. Lu Shouben, former Director-General, Department of Sea Management, the State Oceanic Administration. After Mr. Li Peiying completed his presentation on the project report, the workshop participants entered a long discussion session. Many of the participants contributed comments and suggestions on the project. It was not until all relevant issues had been discussed that the workshop ended at 18:00h.

2.2.5 Major points of discussion

The participants highly appreciated the project report and added many comments and recommendations during the workshop discussion session. After discussion, the participants understood that the project mainly focused on climate change and sea level rise;

Major points of discussion included:

- The project report was generally successful and the recommendations made in the report would be useful and important for the future coastal management of the YRD and elsewhere in China;
- The project has provided a sound technical model and assessment process for similar analyses in China;
- As the vulnerability assessment of the YRD had not been fully elaborated in detail, further analysis was suggested;
- Some participants pointed out the artificial forcing factors could exert more influences than the forcing factors of climate change and sea level rise.
- It was suggested that the project report attach more attention to coastal wetlands than the whole area of the Yellow River Delta;
- It was suggested that the project outputs should be incorporated into the local economic development and environmental management plan;
- It is necessary to establish a dynamic environmental monitoring and management system so that the environmental security of the Yellow River Delta can be ensured;
- It was suggested to improve the public awareness of the environment and sustainable development so that recommendations made in the report can be more readily implemented.

2.3 Major Outcomes

- The YRD project results were successfully presented and disseminated;
- Awareness of local and national decision makers about vulnerability assessment and the potential impacts of climate change and sea level rise was greatly improved;
- Useful feedback on the assessment and the report in general was obtained, and will be integrated into the final vulnerability assessment report;
- Potential management strategies to respond to climate change and sea level rise, and their associated implications, were discussed;
- Mechanisms to incorporate potential strategies into coastal planning in China were further discussed.

List of Attachments

2.1 Workshop program.

2.2 Summary of workshop expenditure.

2.3 List of participants.

2.4 Opening Speech by Dr. Rick van Dam, Research Scientist, ***eriss***.

Attachment 1.1

List of participants for the Olango Island Vulnerability Assessment

ATTACHMENT 1.

Workshop on Vulnerability Assessment of Olango Island to Climate Change and Sea Level Rise
Costabella Tropical Beach Hotel, Mactan Island, Phils.

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Attachment 1.2

Olango Island Vulnerability Assessment Workshop program

WORKSHOP SCHEDULE

DAY 1 09 December 1998

Opening Program

9:00 A.M. Invocation
Philippine National Anthem
Welcome Address ..... *Hon. Ernest Welgel, Jr.*
Mayor, Lapulapu City
Intermission Number
Message ..... *Engr. Jeremias L. Dolino*
Regional Executive Director
DENR, Region 7
Introduction of Participants

Workshop Proper

10:00 A.M. Overview
Expectations and Output

CRMP Concerns and Approaches in Olango Island
Dr. Catherine Courtney, CRMP Chief of Party

Rationale and Objectives of the Vulnerability Assessment (VA) Project and Description of the VA Framework and International Effort
Expected Regional Climate Change and Sea Level Rise Scenario
VA Outcomes: The ARR Experience and its Link to Olango VA

12:00 NN LUNCH

1:00 P.M Creation of Working Groups
Olango Attributes Vulnerable to Climate Change and Sea Level Rise
Vulnerability Forcing Factors

Likely Impacts of Climate Change and Sea Level Rise
Dr. Leonardo Amadore, PAGASA Manila Director

Identification of Data Sources

3:00 P.M. BREAK

3:30 P.M. Vulnerability of Olango to Forcing Fa[illegible]s
Vulnerability of Olango to Predicted Climate Change And Sea Level Rise
5:00 P.M. Group Output Presentation

6:00 P.M. DINNER and COCKTAILS

DAY 2 10 December 1998

Workshop Cont'n

8:00 A.M. Identification and Description of Management Regimen: Infrastructure
Policy and Regulation
Management Plans

Identification and Description of Monitoring Schemes
Group Output Presentation

10:00 A.M. BREAK

Development of Possible Management Responses to Climate Change and Sea Level Rise
Identification of Further Management and Monitoring Requirements
Group Output Presentation

12:00 NN LUNCH

1:00 P.M. Identification of Adaptive Management
Identification of Data Gaps, Weaknesses and Priorities For Further Research Work
Group Output Presentation

3:00 P.M. BREAK

Closing Program

3:30 P.M. General Synthesis of the Workshop
Impressions from Participants
Closing Remarks ..... ***For. Florendo Barangan***
Regional Technical Director
DENR-ERDS, Region 7
Distribution of Certificates

Attachment 1.3

Opening address of J. Dolino (DENR) at Olango Island Vulnerability Assessment Workshop

ATTACHMENT 3.

MESSAGE OF DENR-7
REGIONAL EXECUTIVE DIRECTOR JEREMIAS L. DOLINO
ON WORKSHOP ON THE VULNERABILITY ASSESSMENT
OF OLANGO ISLAND TO CLIMATE CHANGE
AND SEA LEVEL RISE

DECEMBER 09, 1998
COSTABELLA RESORT HOTEL, MACTAN ISLAND
CEBU, PHILIPPINES

LAPULAPU CITY MAYOR ERNEST WEIGEL, JR, DR. CATHERINE COURTNEY, CRMP CHIEF OF PARTY, OUR DISTINGUISHED WORKSHOP FACILITATORS, DR. DOUGLAS WATKINS FROM THE WETLANDS INTERNATIONAL, DR. RICK VAN DAM OF ERISS, MR. AMUERFINO MAPALO OF DENR-7, GUESTS, PARTICIPANTS, FRIENDS, LADIES AND GENTLEMEN, GOOD MORNING.

FIRST OF ALL, I WOULD LIKE TO THANK THE ASIA PACIFIC NETWORK FOR GLOBAL CLIMATE CHANGE FOR SPONSORING THIS REMARKABLE WORKSHOP ON THE VULNERABILITY ASSESSMENT OF OLANGO ISLAND TO CLIMATE CHANGE AND SEA LEVEL RISE. INDEED THIS A GREAT HELP IN LETTING THE PUBLIC KNOW ON THESE IMPORTANT CONCEPTS.

A CNN REPORT THRU TOM KARL OF THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION SAYS THAT

SINCE 1990 THE EARTH'S AVERAGE TEMPERATURE HAS RISEN MORE THAN 1 DEGREE FAHRENHEIT, WITH LAND TEMPERATURE RISING 20 % FASTER THAN THE OCEAN TEMPERATURE. LAND TEMPERTURES RISE FASTER BECAUSE THEY RESPOND TO EXTERNAL FORCES, LIKE GREEN HOUSE GASES. MANY SCIENTISTS BELIEVE THAT CARBON DIOXIDE AND OTHER GASES RELEASED INTO THE ATMOSPHERE BY INDUSTRIAL ACTIVITIES ARE INCREASING THE EARTH'S TEMPERATURE BY TRAPPING HEAT FROM THE SUN.

STUDIES SUGGEST THAT A 5 TO 10 % CHANCE, THE HUMANS ARE NOT CONTRIBUTING TO GLOBAL WARMING. WITH THIS DATA, WE CAN EXTRAPOLATE THAT MOST OF US ARE POTENTIAL DEVASTATING FACTOR TO GLOBAL WARMING. GLOBAL WARMING EVENTUALLY RESULTS TO ALTER THE CLIMATIC CHEMISTRY OF THE ATMOSPHERE AND SEA LEVEL RISE.

NEVERTHELESS, OUR CONCERTED EFFORT ON THIS IMPORTANT MATTER, HOPEFULLY, MAY NOT BE TOO LATE. OG MANDINO HAS THIS TO SAY :

" EVERY PERSON WHO WINS IN ANY UNDERTAKING MUST BE WILLING TO BURN HIS SHIPS AND CUT ALL SOURCES OF RETREAT, " ONLY BY SO DOING ONE CAN BE SURE OF MAINTAINING THAT THE STATE OF MIND

KNOWN AS A BURNING DESIRE TO WIN, WHICH IS ESSENTIAL TO SUCCESS. HE FURTHER SAYS THAT NO ONE IS READY FOR A THING UNTIL HE BELIEVES HE CAN ACQUIRE. THE STATE OF MIND MUST BE BELIEF, NOT MERE HOPE OR WISH. OPEN-MINDEDNESS IS ESSENTIAL FOR BELIEF. CLOSED MINDS DO NOT INSPIRE FAITH, COURAGE, OR BELIEF. NATURE WRAPS UP IN THE IMPULSE OF STRONG DESIRE, ' THAT SOMETHING', WHICH RECOGNIZE NO SUCH WORD AS ' IMPOSSIBLE,' AND ACCEPTS NO SUCH REALITY AS FAILURE ".

THIS IS NO EASY TASKS. A HERCULENAN TASK IS AHEAD OF US. WE SHALL NEED FULL SUPPORT OF THE CHALLENGES FACING THE WORLD COMMUNITY IN THE NEXT MILLENIUM. NONE WILL BE MORE FORMIDABLE THAN THE FEAT OF A SUSTAINABLE EQUILIBRIUM AMONG ECONOMIC GROWTH, SOCIAL EQUITY, POVERTY REDUCTION, AND THE SOUND AND HEALTHFUL PROTECTION OF THE EARTH'S RESOURCES AND LIFE SUBSISTENCE SYSTEMS. WE SHOULD AIM UP TO BE A WINNER IN THIS BATTLE TO PRESERVE OUR ENVIRONMENT LIKE OUR FOREFATHERS WHO FOUGHT FOR OUR INDEPENDENCE 100 YEARS AGO.

MABUHAY UG MAAYONG PASKO SA TANAN.

C: eddie/rpao

Attachment 1.4

Outputs from breakout groups at Olango Island Vulnerability Assessment Workshop:

Forcing Factors versus Attributes

ATTACHMENT 4.

OUTPUTS FROM THE THREE WORKING GROUPS

Vulnerability Assessment of the Geo-Physical on Olango Island.

Forcing Factors / Attributes	Monsoon	Typhoons	Storm Surge	El Niño	Population Growth	Coral Extraction	Sand Extraction	Groundwork Extraction
Topography	O	–	–	O	O	–	–	O
Hydrology	+	+	–	–	–	O	O	–
Geology	O	–	–	O	O	–	–	O
Water Current	O	O	O	O	O	O	O	O
Tidal Region	O	–	–	O	O	O	O	O

Legend: Negative –
None O
Positive +

Vulnerability Assessment of the Geo-Physical group on Olango to 30 cm Sea Level Rise, Typhoons, Rainfall and Temperature Increases

Attributes	Sea Level Rise of 30 cm	Typhoon	Increased Rainfall	Increased Temperature
Topography	–	–	–	O
Geology	O	–	O	O
Hydrology	–	–	–	–
Water Current	O	O	O	–
Tidal Region	–	–	O	O

Legend: Negative – Bad
None O
Positive + Good

Vulnerability Assessment of the Socio-Economic Group on Olango Island.

Attributes	FORCING FACTORS					
	Monsoon	Typhoon	Storm Surges	El Niño	Climate Change	Sea Level Rise
Population	–	–	–	O	O	–
Transportation	–	–	–	O	–	–
Fishery	–	–	–	O	O	O
Tourism	–	–	–	O	–	–
Sanctuary	–	–	–	O	–	–
Livelihood	–	–	–	O	–	–
Power	O	–	O	O	O	O
Agriculture	O	–	O	–	–	O

Legend: Negative – Bad
None O
Positive + Good

Vulnerability Assessment of the Biological Group on Olango Island.

Biological Attributes	Degree of Disturbances	VULNERABILITY			
		Climate Change	Sea Level Rise	Storminess	Human Disturbances
Fishery	Very high	High	✓	✓	✓
Corals	Very high	High	X	✓	✓
Seagrass	Very high	Low	X	✓	✓
Mangroves	Low	High	✓	✓	X
Land Vegetation	Very high	High	✓	✓	✓
Sanctuary	Low	High	✓	✓	X

Legend: Vulnerable ✓
Not vulnerable X

Attachment 1.5

Outputs from breakout groups at Olango Island Vulnerability Assessment Workshop:

Proposed management strategies to mitigate impacts

ATTACHMENT 5.

Proposed Management Strategies to Mitigate Impacts of Climate Change and Sea Level Rise from the Geo-Physical Group

Attributes	Major Impact	Monitoring Requirements	Management Strategies
Topography	Coastal Erosion	Water Current Study Sand movement Tidal Region	Construction of wave breakers Review policies on mangrove establishment Ban the harvesting of erosion resistant vegetation Ban the extraction of soil along shoreline Intensify information and education campaign
Hydrology	Saltwater Intrusion	Salinity monitoring Transmissibility monitoring Rainfall recharge	Regulate groundwater extraction Intensify information and education campaign Review proposal to close the bays Installation of rain collectors Declare area over freshwater lens as protected

Proposed Measures to Mitigate Impacts of Climate Change and Sea Level Rise On the Socio-Economic Attributes of Olango Island from the Socio-Economic Group.

Vulnerable Attributes	Proposed Mitigating Measures
Coastal Population	Retreat for about 10 m from the highest tide level Toilets must be installed away from freshwater source
Agriculture/Livelihood	Protect and accommodate Shift to other alternatives
Transportation/Road Network	Protect and elevate road level Retreat for about 10m from highest tide level
Freshwater Distribution System	Protect Implement Water Resources Center recommendation

Proposed Measures to Mitigate Impacts of Climate Change and Sea Level Rise on the Biological Attributes of Olango Island from the Biological Group

Vulnerable Attitude	Proposed Measures
Fishery	Shift to other livelihood Intensify law enforcement Intensify information and education campaign Establish fish sanctuaries Install fish attraction devices Monitor reef fish biomass
Coral Reefs	Intensify proper solid waste disposal Intensify law enforcement Intensify information and education campaign Encourage "reef tourism" Identify more recreational dive sites Monitor reef destruction
Seagrass Beds	Intensify information and education campaign Try seagrass planting Monitor seagrass cover
Mangroves	Enrichment planting in natural stands Intensify information and education campaign Monitor mangrove cover, growth and distribution
Land Vegetation	Enhance planting of salt tolerant species Encourage planting of fruit trees Intensify information campaign Revegetate water catchment area
Sanctuary	Intensify mangrove cluster planting around Nature Center Intensify information campaign Update management plan Develop community based ecotourism and livelihood options Monitoring bird populations, zoobenthos, storm Surges

Proposed Strategies and Measures to Mitigate Impacts of Climate Change and Sea Level Rise

1. Construction of wave breakers.
2. Review policies on mangrove plantation establishment.
3. Ban the harvesting of erosion resistant vegetation.
4. Ban the extraction of sand along shoreline.
5. Intensify information and education campaign.
6. Formulate doable management scheme on freshwater extraction.
7. Encourage families to install rainwater collectors.
8. Revegetate the area above the freshwater lensl and declare it as a protected area.
9. Review the proposal to close the bays.
10. Ban the use of fertilizer and insecticide in the freshwater lens area.
11. Review existing policy on aquifer exploitation.
12. Involve the community in the protection of the water source.
13. Integrate the distribution of water into the plans of the LGUs.

Some Attributes that require some monitoring and study.

1. Water current
2. Sand movement/displacement
3. Tidal region
4. Groundwater salinity and transmissibility.
5. Limestone porosity

Attachment 1.6

Newspaper articles in connection with Olango Island Workshop

Climate change, higher seas mean more storms, land loss: scientist

By Liberty A. Pinili
Sun.Star Staff Reporter

EVACUATION of coastal communities, more typhoons and land loss are among the potential effects of a rise in sea level and climate change.

Dr. Rick Van Dam of the Environmental Research Institute of the Supervising Scientist in Australia said these sound apocalyptic because "they are still uncertain."

During the seminar on the vulnerability assessment of Olango island to climate change and sea level rise the other day, Ed Walag of the University of San Carlos engineering department raised uncertainties on the effects of the two phenomena.

But Van Dam stressed they are not making "predictions."

"These are scenarios," he added, which should be used as basis for the government's land use and development planning.

He said solutions to the potential effects of sea level rise and climate change should be incorporated in the government's coastal resource management plans.

These incidents may or may not occur, but appropriate programs to address them have to be in place, he said.

Action plan

There should also be a continuous monitoring on the indications of climate change and sea level rise. If there is a need, the existing management plan may be modified, he added.

The seminar was initiated by the Asian Network for Global Climate Change, Wetlands International, Eriss and the Department of Environment and Natural Resources.

In an interview, Van Dam said the Philippines—being an archipelago—is vulnerable to the effects of climate change and sea level rise.

Dr. Rosa Perez, assistant weather services chief of the weather bureau Pagasa said the inter-agency committee on climate change has drafted a national action plan on climate change.

The plan will be sent to the national task force on sustainable development and then to the President for approval.

The National Map Resources Authority, through its station at the Cebu city port area, noted a rise in the sea level of .027 meter in the 1970s to .069 meter in the previous decade.

The Intergovernmental Panel on Climate Change projected a global sea level rise of six millimeters a year or an in-crease of 16 to 95 centimeters by the year 2100.

The rise in sea level occurs because of several factors, among which is the melting of glaciers and icebergs due to global warming.

Plan ahead

Global warming is caused by the increasing emission of greenhouse gases: nitrogen oxides, carbon dioxide, methane and chloroflourocarbons. These greenhouse gases are caused mainly by burning of fossil fuels by industries.

Global warming, according to international studies, will cause extreme climate changes—abnormal rainfall, more droughts and stronger typhoons.

Perez said that although indications of climate change and sea level rise can be observed significantly only by the year 2030, the government should plan ahead.

"When are we going to start planning or doing something? Not when it is already too late," she said.

In her presentation on the effects of sea level rise, Perez said the phenomenon will cause "another Ormoc."

More than 4,000 people died in a flood in Ormoc city in 1991.

"But I don't want to alarm people, I want to move to action," she said.

Other data compiled by Pagasa:

- Hilutungan channel is one of the areas in the country considered tsunami-prone.

Cebu experienced a three-meter high tsunami during Typhoon Ruping. This may occur again if extreme climate changes occur and when there is a significant rise in the sea level.

- In the entire country, a sea level rise of up to two meters will affect 129,114 hectares of coastal areas by the year 2030.

Walag, however, said that while the scenario on climate change and sea level rise sounds serious, all of these are still uncertain.

Van Dam said the scenario they have cited ought to serve as a precaution. "Even in the absence of sufficient data, you need to err on the side of caution."

Other resource speakers during the seminar were Doug Watkins of Wetlands International and Dr. Catherine Courtney of the Coastal Resource Management Program.

SUN.STAR DAILY, SATURDAY 12 DECEMBER 1998, P. 26.

FLOODED BARRIO. **A big portion of Barangay Cambaro (above), among other places in Mandaue city, got flooded yesterday due to continuous rains brought by typhoon Norming as the storm passed by Cebu.** *(SUN.STAR FOTO/ALLAN L. CUIZON)*

CLIMATE CHANGE CONFAB SUGGESTS

Gov't should consider pullout of residents in Olango island

Elimination of illegal fishing also recommended

By Liberty A. Pinili
Sun.Star Staff Reporter

LAPU-LAPU

The relocation of coastal communities in Olango island that might be affected if the sea level rises should be included in the government's plans.

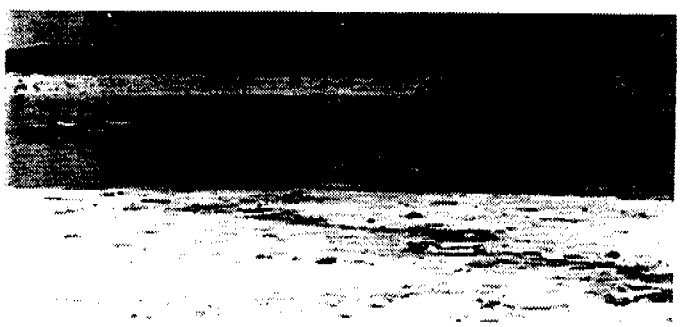
This is one of the strategies named by participants of a seminar on vulnerability assessment of Olango to climate change and sea level rise.

The other strategies are:

- Eliminating illegal fishing, and
- Implementing an effective coastal management program in the island.

Australian speakers Rick Van Dam of Environment Research Institute of the Supervising Scientist, and Doug Watkins of Wetland International said Olango will be affected by an increase in sea level.

■ Slight increase in sea level noted by National Map Resources Authority for the past two decades
■ Olango, other small islands in the country, will be affected by phenomenon although significant changes in sea level will occur only in the year 2030



EVACUATION. **Olango island faces grave threat posed by an increase in sea level.** *(SUN.STAR FILE FOTO)*

Sea level rise occurs due to several factors, among which is the melting of glaciers and icebergs due to global warming.

Global warming is caused by the increasing emission of greenhouse gases: nitrogen oxides, carbon dioxide, methane and chlorotlourocarbons (CFCs). These greenhouse gases are caused mainly by burning of fossil fuels by industries.

The Intergovernmental Panel on Climate Change IPCC projected a global sea level rise of 6 millimeter a year or an increase of 16 to 95 centimeters by the year 2100.

In Cebu city, a slight increase in the sea level has been noted by the National Map Resources Authority for the past two decades.

Van Dam and Watkins said Olango island, as well as other small islands in the country, will be affected by the phenomenon. They expect significant changes in the sea level only in the year 2030.

This was the reason why the Asia Pacific Network for Global Climate Change initiated the vulnerability assessment of Olango.

Ed Walag of the University of San Carlos Engineering Department said a vulnerability assessment of other small islands in the country should be conducted as well.

Olango's water sources, sanctuary at risk from sea level rise: DENR

By Liberty A. Pinili
Sun. Star Staff Reporter

OLANGO's meager water resources will further be depleted due to the rise in sea level, said Armerfino Mapalo of the Department of Environment and Natural Resources 7 environmental research division.

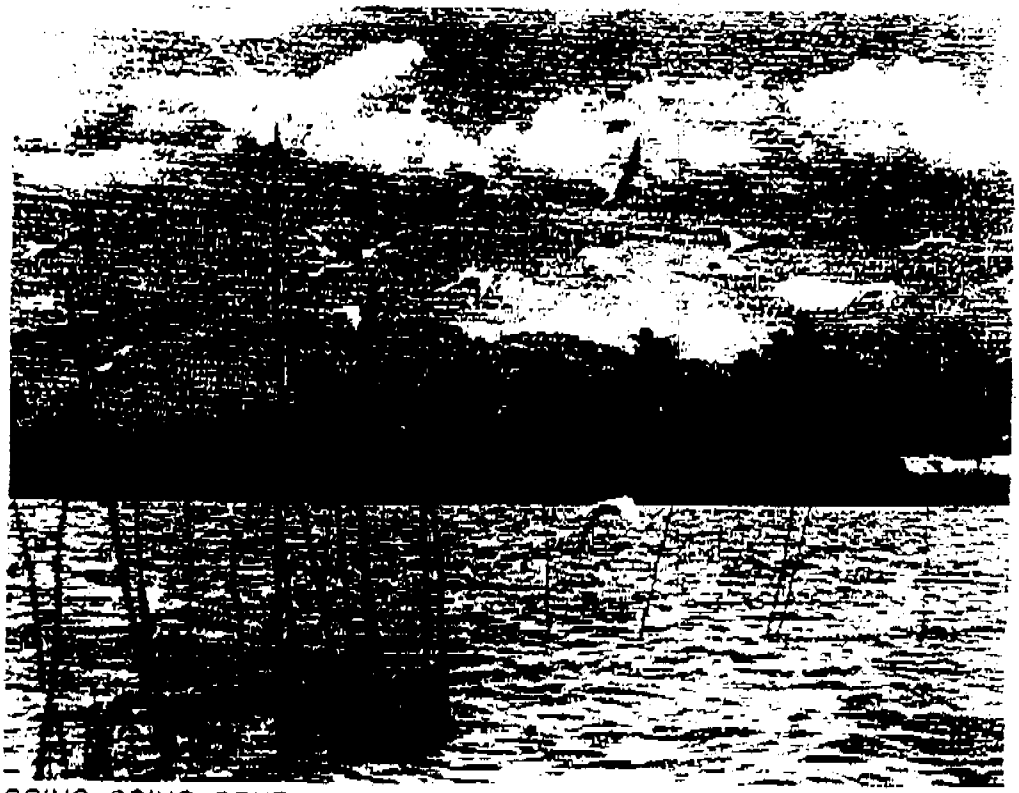
Mapalo said the predicted sea level rise of one meter by the year 2100 will worsen saltwater intrusion into the island's groundwater aquifer.

The island's wetlands, known internationally as one of the destinations of migrating birds, will also be underwater due to sea level rise. This means birds would no longer be able to roost on the wetlands.

"Just a rise of 15 to 95 centimeters in sea level as predicted, and with its present tidal range of one meter, can raise the sea at a level that could inundate more than half of its entire land area," Mapalo said.

The sea level rise predictions were made by the Intergovernmental Panel on Climate Change. The highest rate of sea level rise is expected by the year 2100.

Based on these predictions, Mapalo said only the northern and central parts and the southern coast near the bird sanctuary will be slightly above water.



GOING, GOING, GONE. **Scientists predict these migratory birds which periodically visit the Olango bird sanctuary may soon have no wetlands to roost on due to sea level rise.**

(SUN.STAR/...)

As to the island's water resources, Mapalo noted that "the island has no rivers nor streams to provide freshwater to recharge its groundwater reserve and freshwater eos."

He said the island's freshwater supply becomes "critical" during high tide and dry season.

This is because the recharging of fresh groundwater aquifers depends mostly on rainfall. During the dry months, the rate of extraction of freshwater through deep wells is greater than the rate of recharge.

This results to saltwater intrusion, a condition that is also worsened by sea level rise.

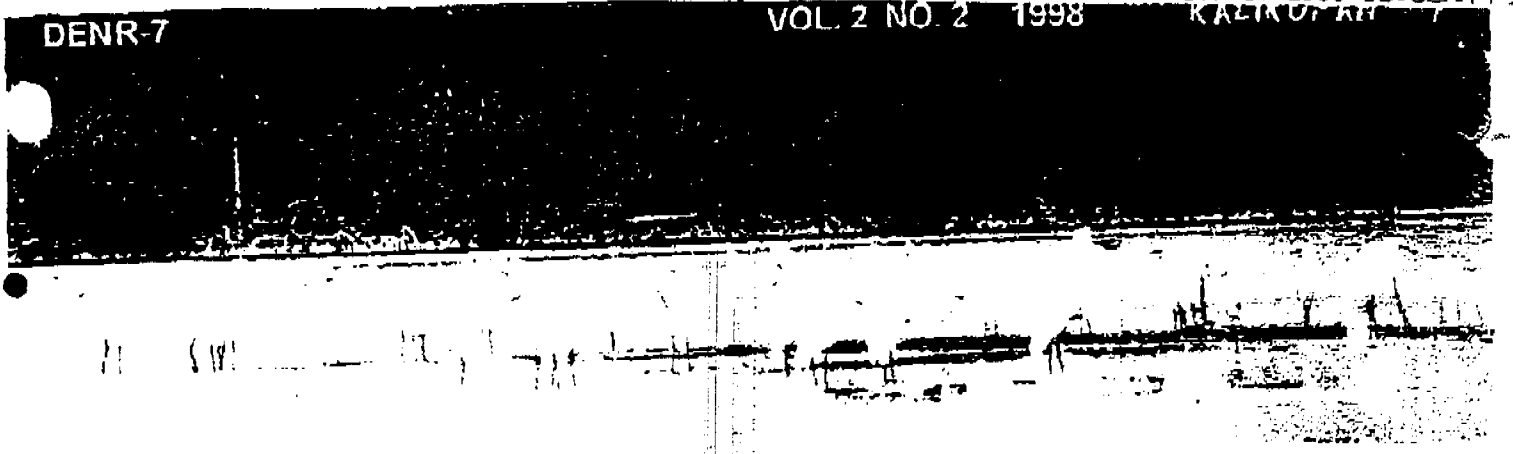
Mapalo conducted a study on the island and its natural resources and how it would be affected by climate change.

The study prompted the holding of a workshop last month to identify ways that will address the effects of climate change and sea level rise on the island.

During that [illegible] participants — [illegible] Lapu-Lapu city and [illegible] officials — agreed that an effective coastal management program should be established for the island.

The program should include relocation plans for coastal communities that might be affected [illegible]

DENR-7 VOL. 2 NO. 2 1998



OLANGO ISLAND:

assessed of its vulnerability to climate change and sea level rise

The major wetlands of the Asia-Pacific region provide many values and benefits to humans. Foremost among these are the supply of water, the production of foods and the amelioration of floods. In addition, the wetlands are major conservation zones for plants, fish and migratory birds. In recent decades, the pressure on these habitats has increased as human populations have expanded and sought more land for urban and agricultural usage. These pressures have brought production activities into conflict with conservation and even the loss of the habitats concerned.

Coastal wetlands are vulnerable to flooding, siltation and erosion from global climate change and sea level rise. In the worst case, many of the essential features of the coastal wetlands that provide values and benefits to society could be lost. 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 50 years.

Looking into the situation, the Asia-Pacific Network (APN) for Global Climate Change in coordination with the Environmental Research Institute of the Supervising Scientist (eriss) based in Jabiru, Australia and the Wetlands International - Asia-Pacific Region" using the assessment model previously applied to the Alligator Rivers Region in northern Australia.

The project is undertaken in two major wetlands in the Asia-Pacific region namely Olango Island in the Philippines and the Yellow River Delta in Qingdao, China.

The project involves survey of major land uses, conservation values and management threats and issues; analysis of the major values and benefits derived from the wetlands, development of a spatial bibliography and meta-database, analysis of the vulnerability of the major 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 and identification of necessary [illegible] for local conservation

Relative to this, a workshop on the Vulnerability Assessment of Olango Island to Climate Change and Sea Level Rise was conducted last December 9-10, 1998 at Costabella Resort Hotel in Mactan Island, Cebu.

The workshop aimed to assess the vulnerability of Olango Island to climate change and sea level rise; determine the likely impacts of climate change and sea level rise to Olango Island; formulate and recommend management strategies and responses to climate change and sea level rise; formulate and recommend schemes geared toward monitoring of climate change and sea level rise; determine information gaps and priorities for future research and management works; increase awareness of local and national decision makers about the potential impact of climate change and sea level rise; present the preliminary results of an assessment of the vulnerability of Olango Island to climate change and sea level rise; obtain assessment from the workshop participants; and, identify mechanism to incorporate potential strategies into coastal and other management plans in the country.

The 2-day workshop was facilitated by DENR-7 Senior Science Researcher Amuerfina Mapalo, Dr. Rick van Dam me of the Environmental Research Institute of the Supervising Scientist (eriss) based in Jabiru, Australia and Douglas Watkins of Wetlands International.

Other guests who served as resource persons were Dr. Catherine Courtney of CRMP who gave a backgrounder on Olango Island including CRMP's work and approaches in the island; and Dr. Rosa Perez of PAGASA-Manila who provided information on the possible impacts of climate change and sea level rise.

Participants of the workshop included local government leaders and decision-makers/representatives from different government and private agencies like DENR, DA, DOT, PAGASA-Mactan, Water Resources Center, Philippine Coast Guard, DPWH and the local Health Department.

DENR representatives were Emma Melana of Research, Demetrio Rio and Michael Merales of Protected Areas and Wildlife, Abraham Lucero of Mines and Geo-Sciences and Vic Rendon of

Attachment 2.1

Program for the Workshop on Vulnerability Assessment of the Yellow River Delta, China, 22 January 1999

Workshop Venue: Beijing Grand Hotel, 20 Yumin Dongli, Deshengmenwai, Xicheng District

Chairperson for morning session: Mr. Sun Shuxian, Deputy Director-General, Department of Sea Management, State Oceanic Administration

09:00-09:30 Opening ceremony

09:00-09:10 Opening address by Mr. Lu Shouben, former Director-General, Department of Sea Management, State Oceanic Administration

09:10-09:20 Speech by Dr. Rick Van Dam, Environmental Research Institute of the Supervising Scientist, Australia

09:20-09:30 Speech by Mr. Chen Kelin, Coordinator, Wetlands International – China Program

09:30-10:30 Introduction to the project background and organization, by Dr Rick van Dam, Environmental Research Institute of the Supervising Scientist, Australia

10:30-10:50 Tea Break

10:50-12:30 Introduction to the project report Vulnerability Assessment of the Yellow River Delta, by Prof. Li Peiying, First Institute of Oceanography, State Oceanic Administration

12:30-13:30 Lunch

Chairperson for afternoon session: Mr. Lu Shouben, former Director-General, Department of Sea Management, State Oceanic Administration

14:00-18:00 Discussion on the project report

1. Identification of natural and anthropogenic Forcing Factors
2. Assessment of the primary impacts
3. Vulnerability assessment
4. Recommendations for coastal management
5. Major conclusions

18:00 End of the plenary meeting

18:30-19:30 Dinner

Attachment 2.2

Summary of Workshop Expenditure

Item	Expenditure (in RMB Yuan)	Expenditure (in USD)*
Travel of Local Participants from Dongying City	9600	1162
In-Beijing Transportation	2800	339
Costs in Beijing Grand Hotel (including food, accommodation and conference room rental)	20000	2421
Workshop materials	4000	484
Communication	821	99
Total	**37221**	**4505**

* (USD1 = RMB Yuan 8.26)

Attachment 2.3

Participant List of the Workshop on the Vulnerability Assessment of the Yellow River Delta, China

1. Mr. Chen Kuiying, Senior Engineer, State Oceanic Information Center

2. Ms Chen Yue, Division Chief, Department of International Cooperation, State Oceanic Administration (SOA)

3. Mr. Ding Fulin, Deputy Manager, China Green Times

4. Mr. Fu Mingzuo, Researcher, First Institute of Oceanography, SOA

5. Mr. Feng Renguo, Associate Researcher, Department of Resources, Sciences and Technology, Chinese Academy of Sciences

6. Mr. Huang Changyang, Senior Engineer, Bureau of Meteorology of Dongying City

7. Mr. Guo Yufu, Project Officer, Department of International Cooperation, the State Oceanic Administration

8. Mr. Hu Enhe, Associate Researcher, State Oceanic Information Center

9. Ms Lu Caixia, Division Chief, Department of Sea Management, SOA

10. Mr. Liu Fengming, Deputy Director, Agriculture Bureau of Dongying City

11. Ms Liu Rongping, Associate Researcher, Institute of Strategy, SOA

12. Mr. Lu Shouben, Director General, Department of Sea Management, SOA

13. Mr. Li Yi, Project Officer, Department of Nature Conservation, the State Environmental Protection Administration

14. Mr. Li Peiying, Researcher, First Institute of Oceanography, SOA

15. Mr. Li Wenjian, Deputy Director, Environmental Bureau of Dongying City

16. Mr. Sun Shuxian, Deputy Director General, Department of Sea Management, SOA

17. Mr. Song Chaoshu, Researcher, Chinese Academy of Sciences

18. Mr. Song Xuejia, Researcher, Environmental Forecasting Center, SOA

19. Ms Tian Suzhen, Researcher, the Institute of Strategy, SOA

20. Mr. Tian Tongzhou, Senior Engineer, Department of Forecasting and Disaster Mitigation, the State Bureau of Meteorology

21. Mr. Wang Baogen, Deputy Division Chief, Department of Sea Management, SOA

22. Mr. Wang Bin, Office of SOA

23. Mr. Wang Longfu, Senior Engineer, the State Forestry Administration

24. Mr. Wang Zhong, Department of Sea Management, SOA

25. Mr. Wang Xinian, Researcher, Environmental Forecasting Center, SOA

26. Mr. Wang Yamin, Deputy Chief, Department of Fishery, the Ministry of Agriculture

27. Mr. Xu Fuxiang, Senior Engineer, Environmental Forecasting Center, SOA

28. Mr. Yan Chenggao, Senior Engineer, the State Forestry Administration

29. Ms Yin Hong, Deputy Division Chief, Department of Wildlife Conservation

30. Mr. Zhao Liansheng, Engineer, the Yellow River Delta National Nature Reserve Administration

31. Ms Zhang Yisu, Division Head, China Green Times

32. Mr. Chen Kelin, Coordinator, Wetlands International-China Program

33. Mr. Li Lukang, Senior Advisor, Wetlands International-China Program

34. Mr. Yuan Jun, Senior Technical Officer, Wetlands International-China Program

35. Mr. Li Zuowei, Project Officer, Wetlands International-China Program

36. Ms Zhang Yu, Administrative Assistant, Wetlands International-China Program

37. Dr. Rick van Dam, Research Scientist, Environmental Research Institute of the Supervising Scientist, Australia

Attachment 2.4

Opening Speech by Dr Rick van Dam, *eriss*

The State Oceanic Administration, Wetlands International - China Program, the local government of Donying City, and remaining participants and participating organisations of the workshop on the vulnerability assessment of the Yellow River Delta.

I am very thankful to have the opportunity to travel to this magnificent country to assist in the coordination of, and participate in this workshop on the vulnerability assessment of the Yellow River Delta to climate change and sea level rise.

While the workshop is the major purpose of my visit to Beijing, my wife and I have also had the privilege of experiencing some of Beijing's magnificent historical monuments, particularly the Summer Palace, with its tranquility, architecture and culture. It is a world away from our home in Jabiru, Australia. In addition, we are also very much looking forward to setting foot on the Great Wall before we leave.

But back to our reason for being here today.

The public is becoming increasingly aware of the issue of climate change and its potential impacts on the environment and society. Barely a day goes by where a newspaper does not publish an article that is related to global warming.

The climate is changing naturally, but there is now clear evidence that the results of human activities will, and are, contributing to these changes. Global mean surface temperature and sea level have already increased in the past 100 years, and according to the Inter-Governmental Panel on Climate Change, or the IPCC, the rate of increase is expected to be even greater over the next 100 years.

Such changes may have serious implications on the environmental and socio-economic resources of China, particularly in the low-lying coastal and deltaic regions, such as the Yellow River Delta. Therefore, there is a need to understand these implications so that they can be incorporated into future management and planning decisions. Hence, this project and this workshop.

In recent years, China has been particularly active in predicting regional climate change scenarios, determining potential impacts of climate change, and formulating appropriate management options. A major example of this has been the China Country Study, initiated in 1994.

The Yellow River Delta vulnerability assessment fills an identified gap in the assessment of climate change impacts - it assesses impacts at a local or regional scale. This is considered a priority research area by the IPCC. The project also forms a valuable component of the ongoing research into the potential impacts of climate change in China, and can hopefully serve as a model for future local and regional assessments.

Importantly, it recognises that climate change is just one of the many forcing factors that is placing stress on the ecosystems of the Yellow River Delta. Hopefully this will be of benefit to the future management, planning and development of the region.

The major purpose of today's proceedings is to disseminate this type of information to people who might be able to use it, benefit from it, or even help improve it. I am confident that by this evening we will have participated in a very productive and successful workshop.

So, I thank the workshop's primary organisers, Mr Yuan Jun, Mr Chen Kelin and Mr Li Peiying for their efforts thus far, and I also thank the remainder of you who have taken the interest and time to attend today.