

**Joint International Conference and  
First Annual Meeting of IGCP-475 *DeltaMAP* and  
APN Project on the Mega-Deltas of Asia**



**January 15–20, 2004  
Bangkok and Ayutthaya, Thailand**

**Call for Abstracts  
Registration application form**



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**Background**

River deltas are one of the most significant coastal features and depositional systems. Most of the sediment delivered to the oceans by rivers has been deposited in the coastal zones, where it has built numerous deltas. These delta systems are significant not only for helping sedimentary and marine geologists understand modern processes and ancient rocks, but also for their human populations, port and city infrastructures, and natural and living resources. The Asian coast has many large and distinct river deltas, which have abundant resources and products and sustain a huge human population. Deltas in the Asia-Pacific region include the Huanghe (Yellow), Changjiang (Yangtze), Zhujiang (Pearl), Song Hong (Red), Mekong, Chao Phraya, Irrawaddy, Ganges-Brahmaputra, Indus, Fly, and many other important river deltas. These delta systems receive approximately 75% of the worldwide sediment discharge from the land to the oceans and collectively compose the largest depositor on Earth. On the other hand, these deltaic environments are vulnerable to numerous and frequent geo-hazards, such as storms, floods, droughts, and sea-level rise, and recently they have been subject to anthropogenic impacts from engineering projects, urbanization, and land-use changes. Vulnerability assessment and environmental preservation along deltaic coasts to achieve sustainable development require more attention from scientists interested in global change.

Two new projects on the deltas of Asia and Oceania are being launched this year (2003). The first project is International Geological Correlation Programme (IGCP) Project 475, *Deltas in the Monsoon Asia-Pacific Region (DeltaMAP)*, which will run for five years from 2003 to 2007. The IGCP has been a joint endeavor of UNESCO (United Nations Educational, Scientific and Cultural Organization) and IUGS (International Union of Geological Sciences) since 1972. The second project, entitled *The Mega-Deltas of Asia* (project 2003-12), is being funded by the Asia-Pacific Network for Global Change Research (APN). APN is an intergovernmental organization to foster global-change research in the Asia-Pacific region. (Note: major objectives and overviews of the two projects are attached below.)

The inaugural meeting of each project is being held jointly in conjunction with the 5th International Conference on Asian Marine Geology (ICAMG-V) in Bangkok, Thailand, in January 2004. The joint IGCP-APN meeting will begin with a special session on deltas scheduled for January 16, 2004, during ICAMG-V. Following this session will be a field excursion to the Chao Phraya delta on January 17–18 and an additional two-day scientific meeting on January 19–20. Both the field trip and subsequent IGCP-APN meeting will be held in Ayutthaya, Thailand.

*First Circular of the Joint meeting of IGCP-475 DeltaMAP & APN Mega deltas in Asia*

**The general objectives of IGCP-475 DeltaMAP** are to significantly improve our understanding of Asian river deltas by **1)** synthesizing recent research results; **2)** bridging the traditional gaps between terrestrial, coastal, and marine research; and **3)** identifying the major needs and goals of future research. Furthermore, in pursuing these goals, we expect significant advances in fundamental research on monsoon-driven sediment-dispersal systems.

**The APN project on the mega-deltas in Asia** will focus on **1)** establishing a comprehensive conceptual model for Asian mega-deltas, where unique geologic conditions play a critical role in the deltas' response to natural and anthropogenic forcings; **2)** contributing to an improved understanding of the dynamic responses to human activities, natural variability, and global climate change, in order to provide useful information for future coastal vulnerability assessments; and **3)** clarifying the significance of Nos. 1 and 2 above for the sustainable development of this densely populated region.

*(See the attached overviews for more details of each project)*

**IGCP-475 DeltaMAP project: Co-leaders**

Steven Goodbred, Jr.: Marine Sciences Research Center, Stony Brook University, Stony Brook, New York, USA

Yoshiki Saito: MRE, Geological Survey of Japan/AIST, Tsukuba, Japan

**APN project:**

**Leader (PI)**

Zhongyuan Chen: East China Normal University, Shanghai, China

**Co-PIs**

Steven Goodbred, Jr.: Stony Brook University, Stony Brook, New York, USA

Tran Duc Thanh: Haiphong Institute of Oceanology, Hai Phong City, Vietnam

Yoshiki Saito: MRE, Geological Survey of Japan/AIST, City, Japan

Md. Badrul Islam: University of Rajshahi, Rajshahi, Bangladesh

**Joint International Conference and**

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**Organizer/Sponsors**

UNESCO/IUGS, IGCP-475

APN project 2003-12, *The Mega-Deltas of Asia*

Department of Geology, Chulalongkorn University, Bangkok, Thailand

MRE, Geological Survey of Japan/AIST

**Supporting Body**

IGBP-LOICZ (Land and Ocean Interactions in the Coastal Zone)

**Local Organizing Committee**

Thanawat Jaruphongsakul and Yoshio Sato

(Department of Geology, Chulalongkorn University, Bangkok, Thailand)

## **Field Excursion**

Montri Choowong, Yoshio Sato, and Niran Chaimanee

## **Venue and Schedule, January 2004**

(Note: Registration for ICAMG-V begins on January 13th, but the official IGCP-APN program begins on January 15th)

15th: Registration at the Miracle Grand Convention Hotel, Bangkok

16th: Registration and special session of the 5th International Conference on Asian Marine Geology (ICAMG-V):

*Asian Deltas: Evolution and Recent Changes*

at the Miracle Grand Convention Hotel, Bangkok

Welcome party on a boat on the Chao Phraya River

17th–18th: Excursion to the Chao Phraya delta (See Excursion for details)

19th–20th: Scientific sessions and business meeting at the Krungsri River Hotel, Ayutthaya

## **Sessions**

Scientific sessions consist of two parts: a one-day special session on deltas during ICAMG-V and a two-day session after the ICAMG-V meeting. Please indicate your choice of sessions for your oral presentation. Because of the tight schedule for the special session during ICAMG-V, the organizing committee will accept only a limited number of oral presentations for this session. The IGCP-475/APN meeting will emphasize poster presentations as a tool for exchanging information, which will allow sufficient time for discussion among participants and for learning new knowledge. The same poster can be displayed at both the ICAMG-V (13th–16th) and IGCP/APN venues (19th–20th), but oral presentations at the two meetings must be different

## **Official Language**

English will be the official language of the conference.

## **Call for Abstracts**

Abstracts should be e-mailed or arrive by post at the conference secretariat (Dr. Thanawat Jarupongsakul, <thanawat@sc.chula.ac.th>) by **November 1, 2003**. Abstract format: MS Word file; title, authors, affiliation(s), e-mail address of corresponding author, main text (A4, 1 page including figures, less than 500 words). All abstracts will be published in an abstract volume that will be distributed to all participants. If you have any trouble submitting the abstract, please e-mail <yoshiki.saito@aist.go.jp>.

## **Field Excursion**

A two-day, mid-conference field trip has been planned jointly with ICAMG-V: Take a long-tail boat tour to view coastal erosion in the Chao Phraya River delta, including wonderful outcrops in an open pit (20–30 m below the present sea level!) showing the whole Holocene deltaic sequence. The tour will also include a visit to an oyster pagoda temple, and a one-night stay in the old capital of Thailand, Ayutthaya.

Detailed information on the field trip will be given in the next circular, and a Field Trip Guide will be available at the conference.

**Schedule at a glance**

Activities	January, 2004								Venue
	13	14	15	16	17	18	19	20	
<b>IGCP-475/APN Joint meeting</b>									
• Registration			★						The Miracle Grand Convention Hotel, Bangkok
• Scientific session			↔	↔					The Miracle Grand Convention Hotel, BK
• Welcome party				★					Boat Restaurant on the Chao Phraya River, BK
• Field trip ICAMG-V/IGCP-475/APN				↔	↔				The Chao Phraya delta and stay in Ayutthaya
• Scientific sessions							↔	↔	The Krungsri River Hotel, Ayutthaya
• Business meeting							↔	↔	The Krungsri River Hotel, Ayutthaya
• Farewell dinner								★	The Krungsri River Hotel, Ayutthaya

**Hotel and Weather**

The Miracle Grand Convention Hotel is located on Vibhavadi Rangsit Road, just a 10-minute drive from Bangkok International Airport and adjacent to the expressway for fast and easy access to the Bangkok Central District.

The Krungsri River Hotel is located on the banks of the Chao Phraya River in Ayutthaya, which is the old capital of Thailand and a UNESCO World Heritage Site. It is about 50 km from the Bangkok International Airport.

Bangkok is a city of about 10 million people located about 35 kilometers from the Gulf of Thailand in the heart of the Central Plain. The weather in Bangkok in January is normally mild; the average temperature during the daytime is 20–23 °C.

**Health Requirements**

It is recommended, but not required by Thailand, that travelers to Thailand be immunized against cholera. Please consult travel agents in your own country to obtain up-to-date information on recommended immunizations and other health precautions.

**Travel Arrangements**

Bangkok is a hub for air traffic in Southeast Asia, and most major airlines fly either directly to Bangkok or connect to Bangkok through Tokyo, Hong Kong, or Singapore. The Miracle Grand Convention Hotel bus service is available to transport participants between the airport and hotel.

All participants are expected to make their own arrangements for transportation to Bangkok and for accommodations in Bangkok. However, if requested, the organizing committee will assist participants in securing hotel accommodations.

**Visa**

Participants must possess a valid passport and obtain an entry visa for Thailand, available from any Thai diplomatic or consular mission. Particulars regarding visa requirements are also available from the airlines by which participants

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intend to travel. Passport holders from 39 countries do not require a visa when entering Thailand for tourism purposes if their stay in the Kingdom does not exceed 30 days. Please visit the web site:  
<http://www.mfa.go.th/web/12.php#General>

**Accommodations**

The registration fee for the IGCP/APN package covers accommodations during the field excursion and the Ayutthaya meeting, but it does not include accommodations in Bangkok. The accommodations at the Miracle Grand Convention Hotel in Bangkok for the first two days are recommended. Special discount prices of 1600 Bt (ca. US \$40, superior single) or 1800 Bt (ca. US \$45, superior double/twin beds) are available to conference participants. If you wish to share a room, please indicate it on the application form. Your hotel request should be sent to the secretariat by November 1, 2003. Please use the ICAMG-V registration form.

**Registration Fee**

Registration fee: US \$310, includes abstract volume, one-day participation in ICAMG-V, dinner on January 16, field excursion, accommodation in Ayutthaya for four nights from January 17 to 20, and lunches from January 16 to 20. Please note that the fee does not include the cost of accommodations in Bangkok. There are four kinds of registration modules. Please indicate your choice on the ICAMG-V registration form. The conference organizers have attempted to keep the costs low for all participants rather than to support some individuals (but see Financial Assistance below). For more information on ICAMG-V and registration, please visit a web site at: <http://www.geocities.com/geology5th/> or <http://www.geo.sc.chula.ac.th/icamg5/index.htm>

**Registration fees for each scientific program**

Convention Option	Scientific Program	Registration Fee, US\$	Dates (January 2004)	Remarks
Module 1	ICAMG	70	13–16	Includes abstract volume, 3 lunches, welcome and farewell parties
Module 2	ICAMG + Excursion	170 (150)*	13–18	Includes abstract volume, welcome and farewell parties + excursion guidebook, 5 lunches, 1 dinner, and 1 night's accommodation in Ayutthaya
Module 3	ICAMG + Excursion + IGCP–APN Meeting	310 (250)*	16–20	Includes abstract volume, welcome party + excursion guidebook, 5 lunches, 4 dinners, and 4 nights' accommodation in Ayutthaya
Module 4	ICAMG + Excursion + IGCP–APN Meeting	350 (290)*	13–20	Includes abstract volume, welcome and farewell parties + excursion guidebook, 7 lunches, 4 dinners, and 4 nights' accommodation in Ayutthaya

\*Registration fee in parentheses: share a room

Modules 1 and 2 are for those participating only in ICAMG-V.

### **Advanced Payments/Deposits**

All price & quoted are in US dollars. Payment should be made by overseas bankdraft payable to “ICAMG-V, Department of Geology, Chulalongkorn University”, or by internet merchant (at <http://www.geocities.com/geology5th/> or <http://www.geo.sc.chula.ac.th/icamg5/index.htm>) to arrive by November 1, 2003. Pre-registration will not be processed without payment.

### **Financial Assistance**

There are limited project funds available to partially support attendance by some participants from developing countries. Preference will be given to younger scientists who present a paper at the conference. Persons wishing to receive such support should approach Yoshiki Saito <[yoshiki.saito@aist.go.jp](mailto:yoshiki.saito@aist.go.jp)> or Steven Goodbred <[sgoodbred@notes.cc.sunysb.edu](mailto:sgoodbred@notes.cc.sunysb.edu)> with information about the nature of the contribution they wish to make at the meeting. Early submission of the intended abstract, by the end of September, will assist us in reaching a decision concerning financial assistance.

Some countries have a national IGCP fund to support attendance by their scientists and graduate students at IGCP conferences. Potential delegates should ascertain whether their national IGCP Committee distributes travel grants.

**Key date: November 1, 2003; Registration form, abstract submission, hotel request (in Bangkok). PLEASE SEND TWO REGISTRATION FORMS (ICAMG-V and IGCP/APN) to the secretariat.**

### **All correspondence and special requests should be directed to:**

Dr. Steven Goodbred, Jr.  
Marine Sciences Research Center  
Stony Brook University  
Stony Brook, NY 11794-5000, USA  
Tel: +1-631-632-8676, Fax: +1-631-632-8820  
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Fax to +66-2-2185464 or 5, Tel: +66-2-2185442 or 3

**Registration Form for IGCP & APN**

Please return this form WITH THE REGISTRATION FORM FOR ICAMG-V by e-mail in the body of the message to <thanawat@sc.chula.ac.th>, by fax to +66-2-2185464 or 5, or by post. If you have any trouble submitting the form, please e-mail <yoshiki.saito@aist.go.jp>.

**Deadline: November 1, 2003 (firm)**

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**Joint meeting of 1st Annual Meeting of IGCP-475 DeltaMAP and APN Project on the Mega-Deltas of Asia  
Bangkok and Ayutthaya, Thailand**

Surname \_\_\_\_\_ Other Names \_\_\_\_\_

Prefix (select one)      Professor/Dr./Mr./Mrs./Miss      \* Male [ ] Female [ ]

Address \_\_\_\_\_

Tel: \_\_\_\_\_ Fax: \_\_\_\_\_

E-mail: \_\_\_\_\_

**Presentation:**

**(1) If you want to present at the January 16 delta session during ICAMG-V, please describe your paper on the ICAMG-V registration form**

**(2) If you want to present at the IGCP-APN Ayutthaya meeting on January 19-20, please fill in the information below.**

Title of paper (oral presentation)

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For poster presentation: Please describe on the ICAMG-V registration form.

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Abstract enclosed\*      Yes [ ]      No [ ]

**Hotel request:**

**(1) The Miracle Grand Convention Hotel in Bangkok**  
**Please show your request on the ICAMG-V registration form.**

**(2) The Krungsri River Hotel in Ayutthaya**

Please check appropriate boxes.

Room choice: [ ] Superior single  
                  [ ] Superior double/twin beds, share a room  
                  [ ] Non-smoking, [ ] Smoking

Accompanying spouse or other person: .....

For participants wishing to share a room with twin beds with another conference participant, please name your roommate, if known [name:.....], or are you willing to have your roommate assigned by the organizers? Yes [ ]      No [ ]

Special requests (dietary restrictions, wheelchair access, etc.):

**(FROM B)**

**Advanced Payment Form**

**PAYMENT**

Hotel Reservation (US\$) .....  
Pre-registration fees for:  
Module 1 (US\$).....  
Module 2 (US\$).....  
Module 3 (US\$).....  
Module 4 (US\$).....  
Total of Payment (US\$).....

**PLEASE CHARGE MY:**

Maestro Credit Card No.....  
 Visa Credit Card No.....  
 Master Credit Card No.....  
 JCB Credit Card No.....  
Valid until (m)... .. /(y).....  
 I enclose my US\$ Bank Drefit No.....  
Name of the Bank.....  
Payable to: ICAMG-V, Department of Geology  
Chulalongkorn University

Name..... Date.....  
Address (Home address if using Credit Card facilities).....  
.....  
Signature.....

**Deadline: November 1, 2003 (firm)**



## IGCP-475 (2003-2007)

### **Deltas in the Monsoon Asia-Pacific Region (DeltaMAP): Late Quaternary Development and Recent Changes Due to Natural and Human Influences**

#### **INTRODUCTION**

River deltas are among the most significant settings on Earth, in terms of their human population, infrastructure, and resources such as agriculture, fisheries, hydrocarbons, and wildlife. Such importance has fueled decades of research on Western Hemisphere river deltas, such as the Mississippi, Rhine, and Nile. In contrast, research on the many river deltas of South, Southeast, and East Asian region began in earnest only last 20 years. The recent studies of these Asian systems reveal that they are distinct from existing models because of regional factors such as (1) a monsoon-dominated climate, (2) young, mountainous catchment geology, (3) high-energy coastal settings, (4) large water and sediment discharges and (5) tectonic activity. In addition, these Asian river deltas including Oceania region also serve as major gateways for chemical and particulate fluxes to the global ocean, including >75% of worldwide sediment discharge.

Moreover, the developing nations of these Asian region have long suffered from numerous river delta-related hazards. These countries would benefit from a better understanding of the controls and responses of their fluvial delta systems. Over the course of the next 5 years, this project seeks to significantly improve our understanding of Asian river deltas by (1) synthesizing abundant recent research results, (2) bridging the traditional gaps between terrestrial, coastal, and marine research, and (3) identifying the major needs and goals of future research. Furthermore, in pursuing these goals we expect significant advances in the fundamental research of monsoon-driven sediment dispersal systems.

#### **OBJECTIVES**

The project's overall aim is to assemble a collective knowledge of river-delta systems in the monsoon Asia-Pacific region, with the intent for capacity building and advancing basic research in developing nations. Climate, tectonic, and coastal regimes in this region are very dynamic and drive many large, active river-delta systems. These systems also support an immense human population and comprise an important part of regional economies through agriculture, fisheries, shipping, infrastructure, and natural resources. To address the broad-range of interests for the proposed DeltaMAP project, from basic to applied research, the following key issues have been identified:

- Sediment Transport Patterns and Processes
- River Discharge and Sediment Load
- Sequence Stratigraphy and Reservoir Geometry
- Coastal Plain Development
- Alluvial Valleys
- Climate, Paleomonsoons, and Paleohydrology
- Earthquake History and Impacts

- Early and Modern Human Impacts
- Tropical Storms, Surges, and Tsunamis
- Comprehensive Delta Models for MAP Region

## **WORK PLAN**

To address the broad interests of the project, the study will involve five working sub-groups that will each focus on a specific aspect. These working groups will also have a team leader who will oversee research and project activities. The working groups will include the following:

- Late Quaternary Delta Stratigraphy and Correlation
- River-Delta Processes and Controls
- Human Impacts, Sustainable Development, and Geohazard Mitigation
- Quantitative Modeling of Delta Process, Response, and Stratigraphy

In addition to the above working groups, the DeltaMAP project will also have regional coordinators who will organize multidisciplinary efforts for individual delta systems within their area. The major areas include South (Pakistan to Bangladesh), Southeast (Myanmar to Hong Kong), East (east China to Korea and Japan), and Oceania (Indonesia to Papua New Guinea).

Based on the working groups and regional divisions, the project committee will consist of nine group/regional directors and two general executive officers. Although this number of leaders will require greater effort and organization, we feel that the benefits are significant. The project will have greater impact if participants are directly involved and have more ownership of the study. This approach will also allow us to involve more members of developing nations and support capacity building and professional development.

## **LOCATION OF MAJOR FIELD ACTIVITIES**

China – Huanghe (Yellow River) delta, Changjiang (Yangtze) delta, Zhujiang (Pearl River) delta, deltas of Bohai Sea, others

Vietnam – Song Hong (Red River) delta, Mekong River delta

Thailand – Chao Phraya river delta

Indonesia – Mahakam River delta, Digul River delta, Kapuas River delta, others

Malaysia – Baram River delta, Rajang River delta, others

Papua New Guinea – Fly River delta, Markam River delta, others

Myanmar – Irrawaddy River delta, Salween River delta

Bangladesh – Ganges-Brahmaputra River delta

India – Ganges River delta, Krishna River delta, Godavari River delta, Cauveri River delta, Narmada River delta, Mahanadi delta, others

Pakistan – Indus delta

Japan – Kurobe river delta, others

Korea – Keum river delta, Han river delta, others

## **APN project #2003-12**

(April 2003 to March 2005)

# **The Mega-Deltas of Asia: Conceptual Model and its Application to Future Delta Vulnerability**

## **Background**

The Asian coast supports many large and distinct river deltas, comprising abundant natural resources and an immense human population. These deltas are located in seven different APN nations, and include the Huanghe (Yellow), Changjiang (Yangtze), Pearl, Red, Mekong, Chao Phraya, Irrawaddy, Ganges-Brahmaputra, and Indus river deltas. The world community has become increasingly aware that these deltaic environments are vulnerable to numerous and frequent geo-hazards, resulting from storms, floods, droughts, and sea-level rise. In another respect, humans are also degrading the coastal environment through engineering projects (e.g., river dykes and dams), urbanization, and the over-utilization of natural resources (e.g., groundwater, coastal forests).

Recently, major efforts have been put forth to assess the potential impacts that global change may have on these delta systems. *However, most such assessments have been based on a gross over-simplification of delta behavior, as well as a limited database for Asian deltas.* Although some background information can be based on delta research from other parts of the world, recent findings from the Asian mega deltas reveal that these systems are fundamentally distinct from existing models. Notably, the following characteristics of Asian deltas contribute to their unique behavior: 1) monsoon control, 2) high sediment loads, 3) high, strongly seasonal water discharge, 4) large coastal tide ranges, and 5) silt-sand dominated sediment texture, and 6) tectonic activity (only in a few systems).

**Thus, we propose a 2-year study that will focus on:** 1) establishing a comprehensive conceptual model for Asian mega deltas, where unique geologic conditions play a critical role for delta response to various natural and anthropogenic forcings; 2) an improved understanding of the dynamic processes of Asian mega deltas in order to provide useful information for future coastal vulnerability assessments; and 3) the significance of #1-2 above for the sustainable development of this densely-populated region.

*Deltaic systems are very complex and involve significant feedbacks among climate, catchment, deltaic depocenter and continental-margin controls. This truth is not appreciated by many researchers who are trying to predict the impact of future changes on Asian deltas.* Furthermore, understanding the response of deltas to environmental change becomes more complicated when anthropogenic modifications are considered. These complexities must be taken into account to yield valid vulnerability assessments for deltaic systems. In fact, the scientists involved in the proposed study represent almost all Asian mega deltas (appendix I, II) and have done extensive research in the region over the past decade. However, these relatively isolated works have not yet revealed their broader regional significance, which in association with risk assessment is a primary goal of the proposed project. Past failures in coastal planning suggest that the lack of a fundamental geological context for risk-assessment studies has harmed our socioeconomic and sustainable development, and this will continue in the future unless better information can be brought to regional planners and managers.

### Primary Objectives

- A. To establish a comprehensive conceptual model for Asian mega deltas, based on the integration of large databases existing in various delta systems, including both the geological framework of the delta and the dynamic material fluxes from Himalayan/Tibetan plateau to the delta estuaries (e.g., sediment load, runoff, and nutrients);
- B. To synthesize the existing large database and previous research results from various Asian deltas, in order to upgrade the capability of geo-hazard assessment for all delta systems;
- C. To understand the role that geological processes and delta response play in the proper assessment of global-change and human-modification impacts, including: (a) sea-level rise associated with global warming, (b) land subsidence due to groundwater withdrawal, (c) flooding from both drainage-basin runoff and coastal storm surge, and (d) saltwater intrusion, river-channel dry-up and coastal erosion due to upstream damming and water diversion;
- D. To directly communicate the important issues and findings of the proposed study with our policy-makers for adjusting the currently oversimplified manner of hazard assessment, mitigation, and prevention. To establish an effective network system among our delta-coastal scientists, aiming at a long-term collaboration on the basis of information circulation」 †
- E. To set up a Website for circulating the information of the project, in order to call for more public awareness.

### Workplan and Timeline

#### *Synthesizing conceptual model*

Key members of the project who have worked with different Asian mega-deltas will work on the synthesis of conceptual delta models, and the risk assessment of delta system during the year of 2003 and 2004, on the basis of large existing database. This will present a substantial output to all participants during the two workshops of 2004.

### Expected Outcomes

- A long-term collaborative network among our delta scientists will be established to work together for delta key issues;
- A web-site for proposed project will be set up to circulate information and discuss key issues among our coastal scientists, as well as solicit public comments;
- Workshop proceedings and model results will be published to upgrade our academic values, emphasizing the needs for a geological framework for assessing impacts and hazards for representative delta systems;
- The criteria of hazard assessment will be standardized in terms of a series of tables and maps.