

**The Mega-Deltas of Asia: A Conceptual Model and its
Application to Future Delta Vulnerability
(APN 2003-12)**

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Participating countries:

Participants from the following countries were funded: Australia, Bangladesh, Cambodia, Canada, India, Japan, Pakistan, P. R. China, Singapore, Thailand, USA and Viet Nam.

Participating countries funded from sources other than APN included Brunei, Germany, Iran, Republic of Korea and Russia, etc.

A representative of APN, Dr. Anond Snidvongs (APN Liaison Officer for Southeast Asia), was funded by APN directly.

Brief introduction and background:

This two-year project (the second year of which is pending approval of APN) focuses on developing a conceptual model for the geological process and response behaviour of Asian mega-deltas affected by strong monsoons, high river flow and sediment load, and frequent geo-hazard occurrences. Previous databases will be integrated by many experienced Asian delta scientists, each working on specific geological issues such as:

- Subsidence from underground water withdraw;
- Sea-level rise impact; and
- Coastal erosion, saltwater intrusion, and river channel dry-up from damming and water diversion.

The database will further incorporate new field measures to better understand the geological framework of the delta basin. Thus, we hope to allow for substantial improvement and mitigation policies, which most often rely on oversimplified models because of insufficient data and/or lack of solid observation. Two workshops will be held:

- A workshop to develop the Asian delta model; and
- A forum for Asian scientists and policy-makers to better understand coastal management strategies.

Outline of activities conducted:

As planned, an APN-funded workshop convened from 21-31 January, 2004 in Bangkok, Thailand <www.megadelta.ecnu.edu.cn>. This workshop was held in parallel with the ICAMG –V (Fifth International Conference of Asian Marine Geology) and IGCP-475 (also headed by our APN project co-leaders, Drs. Saito Yoshiki and Steve Goodbred). Over 240 scientists attended the conference to focus on the delta conceptual model, geological and climatic controls, impacts from human activities, coastal vulnerability and environmental hazards, and the linkage between the natural sciences and policy-

making. The focus of the APN-funded project is to try and address the kinship between the Tibetan uplift and mega-delta evolution through large drainage basins of Asia, where it is densely populated. Thus, a major priority for all involved is to fundamentally discuss (in an interdisciplinary manner) and propose a conceptual model of the Asian delta system during the first year of the project. The workshop featured a one-day delta special session focusing on: sediment sources and sinks, delta/coast evolution in response to global change, sedimentation on fluvial and sea level controls, sediment transport and dispersal patterns, modelling applications to estuarine processes, and river-coastal environmental risk and hazard assessments. The workshop also consisted of a one and a half day poster session that introduced individual deltas including the Yellow, Yangtze, Pearl, Red, Mekong, Irrawaddy, Bengal, Indus, Brahmaputra and Ganges. Other deltas involved in the studies include the Fraser river delta of Canada, the Lillooet river delta of Canada, the Rhône river delta of the Mediterranean, and small-scale deltas of Japan. During the conference, working group meetings headed by each delta scientist discussed the delta model and environmental issues that will serve as the key to our next year model development. A follow-up speech by the APN Liaison Officer for Southeast Asia, Dr. Anond Snidvongs, introduced both APN and START strategies, which are of great significance in explaining the foci in global change through building capacity networks. A mid-conference field trip also took place to observe the coastal erosion of the Chao Phraya river delta, and the sedimentary architecture of the Holocene sediment section interaction between land and sea.

Outcomes and products:

- Providing a venue for all scientists and policy-makers/government administrators who are encouraged to address all issues related to the delta model and environmental vulnerability during the workshop and via an established website: <www.megadelta.ecnu.edu.cn>;
- Synthesizing the existing database in relation to sediment source supplements, monsoon-driven factors such as morphological/hydrological dynamics, high flow/ sediment load to delta sinks, and coastal hazard mitigation;
- Building capacity networks. Four working groups (East Asia, Oceania, South Asia and Southeast Asia) have been established aligned with our future plan;
- Bridging natural and social sciences. This is one of the major objectives of the project. A substantial communication among government administrators, policy-makers, social and natural scientists took place during the conference; and
- Knowledge-diffusion. The proposed preliminary delta model is more beneficial to the scientific community and policy-makers, especially to those from developing countries. Funded countries involved eight developing and seven developed countries, and all participants were grateful for the opportunity to become involved in regional capacity networks.

Future directions and follow-up work:

The target for 2004/05 will be:

- Further completion of the delta conceptual model by incorporating field/laboratory results collected from fieldwork into a database;
- Circulation of the model via the website and to receive critiques from colleagues as well as the general public;
- Proposal of a set of criteria for the assessment of coastal hazards and vulnerability,

and generate feedback from the scientific community and society in general. The second workshop (planned for January 2005) will have an open discussion with all scientists, policy-makers and local government administrators to finalize the model. Key outputs are to support sustainable development, in terms of the assessment of delta-coast vulnerability, and model implications for policy development and improvement. Outputs will be published as proceedings, peer-review papers and circulated on the website. A long term goal is to continue our sustained efforts to expand the knowledge of the delta model on the basis of the established capacity networks.