



## FEATURED ORGANISATION

### CLIMATE, ENVIRONMENT AND PEOPLE IN THE ASIA-PACIFIC REGION: A VIEW FROM THE PAST

**Keith Alverson**, Executive Director, IGBP-PAGES, <http://www.pages-igbp.org>  
[alverson@pages.unibe.ch](mailto:alverson@pages.unibe.ch)

Four thousand years ago Yu the Great, founder of the first, semi-mythical, Xia dynasty of China is said to have spent more than a decade battling floods continuously inundating the valley of the Yellow river. According to Confucius' *Shu Jing* (Book of History), written much later in the 5<sup>th</sup> Century BC but supposedly collated from ancient sources, Yu's great insight was to stop relying on the practice of building ever-higher levees and dikes, and instead dig a vast network of channels to drain the great volumes of water east to the sea. Flooding, up until the present day, has continued to be a major concern for the region. A million people are thought to have died when the Yangtze broke through flood defenses in 1877. But flooding is not the only problem; the flow of the Yellow River has been in continual decline for the last 50 years. In 1997, the river ran dry in places during 226 days of the year. Much of China's agriculture and population depends on water from the Yangtze and is greatly vulnerable to drought.

The proposed modern day solutions, although multi-billion dollar engineering projects, are not so very different from those under discussion in the time of Yu. One, the famous Three Gorges Dam, in addition to generating electricity, is intended to control flooding. A second, intended to ameliorate vulnerability to drought, is to divert water to the north, primarily from the Yangtze river basin, by digging a series of south to north canals in the western, central and eastern parts of China. Will these gigantic engineering projects fulfill their goals? Will they reduce human vulnerability to climatic variability and change?

The answers to these questions are a matter of much debate, and I won't even try to provide them here. Instead I wish to point out that paleoenvironmental science, which is often ne-



Eroded cliffs in the Chinese Loess Plateau in the Yellow River catchment. These natural exposures show paler and darker bands reflecting climatic changes on timescales of thousands to hundreds of thousands of years. Alternations between loess deposition, during glacial periods, and soil development during interglacials provide evidence for enormous natural climatic, environmental and hydrological variability allowing direct and indirect human influences in the Yellow river flow to be put in a long term perspective. (Photo: Barbara Mahe)

glected in such debates, provides a detailed, quantitative four thousand year record of human society, climate variability and their interaction in the Yangtze valley region. Such information from the past is directly relevant to questions of climate variability and human vulnerability and therefore relevant to decision making processes today. In fact, the very definition of flood magnitude used in risk assessment by the modern insurance industry, the commonly used concept of the 'hundred year flood,' puts modern events in the context of the long term record. The record of long term variations is crucial to understanding modern changes.

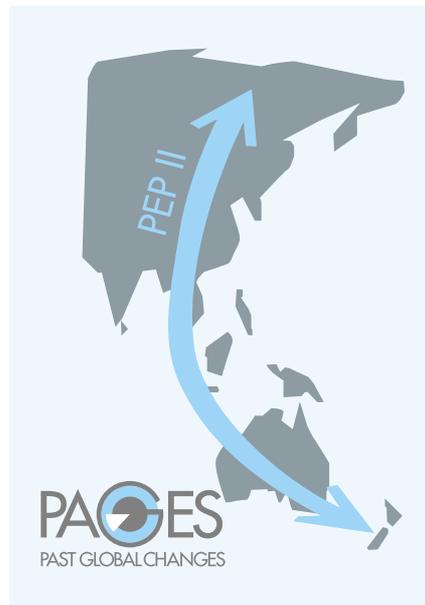
**This message, that the past record is important, is relevant throughout the entire spectrum of global change research, and throughout the Asia-Pacific region. Paleoenvironmental research should be a vital component**

**in any holistic study of ongoing changes in groundwater, landuse and landcover change, sea level, biodiversity, extreme climatic events, human vulnerability.** Am I preaching the obvious? A look over the seven year history of APN supported projects indicates that I am not. APN has tackled a wide range of global change problems in cooperation with a plethora of projects from the international Global Change community. The list of cooperating partners in these projects reads like a veritable acronym soup of international global change programs and includes IGBP, WCRP and IHDP as well as many of their core projects: START, LUCC, LOICZ, BAHC, GCTE, JGOFS, GLOBEC, GEWEX and CLIVAR to name a few. But the international core project coordinating an understanding of past environmental change and its relevance to the future, PAGES, does not appear. With this in mind, I thank the APN

Secretariat for taking the initiative to ask me to write this short article as a way to encourage both PAGES and APN research communities to reach out to each other.

Over the past decade, the community of paleoenvironmental scientists in the Asia-Pacific have been extremely active and successful, primarily under the auspices of the PAGES Pole-Equator-Pole (PEP) II, austral-asian transect. The PEP II Transect covers the eastern part of the Asian landmass from India and Southeast Asia to the Bering Strait. It includes the complex of islands from Sakhalin to Japan and Chinese Taipei. It spreads south to Indonesia, Philippines and New Guinea and in the Southern Hemisphere through Australia, the islands of Micronesia and Melanesia to New Zealand and Fiji, then across the Southern Ocean to Antarctica. The significance of this region to the Earth System as a whole includes: the most important source of dust to the world's oceans—a potentially important control on the flux of carbon to marine sediments; the West Pacific Warm Pool—a key component of the ENSO mode of variability; and the monsoon systems—providing the climatic regimes supporting the most populous areas of the globe. All of these are the topic of intense study in the paleoenvironmental community.

The area spanned by PEP II also includes a huge diversity of environments, from tropical rain forests to arid continental interiors, from humid coastal lowlands to the highest mountains on Earth and from warm tropical seas to the permafrost and ice covered regions at high latitudes. Past change in these environments has played a major role in the welfare of people across the region. All current indications are that their significance may be even greater in the future. The combination of high vulnerability to environmental hazards such as floods and droughts, and continuing rapid population growth leave parts of the region under serious threat



from increased variability, extreme events and future sea-level rise. Climate variability affects human welfare in a variety of ways and on a range of spatial and temporal scales. Equally, as land cover and agricultural practices change in response to evolving human needs there are important feedbacks to the climate system. The paleo-record holds vital clues as to these interactions. Improving the quality and long term security of water supplies, enhancing agricultural productivity and planning for the avoidance or mitigation of environmental hazards are all of high priority in the Asia-Pacific region. To do so requires an understanding of past variability, human responses and human-environment interactions.

During the 1990's, under the leadership of John Dodson (Australia) and Liu Tungsheng (China) a variety of PAGES PEP2 coordinated workshops and colloquia at international meetings provided the opportunity to bring researchers from the Asia-Pacific region together and consider the kinds of proxy evidence available in order to improve an understanding of environmental variability across the region. Recent and planned outcomes of these include numerous synthesis publications specific to the region (Dodson

and Guo, 1998, Larocque and Alverson 2001, Shulmeister and Dodson 2002, Rutter et al in press, Dodson and Taylor in press, Solomina and Alverson in preparation) as well as substantial contributions to the global PAGES synthesis (Alverson et al 2003). In 2002, the leadership of the PAGES-PEP II program was turned over from its very successful originators to a new and enthusiastic leadership chaired by Paul Hesse (Australia) and including Zhengtang Guo (China), Jamie Shulmeister (New Zealand), Tamban Meloth (India) and Tomohisa Irino (Japan).

**To build on past successes and to harness the energy of this new group, the timing is right for APN to become involved with the vibrant community of global change scientists working in the Asia-Pacific region to understand the past climatic and environmental change and its relevance to modern societal concerns. APN**

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