

Preface

With the creation of the Future Earth initiative in 2013, the global research community is embarking on a decade of scientific research that brings together the environmental and social sciences to promote sustainable development for the betterment of society. This same year marks the creation of a new decade of research within the hydrological community promoted by the International Association of Hydrological Sciences (IAHS); the decade will be named “*Panta Rhei*” meaning “everything flows”, embodying the concept that not only are hydrological processes evolving, but that they are doing so within human, economic and political environments that are also changing.

Thus, major overall initiatives are beginning – initiatives that will greatly influence the scientific research that will be undertaken and the ways in which that research will impact human and environmental developments, meaning that natural and social sciences must work hand-in-hand to understand our planet in an integrated way, its resources and how we can use them sustainably.

Simultaneously, a major decadal research initiative is being promoted on deltas. Deltas are the downstream products of river basin processes where the land meets the sea. They provide important sub-sets of Future Earth concerns and are the outcome of the interaction of hydrological and marine processes. Thus it is entirely appropriate that the International Association of Hydrological Sciences and the International Association for the Physical Sciences of the Oceans (IAPSP) are jointly sponsoring this symposium in Gothenburg.

Deltas, both marine and lacustrine are environmental and economic hot spots; occupying about 1% of the global land surface, they are home to some 500 million people and typically have vibrant ecosystems – thus they are vitally important human and natural habitats. Deltas pose great challenges, both as regions of purely natural conditions and as regions of intense human activity set in the context of complex and often rapidly changing natural environments.

Physically they are complex systems where land and marine/lacustrine environments meet. They are the end-products of catchment processes involving water supply, sediment delivery and water quality – elements that are fast changing over time as a result both of human influences and changes in climatic drivers. Tides, waves, sea level changes, storm surges, tsunamis and littoral currents result in influences from the marine environment. They are regions of natural subsidence, with rates of subsidence often increased by human extraction of groundwater and minerals.

In delta regions a significant portion of the global population often lives in very densely settled conditions, in regions that are, at the same time, areas of high food productivity. Thus, there are great challenges for the managers of water resources – challenges that are intensified by recurrent disasters from land- and ocean-based floods.

The set of papers within this volume provides overviews on delta processes and covers almost all types of delta environments, mostly marine, but also inland deltas. The scene is set with an overview paper on the “Delta Decadal Initiative: A framework of actionable research towards delta sustainability” followed by papers on changing fluvial sediment inputs and on the general theory of delta formation and evolution. A series of papers on the human influences on and uses of deltas and on their geomorphology and ecosystem characteristics follows. The special

conditions of Arctic deltas, and both inland and marine deltas within the Niger River basin round out the volume.

This volume will not only provide important input to the Delta Decadal Initiative, but also will provide tools for both delta researchers and decision makers to better understand these significant elements of the Earth's geography.

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