

Ecosystem Services for Well-Being in Deltas

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Ecosystem Services for Well-Being in Deltas

Integrated Assessment for Policy
Analysis

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*Dedication: To Dr. Nazmul Haq, University of Southampton, aka 'Uncle',
for his facilitation of the research herein and his ongoing commitment to the
people of Bangladesh.*

Foreword

Deltas, Ecosystem Services and the Sustainable Well-Being of Humans and the Rest of Nature

Humanity is finally rediscovering an important relationship—the interdependent relationship between humans and the rest of nature. The industrial revolution and some religious traditions have emphasised the distinctions between humans and ‘nature’—that humans are somehow above, apart from or fundamentally different from the rest of nature. In fact, the more we learn about the way the world and its complex interconnected systems function, the more we recognise that *homo sapiens* is, and has always been, an integral component of the ecosystems it is embedded within. Humans are not apart from nature, but are a part of the natural world, and their health and well-being cannot be understood or managed separate from that complex and evolving context.

The concept of *ecosystem services* makes this interdependence with the rest of nature more apparent and quantitative. It does this by analysing, modelling, quantifying and valuing the degree to which humans are connected with and benefit from the ecosystems that enclose them. Ecosystems provide a range of services that are of fundamental importance to human well-being, health, livelihoods and survival (Costanza et al. 1997; Daily 1997; MEA 2005; de Groot et al. 2014).

The idea that preserving the environment *as an asset*, rather than an impediment to economic and social development, is both very old and very new. For most of human history, at least until the start of the Industrial Revolution, the benefits humans derived from the rest of nature were well recognised and embedded in various cultural rules and norms. Parts of forests, lakes, wetlands or mountains were often deemed sacred and off limits. But it is no coincidence that these sacred natural assets also supplied essential life-support services for the communities involved. This is in stark contrast to the post-industrial view in much of the Western world that nature is merely a pretty picture—nice to enjoy if you can afford it but not essential to the more important business of ‘growing the economy’. Too often, when the issue of conservation of the environment has entered public or political discussions, it has been purported to come at a cost, and the discussion has been framed as ‘the environment versus the economy’.

Probably the most important contribution of the widespread recognition of *ecosystem services* is that it reframes the relationship between humans and the rest of nature to be more consistent with what we know. A better understanding of the role of ecosystem services emphasises our natural assets as critical ingredients to inclusive wealth, well-being and sustainability. Sustaining and enhancing human well-being requires a balance of all of our assets—individual people, society, the built economy and ecosystems. This reframing of the way we look at ‘nature’ is essential to solving the problem of how to build a sustainable and desirable future for humanity—a goal that we all share.

The ecosystem services concept makes it abundantly clear that the choice of ‘the environment versus the economy’ is a false choice. If the environment contributes significantly to human well-being, then it is a major contributor to the *real* economy and the choice becomes how to manage *all* our assets, including natural and human-made capital, more effectively and sustainably (Costanza et al. 2000).

Interest in ecosystem services in both the research and policy communities has grown rapidly (Braat and de Groot 2012). As of this writing, over 18,000 journal articles have been published on this topic, according to SCOPUS, and the number is growing exponentially. The most highly cited of these (with over 7,000 citations in SCOPUS as of this writing) is one that I and 12 co-authors published in *Nature* in 1997 that estimated

the value of global ecosystem services to be in excess of US\$33 trillion per year, a figure larger than global gross domestic product (GDP) at the time (Costanza et al. 1997). This admittedly crude underestimate, and a few other early studies, stimulated a huge surge in interest in this topic. In 2005, the concept of ecosystem services gained broader attention when the United Nations published its Millennium Ecosystem Assessment (MEA 2005). The MEA was a four-year, 1,300-scientist study for policymakers. In 2008, a second international initiative was undertaken by the UN Environment Programme, called The Economics of Ecosystems and Biodiversity (TEEB 2010). The TEEB report was picked up extensively by the mass media, bringing ecosystem services to a broader audience. Hundreds of projects and groups are currently working towards better understanding, modelling, valuation and management of ecosystem services and natural capital. In 2012 the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) was established. IPBES is an intergovernmental body (similar to the IPCC) which provides information on the state of biodiversity and ecosystem services for decision-making purposes. Its current membership includes 126 national governments. Emerging global, national and regional networks like the Ecosystem Services Partnership (www.es-partnership.org) have also emerged. Ecosystem services are now poised to provide real solutions to the problem of how to sustainably manage our critical natural capital assets.

From the perspective of ecosystem services, wetlands are among the most important and valuable ecosystems in the world (de Groot et al. 2012). The recognition of this value is a far cry from the situation not that long ago (and still prevalent in some places) when wetlands were considered to be ‘wastelands’ and every effort was made to drain, fill and convert them to other land uses.

Coastal wetlands, and in particular large river deltas, are especially important and valuable. River deltas contain the majority of coastal wetlands. However, they are also among the most impacted by human activities and 1 in 14 people globally live in deltaic regions (Day et al. 2016). The world’s most populated delta is the Ganges–Brahmaputra–Meghna in Bangladesh.

This book is a compendium of some of the latest work on understanding, valuing and managing ecosystem services in this, one of the most

important and vulnerable delta ecosystems in the world. It takes a much needed ‘whole systems’ approach to understanding the current status and trends in this complex system and focuses on the fundamental relationships between the biophysical system and the welfare of the diverse human communities that rely on it.

If we are to build the sustainable and desirable future we all want, we need to be able to understand, model and value complex social-ecological systems in the comprehensive way this book exemplifies. It is truly a model that needs to be broadly emulated.

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Bangladesh Meteorological Department (BMD)
Bangladesh Water Development Board (BWDB)
Comprehensive Disaster Management Program (CDMP)

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Institute of Water Modeling (IWM)
River Research Institute (RRI)
Soil Resources Development Institute (SRDI)
Space Research and Remote Sensing Organization (SPARRSO)
Water Resources Planning Organisation (WARPO)
WildTeam

Local Organisations

Cyclone Preparedness Programme
Local community-based organisations
Local Disaster Risk Reduction (DDR) Volunteers
Local Government Engineering Department (LGED)
Local media
Local mosque committee
Local non-governmental organisations
Local schools
Shelter Management Committee
Small entrepreneurship
Switch gate committee
Union Parishad
Upazila Administration
Upazila Parishad
Water Management Committee

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German Development Cooperation (GIZ)
Global Water Partnership

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International Union for Conservation of Nature (IUCN)

United Nations Development Programme (UNDP)

World Bank

World Food Program (WFP)

World Health Organization (WHO)

Preface

Deltas provide diverse ecosystem services and benefits for their large populations. At the same time, deltas are also recognised as one of the most vulnerable coastal environments, with a range of drivers operating at multiple scales, from global climate change and sea-level rise to delta-scale subsidence and land cover change. Lastly, many delta populations experience significant poverty. Hence when the Ecosystem Services for Poverty Alleviation (ESPA) programme was announced, we rapidly focussed on deltas as an issue for study. The focus of the book is the world's most populated delta, the Ganges–Brahmaputra–Meghna Delta, and more particularly within coastal Bangladesh west of the Lower Meghna River.

In our first visit to Dhaka, Bangladesh, in 2010, we recognised the complexity and challenges of understanding rural livelihoods in a dynamic delta. We held an intensive multidisciplinary workshop of UK and Bangladeshi scientists, followed by an inspiring visit to the Sundarbans. The resulting debates and conclusions, supported by acres of white board conceptual maps, formed the foundation that became the ESPA Deltas (Assessing Health, Livelihoods, Ecosystem Services and Poverty Alleviation in Populous Deltas) international consortium project. This involves more than 120 individuals and 21 institutions across Bangladesh, India and the UK. The collective thinking and experience of this team is distilled into this book, which examines the present and future of ecosystem services and livelihoods in

coastal Bangladesh. It reflects the strong commitment to integration and a transdisciplinary approach, embracing disciplines as diverse as physical oceanography, sediment dynamics, agriculture, demographics and poverty. Input of policy experts and a substantial array of stakeholders are also fundamental. This study provided opportunities for substantial learning across standard discipline boundaries, providing co-produced policy relevant outputs and insights. It also fostered a family of researchers who developed a shared understanding that could be applied to this difficult and challenging problem. This included effective sharing of knowledge and learning to question and contribute effectively outside an individual's specialist field.

Integration is core to what has been accomplished here bringing together natural and social sciences in ways that are distinct and groundbreaking. Such integration needs to start as the research is initiated and is an ongoing process. Integration needs to be core to the project with key questions and themes that are properly resourced. To be policy relevant, the research must be guided by the perspectives, needs and expertise encapsulated by local stakeholders, especially the decision-making processes and governance context of the deltas in question. Stakeholders from civil society, the non-government sector and of course agencies of government are all involved in policy formulation. Indeed, one of the outstanding successes of the ESPA Deltas collaboration, which is reflected in this book, has been the engagement with and the impact on the policy context of Bangladesh. The research has raised, for the first time, consideration of ecosystem services, their links to poverty and livelihoods and their influence in the national policy and planning process across a range of government agencies including the Government of Bangladesh, Planning Commission and other government partners such as the Water Resources Planning Organization (WARPO). Indeed the Government of Bangladesh has requested continued engagement and further development of some of the modelling tools in the context of the Bangladesh Delta Plan 2100, which is a new national planning approach. Engaging with policy was always a main aspiration of the research and is perhaps the aspect of which we are most proud.

The research provides both the foundation and analyses which has led to some of its most innovative approaches and significant insights. This book offers an overarching and integrated framework to analyse changing

ecosystem services in deltas and the implications for human well-being, focussing in particular on the provisioning ecosystem services of agriculture, inland and offshore capture fisheries, aquaculture and mangroves that directly support livelihoods. Each chapter contributes to the wider integrated assessment. Indeed, throughout the book there are reflections on the process of integrating information on the different environmental, social and economic dimensions of coastal management. The more detailed work supports significant conclusions that challenge elements of the perceived wisdom concerning human–environment relations and progress for the future, under the Sustainable Development Goals. We highlight, for example, that while ecosystem services support all populations in deltas, they act as a more critical safety net for the poorest and most marginalised delta populations. We show that while climate change has a real and tangible impact on the coastal zone, demographic, social dynamics and policy changes are likely to be more significant until at least 2050.

This book is not intended as a tool kit or specific guide to conducting integrated research in deltas or major coastal systems throughout the world. It offers, rather, a detailed account of a major integrative assessment relevant to development dilemmas in major ecosystems where biophysical, ecological and social dimensions are strongly coupled. This approach can be generalised beyond tropical deltas and even coastal zones; it addresses fundamental questions regarding the relationship of ecosystem services to the welfare of diverse rural communities that are important in every corner of the world today.

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The ESPA Delta partnership involves researchers in Bangladesh, India and the UK and across a wide range of relevant disciplines. In the UK these are Universities of Southampton, Exeter, Dundee, Oxford, Bath, Plymouth Marine Laboratory, the National Oceanography Centre Liverpool and the Hadley Centre of the UK Met Office. The Bangladeshi partners are the Institute of Water and Flood Management at the Bangladesh University of Engineering and Technology, Bangladesh Agricultural Research Institute, Technological Assistance for Rural Advancement, Ashroy Foundation, Bangladesh Agricultural University, Bangladesh Institute of Development Studies, Center for Environmental and Geographical Information Services, Institute of Livelihood Studies, International Union for Conservation of

Nature, Water Resources Planning Organization and International Centre for Diarrhoeal Disease Research, Bangladesh. The project's Indian partners are the University of Jadavpur and the Indian Institute of Technology Kanpur.

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