

Why ICZM?

Triggers, impacts and long time series

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Greenland: Summer melt water stream flows into a large 'moulin'— a tubular hole transporting the melt water and associated heat down through the ice sheet to the bedrock.

An important question for low lying coastal countries is whether the Greenland Ice Sheet will be melting 'abrupt' or linear. (photo: Roger J. Braithwaite, University of Manchester, UK)

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Summary

The coastal zone is a complex area to manage and requires a holistic integrated approach. The need for integrated approaches is incited by various triggers, such as the impacts of the unprecedented, strong growth of population, economic development, and concentration of atmospheric greenhouse gases.

Population growth: the world population is increasing exponentially (Figure 1) and the growth was particularly strong during the second part of the 20th century with a doubling of the world population in about 40 years.

The present population of Asia amounts to about two-third of the world population and is rising rapidly, especially in coastal conurbations.

Will this exponential population increase continue in the 21st century? It is estimated that in the year 2030 the world population will be more than 8 billion inhabitants (WRI) and that is more than 4 times as many inhabitants as in 1930 - a very rapid growth rate.

This rate of population growth may possibly continue to 2050.

In addition to the fact that our planet has an increasing number of people, many are also becoming increasingly productive.

Economic growth is wide spread around the world. Global economic wealth, expressed as Gross Domestic Product (GDP) per capita has an unparalleled growth (Figure 2). The average world GDP/capita doubles approximately every 30 years, during the last part of the 20th century and has a 2005 value of US\$ 5,500. This economic development is an important factor in combating poverty, which is important for many reasons, e.g. it increases the recovery rate for the coastal inhabitants in the aftermath of hazards, as demonstrated in Andhra Pradesh, India. The rapid economic development is, however, all too often accompanied by unsustainable resource use and environmental degradation.

These two triggers combined represent an enormous stressor on the environment to such a degree that the exploitation of the resources is threatened by the unsustainable growth. This is for instance illustrated in the world wide declining fish catches.

The strong rise in emissions of greenhouse gases (such as carbon dioxide and methane) in the atmosphere is the third trigger. The natural carbon dioxide concentration in the atmosphere ranged between 180 and 280 parts per million (ppm) for more than the last 0.5 million years. During this long period several cycles of glaciation and deglaciation alternated, as did the sea level. During the maximum of the last ice age (18,000 years

ago), the global sea level was about 120 metres below the present level.

The recent rapid increase of carbon dioxide from 280 to 380 ppm (in 2009) began around 1850, is very likely caused by human activity and is expected to further rise during the next decades and possibly thereafter. The sea is expected to rise with 35 - 40 cm in the 21st century according to IPCC mid-estimates, based on linear melting of the Ice Sheets of Greenland and Antarctica. However abrupt melting of the Ice Sheets should not be disregarded and may have very serious consequences for coastal states.

Moving so far beyond known, long term, natural levels of greenhouse gases and a record number of people living in the coastal zone, urge for strong measures:

- Mitigating measures should be aimed at strongly reducing the use of the finite fossil fuels, to be replaced by renewable energy forms,
- Adaptive measures for coastal areas: ICZM is regarded as an adaptive response mechanism aiming at sustainable use of resources and employment of multiple beneficial coastal measures.

The impacts of these three triggers combined are severe. To mention one example: natural hazards seem to increase both in number and the extent of damage caused during the last part of the 20th century (Figure 3).

The rate of growth of these triggers and their impact is a plea for action by governments for coordination to manage their resources and coastal zones in an integrated and sustainable fashion. An integrated approach is needed, for instance to control the development of land, tourism and fisheries, and thus our ecological assets more wisely. ICZM is an appropriate tool. It helps address present and future challenges, is directed toward sustainable development of the coastal resource and forms an integrated framework for combating hazards, and planning and implementing mitigation and adaptive, no-regret coastal measures.

The large economic and environmental benefits of ICZM may be, however, the most convincing driver to plan and implement an ICZM programme. During the World Coast Conference 1993, a concept on the benefits of ICZM was discussed (Figure 4): “The economic and environmental benefits in terms of monetary and non-monetary values are larger than the costs of integrated management efforts executed within an ICZM framework.” That concept was soon proven to be right. In this CCC publication some examples of highly beneficial ICZM, coastal cooperative efforts and multiple-use coastal measures, are mentioned:

- The positive results of the EU ICZM Demonstration programme (CCC I-1-1),
- The extra added values by the sustainable Rotterdam harbour development (CCC I-2-2),
- The large scale mangrove planting in Vietnam (CCC II-3-1-1, III-3-3-7) and
- The conservation of the attractive and protective coastal vegetation belts in the Seychelles (CCC II-5-1).

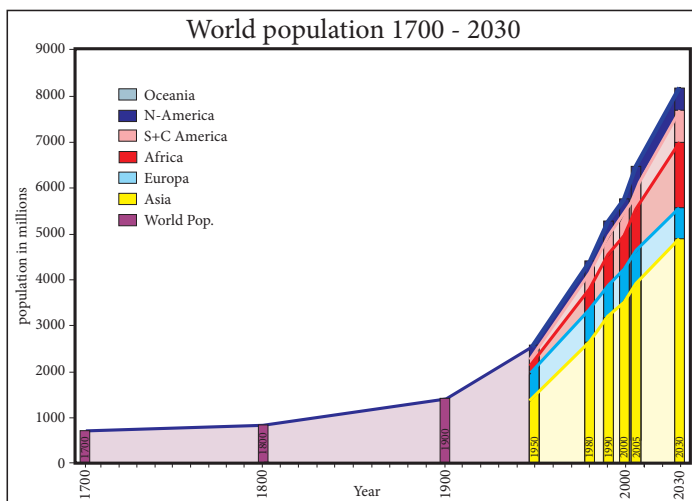


Figure 1: World population 1700 – 2030: an exponentially growing trigger. (source: Robbert Misdorp based on www.j-bradford-delong.net + WRI database)

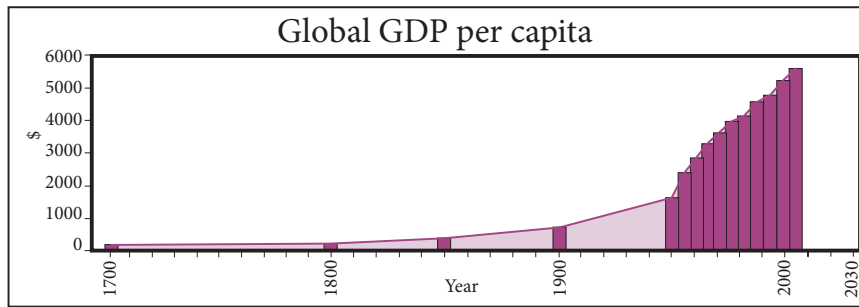


Figure 2: *World Gross Domestic Product per capita 1700 – 2005 (in 2000 constant US\$): strongly increasing during 20 century and particularly in the second half, with an unprecedented known short doubling period of about 30 years. (source: R.Misdorp based on www.j-bradford-delong.net: 1700 – 1950; WRI database in 2000 constant US\$:1960 – 2005)*

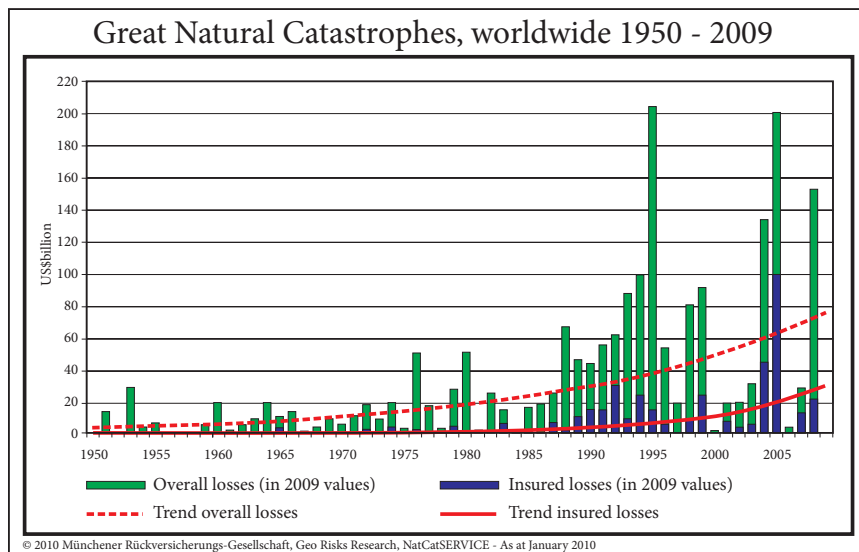


Figure 3: *Natural hazards: worldwide strong increasing annual losses: in US \$ billion of the 'Great natural catastrophes', during 1950 – 2009. (source: Munich Re, 2010)*

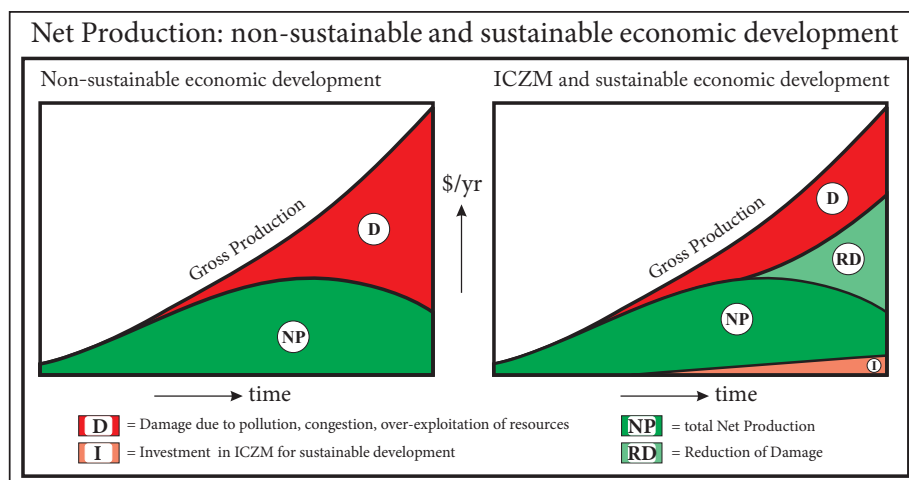


Figure 4: *The benefits of ICZM and sustainable economic development: in terms of reduced damages and increased added values resulting from a relative small investment in ICZM efforts. (source: Hulsbergen & Eid, 1990, IPCC-CZMS 1992). This WCC'93 concept was confirmed to be valid by examples of ICZM and coastal cooperation applying resilient, adaptive coastal measures, as demonstrated in this publication.*

In order to facilitate the application of ICZM, some planning tools and examples of innovative, adaptive coastal measures are discussed and made available in the following chapters.