IHDP UPDATE

Magazine of the International Human Dimensions Programme on Global Environmental Change

October 2007 · Issue 2

ISSN 1727-155X

The Implications of Global Environmental Change for Human Security in Coastal Urban Areas

www.ihdp.org

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UNITED NATIONS UNIVERSITY

Dear Readers,

The year 2007 has brought about major changes and exciting developments for the International Human Dimensions Programme on Global Environmental Change. On January 1st IHDP became a joint programme of three institutional sponsors: the International Council for Science (ICSU), the International Social Science Council (ISSC), and the United Nations University (UNU). This new institutional affiliation model underlines and fosters IHDP's claim to provide world-wide leadership in framing, promoting, and coordinating social science research on global change for the benefit of societies and civilizations. An immediate outcome of the new sponsorship model was the relocation of the IHDP Secretariat's offices in March. The Secretariat is now hosted by UNU at the United Nations Campus in Bonn, Germany. This location and the vicinity to major UN agencies in the field of sustainable development (e.g. the Secretariats of UNFCCC and UNCCD, several agencies of UNEP, UNESCO, and the WHO, as well as other UNU institutes and programmes) prove to be beneficial for and conducive to IHDP's goal to reach out to policy and practitioner communities, especially in the inter-governmental arena.

IHDP is also proud of its newly finalized Strategic Plan 2007-2015, a comprehensive and innovative document established through a thorough and broad consultative process involving many key players within the global IHDP community. The new Strategic Plan will provide intellectual guidelines and inspiration, and pave the way for the programme's second decade. This period is expected to produce fresh and innovative approaches to a variety of research themes and science portfolios as well as to enhanced capacity development and science-policy interaction. We are full of energy and vigor, ready to launch and implement the Strategic Plan and have embarked on a series of consultative meetings and workshops to identify and define the terms and outlines for new science projects on Earth System Governance, Integrated Risk Governance, and Vulnerability-Resilience-Adaptation. We will certainly further strengthen and fine-tune our cross-cutting and comprehensive work on climate change and energy, and we have engaged in a number of dialogues with the global policy community at various levels and through a variety of fora. The IHDP Strategic Plan 2007-2015 is online available at *www.ihdp.org* and will be disseminated broadly.

A special issue of our newsletter UPDATE, to be published this fall, will be dedicated to the Strategic Plan and our new science and science-policy initiatives. This current issue of UPDATE focuses on vulnerability in coastal urban areas from natural disasters exacerbated by global environmental change.

I wish you pleasant reading,

Andreas Rechkemmer
Executive Director

Imprint

IHDP Update is published by Secretariat of the International Human Dimensions Programme on Global Environmental Change (UNU-IHDP), Hermann-Ehlers-Str. 10, D-53113 Bonn
V.i.s.d.P.: Andreas Rechkemmer

The IHDP Update newsletter feature the activities of the International Human Dimensions Programme on Global Environmental Change and its research community

ISSN 1727-155x

Editor: Douglas F. Williamson
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Layout: Carolyn Louise Smith
IHDP Update is published three times per year. This Newsletter is produced using funds by the German Federal Ministry of Education and Research and the United States National Science Foundation.

Introduction to the "Global Environmental Change, Natural Disasters, Vulnerability and their Implications for Human Security in Coastal Urban Areas" Issue

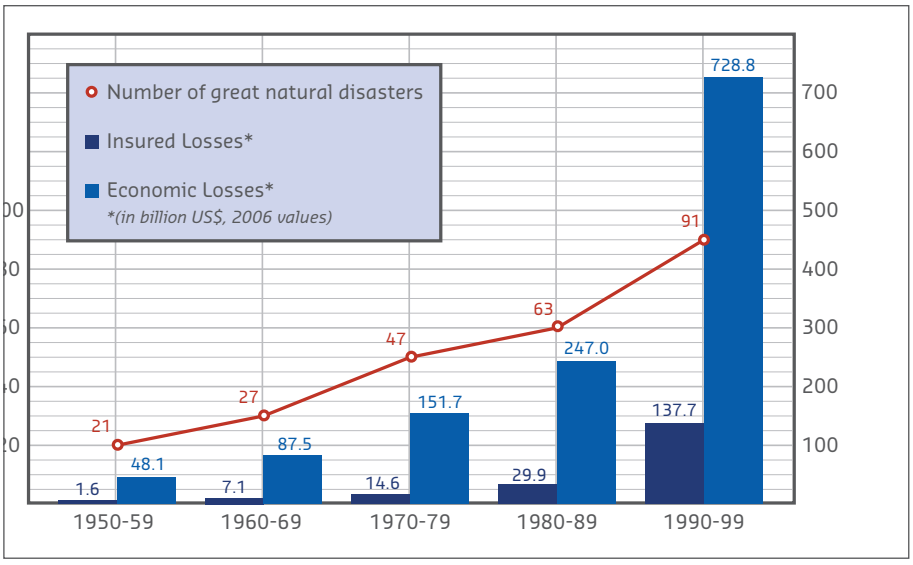
Roberto Sanchez-Rodriguez, Jocef Pacyna, Karen O'Brien, Michail Fragkias, Lynn Rosentrater, Jürgen Weichselgartner

Catastrophic events have affected societies around the world in recent years and underscore the close linkages between global environmental change, human security, and urbanization. Little attention has been paid so far to multidimensional perspectives capable of providing comprehensive and integrated approaches to better understand those events and help find avenues for adaptation and minimization of their negative consequences.

The increasing frequency of natural disasters and their tremendous impact on poor communities confirm that disasters continue to be one of developing world's unresolved problems and a major challenge for sustainability. Although the majority of the victims of natural disasters have been in poor countries, recent events such as Hurricane Katrina in New Orleans illustrate the vulnerability of communities in rich countries too.

The combined effect of globalization and global environmental change has provoked a rise in the number and intensity of natural events that have brought death and destruction in poor and rich countries, particularly in urban and peri-urban areas (Sánchez-Rodríquez et al., 2005). Many of the most important and significant changes associated with the impact of globalization are taking place in and around cities. This year, the world's urban population will for the first time equal the world's rural population (United Nations 2004). Around the turn of the century there were 19 mega-cities (i.e., with 10 million or more people) and 22 cities with 5 to 10 million people (UNCHS 2002). More than 90% of future population growth is likely to be concentrated in cities, and mainly in poor countries. Cities in the developing world will account for 95% of urban growth over the next two decades. By 2030 they will be home to 80% of the world's city dwellers (UN-HABITAT 2006). Rapid growth of population and its concentration in urban areas have significant implications for the long-term outlook for humanity.

Already burdened with many problems associated with growth (e.g. pollution, migration, poverty, environmental degradation, energy supply), urban areas are increasingly subject to dramatic crises. This is especially true in poor countries where economic and financial crises, together with fast and unbalanced growth of urban areas, have created fragmented spaces with high spatial segregation and social exclusion. The aforementioned problems play an important role in the interactions between urban areas and global environmental change and in their social and urban vulnerability to natural disasters.



Note: *The cities included in this figure have populations greater than 5 million. Hazard risk represents a cumulative score based on risk of cyclones, flooding, landslides and drought.* Sources: *CIESIN 2006, Dilley et al. 2005.*

Many of those urban areas are located in coastal zones. Low elevation coastal zones (LECZ) – contiguous coastal land areas at elevation less than 10 meters – only account for 2% of the world's land area but contain 10% of the population, and 13% of the urban population. Ten countries with the most people living in LECZs account

for about 73% of the people that live in the zone globally. Of the more than 180 countries with populations in the LECZ, 70% of them have their largest urban area extending into that zone. Furthermore, the largest cities (with five million or more people) have on average one-fifth of their population and one-sixth of their land area within this coastal zone and 15 out of the 20 mega-cities are coastal. All but two of the countries with the largest shares of their populations in the LECZ are of low or lower-middle income, an important fact considering the importance of economic development on vulnerability of populations.

The current IHDP Update is a joint effort by three IHDP core projects: Urbanization and Global Environmental Change (UGEC); Global Environmental Change and Human Security (GECHS); and Land-Ocean Interactions in Coastal Zones (LOICZ) – co-sponsored by IGBP. It focuses on natural disasters associated with global environmental change in coastal urban areas and sheds light on the main pathways of social and urban vulnerability to natural disasters caused by climate variability and change. The invited authors explore the close links between global environmental change, human security, and urbanization from multidimensional perspectives seeking to provide integrated approaches to those complex interactions.

Reference: *www.ihdp.org/publications*

Three Cities and Their Vulnerabilities to Climate Hazards

Alex de Sherbinin, Andrew Schiller, and Alex Pulsipher

Global cities are engines of economic growth and centers of innovation for the global economy and the hinterlands of their respective nations. The foundations of prosperity and prominence for most global cities lie in their long-standing commercial relationships with the rest of the world, a position that is facilitated by easy access to marine shipping, the least costly of all shipping options. Their location in coastal zones place global cities at greater risk from current and projected climate hazards such as cyclones, high winds, flooding, coastal erosion and deposition, and, sea-level rise (Nichols 1995, Rosenzweig & Solecki 2001, McGranahan et al. 2007).

It is now widely recognized that vulnerability is related as much to the sensitivities and adaptive capacity (resilience) of peoples and places as it is to hazard magnitude and frequencies (Cutter et al. 2003, Wisner et al. 2004). In this study we looked at the coupled human-environment system and the resulting place-based vulnerabilities in three cities: Mumbai, Rio de Janeiro, and Shanghai (Figure 1). We employed a framework developed by the Sustainability Science (SUST) project (Turner et al. 2003), which explicitly recognizes that macroforces – broad-scale environmental and human systems within which the local system resides – come together to affect (and sometimes intensify) the pressures that act upon the local system. Different pressures across scales come together in various sequences to create unique "bundles" of stress that affect local systems. A major hypothesis of this framework is that when stresses or perturbations emanating from the environment coalesce with those arising from society, significant negative consequences can result for the human-environment system as a whole.

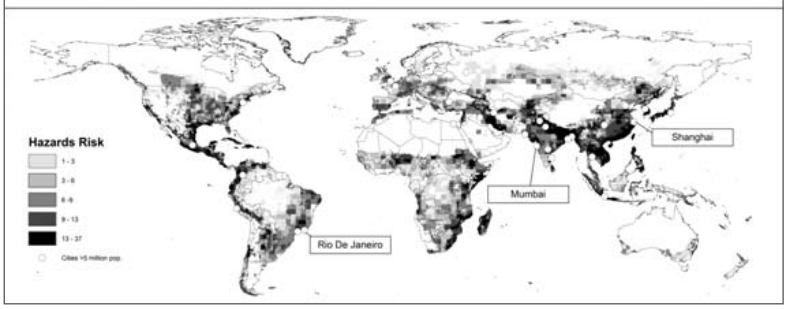
Using climate change scenarios for 2050 and a variety of primary and secondary data on the physical characteristics and social vulnerabilities of each city, we assess their unique stress bundles. In this abridged version of the full article, we report only on the results for each city and the overall conclusions.

Mumbai

Mumbai's greatest stress bundle is related to extreme rainfall and floods, such as the heavy flooding that occurred in July 2005. Mumbai's various characteristics of topography (flat), geology (unconsolidated fill material), numerous wetlands and flood-prone areas, the city's building conditions (not meeting building codes, squatter dwellings, previously flood-damaged buildings), poor sanitation and poor waste treatment and removal capabilities together create a particular bundle of stresses that collides with the set of socio-environmental conditions of Mumbai, such that vulnerabilities emerge for the system.

In addition, a stress bundle composed of population (large and growing), projected sea-level rise, and

Figure 1. Large Cities in Relation to Current Climate Related Hazards



Note: *The cities included in this figure have populations greater than 5 million. Hazard risk represents a cumulative score based on risk of cyclones, flooding, landslides and drought. Sources: CIESIN 2006,*

economic stresses converge to create some particularly problematic issues for Mumbai. This is because of a set of characteristics for Mumbai that include the lack of dykes and other coastal armaments for dealing with sea-level rise, weak disaster preparedness at the scale of sea-level rise, building conditions (not meeting building codes, squatter dwellings, previously flood-damaged buildings), and low incomes that do not allow the city to improve building conditions to the level required, nor to better develop and fund disaster preparedness. Mumbai is thus facing threats that local authorities have very little ability to control, dampen or mitigate. This is exacerbated by governance problems and institutionalized disparities (Revi 2005). This suggests that a reinforcing spiral could emerge for this set of issues, where increasing population comes together with sea-level rise and a stressed economy to further damage already weak buildings, undermine efforts to improve disaster preparedness and build coastal armaments; and these, in turn, further erode the economy while the sea level rises.

Mumbai's informal coping capacities, as a result of notably strong social networks and cooperation in the form of slum dwellers associations, emerge as important parts of Mumbai's resilience in the face of stresses. These informal coping systems are expected to help reduce vulnerabilities to some degree for both sets of issues that emerge from this preliminary analysis. Yet, by themselves, these informal coping capacities appear quite inadequate to meet the challenges from climate hazards and population size and growth that now face Mumbai.

Mumbai's overall vulnerability appears to be high. While the city is relatively prosperous compared to the rest of India, and it does have an elaborate disaster management plan in place, the challenges posed by climate change, especially flooding and sub-surface shifting in landfill areas, are unlikely to be met effectively. In particular, sub-surface shifting of the type that Mumbai might face could well overwhelm the adaptive abilities of any city, and particularly one with some of the other critical issues that Mumbai now faces.

Rio de Janeiro

In our analysis we found that there are three stress bundles that are particularly troublesome for Rio de Janeiro. In the first bundle, temperature increases come together with drought to put stress on Rio's drinking water supply. In addition, problems with governance exist that could further hinder the city in developing more robust potable water storage and delivery systems. In the second, extreme and unpredictable rainfalls and floods converge with projected sea-level rise to increase stresses which will be difficult for Rio to handle owing to the city's topography (narrow coastal shelf backed by steep mountains subject to mass erosion), poor building conditions, the lack of secure land tenure for a notable portion of the city's population, poverty coupled with large income inequalities, high rates of crime that reduce social trust, and large problems with sanitation systems and sewage disposal.

Lastly, sea-level rise converges with the tourism-based economy of a beach city to create a third stress bundle of great importance to Rio de Janeiro. Because of Rio's characteristically narrow beach, which is backed by steep slopes and mountains, modest increases in sea level will likely magnify sand erosion. In addition, Rio has no dykes or other armaments that could protect the beach from modest sea-level rise, or even from great storm surges. This situation illuminates a gap between the stress bundle and Rio's ability to resist or cope with it. Because of Rio's economic dependence on beach tourism, such damage will likely have reciprocal effects on the economy, thus creating additional stress on the city.

Based on a preliminary assessment, we conclude that Rio suffers from a significant ongoing vulnerability to climate hazards, particularly flooding and landslides. Although civil defense institutions have been set up to cope with natural disasters, underlying structural problems, including political clientelism and spatial segregation based on income, render the city vulnerable to climate hazards. Little in the way of concrete flood protection infrastructure has been set up in the wake of devastating floods in February 1988, which followed an El Niño year. It is possible to speak of highly vulnerable sub-populations living in favelas and near waterways, and relatively less vulnerable upper classes living in high-rise apartments in locations less susceptible to inundation. As in Mumbai, social segregation of housing by income group has created significant vulnerabilities.

Although the economy of Rio de Janeiro is relatively

robust, significant portions of GDP will be required for relief and reconstruction if floods of the magnitude of 1967 and 1988 are repeated. Unless more concerted efforts are made to prepare for climate hazards, the city will remain vulnerable.

Shanghai

As in Mumbai and Rio, recent and severe flooding has tested Shanghai. Perhaps given the magnitude of the city's recent losses (3,000 dead and 16 million displaced in the Yangtze basin in the wake of floods in 1998), the government appears to be taking a genuine interest in long-term disaster planning, and major reforestation efforts have been undertaken to decrease runoff in upland portions of the Yangtze basin. The municipality has also engaged citizens in "volunteer" civil defense networks, which presumably means that citizens know what to do in the event of disaster and are prepared to take action.

Nonetheless, several key bundles of stress converge to create specific vulnerabilities for Shanghai that emerge out of gaps in the city's ability to resist and cope with these stresses. First, sea-level rise along with increasing severity and frequency of heavy rains and floods come together with Shanghai's topography (level and low lying), geology (unconsolidated), land subsidence due to groundwater withdrawal, many wetlands and flood-prone areas, the inability of many buildings to withstand shifting land and water damage due to their poor condition, sanitation and waste disposal systems that are near capacity, and relatively modest income levels. This mix is likely to produce significant vulnerabilities for a large proportion of the city's residents, the city's built infrastructure and the Shanghai region's economy.

Second, Shanghai's population is already large and continues to grow rapidly. When this massive trajectory comes together with projected sea-level rise and increasing water use by the city owing to industrial development in peri-urban areas, this exacerbates land subsidence, probably puts greater numbers of people in harm's way from climate hazards and coastal erosion, and places people in greater concentration within areas that are likely increasingly flood prone. This set of circumstances may lead to a diminishing capacity for Shanghai to cope with such stresses because of its burgeoning population on already vulnerable lands, and a greater draw down of groundwater, causing densely populated lands to subside while sea level continues to rise. This could lead to increases in direct mortality, economic downturn and, potentially, large-scale disease outbreaks. On the other hand, Shanghai's wealth means the city has a high adaptive capacity. Resources will likely be invested in technological solutions even if such solutions fail to address root causes of vulnerability.

Conclusion

Until recently the emphasis of climate change policy has largely been on mitigation. The recent IPCC report gives far more attention to the urgent need for adaptation. Among other elements, disaster preparedness and management plans are vital components of an adaptation strategy. To design these, however, we need a better understanding of which people and systems are vulnerable to what kind of climate hazards, what makes them vulnerable, and where they are located. That is where vulnerability assessments can help.

From a policy perspective, there are few easy prescriptions for reducing vulnerability and better preparing for future climate hazards, at least in the case of the cities we describe above. The political difficulty of reducing vulnerabilities (or conversely, increasing resilience) may be attributed to a number of factors:

- Disasters are an unequally distributed public "bad" that is more likely to affect poorer, more vulnerable sub-populations with the least political influence. Mitigation measures, by contrast, are a public "good" that require substantial investment and adequately functioning institutions.
- Low tax collection capacity and low incomes constrain the resources available to government to make necessary infrastructural or institutional investments. Government resources themselves may become highly contested through political maneuvering.
- The wealthy and more influential classes may simply choose to "exit" from political decision-making processes rather than voice their concern over the lack of disaster preparedness. "Exit" means that they opt out of public resources and, instead, choose to invest in their own capability set (e.g. purchasing a well-built home in a safe location, insurance policies, or private education and health care).
- Adaptation measures are difficult to implement because they require long time horizons, whereas politicians typically operate on short-term horizons. Incentives need to be intelligently designed so that politicians, officials and the private sector find it in their interest to build less risk-prone, equitable cities.
- If vulnerability mitigation/prevention measures are expensive, there may exist a "moral hazard" on the part of state decision makers, as they may assume that the international relief community

will come to their assistance in the event of a significant natural disaster. Thus, to act means committing scarce public resources for a medium- or even low-probability future event, whereas to "wait and see" if disaster strikes, and later claim that the disaster could not be foreseen, shifts the financial burden onto international agencies.

The authors do not underestimate in any way the difficulties entailed in preparing adequately for future climate change-related vulnerabilities. Given the political and institutional issues, it is worth considering how communities themselves, through micro-planning or other efforts at collective organization, might develop plans and infrastructure necessary to reduce their vulnerability to natural disasters in contexts in which governments either lack the resources or are unwilling to consider investments in preparedness. Many efforts to improve local environments, such as enhanced drainage and improved waste disposal, also reduce vulnerabilities to disasters and their consequences (such as the spread of disease).

Reference: *www.ihdp.org/publications*

Cities as Crucibles of Disaster Politics

Mark Pelling and Kathy Dill

The Paradox of Crisis

The local impacts of global environmental change are embedded within the political life of cities – and nations – and can provoke political debate and policy change. The discrete nature of disaster events has prompted progressives to highlight recovery as a window of opportunity for policy to more effectively address risk and inequality within urban areas. UN-HABITAT (2006) calls this positive outcome of disaster the 'paradox of crisis'.

The 2004 Indian Ocean Tsunami impacted countless small and medium sized human settlements and was followed by a second tsunami of relief and reconstruction aid. According to the International Federation of the Red Cross and Red Crescent Societies (2006), government and private donations amounted to over US$18 billion. Like the first tsunami, this aid tsunami overwhelmed the capacity of local agencies to cope and too often swept aside developmental goals and practices in place before the tsunami in the rush to deliver a humanitarian led response. This was especially so in Sri Lanka and in the Aceh province of Indonesia where huge quantities of international aid have been concentrated. The Tsunami Evaluation Coalition, amongst others, has undertaken rigorous critiques of the behavior of humanitarians during the relief and reconstruction periods and recommended technical changes in the ways aid is organized and administered in such large events.

Unusually for the assessment of disaster response, the Tsunami has also prompted a limited debate on the political and social impacts of the event and its aftermath. Both Sri Lanka and Aceh province were in states of civil conflict before the Tsunami. Did the experience of facing a common threat lead to co-operation in relief and reconstruction and if so might this feed into peace building and resolution of the larger political conflicts? While the opportunity for peace building through reconstruction was identified, Sri Lanka is now closer to civil war than it was before the Tsunami struck. In Banda Aceh and Aceh province, the combination of huge local loss of life and the opening up of the city and province to international agencies and observation have arguably contributed to a scaling down of conflict and some political movement. It seems from this case that the impact and recovery from large natural disaster events do have the potential to contribute to progressive political change.

Upsetting the Social Contract

The social contract symbolizes a reciprocal agreement between social stakeholders (the public, private sector, and civil society) who cede some of their autonomy to other actors (often the state and its agents but also warlords) who in return guarantee security. The presence of a social contract does not imply equality in power relations or even inclusion in the determination of how security might be constructed and policed. It is however a useful theoretical devise for examining the ways in which sudden shocks – like disasters – can unsettle the status quo and lead to a questioning of and potentially a withdrawal

from and re-writing of the social contract by social stakeholders. Might the disruption to the political and social status quo caused by disasters open space for alternative forms of social contract to emerge? If so, what are the consequences for political freedom, autonomy and inclusiveness and the social and spatial distribution of security in the re-written post-disaster social contracts?

The outrage expressed by populations when states fail to react to the immediate needs of its citizens in crisis can be interpreted as the angry reaction to a break in what had been popularly understood as the social contract. Evoking the idea of social contract also points to concerns about contemporary political accountability. International and supranational organizations are taking increasingly important roles in designing, disseminating, and directing programs for disaster mitigation, response, and relief. One important question is whether the shift towards privatization of security entails new forms of social contract(s). A social contract perspective can also help us consider the freedom/security trade-off involved in appropriating a 'human security' framework for disaster.

The opening of political and social space post-disaster is widely recognized. It has been stereotyped by the media with images of looting, for example post Hurricane Katrina in New Orleans. Equally, this period has been romanticized by policy champions who report on local self-organized alternative systems of development emerging from the relief and reconstruction experience. Until very recently, the connection between these political expressions and the disastrous effects of dramatic natural phenomena such as earthquakes, hurricanes, and tsunamis has been tenuous. Unlike the targeted protests for rights to housing for those faced with forced evictions as part of the 'development process' of cities, popular political mobilizations in the aftermath of disaster have received little attention or support.

Taking disaster as an analytical starting point tends to cast subsequent socio-political actions in terms of responses to extreme and short-term conditions, alienating disasters from development. In contrast, contextualizing disaster within broader historical processes opens up diverse avenues for interpretation of political process. Therefore, if the objective is to identify and interpret the relationship between disaster and socio-political change, one should begin by looking for relevant socio-political change prior to any given disastrous event. Instead of envisaging disaster as a discreet and exceptional environmental event at the origins of socio-political change, it may be more productive to frame it as a moment in which contemporary governance is revealed as socially, politically, and/or environmentally maladaptive. Put differently, disaster provides a window into the functioning and failures of the social contract.

The Contours of Disaster Politics

At the international level, research has established the limited contribution of disaster events to inter-state relations. Where states have tense relationships before disaster, these tend to continue into reconstruction and beyond, even where disaster impact zones cross state boundaries, as in the case of the South Asian earthquake in 2005, which hit Pakistani and Indian controlled Jammu and Kashmir. At the sub-national and local levels, disaster politics is more varied with disaster and reconstruc-

tion being contested as the level of political discourse and action on the ground. Here we present five ways in which disaster politics interfere with local and sub-national political process and the balance of power that underscores the social contract. Discussion is based on a research project that reviewed 14 large natural disasters from 1899 to 2004.

1. Disasters provoke scrutiny of dominant ideologies, political systems, and institutions when they are perceived as being a product of maladaptive development. The specter of a multitude of largely African-American, poor, and elderly citizens trapped in New Orleans before catastrophic flooding inundated the city in 2005, combined with the federal government's inadequate response, led to the eruption of a national socio-political crisis.

2. Disasters can increase social tensions. This is due to the inverse relationship between political power and vulnerability, causing disasters often to hit hardest in politically peripheral populations. The 23 February, 2004 Moroccan earthquake led to open dissent with protestors taking to the streets, stopping military and aid convoys, and marching to the regional governor's office in north-eastern Morocco to protest the poor response of the government.

3. Existing inequalities can be exacerbated by post-disaster governmental manipulation. Political conflict following disaster often manifests around attempts to re-distribute land titles or usufructuary rights to land. It is commonplace for developers and speculators to claim rights over low-income settlement space (assessed by government agents as too dangerous for further habitation) with the effect that land is transferred from low to high-income groups. In Mexico City, following the 1985 earthquake, planned redevelopment of low-income inner-city tenements was successfully resisted by a coalition of working-class and professional associations. This intervention changed the character of politics in Mexico City for years to come.

4. Local organizing during response is often repressed by the state. In reconstruction, elite political structures tend to re-emerge at the local and national levels recreating pre-disaster inequalities. This can also increase tensions and undermine gains in community cohesion made during response. Though accomplished without bloodshed, the democratically elected Turkish government repressed civil society organizations activated during the Marmara Earthquake that destroyed the city of Izmit in 1999. In this case, the state proved incapable of providing assistance during the critical first days following the earthquake. Local associations and NGOs stepped in to fill this gap. To regain control, the government froze NGO bank accounts and proclaimed illegal all but select state-authorized NGO activities. The repression was focused especially against organizations with (or identifying with) a religious, Islamic orientation. These examples also point to the need to explain national political action following disaster within the international political context. Repression in Guatemala unfolded in a Cold War client state. Turkey is caught between the external pressures of EU candidacy and US strategic interests, which magnify longstanding internal struggles between political, religious, and ethnic groups.

5. Political leaders can regain or even enhance their personal or political legitimacy in the aftermath of disaster, regardless of their culpability. This hypothesis is exemplified by political responses to a 1966 hurricane in the city of New Orleans (Abney & Hill 1967) where the incumbent mayor used disaster relief to bolster his public image and was re-elected to office a month later despite being personally responsible for the reallocation of city funds originally destined to shore up the levee. The mayor had successfully manipulated the disaster event to maintain his popular legitimacy.

Cities as Crucibles of Disaster Politics

James Mitchell (1999) famously described cities as "crucibles of hazard". They are also crucibles of disaster politics. Cities bring together in high concentration vulnerable groups, competing political interests, and multiple forms of hazard. The flash point for urban politics during disaster and in everyday life is land rights. Disasters demonstrate in terrible clarity the inequality in access and failures in governance that distribute risk in the city. They often generate moments of struggle where land rights can be won or lost by competing political actors in the city.

Disaster can trigger popular mobilization but sustained political activity/opposition requires discursive (ideological), organizational (social capital), and material (financial) support. The transitional political space following disaster, where progressive political movements can emerge in otherwise authoritarian political regimes, has not received the attention it deserves. The result is that the window of opportunity offered by disasters is too often seized by opportunistic political and private interests or rapidly closed by states threatened by emergent political forms that may contest the pre-disaster social contract.

Acknowledgements: *Mats Berdal, Jonathan Goodhand, UK ESRC New Security Challenges Programme grant.*

Reference: *www.ihdp.org/publications*

Social Challenges of Global Change

om'08

IHDP Open Meeting 2008

7th International Science Conference on the Human Dimensions of Global Environmental Change

15th - 19th 2008, India Habitat Centre, New Delhi, India

Co-organizer and local host: TERI (The Energy and Resources Institute)

While still reaching out to the large and diverse international human dimensions community, it is expected that this Open Meeting will be highly applicable to the South Asian region generally and India in particular. Together with the local host and co-organizer, a unique developing-country institution with a main focus on energy, environment and sustainable development on a global perception and a local focus, the IHDP will follow up on outcomes from the last Open Meeting in Bonn in 2005, which tried to outline the need for a more specific and selective scientific approach.

With the theme of the 7th Open Meeting, "Social Challenges of Global Change," IHDP wants to indicate the need to incorporate not only the general discussion about climate change, but also many other environmental changes which happen in our society: resource shortages, the destruction of ecosystem services, new threats to human health. At the first planning meeting of the ISPC, which took place in Bonn at the end of June this year, the planning committee agreed on four core questions, which should cover the widespread aspects of Social Challenges of Global Change:

1. How do we deal with demographic challenges?
2. How do we deal with limitations of resources and ecosystem services?
3. How do we maintain social cohesion while increasing (global) equity?
4. How do we adapt institutions to address global change?

Each of these questions will for the crux at one of the days of the 7th OM.

Contributions to this conference will need to relate to one of the questions mentioned above and the numerous cross-cutting issues and topics that intersect them, as laid out in the 7th Open Meeting concept note.

Call for Contributions is open!

For more information, visit *www.ihdp.org* or *www.openmeeting2008.org*
or contact the secretariat at, *openmeeting@ihdp.unu.edu*

www.openmeeting2008.org

Climate change and the risks of settlement in the low elevation coastal zone

Gordon McGranahan, Deborah Balk and Bridget Anderson

Coastal settlement is both environmentally damaging and environmentally vulnerable. Climate change, which will bring sea-level rise and greater storm intensity, amplifies the risks of coastal settlement. Yet, coastal zones are densely settled and growing rapidly.

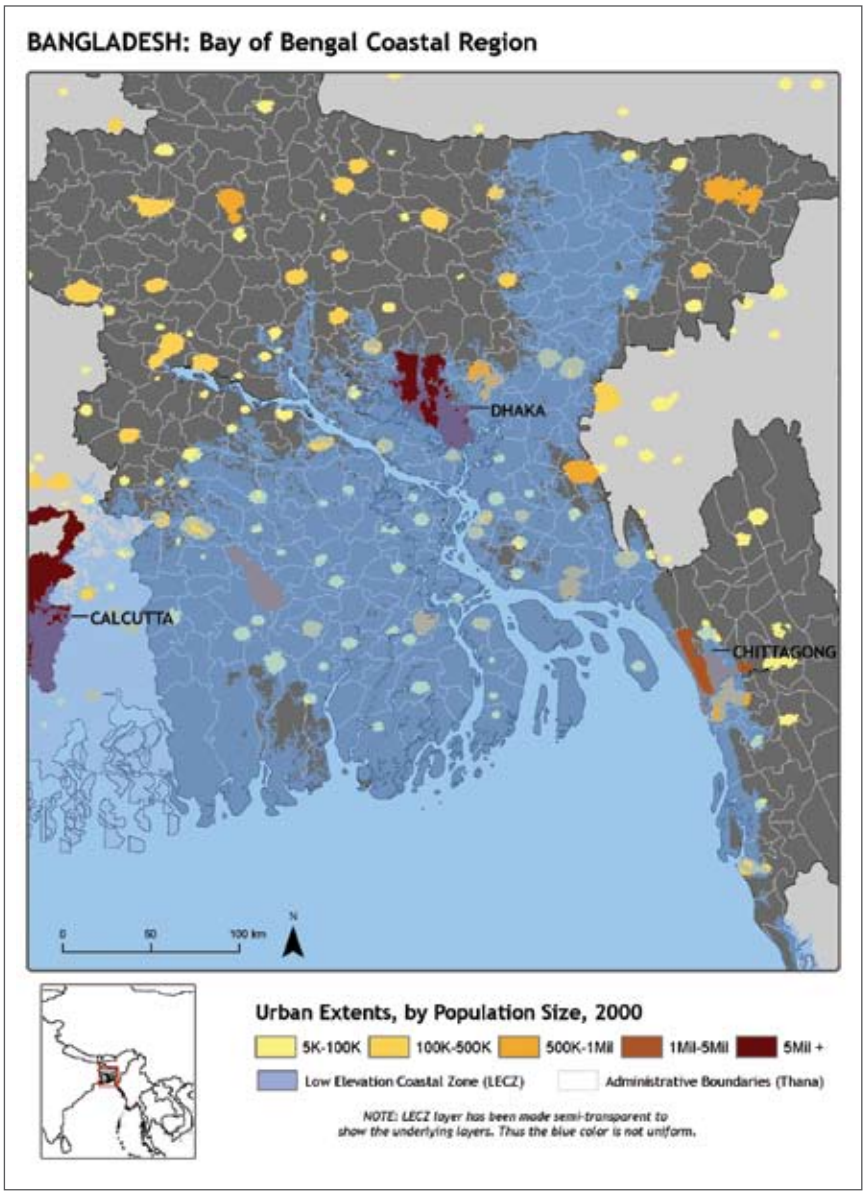
The low elevation coastal zone (LECZ - defined as contiguous coastal land less than ten meters in altitude) only accounts for about 2 percent of the world's land area, but contains 10 percent of the population, and 13 percent of the urban population.

As illustrated in Table 1, about two thirds of the population in this zone is in Asia. Yet even in Africa, with only one percent of its land in the zone, and a comparatively high share of the population engaged in agriculture, 7 percent of the total population and 12 percent of the urban population live in the zone.

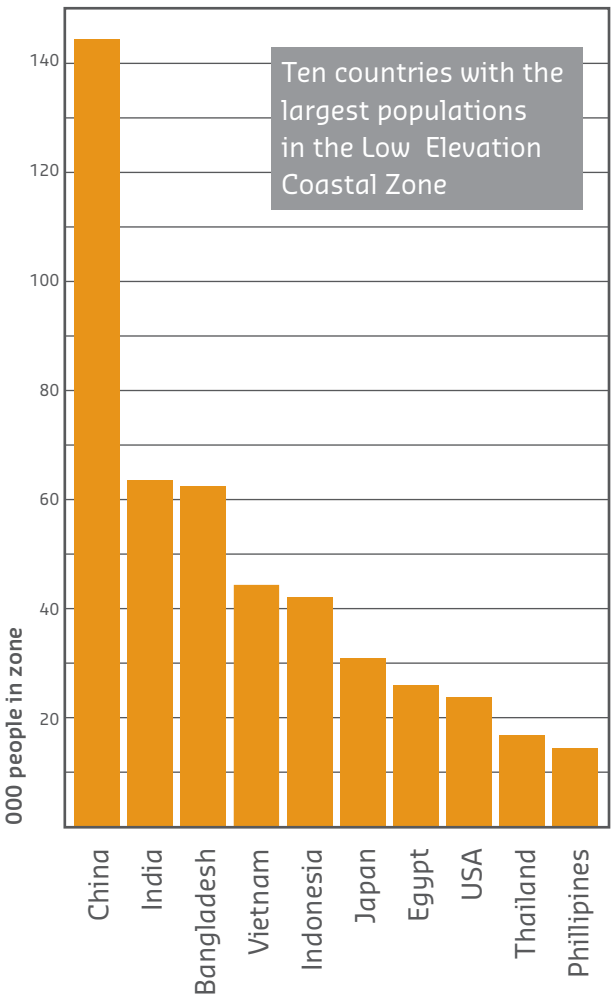
While the Small Island States have by far the largest share of land in the zone, their population percentages are not exceptional. This is in part because some of the most populous small island states have comparatively little settlement in the low elevation areas, but is also because small island states do not have large rivers, which create flat and fertile deltas.

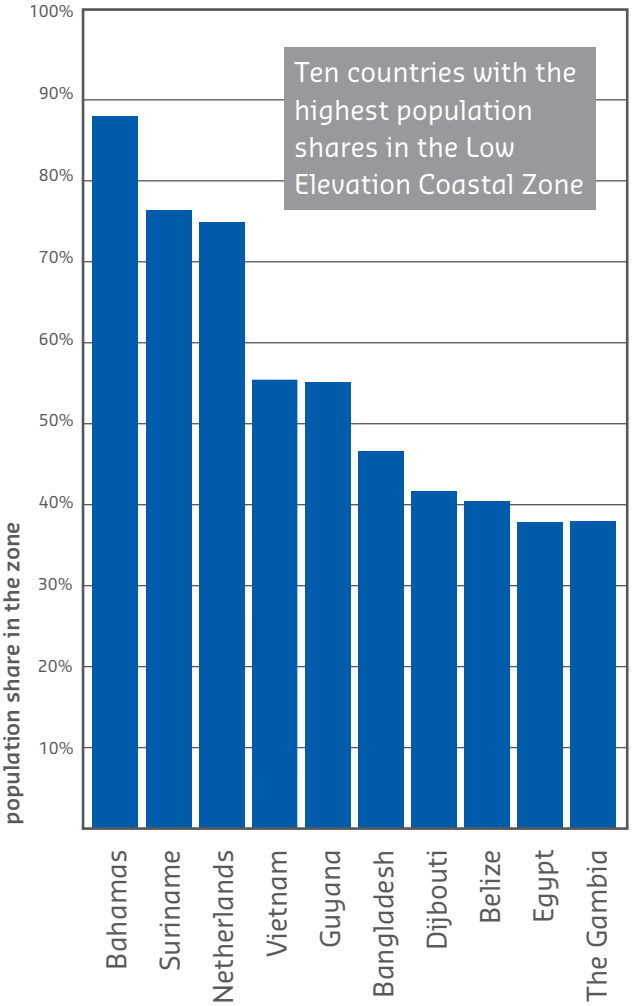
Regional averages hide considerable national variation, and the ten countries with the most people living in the zone – see Figure 1 – together account for about 463 million people, or about 73% of the people who live in the zone globally. Most of these countries are both populous and contain large and densely populated delta areas, many of which are also susceptible to subsidence and already have large populations at risk from storm surges.

The countries with the highest population shares in the zone (excluding those with total populations of less than 100,000 or land areas less than 100 square kilometres) are shown in Figure 2. Three of these countries, Vietnam, Bangladesh, and Egypt, are also among the countries with the largest overall populations in the zone. Only one is a small island state, although there would have been several more had the very small countries with populations below 100,000 been included in this figure.



From a vulnerability perspective, it is especially troubling that all but two of the countries with the largest shares of their population in the LECZ (excluding the very small countries) are of low or lower-middle income. This is somewhat surprising, given that urban settlements are generally more coastal than rural settlements, and that more wealthy countries are more urban.





In the world as a whole, but most notably in Asia, not only are urban populations more likely to be in the LECZ than rural populations, but larger urban settlements are more likely to overlap with the LECZ than smaller urban settlements. While only 13 percent of urban settlements with populations fewer than 100 thousand overlap with the LECZ, this figure rises to 65 percent among cities of five million or more. Perhaps even more striking, of the 183 countries with people living in the LECZ, 130 have their most populous urban area extending into the zone.

Continued urbanization is in danger of drawing still greater populations and population shares into the low elevation coastal zone. In China, where export-driven economic growth has been associated with very rapid coastal migration, national population growth between 1990 and 2000 was approximately 1.0 percent, while growth in the low elevation coastal zone was 1.9 percent, and urban populations in the zone was 3.4 percent. Even in Bangladesh, where urbanization is a less clear driver, movements towards the coastal zone are evident, with a total population growth rate of 1.2 percent, growth in the zone of 2.1 percent, and growth in the urban population in the zone of 2.8 percent.

Looking to the future, the responses to the growing risks in coastal settlements brought on by climate change will need to include each of the three Ms – mitigation, migration, and modification – all of which have a long lead-time. Low-income groups, who often settle the flood plains, are most at risk. These same groups are most at risk from hastily constructed government policies. All of these factors point to the need for timely action – starting now.

Methodology

This study integrates recently-developed spatial databases of finely resolved global population distribution, urban extents, and elevation data to produce country-level estimates of urban land area and population in LECZ (low elevation coastal zones). By overlaying geographic data layers, the population and land area in each country's LECZ are calculated and summarized by country, region, and economic grouping. Shuttle Radar Topography Mission (SRTM) data was used to delineate a low elevation coastal zone including land area contiguous with the coast up to 10 metres in elevation. Urban extents were taken from Columbia University's Center for International Earth

Region	Total Population	Urban Population	Total Land	Urban Land	Total Population	Urban Population	Total Land	Urban Land
	Million	Million	1000 km²	1000 km²	%	%	%	%
Africa	56	31	191	15	7%	12%	1%	7%
Asia	466	238	881	113	13%	18%	3%	12%
Europe	50	40	490	56	7%	8%	2%	7%
Latin America	29	23	397	33	6%	7%	2%	7%
Australia & New Zealand	3	3	131	6	13%	13%	2%	13%
North America	24	21	553	52	8%	8%	3%	6%
Small Island States	6	4	58	5	13%	13%	16%	13%
World	*634*	*360*	*2,700*	*279*	*10%*	*13%*	*2%*	*8%*

Table 1: *Population and Land Area in Low Elevation Coastal Zone by Region - 2000*

Science Information Network's Global Rural Urban Mapping Project (GRUMP). These urban extents were primarily delineated using NOAA's night-time lights satellite data (city lights 1994-95) verified with additional settlement information, and represent urban agglomerations including surrounding suburban areas. Population and land area were also taken from GRUMP, which provides these data as gridded surfaces globally based on geo-referenced census data with population allocated between urban and rural areas as delineated by the urban extents. All data are expressed at 1km resolution. Figure 3 illustrates, for the Bay of Bengal region of Bangladesh, the data layers with which the calculations were made.

Storm surges - the case of Hamburg, Germany

Hans von Storch, Katja Woth, Gabriele Gönnert

Along the coast of the North Sea, storm surges present the major geophysical risk (Gönnert et al., 2001). A long history of disaster has deeply engraved the severity of this danger into the cultural texture of the local population (Petersen and Rhode, 1977). The stories about the loss of a major island, Nordstrand to the North Sea and the "great man-drowning" (grote Mandränke) on 16 January 1362 is part of an ubiquitous folklore, which reminds people that the North Sea is a dangerously stormy "subject", actually named "Blanke Hans" in the region.

Hamburg has often been subject to storm surges and has suffered substantial damages. However, the risk, and the vulnerability of the population has changed. The storm surge situation in Hamburg has evolved over the years in comparison to the North Sea coast situation. The objective of this short paper is to describe these changing risks and vulnerabilities.

Past development

In the 18th century, storm surges and breaking dikes were relatively frequent in Hamburg. The dike failures took place at water levels of about NN + 5,20m, or so. These storm surges came along in clusters. After the severe storm surge in 1825 dike heights were raised to NN+5,70m. From then until 1962, only one severe storm surge happened, in 1855. After this storm flood, for more than 100 years, until 1962 the improved dike levels were not challenged. All gauge readings remained below NN+5.00 m.

During this time, the conditions of the dikes deteriorated, as some of them were enlarged but but not fortified at the base. Thus, the dikes became too steep, so that waves and overflow had a stronger impact, with an increased chance for failure in the case of a storm surge.

When the big flood came in 1962, severe damage occurred all along the German North Sea coast. Many dikes in Hamburg broke and more than 300 lives were lost there. Nobody expected such a disaster, and many unprepared members of the immigrant community perished. The calm period of more than 100 years had lead to a false perception of safety, which increased the vulnerability.

After 1962 massive investments into the coastal de-

fense were made; dikes were raised to NN+7.20 m. A very strong flood happened in 1976, well above the 1962-level, at NN+6.45 m. However the newly enforced costal defense held and damages were insignificant in Hamburg. Nevertheless, dikes were raised again to a level between NN+8.00m and NN+9.30m. Since 1962, several very high storm surges took place with heights between NN+5.50 m and NN+6.00 m, but only minor damages were reported.

The history of storm surges in Hamburg, as documented since 1750, had three phases – the frequent damage-period prior to 1850, the calm period of 1855 – 1962, and a period of elevated storm surge-levels with appropriate defenses and management since 1962.

It has been speculated that the increase of storm surge heights in Hamburg St. Pauli since 1962 would contain a significant component reflecting global man-made climate change. This is very likely false. The main part of this increase is due to the improvement of coastal defense along the River Elbe. Another cause is the dredging of the shipping channel to Hamburg. The intensification of the North-Atlantic Oscillation during the period between 1960 and 1995 may have contributed a minor increase in storm surge level (Weisse and Plüss, 2007). A measure of the effect of the former two is the difference of storm surge heights in Cuxhaven, at the mouth of the Elbe estuary, and in Hamburg. Before 1962 storm surges in Hamburg were on average about 30 cm higher than in Cuxhaven. After 1962 this difference rose to about 1 m (Grossmann et al., 2007). Experts estimate that about ¾ of this increase is related to coastal defense measures along the river, and ¼ to the deepening of the Elbe shipping channel from less than 11 m to 14.50 m.

Thus, modifications of the river Elbe have significantly increased the storm surge height in Hamburg, while climatic effects were rather minor (cf. Weisse and Plüss, 2005; WASA, 1998; Alexandersson, et al., 2000)

Scenarios describing global climate change

The ongoing rising concentrations of carbon dioxide and other radioactive trace gases in the atmosphere lead to global climate change, the effect of which is now already detectable mostly in terms of thermal variables (in particular global mean air temperature; IDAG, 2005). A cascade of models, global and regional atmospheric models, followed by a hydrodynamic model (describing water levels and currents) may be used to estimate future storm surge levels along the North Sea coast – under the assumption of different emissions of greenhouse gases in the coming decades (Woth et al., 2006). Interestingly, these scenarios differ little among a series of different

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New Dehli, India

The 6th International Human Dimensions Workshop (IHDW) will take place October 12th - 15th 2008 in India, immediately before the 7th Open Meeting. This IHDW will be a shortened series of parallel workshops, offering an intense training on subjects such as Industrial Transformation, Health, Vulnerability, Resilience, and Adaptation.

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Participants to the IHDW will be requested to also present papers or posters at the Open Meeting itself, and must submit abstractsto the Open Meeting call.

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model set-ups, and among two rather different emission scenarios (Woth, 2005).

Based on these North Sea storm surge scenarios, Grossmann et al. (2007) have used an empirical link between coastal and estuarine water level variations to derive a consistent estimate for Hamburg. Their results, shown in Figure 1, take into account both an estimate of mean sea level rise (due to thermal expansion as reaction on global warming) and the elevated wind-driven surges.

Thus, according to these projections, water level extremes, in terms of the mean maximum water level in a storm season, would rise by 15 cm ± 5 cm in Cuxhaven at the mouth of the river and 20 cm ± 5 cm in Hamburg until around 2030, relative to 1980-90 levels. Such an increase does not cause significant concern among coastal engineers. However, at a later time in the 21st century, say 2085 representing the last three decades of the century, the increase may amount of about 50 cm ± 15 cm in Cuxhaven and 60 cm ± 20 cm. Such an increase would need adaptations in both Cuxhaven and Hamburg.

These projections have been calculated under the assumption that the river topography will remain unchanged in the future. In fact, it seems unlikely that this assumption will be the case. Because of disadvantageous patterns of sediment transport, plans are now in place to slow the hydrodynamic regime in the Elbe estuary, as outlined in the German-written "Concept for a sustainable development of Tidal Elbe River as an artery of the metropolitan region Hamburg and beyond" (http://www.tideelbe.de/pdf/Strategiepapier_Tideelbe_deu.pdf) of Hamburg Port Authority.

When the tidal regime in the Elbe is slowed down, then not only ecology and sediment transport are affected but also the movement of water, including tides and storm surges. Therefore, part of the earlier increase in storm surge heights in Hamburg may be reduced, so that the perspectives for future storm surges may be less than what was envisaged under unchanged topographic conditions in Figure 1.

Conclusion

In this short note, we have discussed changing storm surge conditions in Hamburg in Northern Germany during the past 200 years and perspectives for the future. The major conclusions to be drawn are:

1. Human interventions into the topography of the river Elbe had a significant impact on the statistics of storm surge heights – the surges rose by approximately 70 cm.
2. The timing of storm surge events can not be described as a Poisson-process with random waiting times between any two events. Instead, the series of events show clustering and extended active and passive stretches of time.
3. So far, a change in the storm statistics related to elevated levels of greenhouse gases in the atmosphere cannot be detected
4. In the future, an accelerated increase of storm surge heights due to rising mean sea level and changing storm patterns is plausible. The perspectives depend little on the assumed future emissions of greenhouses gases. Until 2030 the changes are not serious for coastal defense; later in the century the changes will probably require adaptation measures.
5. While this increase of surge height along the North Sea appears unavoidable, the earlier modifications of the geometry of the estuary indicate possibilities to counteract the expected rise in surge heights in Hamburg to some extent.
6. When speaking about future risks, one has to take into account also changing patterns of vulnerability of coastal populations. It seems that the vulnerability of the population has increased in the recent past. The effective coastal defense has created a perception of absolute security, even if scientists have demonstrated that a slight modification of past storms (in terms of path and speed) could cause significantly exaggerated high storm surges. The vulnerability increases also because of the influx of people not originating from the coastal zone, who simply are not aware of the severity of the risk.

Reference: *www.ihdp.org/publications*

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Adaptation Options for the Built Environment: Linking Experiences of Developed & Developing Countries

Monirul Mirza

Extreme weather events can cause different magnitudes of economic damages and loss of human lives in developed and developing countries. These are also dependent on location of occurrence, magnitude, and extent of the events. Tropical developing nations are often affected by perilous floods and storms. However, developed regions (Europe and North America) also face the onslaught of these events. At least 80% of fatalities is limited to the developing countries while developed countries bear the largest share of economic losses (Mirza, 2006) Although, the global share of economic losses of developing countries in the wake of extreme weather events is small, taking into account their low GDP, per capita losses often cause significant impact on livelihoods and economic recovery. Jahan (2000) demonstrated this with a case study of the devastating 1998 floods in Bangladesh. The economic damage caused by Hurricane Mitch to Honduras was estimated at approximately 2 billion dollars or 18 per cent of capital stock (Box 1). Model analysis indicated an annual $123 million requirement of additional external funding to meet losses due to natural catastrophes in Honduras (Freeman et al., 2004). On the other hand, the United States and Canada quickly recovered from Hurricane Katrina (Box 2) in 2005 and severe ice storms in 1998, respectively. However, in both developed and developing countries, the recovery time for a large number of victims from any extreme weather events depends on their demographic, racial and gender compositions, economic and social conditions, and access to economic and administrative resources, among other factors.

Developed countries (DCs) are generally in an advantageous position relative to developing countries in terms of infrastructure and development. In the DCs, governments are the primary decision makers regarding investment in infrastructure. On the other hand, in developing countries, a government cannot decide alone. Most of the infrastructure investments are funded by foreign/international banks (e.g., World Bank, International Development Agency, Asian Development Bank, African Development Bank, etc.) (Mirza, 2003). Financing decisions are mostly based on cost-benefit analysis of a project. For example, in Bangladesh, no infrastructure project is funded if the EIRR (economic internal

Flooding after Hurricane Katrina in New Orleans, USA

Box 1
Hurricane Mitch & Damages

Mitch had grown into a Category 5 storm within four days of its birth in the western Caribbean Sea. It dumped huge rains on Honduras and Nicaragua and caused catastrophic flooding. It was the second deadliest hurricane recorded, killing 10,000 people, affecting 6.7 million more, and causing economic losses of over 8.5 billion US$ at 1998 prices (Pielke Jr. et al., 2003). Mitch's impacts were greatest in Honduras and Nicaragua but it also affected El Salvador, Guatemala, Belize, and Costa Rica.

Box 2
Hurricane Katrina, 2005, USA

In late August of 2005, people around the world watched the devastation of Hurricane Katrina on the New Orleans and Mississippi Gulf Coast of the USA. Katrina formed in the Bahamas on August 23, moved northeastward and began to strengthen after crossing South Florida and entering the Gulf of Mexico. On August 28, it reached category 5 strength about 400 kilometers South-Southeast of the mouth of the Mississippi River. Storm surges generated by Katrina breached the levee that protected New Orleans from Lake Pontchartrain. There was evidence of significant overtopping at a number of sites, such as along the Mississippi River Gulf Outlet and the Inner Harbor Navigational Canal (ASCE, 2005). Most of the city was subsequently deeply flooded by the lake's waters.

Over $200 billion in damages in New Orleans were estimated and other major damage to the coastal regions of Louisiana, Mississippi, and Alabama made Katrina the most destructive and costliest natural disaster in the history of the United States after Hurricane Andrew ($26.5 billion loss). Katrina will likely be recorded as the worst natural disaster in the History of the United States. About 1100 people lost their lives in Louisiana and over a million people were displaced or left homeless (US House of Representatives, 2006). A humanitarian crisis on such a scale had not occurred in the U.S. since the Great Depression of 1930s. The full extent of the physical and human devastation may never be estimated (Mirza, 2006).

rate of return) is less than 12.5%. Sometimes, damaged infrastructure cannot be repaired because of lack of resources or requirement of resources for other priorities such as poverty alleviation, or disaster recovery.

Inadequately designed structures are built in both developed and developing countries. The implications of this are the creation of a false sense of security and elevated levels risk. For example, the levees built along the Lake Pontchartrain and the Mississippi River in New Orleans, USA were for a Category 3 Hurricane and associated storm surge. The levees failed at several locations because they could not withstand water pressure generated by a Category 5 hurricane (Katrina). Many high voltage transmission lines were found to be inadequately designed when they collapsed during a severe ice storm in 1998 in Quebec, Canada. Failure of inadequately designed levees (due mainly to economic reasons) is very common during extreme flooding events in developing countries (Bangladesh, India, Mozambique, etc.). Lack of adequate resources for regular maintenance also leads to failure.

Climate change can amplify extreme weather events into much greater and more destructive events than they would have been in a stable climate situation. They may occur more frequently, their magnitude might increase, and new areas may experience extreme hazards where they are now absent. Taking climate change risks into account in designing new infrastructure is an imperative as the economic lives of many infrastructures will be within the time-horizons of climate change. Retrofitting is a possibility, but is not always feasible. For example, retrofitting cannot be done for a bridge over a large river in the coastal zone to ensure ample navigational heights in the wake of sea level rise. A flood levee designed for a 100-year flood estimated from present conditions cannot be expected to withstand a future 100-year flood under more extreme, climate-changed conditions. This process is slightly easier for the wealthy, developed countries, but still needs an acknowledgment of risks, mobilization of resources, solid policy guidelines and, in some cases, legislation. For developing countries, consideration of climate change risk into infrastructure design could be a short-term economic burden, but would be economically viable in the long-term as construction of new infrastructures or retrofitting would not be necessary. Policy changes and mainstreaming climate change are necessary at the country level but the starting point should be the lending/financing agencies that finance infrastructure construction in developing countries.

Developed and developing countries both can learn from each other's experiences. In many cases, the way developing countries have created resilient societies could provide lessons for many developed countries. On the other hand, developing countries can learn about advanced design technology, resources management, non-structural measures such as insurance, from the developed countries. A greater cooperation between developed and developing countries will lead to safer societies across the world.

Reference: *www.ihdp.org/publications*

Management Strategies for Urban Coastal Zones: Integrating DPSIR Concepts with GIS Tools in People's Participatory Programs

Alungal N. Balchand, Mooleparambil S. Madhusoodhanan, And C. Reghunathan

1. Introduction

The coastal region has historically provided human societies occasions for trade and commerce, venues for conquest and self defense. Most cultural and social agglomerations originated near coasts (Bartlett and Carter, 1988 & 1990). Apart from being a primary food production area traditionally, the shore has hosted large civilizations. This zone now provides for income, recreation, a habitat for humans, and is shared by various, differing sub-ecosystems. This region is very vulnerable too. Natural climatic variability – floods, drought, severe sea state, etc. - and man made changes, like building construction, port and harbor operations, dredging and mining, and pollution discharges, among others, have affected rich coastal biota systems and their productivity. In the opinion of Soucie (1973), "the real conflict of the beach is not between sea and shore but between man and nature".

This raises the concept of coastal zone management - developed according to natural cycles and operated by humans in a sustainable manner. The historical approach has been to apply technological solutions to coastal problems. While population and technology were limited, long term damages were minor and adjusted (Walter, 1990). We now have the knowledge to assess and re-assess current situations that have worked to our benefit or detriment in a growing world with multiple objectives and composite stakeholders.

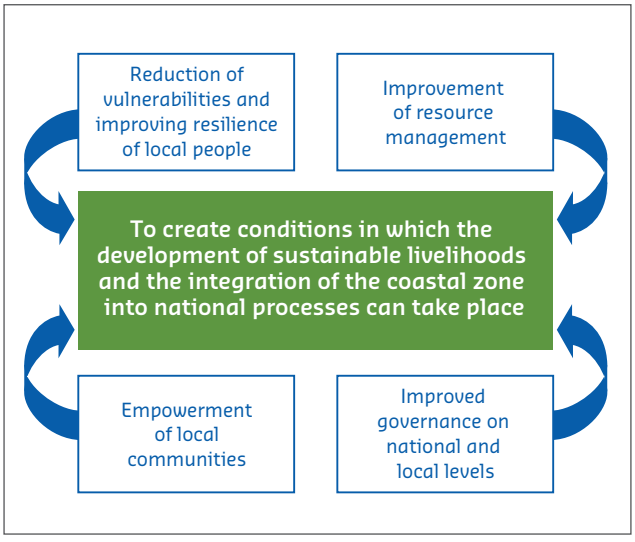


Figure 1 *The concept and goals of ICZM*

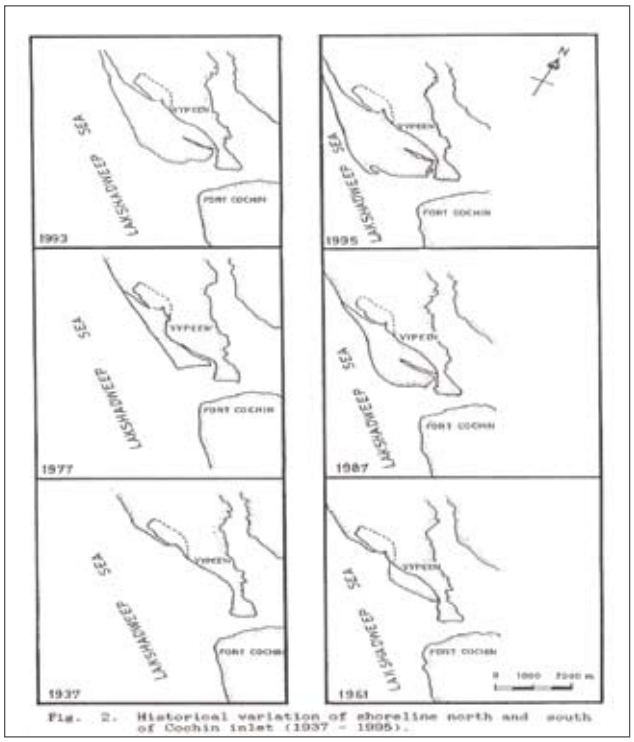


Figure 2

The primary goal of Integrated Coastal Zone Management (ICZM) is "to achieve sustainable development of coastal and marine areas and reduce vulnerability, meanwhile improving the biodiversity, among coastal ecosystems" (Balchand and Nambisan, 1988).

2. Coastal Policy of India

The Indian National Steering Committee (of the Ministry of Environment and Forests) has worked on a draft national coastal policy (currently adopted and practiced, poised for amendment based on Swaminathan Committee, 2005 recommendations), that incorporates concepts suggested in the guidelines from Baba (2001):

- Holistic view of coastal zone,
- Ecologically sensitive area development with funding provisions,
- ICZM planning,
- Permit / regulation criteria for coastal regulation zone (CRZ) activities at state/local level,

- Environmental Impact Assessments (EIA) mandatory for new projects,
- Fixing set back dates,
- Integration of all environmental actions aimed at development,
- Inter-sector cooperation and conflict resolution built in,
- Interstate cooperation contemplated,
- Administrative setup envisaged,
- Public participation encouraged and
- Implementation, monitoring, and review as part of the system.

Benefits of CRZs were mainly the heightened level of awareness of the needs for coastal region conservation, the introduction of planned development, the recognition of the rights of fishermen, the regulation of industrialization and unplanned growth, the control over pollution discharges, and the increased attention for the protection of life and property from natural hazards (Baba, 2001). Drawbacks due to implementation of CRZs were mainly the ban on housing in the selected no-development zones, infrastructure slow-down in designated coastal areas, slum development in frontage areas of existing buildings, the misinterpretation of provisions by local authorities, which obstructed lawful activities, the blanket ban on industries, the total ban on reclamation and ground water extraction, and the objections raised in respect to regulations not addressing geomorphologic features of the coastal area while being implemented (Baba, 2001).

3. Urban COCHIN - its coast and hinterlands

Understanding the State of Coastal and Marine Environment (SoE) of Urban Cochin in Kerala, India. The region highlights the following features:

- Tropical Maritime Climate
- Higher / Extensive Biodiversity reported
- Shallow coastal shelf with seasonal reversal of ocean currents
- Predominant mud clay deposits
- Prominent southerly movement of net beach material
- Shoreline under dynamic disequilibrium with tendencies of erosion
- Coast noted for upwelling features
- Unique formation – mud banks during SW monsoon
- 6 west-flowing rivers with one permanent tidal inlet and two seasonal and one major backwater system – these decorate the landward coastal segment

Figure 3a *Cherai Beach north view 2002*

Figure 3b *Cherai Beach north view 2004*

Figure 3c *Cherai Beach north view 2006, (Inscribed in red color, in Malayalam language, states the proposal to government to the tune of Indian Rupees One Crore [ten million] to develop the eroded beach)*

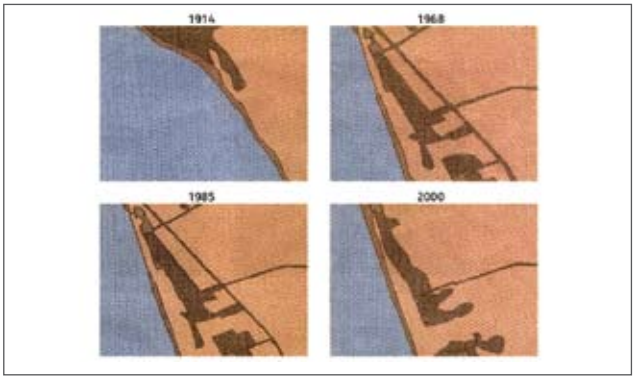


Figure 3d *Highly Dynamic Shoreline Changes: 1914 - 1968 -1985 - 2000, Maradu to Elamkunnapuzha (after Lancelet & NIE, 2006)*

Driving Force (D) Indicators	Pressure (P) Indicators	State (S) Indicators	Impact (I) Indicators	Response (R) Indicators
Population	New Housing Complexes	Particulate Matter	Allergy and Disease prevalence	Water distribution and Rain water Harvesting
Population Distribution	Emissions from Automobiles and Industry	Gas Concentrations	Fish Kills	Integrated Pollution Control System
Unemployment	Water Availability and Uses	Estuary Water Quality	Drinking Water Quality	Sale of Unleaded Petroleum Products
Energy Demand & Economic Growth	Emissions of Greenhouse Gases	River Water Quality	Noise and Annoyance	Recycling of Waste
Industrial Production	Use/fate of Selected Chemicals	Nutrient Levels in aquatic systems	Loss of Beaches and Vegetation	Collection and Control on Litter
Productivity	River Loads to Estuaries	Fertilizer Levels in Soils	Effects of Bioaccumulation in Biota	People's Participation in Environmental Protection,
Agricultural Output	Exploitation of Selected Fish Stocks,	Fisheries and Fish Stocks	Trends in Journey Times	Designation of Areas as Protected Sites
Vehicle Numbers	Commercial Dredging and Reclamation	Radioactivity in the Region	Traffic Patterns and Safety Aspects	Investment in Environmental Services and Heritage
Transport Patterns	Household and Commercial Waste Management	Changes in Vegetation	Numbers of Threatened Fauna	Environmental Strategies and Management Plans
Tourism	Hazardous Hospital Waste Generation.	Changes in Species Abundance	Ecological Footprint of the region	Environmental Awareness and Attitudes

- SW / W waves of growing heights under SW monsoon
- Tides of moderate range < 1m

The points of concern were the infringement of property rights, the rain water harvesting practices in coastal areas – its productivity, the upkeep of archeological sites, coastal upwelling features, the construction of high-rise buildings, land use patterns and landscaping, noise and associated pollution, zoning (not to be confused with CRZ) – by geological / geographical features, the multi-administration structure and its implications, the continuing traditional practices and their preservation, coastal erosion / deposition, solid waste management, salt water intrusion, fluoride crisis and mosquito menace and vector disease

Figure 2 shows the long term coast line variation around the Cochin inlet while Figures 3a – 3d exemplify the highly dynamic morphology of Cherai beach on the northern parts of Cochin.

The evolving state of coastal and marine environment can be better understood through issues of general management, hotspot management, and coastal zone management:

A) Management issues

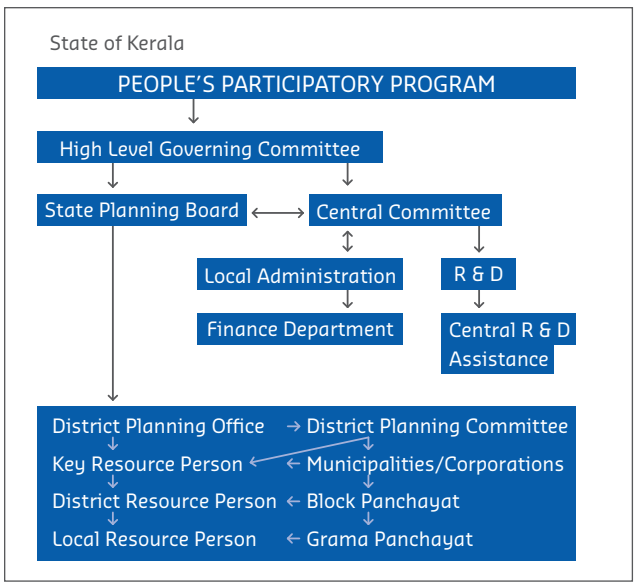
1. lack of a central authority – (though a council is functioning) – multiple control mechanisms prevail at panchayat (village) to district levels – different environments have multi-functions and multi-control agencies
2. sectored plans, yet to be defined for short/long term benefits
3. conflict resolution not yet effectively practiced
4. pollution control is ineffective
5. no ability demonstrated to address coastal hazards

B) Hotspot management

1. Issues to be clearly defined
2. No remedial measures have been successfully attempted / are successful unless funds are allocated
3. industry / enterprises override local concerns
4. degradation is evident; tolerance and perseverance - a (formed) habit of local community
5. Specific issues have specific solutions –not practiced

C) Coastal Zone Management (CZM) / CRZ act – impacts

1. generally welcomed – but target group resistant
2. loss of clarity in regulations leads to additional litigation
3. large industrial concerns / developers seek means to overcome protective clauses
4. lack of accountability - regulations viewed more as guidelines
5. a set example will pave way as a model



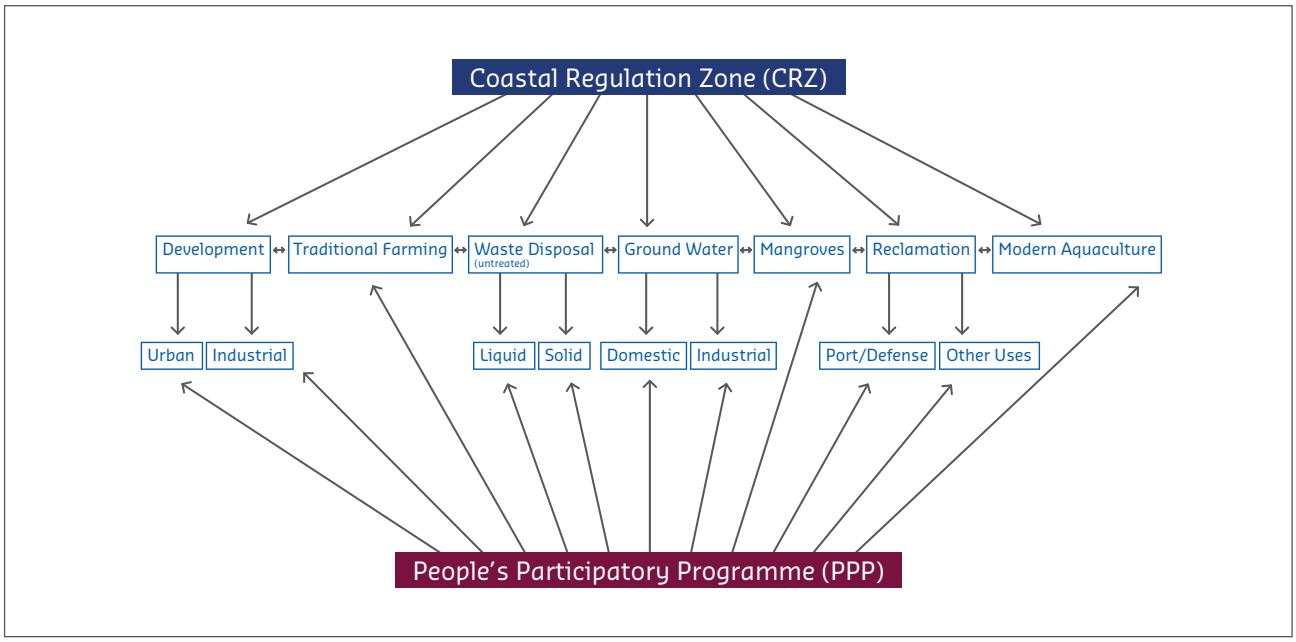


Figure 4 *The functionary roles and the interactions, viewed from a management perspective, of bottom vs. top approach within the PPP*

4. Management options – DPSIR, PPP and GIS

We, the authors, recommend a modus operandi for the management of valuable coastal urban areas, applying the following tools:

- DPSIR (Driving Force, Pressure, State, Impact and Response)
- GIS (Geographical Information System)
- PPP (People's Planning Program)

Driving force-Pressure-State-Impact-Response (DPSIR) System Indicators are listed in the table below:

The analysis of the site based on DPSIR paved the way to focus on the Cochin Urban region as one among the High Priority Areas, based on the criteria for selecting HPAs in Kerala, India. The parameters specifically considered were:

- biodiversity and ecosystem type and services,
- cultural values,
- importance for research purposes,
- area of special sensitivity particularly susceptible to damage or disruption,
- area significant for biotic character of species representation, and
- area of exceptional human use value.

As a pre-requisite to enforce fruitful ICZM policies, the People's Planning Program (PPP) was initiated in Cochin to induct public participation in all developmental activities (Figure 4). The PPP as a method for empowering people at local level is simply a localized model - the "Kerala Model". The full administrative, financial, planning and implementation powers are vested with local units which have 40% of plan funds at their disposal, yearly. The last ten years though have indicated mixed results.

The factors for success through PPP within the scope of ICZM are a) implementation by the affected target group whose motivation comes from its commitment and will, b) a necessity for sufficient awareness to persist beyond the achievement of short-term gains, c) the clear benefits of active participation, and d) the provision of a benefit sharing platform. The PPP is administered through very short term action plans - 2 weeks to 2 months, short term activities – 2 to 6 months, medium span activities – 6 to 24 months, and up to 5 years of continued activities and followed by long term plans.

The following figures (5a and 5b) demonstrate the versatility of GIS use on land use / land cover, 1972 and 1999. The spatial GIS data incorporated clearly show the extent of developed area between 1972 and 1999 and the vast expanses of mid-plains being converted for rubber plantation. Also, the reduction in forest cover is clear. Furthermore, the conversion of barren lands for mixed crops and the significant reduction in paddy cultivation is apparent. The analysis of these environmental changes over a period of time enhances our understanding of the human modifications of nature for development vis-à-vis its sustainability. The environmental indicators under DPSIR will thence justify (or not) the success of such management strategies.

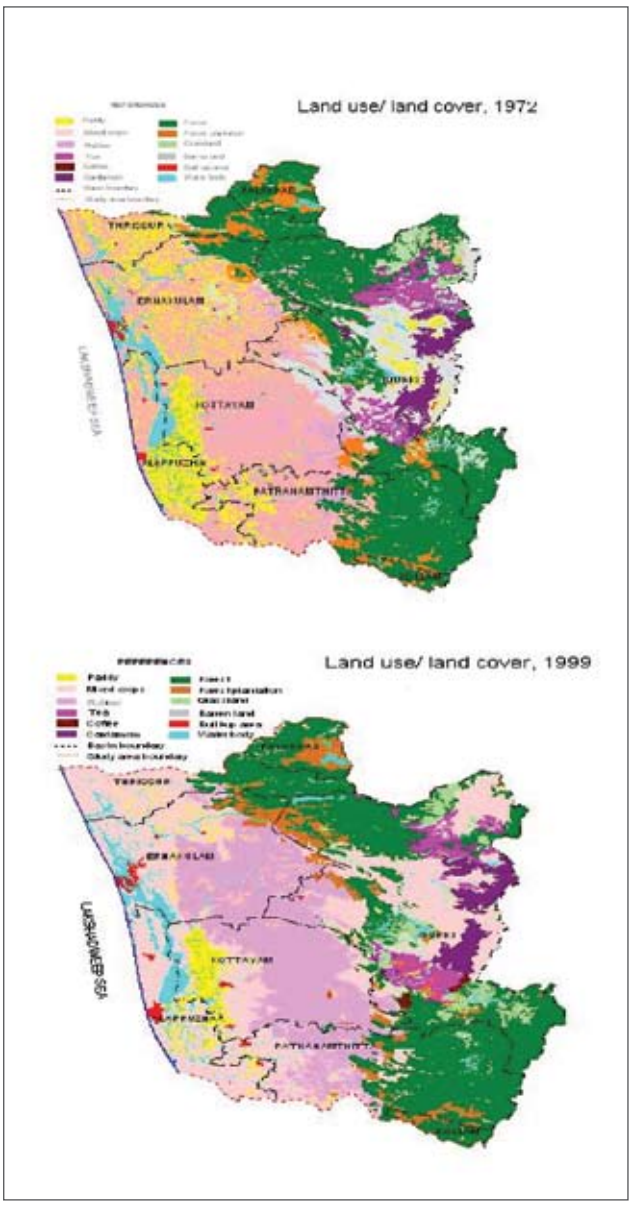


Figure 5

Figure 6 *SE Indian peninsular region vulnerability map – yellow colored portion is coastal land at 20 meters elevation (Source: www.disasterscharter.org)*

The combination of the three tools, DPSIR, GIS and PPP, can be fully put into practice in managing the impacts of urban growth at coastal Cochin. Together they can help tackle events that could unfold at Cochin, such as a dam burst, earthquakes, marine pollution, industrial accidents, vector diseases – (chickungunya, dengue, malaria, filariasis, Japan fever), freshwater weeds, invasion of foreign species, and Tsunami – the potential threat from the Arabian Sea (Makaran, off Saudi Arabia coast) or a repetition of the 2004 tsunami event. Figure 6 portrays the vulnerable coastal zone of the SE Indian peninsula (covering the urban Cochin region).

In conclusion, ICZM is a worthy cause: DPSIR is helpful for facilitating administrators and planners to fruitfully interact with scientists/researchers and laypeople, and low-level government officials; GIS is a versatile tool to forge ahead with past and present data; and PPP is a powerful tool for the people to have their voice heard and for them to reap the rewards.

We recommend holistic management of the coastal zone, the integration of traditional practices with modern technological means, ensuring the collaboration of all stakeholders, a proactive approach rather than a reactive one, an appreciation of local expertise, the strengthening of the education sector, and greater awareness.

5. Academic Initiative

At Cochin University researchers already apply the above academic model in ICZM, which is worked out in the realm of three entities: Ecological Integrity vis-à-vis Economic Security vis-à-vis Social Equity which in turn helps to promote Stewardship vis-à-vis Development vis-à-vis Community Capacity.

The education imparted in the making of a coastal manager is aimed at the systematic identification of key scientific priorities for a region, facilitation of regional and local co-operative research projects, establishment of policy guidelines and alerts for the scientific community, provision of scientific information to policy makers (through workshops where scientists and policy makers meet, maintenance of a database on CZs), the building of efforts to disseminate information on CZ, holding awareness camps and providing training to people in CZ, arranging for audits of capacity needs for the region of concern, encouraging public participation at all stages of development, and establishing a contact/resource/liaison officer for each region.

Reference: *www.ihdp.org/publications*

Urbanization and global environmental change in Varadero, a coastal zone under tourist exploitation.

Barbaro V. Moya, Alfredo Cabrera , Lorenzo Castillo, Jose Rojo

Introduction

The Intergovernmental Panel on Climate Change (IPCC) has concluded that climate change is already underway, that some sensitive systems are responding (IPCC, 2001b), and that serious and irreversible damages will occur within this century (IPCC, 2001a). The recent IPCC 4th Assessment Report concludes that continents and oceans are being affected by regional climate changes. Global assessment of data since 1970 has shown it is likely that anthropogenic warming has had a discernible influence on many physical and biological systems particularly through temperature increases. Some large-scale climate events have the potential to cause very large impacts, especially after the 21st century (IPCC, 2007). These conclusions demonstrate the urgency to develop adaptation policy for future climate change impacts. (Jones et al, 2002). Coastal resources will be affected by a number of consequences including higher sea levels, higher sea temperatures, changes in precipitation patterns and coastal runoff, changed oceanic conditions, and changes in storm tracks, frequencies, and intensities (UNFCCC, 2006).

Varadero, a coastal tourist city located in the Hicacos peninsula is naturally vulnerable to climate change impacts in a variety of ways and increasingly so because of the influence of the human processes of urbanization and tourism. An integrated assessment of climate change in Varadero shows the variability in the climate during the last decade, its effects given specific future climate scenarios, vulnerabilities and impacts on tourism (the main economic activity) and social and environmental vulnerabilities and impacts.

The natural vulnerability of Varadero is defined in relation to its physical geographic conditions, the exposure to tropical and extratropical storms, its morphology, the exposure to winds, the hydric deficit, the lack of soils, and its low lying coast. Effects of human activities include the fragmentation of ecosystems, deforestation of dunes and mangroves, construction on the dunes, sand extraction, the canalisation of the Paso Malo Lagoon, the construction of the South freeway, the use of inappropriate architecture, the increase of water consumption, growing ecosystem stress, rising population, and the increase of economic interests exposed to floods and also increase vulnerability in Varadero.

Climate

The climate in Varadero over the last year has become hotter in the early mornings. The precipitation pattern shows larger accumulations in less rainy periods and smaller accumulations during rainy periods. This trend has been determined by the more frequent El Niño-Southern Oscillation (ENSO) over the last decades. The droughts have been more frequent, intense and longer. Although uncertainties exist, different models show an altered climate in the future (IPCC, 2001a; UNFCCC 2002).

Adaptation

Identified potential climate change impacts in Varadero are effects to the marine biota due to the water warming and coastal ecosystems changes, loss of spaces due to marine invasion, floods, environmental condition changes leading to pathogens and disease vectors devel-

Emission Scenario	Climatic Sensitivity	Global Warming				Sea Level Rise			
		2010	2030	2050	2100	2010	2030	2050	2100
IS92a	Low	0.34	0.63	0.96	1.72	1.68	4.68	8.87	22.79
	Med	0.47	0.90	1.38	2.52	4.85	12.63	23.30	55.20
	High	0.65	1.25	1.94	3.63	10.17	25.90	44.41	95.93
KYOTOA1	Low	0.32	0.58	0.87	1.53	1.60	4.28	8.01	20.22
	Med	0.45	0.83	1.25	2.25	4.71	11.91	21.63	50.28
	High	0.61	1.15	1.77	3.26	9.93	24.70	42.2	89.67

opment, excessive water exploitation, the increase of the probability of saline intrusion of agricultural lands, loss of potential tourism due to temperatures increase and beach fringe loss, risk of human life losses and, therefore, negative effects on the economy.

Scientists, decision makers, and other stakeholders in the region have developed an integrated adaptation program, with managed retreat, accommodation and protection measures, the demolition of homes on the dune and other vulnerable zones, development of the meteorological early warning system, improvement of the protection mechanism to face meteorological extremes, regulation of energy and water use, development of an environmentally safe architecture in harmony with the dune ecosystem, rescue of autochthonous vegetation, shedding and maintenance of the beaches (Fig 1). These measures are designed to decrease vulnerabilities and improve the coping and adaptative capacity in Varadero. Currently the work is focusing on the inclusion of this adaptation program in the Integrated Management Program of Varadero beach.

Reference: *www.ihdp.org/publications*

Figure 1 *Beach before and after shedding and maintenance.*

Interactions and responses to Global Environmental Change (GEC) and their implications for human security in urbanized coastal zones - a synthesis

Michail Fragkias

This issue of the IHDP Update exemplifies cutting edge research on global environmental change risk assessment for human settlements and the vulnerability of populations in the world's low elevation coastal zones (LECZ). The 13% of the world's urban population that lives in low elevation coastal zones is spatially highly concentrated; the ten countries with the most people living in LECZs account for about 73% of those who live in the zone globally (McGranahan et al.). New research shows that vulnerabilities of populations in LECZs to GEC are largely affected by levels of economic development, and the vast majority of the countries that have the largest share of their populations in LECZs belong to the most at-risk low or lower-middle income group requiring special attention.

Localized assessments of vulnerabilities improve understanding of higher environmental hazard risks facing global cities of the coastal zone. Combining climate change scenarios, physical characteristics and social vulnerability data helps identify unique stress bundles for individual cities. Research on vulnerabilities to environmental hazards for global cities identifies several sets of stress bundles that consist of environmental factors (such as extreme rainfall and flooding; sea level rise and temperature increases; temperature increases and drought) and their interaction with sets of physical characteristics (terrain topography, geology, percent of wetlands and flood-prone areas, sub-standard urban planning and infrastructure), and socio-economic characteristics (population growth and poverty levels) that create environments of increased vulnerability for urban populations (de Sherbinin et al.; Moya et al.)

There is an evolving nature in the perception of risks and vulnerability of city populations. Addressing storm surges in Hamburg, Germany, von Storch et al. exhibit how storm surges have embedded a notion of existing severe dangers in local culture. Altered storm patterns, stronger winds and rise of mean sea level, increasing the height of storm surges, obviate the risk of anthropogenic global environmental change. The authors do not attribute a significant amount of the observed variation in storm surges to climate change (but they do suggest it will potentially increase in significance after 2050). Utilizing present or in-the-works coastal defense measures makes short-term predictions of change "well manageable"; the longer term predictions will require "alternative adaptation strategies". Paradoxically, although state-led adopted measures reduced actual risk levels, vulnerability of populations increased by the changes in perceptions of risk (as unforeseen paths and speeds of storms can still lead to dangerous storm surges) and by the sheer inflow of population with little experience and awareness of the severity of the risk in the urbanized area.

Finally, studies of vulnerability are becoming a standard framework for the analysis of integrated management strategies for urban coastal zones. One innovative method is the integration of DPSIR (Driving Force, Pressure, State, Impact and Response) concepts with GIS and local community participatory programs (Balchand et al.), discussed in the context of Cochin, in Kerala, India.

Almost all contributions prescribe some form of attention to the three "Ms" - mitigation, migration, and modification as future responses and adaptation to the environmental change risks present in coastal settlements (McGranahan et al.). Particular importance is placed on the roles and relative importance of formal and informal institutions as coping mechanisms. de Sherbinin et al. argue that while in some cases a city's formal institution and governance structures exacerbate problems related to coping capacities, this is not a universal finding (Mumbai as opposed to Shanghai, for example). Furthermore, informal institutions tend to increase the resilience of the urban system but are not enough to deal with complex interactions of biophysical and social processes.

For the developing world, financing institutions will be critical for the creation of infrastructure in response to global environmental change (Mirza). Infrastructure (repair) projects often do not move forward due to lack of resources (totally missing or devoted to post-disaster uses). While all countries face inappropriately designed infrastructure, which often results in the paradox of false perceptions of risk, the problems are exacerbated in the developing world. New or retrofitted (if possible) climate-change-risk-conscious urban infrastructure designs and plans have to be efficiently designed (Mirza); although learning about resilience at the state level can be a hard task, the possibility of success exists on both structural (technological, resource management) and non-structural (insurance etc.) levels. Countries can learn from each other's experiences and societal safety can be achieved through increased cooperation and knowledge sharing.

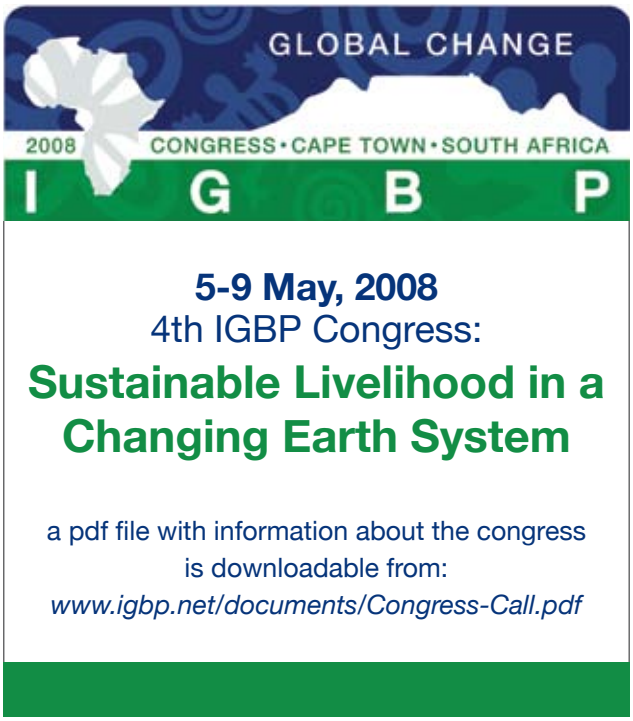
Institutional responses to GEC are also present at the intersection of "high concentrations of vulnerable groups, competing political interests" and a multitude of hazards (Pelling and Dill). Crises and disasters can become a window of opportunity for policy change. While these positive outcomes (or the processes that bring them about) are often problematic, they have the potential to produce considerable rearrangement within the social fabric. Disasters, or sudden shocks, act as agents upsetting the "social contract". In this coupled disaster/social contract perspective, "[d]isaster provides a window into the functioning and failures of the social contract" and creates a "transitional political space".

Prescriptions for the reduction of vulnerabilities tend to be problematic – although state-led adopted measures have proven successful in the past (von Storch et al., Mirza). Some authors suggest that this is due to public bad/good nature of disaster and mitigation, a reduced fiscal/taxation capacity of (local) governments, the increasing marketization / privatization of resilience, the current political incentive design, and existing political moral hazard problems (de Sherbinin et al.). Furthermore, after disasters strike, politics at the sub-national level "interfere with the political process and the balance of power that underscores the social contract" (Pelling and Dill). Disasters and their aftermath provoke scrutiny of dominant ideologies but can also increase social tensions. Existing inequalities can be exacerbated by post-disaster governmental manipulation, local organizing during response can be repressed by the state, and political leaders can regain or even enhance their personal or political legitimacy (regardless of their culpability). Facing scarce resources or unwillingness for "investment in preparedness", local communities could take the lead in collectively organizing and developing plans and infrastructure for reducing their vulnerability to disasters (de Sherbinin et al., Balchand et al.).

The collection of the contributions for this issue of the IHDP Update focuses on the implications of GEC, vulnerabilities, and natural disasters on human security in urban coastal zones areas. GEC places urban coastal areas at high risk. The identification and implementation of mitigation and adaptation programs lies at the forefront of integrated urban planning and coastal management. Moving forward requires the assessment and, eventually,

increased awareness, education, and training on the interrelationships between social and environmental urban coastal processes involving topics of sea level rise, population growth, environmental degradation, and economic development. Specific themes emerge from the contributions in this IHDP Update. There exist added values in the coupling of global perspectives on population vulnerabilities with local place-based studies, the use of technological advances in several scientific fields together with local community action and democratic participatory systems, the consideration of a multiplicity of interacting contributors to socio-environmental stress that act at different spatial and temporal scale, and the combination of distinct analyses that expose differing social science view points (as in the case of political economy/ecology contrasted to the more traditional managerial approaches).

Note: The author would like to thank Jürgen Weichselgartner and Douglas F. Williamson for helpful comments and suggestions.



Reference: *www.ihdp.org/publications*

Science-Policy interactions, IHDP science involvement in the IPCC Fourth Assessment Report

Coleen Vogel

Over the course of the past years—and with increasing urgency in the past year—there has been growing attention to the scientific consensus on climate change and the likely impacts those changes will herald for society. The IPCC's Working Group I report to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change stated more conclusively than in the 2001 Third Assessment Report that the Earth's climate is being altered by the effects of humankind's activities (see a brief history of IPCC in Box 1). This conclusion is based on an assessment by the world's top climate change scientists. More recently, the IPCC's Working Group II has provided a better picture of what these changes are likely to mean for populations, especially vulnerable ones, around the world. The prospects are disconcerting. The consequences of climate change for agriculture, forestry, fisheries, water resources, health, and industry have widespread implications for society. Climate variability, particularly severe and protracted extremes of climate, already compromise the livelihoods of many.

Changes in climate will vary regionally, and may have both positive and negative effects for different populations and places. However, it is highly probable that populations with limited resources and adaptive capacity, particularly in developing countries, will be hit the hardest by climate change impacts. Consequences from climate change effects on water security, food security, and human health are all expected to be harsh for the most vulnerable of the world's population.

The IHDP has been active in creating awareness and fostering research and dialogues on climate change. More important, many scientists from the IHDP community have been actively involved in the preparation and writing of chapters of the Fourth Assessment Report. A number of IHDP scientists have been key contributors to the Working Group II of the IPCC Fourth Assessment Report. Through their participation, they have tried to include a focus on some of the human dimensions aspects of climate change, including issues of vulnerability, adaptive capacity, institutional capacity, social transformations, and human security in relation to climate variability and change. These approaches both compliment and extend the impacts-led approach that has been the focus of some of the earlier reports. Thus while not making the IHDP headlines, the roles and contributions of IHDP scientists in this assessment report have been substantial:

- Professor Martin Parry, once Chair of the IHDP SC, co-chaired the 4th Assessment, WG 2.
- Coleen Vogel, previous Chair of IHDP SC was a Coordinating Lead Author of the Africa chapter in WG 2 and is also part of the overall Synthesis panel bringing together Working Groups 1,2 and 3.
- Karen O' Brien, Chair of GECHS, was a Lead Author of the chapter on Assessments of Adaptation Practices, Options, Constraints and Capacity.
- Frans Berkhout, Chair of IT, was a Lead Author on the chapter on Industry, Settlement and Society. The two Coordinating Lead Authors for this chapter were two human dimensions stalwarts and colleagues, Patricia Romero Lankao and Tom Wilbanks.
- Joseph Alcamo, a co-Chair of the Global Water Project, an ESSP project, also was the Coordinating Lead Author on the chapter dealing with Europe.

These are just a few of the scientists that have played a very active role in the production of the Fourth Assessment Report. Many other members of the IHDP community have also played important roles in writing or reviewing chapters, either as part of Working Group II or on other related chapters from other working groups, including Working Group III on Mitigation of Climate Change.

Although the profile of IHDP within the IPCC Fourth Assessment Report was high, the IHDP community continues to develop and address key research areas related to climate change. For example, the GECHS project has been actively engaged in research on climate change and its implications for human security. The project has promoted research that emphasizes the ways that multiple processes—including HIV/AIDS, conflict, and globalization—influence vulnerability and the capacity to adapt to climate variability and change. It has also drawn attention to issues of equity, ethics, poverty and development. Some of the recent GECHS workshops include:

- Shifting the Discourse: Climate Change as an Issue of Human Security (June 2007)
- Workshop on Climate Change, Humanitarian Disasters and International Development (April 2007)
- Climate Change Adaptation in Nordic Countries (December 2006)
- Climate Change and Poverty: Mainstreaming Adaptation into Official Development Assistance (January 2006)
- Human Security and Climate Change (June 2005)

IHDP research draws attention to the ways that society contributes and responds to climate change, including the differential vulnerability and implications for sustainability. As climate change becomes an increasingly urgent issue for society to confront and address, the contributions of the IHDP community will play an increasingly visible role within the global change research community.

The Fourth Assessment Report of the Intergovernmental Panel on Climate Change has recently been completed with a number of summary documents launched for Policy Makers. The IPCC has a long history of being involved with the science of climate change and availing this through a legitimate and credible process to policy makers. The IPCC process essentially involves a review of the science of climate change that is then placed into a policy-relevant context. The IPCC was created in 1988 under the auspices of the World Meteorological Association and the United Nations Environmental Programme and comprises three working groups of scientists appointed by their governments to be part of this process:

- Working Group 1: The Physical Science Basis
- Working Group 2: Impacts, Adaptation and Vulnerability
- Working Group 3: Mitigation of Climate Change

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Conference Reports

The Amsterdam Conference on the Human Dimensions of Global Environmental Change

Amsterdam, Netherlands; May 26, 2007

The Amsterdam Conference on the Human Dimensions of Global Environmental Change took place from 24-26 May 2007. The overall topic of the Conference was "Earth System Governance: Theories and Strategies for Sustainability" and attracted 400 participants and 10 partners as co-hosts. Not only was the Conference itself a lively event and scientifically a great success, but IHDP took this opportunity to convene several planning meetings on its upcoming science project on "Earth System Governance", the successor of IDGEC. The Conference' deliberations and outcomes were used as input to this planning process in order to move one of the most exciting new IHDP initiatives ahead. For further information please go to:
http://www.2007amsterdamconference.org/index.htm

Global Scientific Challenges: Perspectives from Young Scientists

Lindau, Germany; April 4-6, 2007

Igor Sirodoev, M.Sc.

The conference was organized by the International Council for Science (ICSU) on the occasion of its 75th anniversary, celebrated in 2006. 142 young scientists from 71 different countries, representing national members, scientific unions, and interdisciplinary bodies of ICSU attended the conference's sessions. The conference consisted primarily of plenary sessions, keeping the entire group together and just one session had concurrent panels with very interesting presentations.
The main themes of the conference were focused on the future perspectives of interactions within the scientific community (trans-disciplinary collaboration and international cooperation), between science and public on the one hand and between science and private sector on the other. In addition, one session was dedicated to the goals of scientific freedom and responsibilities.
Finding a common language between specialists of different fields appeared to be the main challenge. In contrast, informal discussions were very interesting and fruitful with no barriers due to the friendly atmosphere. Contrary to the expectations and to the assumed incompatibility of disciplinary affiliations of the participants, some stable relationships were established. This was the main achievement of the conference: starting the communication between young scientists from different scientific fields and geographical regions.
Discussions were stimulated beyond the conference's sessions and are supposed to be continued on the conference's web page. However, taking in consideration the average age of the participants (conference was focused specifically on the young scientists), a less formal and more interactive approach would lead to even more efficient results. At the end of the conference, the organizers provided feed-back by video. Also, a new approach in conference organization was represented by offsetting the carbon emissions from the conference. It entailed some additional costs, paid by the participants, and the total was invested in a project in less developed countries.

More information about the conference, semiformal video report about the parallel sessions and PowerPoint versions of the presentations can be downloaded from the conference's web page.
http://www.icsu.org/10_icsu75/75ANNIV_Young.html

Urban Population-Development-Environment Dynamics In Developing Countries

11-13 June 2007, Nairobi, Kenya

The Population-Environment Research Network (PERN) co-sponsored a workshop on urban population-development-environment dynamics in developing countries, 11-13 June 2007, Nairobi, Kenya. Twenty-two original papers were presented, addressing topics such as comparative patterns of development in Hyderabad and Bangalore, India, using remote sensing imagery; slum settlements and attainment of the MDGs in Lagos; water and sanitation provision in Nairobi's slums; metrics of urban sprawl in Brazil; and in-situ urbanization in coastal China. The workshop highlighted the promise of urbanization for the sustainability transition (in terms of energy efficiency and economies of scale), as well as the many challenges to urban administrators and residents given the sheer scale of urban growth and poverty in many countries. For more information visit:
http://www.populationenvironmentresearch.org/workshops.jsp

In Brief

The 2008 Berlin Conference on the Human Dimensions of Global Environmental Change/ International Conference of the Social-Ecological Research Programme will be held in Berlin on 22 - 23 February 2008 SPosored by the Oldenburg Centre for Sustainability Economics and Management, CENTOS, Oldenburg University, the Environmental Policy Research Centre, Freie Universität Berlin, and its partners ,this year's conference will address the theme 'Long-Term Policies: Governing Social-Ecological Change'. It will provide opportunities to bring social-ecological research into international debates and to discuss future perspectives of this field.

Call for Papers: Deadline for proposals and abstracts: 15 September 2007

Notification of acceptance: 31 October 2007

Deadline for full papers: 31 January 2008

Please visit the website for more information.

http://web.fu-berlin.de/ffu/akumwelt/bc2008/

The ninth meeting of the Conference of Parties of the Convention on Biological Diversity will be held in Bonn, Germany from 19-30 May 2008. It will provide a unique opportunity to enhance efforts to achieve the 2010 biodiversity targets and achieve progress in the negotiation of the international regime on access and benefit sharing. More than 100 ministers are expected to attend the High Level Segment to be held from 28-30 May 2008. The meeting will review the programme of work on forests and agriculture, and consider the impact of climate change on biodiversity. The meeting will also be preceded by the fourth meeting of the Conference of the Parties to the Convention serving as the meeting of the Parties to the Cartagena Protocol on Biosafety, which will take place on 12-16 May 2008.

More information will be available online.

http://www.cbd.int/

bonn dialogues

BONN The UN-City

UNEP

The second "Bonn Dialogue on Global Environmental Change"

November 27th, 2007, Bonn

Melting Ice, Vanishing Life: the impacts of environmental change on human society and biodiversity

The second Bonn Dialogue organised by IHDP, UNU-EHS, and DKKV, will pull in topics related to the IPY and to the CDB in 2008 to deal with issues of melting ice and biodiversity, also including a specific component related to the city of Bonn.

The event will be divided into two different sessions: A closed day panel of national and international scientists, politics and economists will be followed by a public symposium in the evening, containing an expert round-table discussion.

The closed day panel will take place at the Bonn UN Campus at Langer Eugen, and the professionally moderated public symposium will proceed next door at the Deutsche Welle.

www.bonn-dialogues.org

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