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Global change and urban risk: the challenge for African cities

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## GLOBAL CHANGE AND URBAN RISK: THE CHALLENGE FOR AFRICAN CITIES<sup>1</sup>

## The Fourth Annual Democracy Lecture, Centre for Constitutionalism and Demilitarisation, Airport Hotel, Ikeja, Lagos

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It is a pleasure to be in Lagos again and an honour to deliver this Fourth Annual Democracy Lecture. In so doing, I would like to pay tribute to CENCOD and its role as a campaigning and educative civil society NGO. Not only is it making a difference within Nigeria but its reputation is also now being noted abroad. This owes much to the energy and dynamism of its Executive Director, Dr Sylvester Odion-Akhaine, whose PhD it was my pleasure to supervise, but also to the entire team.

## Introduction

The title of my lecture may seem only weakly related to CENCOD's major focus on the democratisation of the state and civil society in Nigeria. However, I am addressing one of the major current global debates and priorities, which is important to everyone and which poses profound challenges to the Nigerian polity and society. My task is to explain how this is so and to link it to the struggle for democracy and development.

<sup>&</sup>lt;sup>1</sup> The present working paper appears also as a research paper in the Research Paper Series of the Centre for Developing Areas Research, Department of Geography, Royal Holloway, University of London, Egham, Surrey TW20 OEX

This is an historic moment in human history, with two dramatic events coinciding. **First**, more people worldwide now live in urban than in nonurban areas. Although there is still considerable diversity both within and between different world regions, humankind is becoming predominantly urban-based, with many rural dwellers, especially the young, aspiring to urban lives or at least increasingly urban lifestyles. In our rapidly globalising world, this will necessarily require considerable adjustment of policy and practice in everything from agriculture to urban design. **Second**, humankind's impact on the environment has reached the point where Global Environmental Change (GEC) is now acknowledged as a reality by all except the most diehard rejectionists. The option of continuing to ignore this, to regard it purely as somebody else's problem or something that our children will have to deal with, no longer exists. My purpose here is to examine these issues and to relate them to current conditions in Nigeria and West Africa more generally.

Imagine if a Katrina-scale hurricane or a tsunami like that of December 2004 hit Lagos, or another low-lying coastal megacity like Kolkota or Manila? The human impact of such so-called 'natural' disasters, which seem to be increasing in frequency and severity, has refocused attention on the vulnerability of the large, disproportionately poor and chronically vulnerable human settlements of the global South. This also highlights the need for a deeper examination of the root causes of such disasters, rather than merely responding in traditionally technocratic or patch-it-up-and-hope-for-the-best manner (see e.g., Parker and Mitchell, 1995; Steinberg 2000; Wisner 2005/6; Cutter 2006; Schipper and Pelling 2006).

### **Global Environmental Change: the Basics**

In essence, the debates about GEC over the last twenty or so years have centred on whether there really is something new and different about current climatic variations, and their alleged human origins, bearing in mind that long-term climate change has occurred naturally throughout the Earth's history. Sometimes this has been gradual, at other times quite sudden, such as the dramatic changes that apparently led to the extinction of the dinosaurs. Evidence for this comes from various sources, including the analysis of extinct lakebed stratigraphy and of deep ice cores collected in the polar regions. However, the balance of evidence for GEC has become increasingly convincing, such that even traditional deniers and sceptics like the current US government and the energy lobby that supports it, have now acknowledged its existence, although they still seek to minimise its likely rate, scale and impact. The authoritative Stern Review Report, published in London on 31 October 2006, concludes starkly (p. vi) that "The scientific evidence is now overwhelming: climate change is a serious global threat, and it demands an urgent global response."

Let me explain briefly the drivers of the process. The burning of fossil fuel as an energy source, and various industrial processes that generate heat, are contributing to an increase in atmospheric temperatures, which in turn affect rainfall and weather patterns in the short term and climatic conditions in the longer term. Direct heat released into the atmosphere is one contributor but the principal mechanism is through the build-up of greenhouse gases (GHG) in the atmosphere. As the name implies, these gases, of which carbon dioxide is the most important – hence its use as the key benchmark indicator – act like a thermal blanket by retaining heat. This inhibits albedo (reflected solar radiation) and heat generated by human activities from escaping through the Earth's atmosphere, so that ambient atmospheric temperatures rise. The relative contributions of different sources to GHG emissions are shown in Figure 1.

As a guide, atmospheric CO<sub>2</sub> levels before the industrial revolution were stable over a long period at an average of 280 parts per million (ppm); GHGs have been rising at an increasing rate, now more than 2ppm annually. The current level stands at roughly 430ppm of CO<sub>2</sub> equivalent<sup>2</sup>, with predictions of 550ppm CO<sub>2</sub> equivalent being reached between 2035 and 2050 under a 'business as usual' (i.e. do-nothing) scenario. This likely to result in an increase in mean atmospheric temperature of 2°C above pre-industrial levels, compared with the 0.5°C increase to date. By the end of the century, unabated emission discharges would raise the levels of CO<sub>2</sub> equivalent to around 750ppm, with a 50% change of a 5°C temperature increase. To underline the seriousness of the problem, the Stern Review points out that this would be equivalent to the same temperature increase as from the last Ice Age until today. "Such a radical change in the physical geography of the world must lead to major changes in the human geography - where people live and how they live their lives" (Stern Review Report 2006, p. vi).

The report calculates that this would also probably reduce global living standards by some 5-20%. However, the worst impacts of climate change could substantially reduced if GHG levels were stabilised within the range of 450-550ppm. The longer we delay, the harder and most costly it will become to achieve even the upper part of this stabilisation range.

 $<sup>^2</sup>$  CO<sub>2</sub> equivalent is a measure of all GHGs converted to their equivalent in CO<sub>2</sub> terms for simplicity. The six principal GHGs covered by the Kyoto Protocol are carbon dioxide, methane, nitrous oxide, PFCs, HFCs and SF.

Because atmospheric changes have cumulative and lagged responses, the effects of what is happening today will be felt increasingly over the coming decades, even if we were able to stabilise emissions at current levels immediately. Hence to stabilise GHG levels within the range of 450-550ppm  $CO_2$  equivalent would require global emission levels by 2050 to be at least 25% below current levels. Another crucial finding of the Stern Review is that – contrary to the conventional wisdom, especially among GEC deniers – is that tackling climate change represents not so much of a financial and resource cost as a substantial economic opportunity that could boost technical innovation and overall economic activity. This conclusion, which I have long felt to be more accurate than the pessimistic scenario, takes debate forward by a large leap, enabling us to focus on how best to address the problem, rather than whether we need to or should do so.

Finally, the Third Assessment Report (TAR) of the IPCC (2001) estimated future sea level rises in different parts of the world within the range 9-88 cm by 2100; the Fourth Assessment Report is due out by Easter 2007 and is expected to contain a firmer estimate in a narrower band at the upper end of this range. Other recent studies provide somewhat higher upper limits, e.g. 1.1 m. The melting of glaciers and polar ice caps, and expansion of seawater as it warms, are the principal contributory factors.

All this clearly has profound implications for humankind, and I will address the challenges, with particular reference to the global South and then to West Africa, in subsequent sections.

### **Distinguishing Disasters and Global Environmental Change**

One widespread perception is that GEC is essentially another category of so-called 'natural' disaster. Were this accurate, then much of the expertise and hands-on experience gained in dealing with extreme events and through initiatives like the International Decade of Natural Disaster Reduction during the 1990s would be directly applicable. However, while there are some similarities – and even overlaps – between disasters/risk and GEC, there are also crucial differences which imply the need for different policy and practical responses.

The quote marks around 'natural' draw attention to the fact that many such events, while ostensibly natural, are ultimately the results of human activities that have changed the environment (e.g. severe flooding due to the destruction of coastal mangrove swamps; river flooding due to upstream deforestation and/or the destruction of reedbeds along riverbanks; land- and mudslides down steep mountain slopes following deforestation, the blockage of natural drainage channels, and the construction of homes on vulnerable slopes). In West African cities, including Lagos, Accra, Kumasi and Cotonou, urban construction and indiscriminate waste dumping often obstruct natural drainage channels, while wetlands are reclaimed (often poorly) and rivers canalised) (Figure 2), leading to flood damage, destruction and even drownings during the wet season. The poor are often the most vulnerable.

**'Natural' disasters** are mostly one-off extreme events of short duration (no more than a few minutes, hours or days), often striking with little warning (e.g. earthquakes, volcanoes, tsunamis, hurricanes) and causing considerable loss of life and damage, especially in high-density urban populations. While cities anywhere can experience disasters, those in poorer countries usually suffer more when their losses are measured in terms of deaths and injuries, as a proportion of GDP or in terms of access to safety nets including insurance (Schipper and Pelling 2006). Conversely, famines due to drought (as distinct from conflict) may last for a season or even a few successive years, and generally affect poor and remote rural dwellers most severely.

Disaster-risk assessment and response emphasize the identification of high-risk areas and the need to better understand those most at risk to various changes (e.g. vulnerable populations) (Wisner et al. 2004). Interventions include early warning systems and prediction, the timely (usually temporary) evacuation of vulnerable populations) and postdisaster recovery as well as renewed efforts to reduce risks to disasters in advance of a crisis event, often referred to by those in the disaster-risk mitigation ISDR reduction community as (e.g. 2005 and www.unisdr.org/hf). The tsunami early warning systems being implemented in the Pacific Rim and then the Indian Ocean Rim following the December 2004 tsunami, and the famine early warning systems (FEWS) already in existence in sub-Saharan Africa are good examples of this, although they can be effective only when linked to appropriate and timely interventions.

Failure to implement effective mitigation measures to cope with all categories of disaster will result in very serious consequences where they do strike. This has naturally been a particular problem in poor countries, where resources and political will are often inadequate or the prioritisation of immediate short-term basic needs outweighs planning to cope with uncertain future events still widely perceived to be 'Acts of God'. The 1,000+ typhoon deaths and widespread destruction in the Philippines during November and December 2006 are but one example. Nigeria, too,

has had its fair share of so-called 'natural' disasters. Local adaptive and mitigation strategies are often dependent on donor assistance. However, even in urban centres that are spared damaging extreme events, the absence of wider mitigation measures may go unnoticed even as cities, and especially their most vulnerable inhabitants, become increasingly exposed to the risks and impacts of GEC.

El Niño and other cyclical weather perturbations deemed responsible for famine trends have been occurring more frequently in recent decades, while their effects have often been increasingly severe. The same is true of other extreme events, such as hurricanes or floods due to excessive rainfall. It is now recognised that these trends are due substantially to climate change – so these categories of disaster demonstrate a direct link between 'natural' disasters and GEC. The scientific work of the Intergovernmental Panel on Climate Change (IPCC), the third report of which was published in 2001 and the fourth of which is due out around Easter 2007, has done much to demonstrate these effects.

**GEC** comprises two mutually reinforcing elements: (a) the increasing frequency and severity of single extreme events and (b) a series of slow-onset trends, such as sea-level rise and increasing ambient atmospheric temperatures. These slow shifts in environmental conditions are likely to have generally long-term or permanent impacts on human activities and settlement (e.g. inundation of low-lying coastal zones, salinisation of the water table, and reduction in water levels of river catchments) which may be of far greater significance than the extreme events that the media present as exemplifying climate change.

Even the wealthiest large cities are vulnerable to both components of GEC. Notwithstanding the enormous difficulties of measuring and calculating disaster losses accurately, there are additional reasons why cities of the South should form a principal focus of a reinvigorated GEC agenda. At the heart of current concerns – now also being recognized by development agencies (e.g. DFID 2006) – are the interlocking vulnerabilities of particular people and places:

... connections between globalization and local urban form are changing the vulnerability of people and places within metropolitan regions [and other scales of urban settlement] ... An important area for future ... urbanization and global environmental change research will be to examine how the physical tightening of globalization processes further transforms the spatial form of cities and, how these changes, in turn, affect the vulnerability to all types of global

# environmental change hazards (Leichenko and Solecki 2006, 12).

Appropriate policy responses to GEC also comprise two components, namely mitigation (seeking to reduce the vulnerability to, and impact of, extreme events and environmental changes) and adaptation (changes to how and where we live in order to avoid severe problems and to address their sources). Mitigation is perhaps better thought of as a more immediate, short- to medium-term set of measures, with adaptation necessarily requiring longer time horizons. Reflecting some of the scientific debates about the extent and rate of GEC, especially regarding the relationship between GHG emissions, atmospheric temperature increases and GEC, views about the relative importance of these two elements have differed.

Rapid GEC impacts would require a strong emphasis on mitigation, whereas slow, indirect impacts imply that we do still have time and that efforts at adaptation would be most appropriate. However, as with GEC science itself, there is now increasing recognition that neither will be adequate on its own and that a balanced strategy is required. We simply do not have the luxury of doing nothing now: all the evidence now points to the inevitability of some degree of climate change, which has indeed already begun. Secondly, mitigation efforts will be essential to buy the time for longer-term adaptive strategies. In the words of one leading South African climate scientist, "...if we do not mitigate, and start soon, we will reach a point where we cannot adapt our way out of the problem" (Winkler 2006).

## **Urban Risk and Vulnerabilities**

Addressing the challenges of evolving twenty first-century human settlement patterns demands a clear understanding of the vulnerabilities shaping such extreme events and also those factors that 'drive' everyday or 'chronic' environmental stresses. Importantly, there is a growing realization that more needs to be understood about how vulnerabilities – and their impacts – are configured by a range of causal mechanisms and how risks are shifted across the landscape differentially between groups of cities in the global periphery and emerging urban cores, and between rich and poor within individual cities (Bulkeley and Betsill 2003).

It is thus important to get behind the headlines of tragic disasters to understand the underlying structural relationships between urban settlements and vulnerabilities to different categories of disasters and GEC. It is also imperative to raise the awareness and policy response capacities of cities everywhere to address the increase in extreme events that may accompany climate stress or other long-term changes.

Very few national environmental policies in any part of the world include urban vulnerability assessments, city disaster-risk assessments or inventories in their plans, let alone systematic GEC responses such as mainstreaming sustainable regulatory frameworks and codes into daily urban management practices. Yet vulnerability to disaster and the impacts of gradual GEC erodes the rights and opportunities of the urban poor. Yahmin, Rahman and Huq (2005) have called for the systematic inclusion of climate vulnerability analysis into the three main policy frameworks relevant for adaptation: development, disaster relief and climate change.

At the urban scale, such integration offers opportunities for a comprehensive approach to reducing risks from a variety of stresses – economic, social and environmental. There is clearly a danger that this downscaling of risk reduction to the city scale will feed into the unfunded responsibilities of already overstretched local governments, and possibly further enable Northern and some Southern countries to step back from the various mechanisms under the Kyoto Protocol, leaving responsibilities with the already overstretched urban local authorities of the South. But cities present a crucial arena in which GEC is being generated, and it is in uncovering the bi-directional linkages between urban settlement and GEC that both risk reduction and greater sustainability lie. A major new research programme on Urbanization and GEC by the International Human Dimensions Programme on Global Environmental Change (IHDP) has begun to examine such processes systematically (Sánchez-Rodríguez *et al.* 2005).

## From Global Babble to Local and Regional Realities

Understandably, many people in the global South remain sceptical about such issues on one or more of four basic grounds:

- *Firstly*, most GHG emissions originate in the advanced industrial (or, perhaps more accurately nowadays, post-industrial) countries while the effects will be felt globally, Therefore it is predominantly the polluting countries that need, quite literally, to clean up their act.
- *Secondly*, calls for global emission reductions and lifestyle changes ring hollow in the face of the evident reluctance (and in George W Bush's USA, even official refusal) to tackle this difficult issue.

- *Thirdly*, any such commitments are unjust because they would hamper the struggle to meet basic needs, improve living standards and promote development (a term often confused and conflated with modernisation) in poor countries, where such challenges must take priority over environmental considerations.
- *Finally*, it is very difficult to relate to such 'global babble' at a high degree of abstraction and generalisation, informed by global aggregate data. What does it actually mean for us locally now and in the future?

I will deal with each in turn. The first point may be accurate historically but no longer today. The changing patterns of industrialisation and urbanisation since the late 1970s have meant that parts of the erstwhile global periphery have become leading producers of industrial goods, with associated environmental pollution, while many now deindustrialised cities in the global North, including the likes of Sheffield and Birmingham, Detroit and Chicago, have greatly improved air quality, although increasing vehicle emissions are changing the nature of current air pollution.

The USA remains the largest emitter of GHGs but China is now second and rising dramatically year-on-year (and likely to overtake the USA by 2009 – *International Herald Tribune*, 8 November 2006), with Russia third and India fourth by a small margin and also rising fast. Some way back is Japan in sixth and then Germany in seventh, followed by Brazil in eighth, Canada in ninth and the UK in tenth. Italy, South Korea, France and Mexico are neck and neck, with Indonesia just slightly behind. Not far behind them are Australia, Ukraine and Iran. South Africa – the largest GHG emitter in Africa – is now ahead of Poland, Spain and Turkey (Table 1).

Of course, when we disaggregate these total figures by population and standard of living, the differences remain clearer but this is a global problem in terms both of causation and effects. Most starkly, Africa contributes a very small percentage of global GHG emissions, both in aggregate terms and especially per capita, yet is expected to be one of the continents most severely affected by its consequences. *The implication is clear: whatever the other pressing and immediate priorities, we cannot ignore this problem, even in West Africa*.

| Country      | Mn tonnes CO <sub>2</sub> |  |
|--------------|---------------------------|--|
|              |                           |  |
| USA          | 6,928                     |  |
| China        | 4,938                     |  |
| Russia       | 1,915                     |  |
| India        | 1,884                     |  |
| Japan        | 1,317                     |  |
| Germany      | 1,009                     |  |
| Brazil       | 851                       |  |
| Canada       | 680                       |  |
| UK           | 654                       |  |
| Italy        | 531                       |  |
| South Korea  | 521                       |  |
| France       | 513                       |  |
| Mexico       | 512                       |  |
| Indonesia    | 503                       |  |
| Australia    | 491                       |  |
| Ukraine      | 482                       |  |
| Iran         | 480                       |  |
| South Africa | 417                       |  |
| Spain        | 381                       |  |
| Poland       | 381                       |  |
| Turkey       | 355                       |  |
| Saudi Arabia | 341                       |  |
| Argentina    | 289                       |  |
| Pakistan     | 285                       |  |

### Table 1 Greenhouse gas production

Source: *The Guardian* (London) 31 October 2006, after World Resources Institute

The second objection has considerable validity but the situation is now beginning to change. To be sure, the USA and Australia, in particular, refused to sign up to the Kyoto Protocol – a limited and admittedly flawed effort to control GHG emissions by the global North – and actively sought to undermine it. The UK was one of the leading protagonists for Kyoto and now its successor, for which negotiations are underway. As the weight of scientific evidence and political commitment by others continues to increase, opinion in the USA has shifted. For instance, over 100 of the largest US cities have established local carbon trading mechanisms in line with Kyoto and in defiance of the US government. This has embarrassed the Bush administration, which, even before the November 2006 mid-term elections but especially since, has moderated its stance and no longer denies the importance of GEC but still opposes strong mitigation measures, preferring so far to retain its traditional faith in technological innovation. However, I predict that this position will shift further.

The third point reflects justified concerns and different geopolitical realities. However, these realities are also changing. Moreover, to rely on historically dated oppositional politics - a favourite rhetorical tactic of former Malaysian prime minister, Mahatir Mohamed - is no longer adequate. The notion that there is a direct trade-off between economic growth (or employment creation) and the environment is frequently inaccurate. Moreover, the environmental and human costs – not least in terms of workers' health; and water and air quality and contamination of food that affect the entire urban population – of indiscriminate industrialisation are huge, as China is now discovering. Very suddenly, the Chinese government is adopting quite stringent measures to address these problems and there are similar signs in India. Moreover, the importance of the Stern Review report's signalling of the economic benefits of proactive measures to mitigate and adapt to GEC is to focus attention more positively on new ways of planning, producing and living. This reinforces work that I and many others have been engaged in over recent years (e.g. Simon 2003) to demonstrate that development should be locally appropriate and not simply a distorted, partial or unthinking imitation of earlier Northern development paths. This is one point of connection with broader processes of political democratisation.

My basic argument is that we need to move beyond such historically conditioned and/or politically reactive thinking. GEC is real and will become serious everywhere. Without losing sight of global political economy and the structural determinants of our current divisions of labour and distributions of resources, opportunities and constraints, every continent, region, sub-region, country and city needs to address the issues seriously and urgently (Huq and Reid 2004; Najam *et al.* 2003). So, I turn now to address the fourth objection cited above by focusing on some concrete realities in this part of the world.

## West Africa and GEC

The impacts of GEC are regionally and even intraregionally diverse. The recent White Paper of the UK Department for International Development (2006), *Eliminating World Poverty*, includes a section on climate change

and its map of African impacts is revealing (Figure 3). For West Africa, the principal effects are likely to be reduced rainfall and rising mean temperatures, and rising sea levels. I will explore the effects of each in turn.

<u>Rising temperatures and reduced rainfall</u> will reduce agricultural prospects and increase pressure on marginal environments, most likely manifest through continued southward movement of the Sahara. The implications for both rural communities (most especially nomadic and semi-nomadic pastoralists) and large urban areas like Kano have barely begun to be considered, let alone planned for. Anyone who has flown south across the Sahara to land at Kano will know how sudden is the transition from desert to intensive agriculture. What if that boundary moves significantly further south? Kano is a city that has traditionally been fed principally from its immediate surroundings.

Further south, along the forest-savanna interface, rainfall patterns have been changing over the last thirty years or so. For instance, in Kumasi, Ghana's second city and which I know well, rainfall has fallen by some 22%, from an average of 1600mm in the 1960s to about 1250mm on average over the decade 1989-1998 (Ghana Meteorological Service, Kumasi Airport station), and the trend is continuing. You don't have to be a farmer or forester to imagine the consequences. However, the impact is far more severe than even those figures alone suggest because over the same period the city's population has grown from approximately 200,000 to over 1 million. Moreover, perhaps half the current population is not connected to the urban piped water system and therefore depends wholly or partly on surface and groundwater resources. Reduced river flow (exacerbated by urban pollution that has rendered the major rivers unpotable downstream) and a falling water table are therefore making their livelihoods increasingly precarious. Rainfall penetration of the soil is also much reduced through the conversion of fields and forests to concrete, brick and tarmac as the urban area expands.

Similar trends have even been observed along the Gulf of Guinea coast. For instance, Cotonou has experienced a 9% decline in rainfall over a 20-year period (Dossou and Glehouenou-Dossou 2007).

Another consequence of rising temperatures is likely to be an increase in certain insect-borne diseases, especially malaria, which already exacts a heavy toll of morbidity (illness) and mortality in West Africa.

Rising sea levels:

Much of the Gulf of Guinea coastline is alluvial in nature and low-lying, with coastal dunes and other formations that are vulnerable to erosion. This has already been problematic for some considerable time as a result of storms and human activity – which has already affected local weather conditions. Many of the region's capital and principal commercial cities are coastal. Several, such as Lagos, Cotonou and Accra, are situated in natural harbours afforded by lagoons, estuaries or artificial links to coastal lakes. Significant parts of the lagoon shores and hinterlands actually lie at or below mean sea level. These coastal environments now suffer heavy pollution from industry, sewage and indiscriminate refuse dumping. The destruction of mangrove swamps, which are among the most efficient breakwaters and silt traps, as well as vital breeding grounds for diverse fish and arthropod species, has contributed to the problem in such areas, as well as affecting the livelihoods of artisanal fisherfolk adversely. Lagos has suffered as much as anywhere in this respect.

In such contexts, it is easy to appreciate the likely impact of sea level rise, which, as indicated above, is already occurring. Table 2 provides data for likely increases in Cotonou, not far from Lagos and therefore a useful illustration of what we can expect right here. Even the extreme level is well below the upper end of the IPCC global average predictions.

|                  | Sea level rise (cm) |      |
|------------------|---------------------|------|
| End dates        | 2050                | 2100 |
| Average scenario | 20                  | 49   |
| Extreme scenario | 39                  | 59   |
| Basic scenario   | 7                   | 20   |

Table 2 Predicted sea level rise scenarios, Cotonou, Benin

<u>Source</u>: First National Communication (Benin), 2001, cited in Dossou and Glehouenou-Dossou (2007).

The most likely effects include accelerated coastal erosion and the inundation of low-lying areas. Even beyond the upper limit of such impacts, increased salinisation of coastal groundwater and estuaries, lagoons, rivers and lakes that survive inundation will dramatically affect human water supply, natural vegetation and agriculture in some of the region's areas of highest population density and resource consumption.

The precise extent and permanence of such damage will depend on local conditions but – as indicated earlier – this is a very different prospect from

localised subsidence or a one-off flood, from which one can begin to recover and rebuild almost immediately.

These impacts will destroy or adversely affect numerous livelihoods. It is also important to remember that coastal urban areas are important concentrations not just of commercial, industrial and service activity but also of fishing and agriculture. Some 15,000 people depend on fishing and ancillary activities in Cotonou, a city of one million (Dossou and Glehouenou-Dossou, 2007, in press). In Cape Coast, Ghana, the fishing community live right on the beach, behind the castle, and thus stand to lose both livelihoods and homes (Figure 4). This is not an uncommon situation. Much low-lying urban land, especially along watercourses and in swampy areas, is utilised for urban and peri-urban agriculture, providing both subsistence production but also a significant source of commercial food for the cities. The peri-urban and nearby rural areas, many of which are also low-lying, are often intensively cultivated by smallholders and larger scale commercial farmers supplying the urban market for food and industrial inputs (Figure 5). Employment statistics for any town or city with vaguely reliable data reveal that agriculture, forestry and fishing typically employ between 10 and 25% of the urban labour force.

The precise proportions of different cities likely to be submerged under the rising seawater will vary, as it will over time in a single city. In extreme cases, entire towns and cities may disappear. Let us think for a moment about Lagos, the second or third largest metropolis on the African continent, with a population generally estimated at some 15 million although the Lagos State Government (2005) projects the 2006 total at 16.9 million. A high proportion of these people are poor, living more or less from hand to mouth, in informal, irregular and/or overcrowded shelter. They certainly lack the resources to cope alone.

Elite and upper middle income housing, along with office and service activities (including tourist development), now dominate parts of the most desirable coastal frontage, e.g. on Victoria Island, Ikoyi on Lagos Island and Moroko (from where some 500,000 largely poor residents were evicted under the military government in 1990). The almost-complete antierosion work and promenade may help to protect part of Victoria Island. However, in many other areas, abutting older industrial and commercial zones along with newer lagoonside locations where conditions are poor and existing environmental hazards sometimes considerable, poor people are concentrated. The southernmost part of Ajegunle and others of Lagos's 200-odd slum areas, including parts of Mushin as well as Ojota abutting the Ogun River floodplain and new shantytowns along the Lekki Peninsula which are home to large numbers of Liberian and Sierra Leonean refugees (Gandy 2005), are also very vulnerable. Parts of Bariga (Figure 6) and Makoko actually stand over the water, with houses built on stilts; many early residents were fishers; now they struggle to catch any fish at all as a result of urban pollution. The numerous sawmills along the shoreline and log trading activities are also very vulnerable.

Superimposing altitude contours on such a map will provide a graphic illustration of the areas – and people – most vulnerable to inundation. According to UN-Habitat's (2006: 41) global scorecard on slums – produced in relation to the Millennium Development Goal 7, target 11, on shelter provision – Nigeria is well off-target, with slum populations growing at 5% p.a. 1990-2005. Although the proportion of slums declined from 80 to 71.9 over that period, the absolute number of slum dwellers increased from 24 to over 46 million in 2005.

Lagos's northward expansion is increasingly encroaching on the Ogun River floodplain which, along with the grassy mudflats and swamps along the northern lagoon (Figures 7 and 8), are particularly vulnerable to sea level rise, as is the area of coastal sand ridges and shallow depressions to the west of the city that stretches well beyond Badagri. Behind that zone lies another area of flat, often waterlogged area (Adeniyi 1981; Braimoh and Onishi 2007; Gandy 2005) – a good example of a zone vulnerable to salinisation if not direct inundation.

I could go on, but the point is surely clear enough. The situation is urgent and critical. How aware are politicians, government officials, aid donors, civil society activists and ordinary citizens? What, if anything, is being done about climate change in terms of abatement, mitigation and adaptation? While I cannot claim to have undertaken an exhaustive survey – and I'd be delighted to be proven wrong – my sense is very little. One good indicator would be official government policy. Yet, the paper presented by the Permanent Secretary in the Federal Ministry of Housing and Urban Development to a UN conference on planning sustainable urban growth in 2005 failed to mention climate change or sea level rise, concentrating entirely on the now-conventional list of challenges and, of course, the poverty-reduction focus of the National Economic Empowerment and Development Strategy (NEEDS), Nigeria's version of a Poverty Reduction Strategy Paper (Alkali 2005).

Similarly, the recently-announced World Bank-funded slum upgrading scheme for Lagos, covering nine large slums with a total of some one million residents, is to focus on drainage improvement and solid waste management. These are certainly important problems given the parlous and deteriorating state of Lagos' poor residential neighbourhoods and urban infrastructure generally (Gandy 2006). However, to play devil's advocate – as the situation indeed requires – any such improvement works that do not take account of the real process of sea level rise will quickly be undermined, wasting the investment and leaving the inhabitants no better off. Indeed, they could well be worse off, since follow-up investment may not be forthcoming, hopes will have been dashed, and rehousing may be urgently required.

We ignore climate change at our peril. Yet planning proactively to address its impacts requires something of a sea change (excuse the pun!) in mindset. Simply tacking it on as an afterthought is inadequate. A different approach is required. To stick with my final example, constructing or strengthening sea defences is crucial but may not be feasible or adequate. The recently completed Bar Beach sea defence work on Victoria Island was designed to address beach erosion but was it constructed to a standard that will enable it to withstand rising sea levels? Elsewhere, drainage systems being installed will need to cope with a different order of magnitude of water and waterborne waste. Can houses be raised or built on stilts to withstand higher water levels? If so, can access to and from them for residents be assured? Will they still have access to even their meagre livelihoods when conditions change? If the answer to some or all of these questions is no, then upgrading slums housing vulnerable people in vulnerable areas may be an inappropriate strategy. It might be necessary to bite an even bigger bullet and relocate the residents to safer ground - a complex and fraught process that will need sensitivity, care and, above all, careful consultation and participation by the residents if they are not to reject such plans as simply another forced removal to provide high quality land to powerful vested interests. Here is another link to political democratisation.

### Conclusions

Without wishing to repeat all my arguments, I will simply highlight the fundamental points. Climate change and its impacts are real, substantial and already occurring. These will be felt worldwide and by most groups of people. Some aspects of the literature and practical experience in relation to disasters and risk are helpful but the distinct nature of GEC, in terms of the increasing frequency and severity of extreme events – which affects recoverability – and slow-onset (semi-)permanent impacts, mean that new thinking, policy formulation and action are required.

Although Africa contributes little in total or per capita terms to GHG emissions – but rather more to other forms of environmental change – it is predicted to suffer more severely than many other world regions. It may be

tempting to regard climate change as somebody else's problem and politically expedient to blame faraway polluters, while demanding that the latter pay to clean up their act. Historically speaking, this may have had some justification. However, that does not alter the growing realities that we all have to face, and face now. The cumulative effects and lags in the biosphere means that even if we capped emissions at current levels immediately, global warming and sea level rise would continue.

Short term pollution abatement and impact mitigation efforts cannot be delayed; a balanced strategy is required. All current and planned future urban (re)development activities must be reappraised and modified to start from the presumption that GEC will occur within whatever parameters are locally determined. Hence coping with sea level rise and seeking, for instance, to minimise the area lost to inundation and to mitigate the extent of salinisation, would be important objectives. As the Stern Review report has argued, there are actually considerable economic gains to be made from (re)acting positively and proactively. Delays and procrastination will increase both the capital and recurrent costs of coping. While these issues are important everywhere, they assume a particular salience in urban areas, not least in the West African context, where the major cities are coastal and highly vulnerable to the impacts of GEC. Not everyone in each city is equally vulnerable; differences of location, social class, ethnic group and other cleavages need to be addressed.

Issues of GEC will need to become crucial arenas of political engagement for several reasons, even in Nigeria. First, the impacts of GEC expose different categories of people to different and uncertain but probably severe risks. Second, different groups of people have different vulnerabilities and recoverabilities; many will require state support. Third, GEC impacts are 'off the scale' of most people's conception and abilities to adapt without appropriate assistance. Fourth, bringing all the others together, the planning and resource allocation challenges are profound, especially in as much as addressing GEC impacts will require scarce resources (financial, capital, human, physical) for which there is intense competition, often with much more immediate alternative demand. Under such circumstances, politicians and public representatives, whether elected or appointed, will be hard pressed to devote attention and funds to GEC mitigation and adaptation. For reasons explained above, this should be integrally linked to other struggles over basic needs, not in conflict or traded off with them. Given the magnitude of what is involved, people will have to mobilise, both electorally and through civil society, in defence of their interests in relation to GEC just like for other agendas. The legacy of unresponsive and self-interested local, regional and national governance is

legendary. Even without the GEC factor, the obstacles are formidable enough, as Gandy (2006: 52) points out:

The scale of the city, its extreme poverty and ethnic polarization now present real obstacles to rebuilding its social and physical fabric. Though informal networks and settlements may meet immediate needs for some, and determined forms of community organizing may produce measurable improvements, grassroots responses alone cannot coordinate the structural dimensions of urban development.

Nevertheless, socially and economically, the costs of a do-nothing approach will ultimately be far higher.

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Figure 2 Inappropriate construction abutting urban wetlands, Bariga, Lagos (Photo D. Simon)





Figure 4 Fishing community at Cape Coast, Ghana (Photo: D. Simon)





Figure 5 Peri-urban agriculture, Lasu, Iba, Lagos (Photo D. Simon)

Figure 6 Houses in Bariga on stilts over Lagos Lagoon (Photo: D. Simon)





Figure 7 Urban growth by period in Lagos (Source: Gandy 2005)

Figure 8 Land use and urban growth, Lagos, 1984 and 2000 (Source: Braimoh and Onishi 2007)

