

Tiempo

#66

03 **THE COOK ISLANDS**
Three burning issues

07 **SURINAME**
Climate change and climate politics

12 **NAMIBIA**
Using indigenous biodiversity

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**Caribbean beaches
and climate change** Page 18

03 The Cook Islands

Vaitoti Tupa discusses the environmental challenges facing the Cook Islands

07 Politics, climate and Suriname

Maureen Silos outlines the vulnerabilities to climate change confronting Suriname

12 Natural resource use in Namibia

Chris Brown argues that switching to indigenous biodiversity production systems in Namibia could help with climate change mitigation and adaptation

18 Caribbean beaches

Gillian Cambers, Lillith Richards and *Sharon Roberts-Hodge* describe activities to conserve beaches and plan for climate change in Caribbean islands

11 News

16 Conferences

25 The Bali Roadmap

28 Climate change and cities

Cover photo: Caribbean children - climate change awareness-raising, Santo Domingo, Dominican Republic - 2006 © EC/ECHO/Susana Perez/DiazImage



Cook Islands children at the Rarotonga Wind Finding Radar Restoration Project

Photo: © Penehuro Lefale

The Cook Islands

Vaitoti Tupa discusses the environmental challenges facing the Cook Islands: climate change and sea-level rise, resource sustainability and capacity building

The Cook Islands has rights and responsibilities over 1.8 million square kilometres of ocean. This area is of considerable ecological, economic, social, scientific and cultural importance. The coastal areas, lagoons and those waters within the three nautical mile zone are directly affected by land-based and inshore activities, thus, although the coastal and outer areas fall under the jurisdiction of the Ministry of Marine Resources, the Environment Service and other institutions have an important role to play.

The Cook Islands oceans and coastal area are in relatively good condition on an international scale. They have, however, experienced localized degradation in coastal environments, aggravated by externally-driven events such as coral bleaching. The ocean and coastal systems are under increasing demands from many users, such as commercial and subsistence fisheries, shipping,

tourism and recreational activities. These activities give rise to significant environmental pressures, such as those from tourism infrastructure development, fisheries bycatch and introductions of invasive marine species. The impact of run-off from urban and agricultural activities places substantial stress on the marine environment.

MAIN POINTS

● **The author describes** how the Cook Islands is vulnerable to environmental, economic and social circumstances.

● **Particular threats include** climate change and sea-level rise, limited freshwater resources, high import dependencies and fluctuating world prices

for commodities, human and food security, cultural dilution and loss of traditional knowledge and practices.

● **The key national ocean issues in a regional context** are climate change and sea-level rise, sustainability of resources and capacity building.

The key burning national ocean issues in a regional context are:

- climate change and sea-level rise;
- sustainability of resources; and,
- capacity building.

Like many other Pacific Islands, the Cook Islands is vulnerable to environmental, economic and social circumstances. Particular threats include: environmental - climate change and sea-level rise, limited freshwater resources; economic - high import dependencies, fluctuating world prices for commodities; and social - human and food security, cultural dilution and loss of traditional knowledge and practices.

Long-term environmental damage to the lagoon ecosystem from unplanned development, as well as increasing nutrient seepage from septic tanks into ground water lenses and into the lagoon, is alarming. Disposal of whitewares, rubbish, motor vehicles and motor vehicle parts is a major environmental



Rarotonga, Cook Islands

concern. The impact of these issues needs to be continually monitored and managed.

Capacity building remains a national priority across the marine environment sector: particularly in the areas of climate change awareness and adaptation measures, biodiversity conservation, disaster mitigation and environmental monitoring in general.

Sea-level rise, changes in storm intensity and frequency, temperature, precipitation and storm surges are components of climate change that will potentially have a

great impact on the coastal area over the coming years. This could be devastating for the Cook Islands, as all of the population is dependent on the coastal areas in one way or another. Rising sea levels could inundate low-lying areas, erode shores and increase saltwater intrusion into ground water supplies to which much of the Cook Islands is already vulnerable.

Recent years have seen an increase in both the intensity and frequency of extreme climate events. Cyclone Sally extensively dam-

aged Rarotonga in January 1987. In November 1997, Cyclone Martin destroyed 90 per cent of the houses and killed 19 people on Manihiki atoll. Since 1998, the Cook Islands has experienced more intense storms, flooding and wave surges, damaging coastal infrastructure. In January 2004, Cyclone Heta induced a storm surge causing significant foreshore damage despite “missing” the Cook Islands. Cyclones can severely damage infrastructure associated with fishing, including ports and breeding areas. Storms are also a major threat to the safety of fishermen.

Coral reefs provide natural breakwaters for Cook Islands coastlines and will become increasingly important for storm protection as the sea level rises. All islands are experiencing coastal erosion, and changes in intensity or frequency of storms are likely to worsen these problems. Although it is not likely that all of the Cook Islands would disappear under the sea even with the highest projected rates of sea-level rise, the effectiveness of the reefs in protecting coasts might be affected.

Due to the relationship of coral reefs to light, temperature, salinity and sea level, corals and reefs have long been regarded as vulnerable to climate change. Coral will inevitably be among the organisms to show the consequences of sustained increases in sea surface temperature. In the Cook Islands, there has been bleaching of coral associated with El Niño disturbances. The question remains whether reefs will keep up, catch up or give up with climate change and sea-level rise

and this is related to how healthy the reefs are presently.

The coastal zone is the base for sustaining livelihoods and economic development for Cook Islanders. Coastal degradation and erosion are a major concern for the Cook Islands primary industry, tourism, which relies heavily on the idyllic lagoon and white sand beach imagery. In an effort to be proactive and not reactive, the Cook Islands government is simultaneously implementing several regional projects, which tackle climate change adaptations, capacity building, impact assessments, hazards and risk manage-

marine industries are major providers of jobs.

As part of the United Nations Convention of the Law of the Sea, Cook Islands has rights to explore, harvest, manage and conserve the natural resources within its Economic Exclusion Zone. With these rights are obligations under regional/international conventions, treaties, arrangements and agreements dealing with matters such as fisheries, shipping, biodiversity, pollution and conservation of cetaceans. The Cook Islands has maritime boundaries with five nations, Kiribati, Niue, the United States, New Zealand and France.

“the question remains whether reefs will keep up, catch up or give up with climate change and sea level rise”

ment. These aim to improve Cook Islanders' ability to cope with climate-related risks at the national and community level. Outcomes required are increased awareness of climate change and sea-level rise impacts, adaptation options that can be mainstreamed at the national level, and ways that communities can work together to lessen potential impacts. A regional ocean policy should reinforce and sustain such steps.

Cook Islands marine industries (aquaculture, tuna long-line fisheries, marine tourism) have been growing steadily over the past decade. Both the aquaculture and tuna industries are export-oriented, and all three

The Ministry of Marine Resources in collaboration with the Ministry of Transport and the Environment Service manages the Cook Islands oceans including enclosed and semi-enclosed seas. The Ministry of Marine Resources' focus is on economic management of the oceans and inshore and coastal areas, while the Ministry of Transport administers the Marine Pollution Prevention Act that prohibits the dumping and transportation of waste in Cook Islands waters. The marine pollution programme provides legal and administrative elements for the appropriate administration and management of shipping (including fishing vessels) in terms

of the safety of life and property at sea and the preservation of the marine environment. This includes the establishment of legislative frameworks for ratifying United Nations conventions and treaties.

The Ministry of Marine Resources has focused on the pearl industry in the Northern Islands of Manihiki, Penrhyn and Rakahanga. Developments in the pearl industry have produced mixed results, including the Penrhyn Marine Research Centre and the establishment of a lagoon monitoring programme with information being disseminated to all stakeholders. Information from the monitoring programme focuses primarily on parameters that are significant for pearl production. The Cook Islands pearl industry has experienced high mortalities due to environmental extremes and localized overcrowding.

The long-line fishing and the fishing industry generally have developed in recent years, with mostly foreign-owned and operated fishing vessels. The establishment of three medium-sized pack-house facilities provides support for processing value-added products locally.

The fish corals and lagoons are among the nation's major assets supporting the tourism sector. Care is required in reef and lagoon management to ensure that their biodiversity is preserved and they remain attractive for diving and snorkelling.

Poor reef health is usually a result of human byproducts and activities. In addition, the lagoon ecosystem that supports the coral

reefs has already been stressed. Sedimentation accumulation from past agriculture runoff threatens both native clams and corals. Such stressed reef habitats provide opportunities for *Ciguatera dinoflagellate* organisms to colonize the coral surfaces, making the reef fish that feed on it poisonous for people. Disturbed reefs tend to also be associated with concerns like crown of thorn starfish outbreaks.

At the regional level, the challenge for the Ministry of Marine Resources is the articulation of Cook Islands issues and interests in relation to the Commission for the Conservation and Management of Highly Migratory Fish Stocks.

Capacity building in the application and use of expert systems and technical tools to decision-making and planning exercises remains a priority for the Cook Islands. Sustainable use of the country's limited resources and maintaining biological diversity is a concept yet to be fully grasped by government and its partners. National and local governments, traditional leaders and the Cook Islands community are essential in the development of integrated approaches to the planning, development and management of the ocean/coastal marine environment.

Primary needs for capacity building are in the area of institutional arrangements and both technology and expertise for ongoing monitoring programmes. Environmental issues and the need to protect and preserve the environment are well supported by the peo-

ple of the Cook Islands as long as processes are not politicized. Politicization caused a delay in passing the national 2003 Environment Act.

Challenges facing the Environment Service include the continuation of community education on the merits of protecting the environment without compromising their rights as traditional landowners and undermining traditional conservation practises and customs. Current issues stem from a general lack of - if not, insufficient - resources within the service, non-government environment groups and the community at large.

The Cook Islands Vulnerability and Adaptation Assessment for coastal areas found that, while different islands' profiles varied greatly, if there is community understanding and support, backed up by consistent local government policy, adaptation responses are possible. This is important, as the coastal areas in the Cook Islands provide a good quality of life, customary tenure and a measure of happiness. Retreat will not be an option, even in the face of accelerated sea-level rise and climate changes. ■

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FURTHER INFORMATION

● **In the Cyberlibrary:** The Tiempo Climate Cyberlibrary maintains a listing of key websites covering small island developing states at www.tiempocyberclimate.org/portal/t3637web.htm.

● **On the Web:** The website of the Pacific Islands Regional Ocean Forum at www.spc.int/piocean/forum/New/forum.htm contains material on other Pacific islands. An overview of the Cook Islands Vulnerability and Adaptation Assessment is available as a 5.9Mb download at www.survas.mdx.ac.uk/pdfs/3carruth.pdf.

ACKNOWLEDGEMENT

This article is based on the Statement by the Cook Islands Delegation presented by Vaitoti Tupa at the Pacific Islands Regional Ocean Forum at the University of the South Pacific, Suva, Fiji, in February 2004.

Politics, climate and Suriname

Maureen Silos outlines the vulnerabilities to climate change confronting Suriname and the difficulties in appropriately and adequately dealing with this urgent issue

Suriname, a small nation on the northeast coast of South America, belongs to a special category of 41 low-lying coastal countries that share similar sustainable development challenges, the Small Island Developing States (SIDS). In the Caribbean, these countries are: Antigua and Barbuda, the Bahamas, Barbados, Belize, Cuba, Dominica, Grenada, Guyana, Haiti, Jamaica, St Kitts and Nevis, Saint Lucia, St Vincent and the Grenadines, Suriname and Trinidad and Tobago. Within the discourse on climate change, the SIDS are recognized as a category of nation states with special needs. Even though these countries have extremely low greenhouse gas emissions, they will be, and some already are, experiencing the most severe impacts of climate change. Some of these countries will probably disappear as a result of sea-level rise; others will experience severe devastation and may even become uninhabitable.

Suriname is particularly vulnerable to the negative impacts of climate change due to its low-lying coastal zone where we find Suriname's most fertile land, with a concentration of the main economic activities and the majority of the population. Sea-level rise may inundate large parts of this coastal zone. The impact will be significant and could even be catastrophic for the country. Hence, Suri-

MAIN POINTS

- **The author describes** how Suriname is particularly vulnerable to the negative impacts of climate change due to its low-lying coastal zone.
- **Recent flooding** has raised awareness of the effects of climate change and has

underscored the fact that the government is woefully unprepared to respond effectively.

- **Government, business and civil society** must work together so that Suriname can protect itself against the adverse effects of global warming.

name's major concern is the vulnerability of the coastal zone.

Recent research by Gordon McGranahan of the International Institute for Environment and Development in London and his colleagues is discussed in the April 2007 issue of *Environment and Urbanization* in the article "The rising tide: assessing the risks of climate change and human settlements in low elevation coastal zones." This article underscores Suriname's vulnerability by reporting that, "the ten countries with the largest share of their population living within ten metres of sea level are: The Bahamas, 88 per cent of population; Suriname, 76 per cent of population; The Netherlands, 74 per cent of population; Vietnam, 55 per cent of population; Guyana, 55 per cent of population; Bangladesh, 46 per cent of population; Djibouti, 41 per cent of population; Belize, 40 per cent of population; Egypt, 38 per cent of population; and, The Gambia, 38 per cent of population".

The National Institute for Environment and Development provided the data and statistics, in 2005, for Suriname's First National Communication to the United Nations Framework Convention on Climate Change. In the Initial National Communication, the government of Suriname states that sea-level rise will result in "increased erosion, large-scale inundation, loss of fertile land, reduction of freshwater resources, decline of biodiversity, and worsening of human health". The report goes on to say that "climate change is likely to result in changes in the hydrological cycle, including rainfall, its intensity and distribution, and droughts. The combined effect of these changes makes the country vulnerable to climate change."

Local politics

In early May 2006, the interior of Suriname experienced unprecedented extreme rainfall that caused severe flooding of large areas in southern Suriname, affecting approximately 49,000 indigenous and Maroon people. The Economic Commission for Latin America and the Caribbean estimates the damage to the area had a financial cost of around US\$40 million, and predicts that the area will need about five to ten years of intensive special assistance to recover from the disaster. Food security was especially threatened with most of the subsistence plots flooded.

In May 2007, at the start of the rainy season, the capital, Paramaribo, experienced unprecedented flooding. Even though seasonal

flooding of the city is an annually recurring phenomenon because of the bad state of the drainage system, this time the flooding affected areas that had not experienced this before and the water stayed for days in certain neighborhoods. The government was at a loss and blamed global warming for the severity of the rain and the flooding, just as it did with the flooding of the interior.

"Wan ogri e tja wan bun." This is Surinamese Creole for "A bad thing always brings a good thing". The extreme flooding of both the interior and the capital city raised awareness on one of the effects of climate change and underscored the fact that the government is woefully unprepared to respond effectively to disasters or to prevent these from happening. In addition, the flooding also illustrated the political reasons for this lack of capacity.

Political loyalties are very strongly tied to groups and, because of the country's multi-ethnicity, the loyalties are tied to one's ethnic group. These influences create political loyalties that are very strongly tied to ethnic groups. That is why the formation of coalitions that could transcend these ethnic groups is almost impossible. Forming coalitions would entail that people would have to be able to find each other on the basis of political principles and policy issues, and this is not possible in a political system that emphasizes ethnic group loyalties.

Surinamese political culture is also very authoritarian. Carl Stone, a Caribbean political



Flooding, May 2007, suburb Paramaribo

Photo: © Maureen Silos

scientist, says that "there is a strong tendency to elevate and defer to political leaders as if they were transcendental authority figures standing at some great distance above the political system. These leaders are (in their moments of high popularity) invested with extraordinary qualities of wisdom and pampered with emotional displays of ritual subservience by party followers. Party leaders are put on a pedestal by cabinet members, parliamentarians, party activists and other members of the party elite. The effect is a tendency for the party leader to assume a

sense of personal authority and power that is inconsistent with leadership accountability and a strong democratic system.”

The current government of Suriname is a coalition of five parties, four of which are organized around an ethnic identity of either Blacks, East Indians, Javanese or Maroons, and a tiny Labor Party which has a primarily black membership. They came together to form a government in a culture where the government is historically seen as an opportunity to use the state for corruption and to further the interests of the elites of these ethnic groups. These parties are actually redistribution cartels, primarily redistributing the spoils from development aid and taxes. Sixty per cent of the population is in government service, and even though political leaders talk about ‘public sector reform’, not much is going to happen soon because giving away jobs in the civil service is one of the means to buy political loyalty and votes at election time.

In this context, only lip service is paid to the issue of climate change and its effect on the country. Even then, this is mainly as a result of funding from international organizations such as the United Nations Development Programme. In effect, it is international organizations and foreign governments, such as the Dutch government, that are pushing the issue of climate change on the Surinamese government and are more or less forcing the government to make some moves so that it might appear to be adhering to the requirements of the international treaties that it

has signed. To really address climate change issues, politicians and policy makers have to transcend their tribal thinking and begin to identify with the interests of the larger society and of future generations.

Climate change and adaptation in Suriname

Suriname ratified the United Nations Framework Convention on Climate Change in 1997. Its First National Communication was only submitted in March 2006. This reporting was made possible as part of a large grant from the United Nations Development Programme to help Suriname comply with the requirements of the Convention. That grant also provided funds for a large-scale climate change awareness campaign in 2006 and for writing a National Climate Change Action Plan in 2007.

The process for writing the National Action Plan was participatory and coastal communities that are already experiencing the negative impacts of sea-level rise were extensively

“politics in Suriname is characterized by a colonial world view and an ethnic group mentality”

consulted. At the end of these community consultations, there was a national climate change workshop in Paramaribo in which participants from government agencies, the university and the private consultancy sectors came together to comment on the draft

National Action Plan. This draft focuses primarily on adaptation measures for the coastal zone because this will be hit the hardest.

As a result, the areas that have been identified as in need of adaptation measures are:

- the coast and river banks;
- water sources;
- public health;
- agricultural production;
- energy;
- education and awareness;
- capacity development;
- scientific research; and,
- fund-raising to finance the implementation of adaptation measures.

The following areas have been identified for mitigation measures: the large-scale mechanical rice sector; the transport sector; the forestry sector; and the waste management sector.

Spatial planning is crucial for the success of adaptation measures in the coastal zone. One reason is the importance of the mangrove forest for coastal and riverbank protec-

tion. Suriname urgently needs a zoning plan that incorporates a buffer zone as protection against sea-level rise. This zoning plan should be codified in a law on spatial planning to prevent arbitrary changes in policy resulting from changes in government coalitions.

In this buffer zone, the government can monitor and control any changes in the coast and river banks. Because of the horse trading between the coalition partners after the elections two years ago, however, a new Ministry of Spatial Planning and Land Management was created to appease one of the coalition members (a Javanese political party) who threatened to leave the coalition and join the opposition if this fiefdom was not provided. The Ministry of Natural Resources was stripped down to a bare minimum of functions to accommodate this particular political party with a new ministry. The result is that spatial planning is not on the agenda of the government, and the only press this new ministry gets is anger around the granting of land titles to loyalists of the political leader of that party.

Climate change and adaptation are not on the priority policy agenda of this new ministry. This ministry also does not have any official opinion about the recommendations made by climate scientists, civil engineers and the Inter-American Development Bank on integrated coastal zone management. In 2005, the Inter-American Development Bank financed the write-up of the terms of reference for a comprehensive coastal zone management plan. The write-up is not used and seems to have vanished into a drawer somewhere.

In conclusion

There is a large discrepancy and disconnect between the intent of the United Nations Framework Convention on Climate Change

that has been ratified by Suriname and the actual practice of preparing for the negative impacts of climate change on this country. Government reports to the Convention Secretariat paint a picture of a situation in which the government is actively engaged in adaptation and mitigation policies. As with other urgent issues of sustainable development in Suriname, these reports are, at best, window dressing that masks the reality of political decision-making that is undemocratic, authoritarian and completely focused on the short-term narrow sectarian interests of ethnic politics.

A society is, however, more than its political culture, and there is growing pressure on the government from civil society to do the right thing. People are speaking out, the media is more informed, and it seems that the government's arguments to paper over its incompetence are increasingly less persuasive.

Eventually, this political culture will be succeeded by another, hopefully more modern one, based on democratized political parties. Then, government, business and civil society can work together to implement recommendations and policies that will allow Suriname to protect itself against the adverse effects of global warming and climate change. I can only hope that it will not be too late. ■

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FURTHER INFORMATION

● **On the Web:** The Tiempo Climate Cyber-library maintains a listing of key websites covering small island developing states at www.tiempocyberclimate.org/portal/t3637web.htm.

JAPAN TARGETS

After heavy criticism at the United Nations Climate Change Conference 2007, held in Bali, Indonesia, Japan is to reverse its opposition to numerical targets for greenhouse gas emissions controls.

Japan will host a climate change summit before the group of eight (G8) leaders meet in Toyako, Japan, in July 2008, where new targets will be proposed. The Japanese and Chinese governments have agreed a carbon-credit deal that will see Japan investing in emission mitigation in China and buying the resulting carbon credits.

Read more:
www.tiempocyberclimate.org/newswatch/archive/arweek080113.htm

NEUTRALITY

The United Nations (UN) aims to become climate neutral in January 2008, offsetting emissions by investing in adaptation fund credits. An increasing number of nations are adopting unilateral this goal.

New Zealand's climate change minister David Parker said recently that his nation's "plan to become climate neutral involves a goal of generating 90 per cent of our electricity from renewable sources by 2025". Costa Rica will become climate neutral as part of the new presidential initiative "Peace with nature".

Read more:
www.tiempocyberclimate.org/newswatch/archive/arweek071230.htm

MEGA-DELTA

The mega-deltas of Asia are in the front line of flood risk, according to a new report from the Organisation for Economic Co-operation and Development.

By the 2070s, climate change, subsidence, population growth and urbanization, and urban development could triple the world population threatened by coastal flooding to around 150 million people. The assets exposed could grow more than ten times current levels, reaching around nine per cent of global Gross Domestic Product.

Read more:
www.tiempocyberclimate.org/newswatch/archive/arweek071216.htm

BANGLADESH

Tropical cyclone Sidr made landfall on the Bangladeshi coast on Thursday November 15th 2007. The official death toll exceeded 3000, with many thousands more injured.

The availability of shelters, as well as an evacuation programme, spared the country the mass casualties of previous events. "We alerted people to be evacuated early," said Samarendra Kar-makar, head of the Bangladesh Meteorological Department. Over half a million people were evacuated.

Read more:
www.tiempocyberclimate.org/newswatch/archive/arweek071125.htm

ABSORPTION

Atmospheric carbon dioxide levels have grown 35 per cent faster than expected since 2000, according to an international team of scientists.

Three factors are held responsible: global economic growth; an increase in carbon intensity; and, a deterioration in the ability of land and oceans to absorb carbon from the air. "Fifty years ago, for every tonne of carbon dioxide emitted, 600kg were removed by land and ocean sinks. However, in 2006, only 550kg were removed per tonne and that amount is falling," said Pep Canadell of the Global Carbon Project.

Read more:
www.tiempocyberclimate.org/newswatch/archive/arweek071118.htm

Natural resource use in Namibia

Chris Brown argues that switching to indigenous biodiversity production systems in Namibia could help with climate change mitigation and adaptation

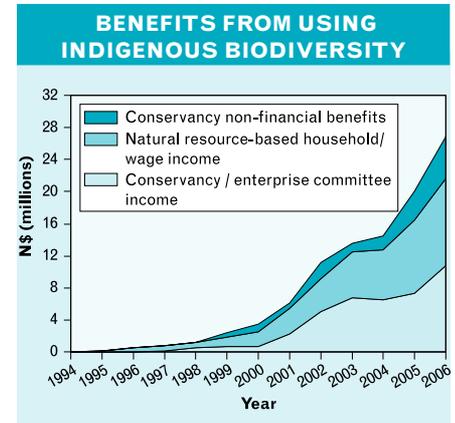
Like many countries in southern Africa, Namibia is likely to get drier as a result of climate change impacts. One of the most useful actions that Namibia can take, both to mitigate climate change and adapt to its impacts, is to reduce its large-scale dependence on farming systems (crops and livestock) and move to other forms of land use that are less dependent on levels of primary production and less vulnerable to droughts and general climatic variability. A good example would be switching to wildlife and tourism. For arid and semi-arid countries, particularly in Africa, farming systems are low production systems and generally poverty traps. Using 'indigenous biodiversity production systems' can provide greater financial returns and more jobs than farming, as well as a number of other social benefits. The figure on this page shows how increases in earnings from indigenous

biodiversity production systems known as conservancies increased in Namibia between 1994 and 2006.

This switch has already happened over large parts of Namibia, particularly in the freehold areas where financial returns from indigenous biodiversity production systems now significantly exceed those from farming systems. National figures for 2005 show

MAIN POINTS

- **Chris Brown describes** how switching from farming systems to indigenous biodiversity production systems in Namibia will help with climate change mitigation and adaptation, reduce poverty and increase economic outputs.
- **He describes** the key challenges to realizing the potential of indigenous systems.
- **He cautions** that switching may only work in low rainfall areas of Africa and where indigenous biodiversity can create higher returns.



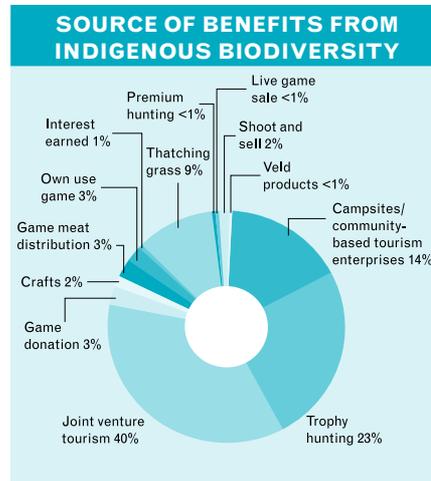
that all forms of farming (rain-fed and irrigated crops, large and small stock, pigs, *et cetera*) in both freehold and communal areas come to N\$1,878 billion. This includes an assessment of contributions from the informal (subsistence) component in the

economy. By contrast, indigenous biodiversity production systems (dominated by tourism and trophy hunting) come to N\$3.2 billion. And this figure only includes the components captured in the formal economy with no incorporation of income assessments from the informal sector. Income from trophy hunting alone exceeds that of the entire small stock farming sector, which uses about 27 million hectares of land. The figure on this page shows where benefits from community-based natural resource management and indigenous biodiversity production systems came from in 2006.

Key challenges

The potential for increasing indigenous biodiversity production systems is huge. There are, however, a number of challenges before the full potential of this sector can be realized. None of these challenges is too difficult to overcome because Namibia has the tools and knowledge regarding how to address them all. Little or no investment on behalf of the state is needed, but policy reform and a change in mindset is essential. Most of the key principles are already in government policy but the civil service is poor at converting policy intent into practical action. Political will and drive is required, plus the energy to overcome or circumnavigate civil service inertia. The most important challenges are defined in the following paragraphs.

Policy reform – particularly devolving more rights to managers of land and natural resources

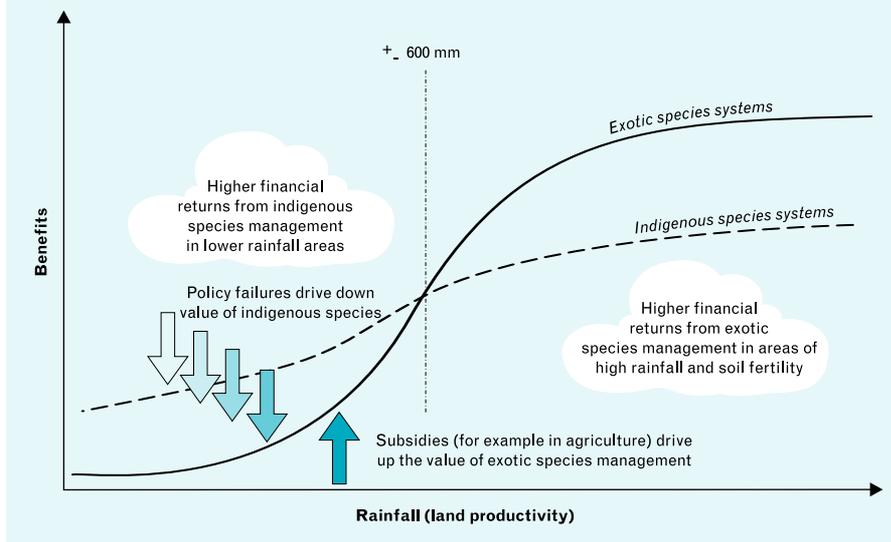


in all parts of the country. The currently policy mindset is that of the state having primary control, with limited devolution to land and natural resources managers. This needs to move to a policy situation where the default setting is full devolution. This will create incentives for sustainable management, and lead to a situation where the markets are working for conservation, sustainable use and optimal economic returns. Only where there are clear failures (essentially market failures where the value of the resource is not sufficient to be an incentive for sustainable management) should regulations be brought in. And this should only occur after an exploration of ways to increase the resource value has not produced the required

results. Appropriate management actions are very different for conditions on the right and the left side of the figure on page 14. Problems arise when right side responses are applied to (and often imposed on) the left side. This essentially undermines good conservation approaches for those areas where markets and conservation are in tune and could deliver win-win results.

Increase investor confidence in the communal areas. Conservancies are areas of communally-owned land where owners have pooled their resources for the purpose of conserving and using wildlife sustainably. Despite sharply increasing income to conservancies in communal areas over the past six years (roughly N\$3 million in 1999 to N\$27 million in 2006 – see figure on page 15), the earnings in communal areas from indigenous biodiversity production systems amount to probably less than five per cent of the national earnings from this sector. Communal areas have the best scenery, the most diverse wildlife and habitats and the richest cultures, yet they are currently minor participants in terms of economic earnings. The limiting factor is a lack of investor confidence because of low security of rights and both perceived and real insecurity of investments. Banks are loath to extend credit to tourism developments in communal areas. The Ministry of Lands and the Ministry of Environment and Tourism need to work together to develop policies that provide security for investors in these areas.

RETURNS FROM DIFFERENT LAND USES



Develop policy and approaches to release the economic potential in and around protected areas. Making better economic use of national parks, and using national parks to create economic incentives for neighbouring landowners to switch land uses could potentially provide up to N\$1 billion more per year. But this requires policy reform and innovative thinking. Done properly, it will not threaten the conservation and biodiversity integrity of the national parks. Rather, it would substantially enhance their conservation

value by opening up systems, removing fences, creating corridors and ecosystem networks – all activities that will contribute to mitigating climate change and promoting adaptation.

Capacity building of managers and custodians of land and natural resources. Strengthened capacity will permit post-holders to (a) manage resources sustainably and optimally, (b) undertake or enter into partnerships with the private sector to develop enterprise and business activities based on natural resources, and (c) man-

age and administer the necessary institutional mechanisms to run community organizations in open, transparent ways that promote good governance and local level democracy.

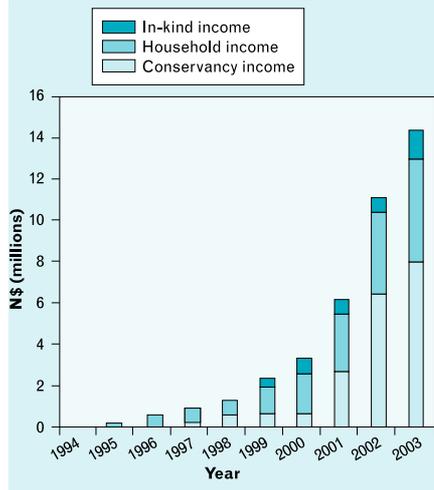
Intensify production systems. For example, one communal conservancy of 400,000 hectares has one lodge, one campsite and one professional hunting partnership. Equivalent operations are run in freehold areas on just 10,000 hectares of land. Such communal conservancies could be selling four or more hunting quotas and supporting a number of lodges.

Diversify further into other forms of indigenous production. Fisheries, crocodile farms, Kalahari silk and medicinal plant products all have potential.

Ways forward

The best way to address climate change is to reduce dependency on farming systems, promote a diversity of enterprises around indigenous biodiversity production systems (which also builds on Namibia's comparative advantages in this field), open up systems to allow for mobility and colonization of new areas as the climate changes, and purposefully and effectively address the policy framework to promote these changes. Importantly, these mechanisms are also the best mechanisms for promoting socio-economic development, rural development, sustainable livelihoods and good conservation, reducing poverty and

INCOME EARNED BY COMMUNAL CONSERVANCIES IN NAMIBIA



creating jobs. It is a win-win-win-win situation, so what is preventing the necessary changes from occurring?

Namibians must not wait for government to take the lead. Civil society needs to be more organized fostering better links with government on these critical issues. Establishing a Namibian Sustainable Development Association, consisting of professional individuals (not organizations) from all sectors (state and non-state) to address national priority issues, approaches and strategies is necessary. This body should then develop a formal relationship with government (perhaps

via the Parliamentary Standing Committee on Environment and Economics) to advise government on key issues, approaches and strategies. Namibia needs to devise more effective ways of turning policy and strategy into action. This is currently one of its greatest weaknesses. This may be because the civil service assumes the role of implementer far too often, when other organizations are better placed for this role.

Endnote

The proposals made in this article may not be appropriate for all nations feeling the effects of climate change. There is probably nowhere else in the world outside of the lower rainfall areas of Africa - particularly southern and East Africa - where, on a large-scale, the value that can be earned from indigenous biodiversity significantly outcompetes that from agriculture. Wildlife in other continents does not even closely approach the actual and potential value of that in Africa. Namibia is a dry country with good infrastructure and a fairly dynamic private sector. Switching to indigenous biodiversity production systems may be less appropriate in higher rainfall areas where rain-fed cropping is possible. In such areas agricultural production would probably exceed indigenous production systems. Also, wildlife and tourism development in countries with poor infrastructure and a weak private sector offers little alternative to subsistence farming. ■

ABOUT THE AUTHOR



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Email: cb@nnf.org.na

FURTHER INFORMATION

● **On the Web:** Namibia's First National Communication under the United Nations Framework Convention on Climate Change is available as a 2.7Mb download at <http://unfccc.int/resource/docs/natc/namnc1.pdf>.

CONFERENCES

International Conference on Rivers in the Hindu Kush Himalaya: Ecology & Environmental Assessment

Nepal, Kathmandu:

03-03-2008 to 07-03-2008

Organized as part of a European Union funded project which has brought together Asian scientists together with scientists from Austria, the Czech Republic and Germany to develop tools for water quality assessment in the Hindu Kush Himalayan region. Conference will disseminate the project's results to students, water managers and other scientists and provide a forum for further discussion.

*Details: ICIMOD, GPO Box 3226, Khumaltar, Kathmandu, Nepal.
Fax: +977-1-5524509
Email: webmaster@icimod.org
Web: www.icimod.org/homepage.php?+ann2*

World Sustainable Energy Days

Stock, Austria:

05-03-2008 to 07-03-2008

The World Sustainable Energy Days 2008 will begin with Renewable Heating and Cooling and the European Pellets Forum. The European Energy Efficiency Conference will run from the 6th to the 7th alongside the Electricity Efficiency Conference and Energy Efficient Procurement seminar. The seminar on Future Energy Technologies will be held on the 5th March. There will also be poster presentations and the choice of technical

site visits to different projects.

*Details: Christiane Egger, Conference Director, O.Oe. Energiesparverband, Landstrasse 45, A-4020 Linz, Austria.
Fax: +43-732-772014383*

Email: office@esv.or.at

Web: www.esv.or.at or www.wsed.at

World Biofuels Markets Congress

Brussels, Belgium:

12-03-2008 to 14-03-2008

One of the leading global conferences on biofuels with experts from major international companies involved in the biofuels industry. Will feature latest in biofuels equipment and will promote services networking. The agenda will include discussion on biofuels investment and finance, certification and sustainability, trading and pricing, next generation technology and science, and distribution and quality amongst other issues

*Details: Annie Ellis, Greenpower Conferences, Shakespeare House, 168 Lavendar Hill, London SW11 5TF, UK.
Email: annie.ellis@greenpowerconferences.com*

Web: www.worldbiofuelsmarkets.com

Community Development & Ecology: Engaging Ecological Sustainability through Community Development

Melbourne, Australia:

26-03-2008 to 28-03-2008

This will be the third Community Development Conference. There will be two streams to the conference - academic papers and community work-

shops and forums - which will run concurrently. Main themes will cover community development and housing, rural and regional issues, globalization, and community development and urban renewal.

Details: Anne O'Keefe, Centre for Citizenship and Human Rights, Deakin University, 221 Burwood Highway, Burwood, Melbourne, Victoria 3125, Australia.

Email: aok@deakin.edu.au

Web: www.deakin.edu.au/arts/cchr/eco-cd-conf08/index.php

European Climate Conference

Rovigo, Italy:

02-04-2008 to 04-04-2008

Intends to be a capacity-building event aiming to transfer good practice and know-how from experienced local governments to medium and small communities. Conference is a follow-up to the "A Future with Zero CO₂ Emissions" conference held in Stockholm in 2006. Key issues will include: climate protection; energy conservation and energy efficiency; renewable energy; urban and land use planning; and adaptation to climate change.

Details: No mailing address provided.

Fax: +49-761-3689229

Email: rovigoc2008@iclei.org

Web: www.iclei.org/rovigoc2008

2008 International Conference on Food Security & Environmental Change

Oxford, UK:

02-04-2008 to 04-04-2008

Aimed at having participants jointly develop adaptation options to improve food security. Main themes are: concepts and methods for research on food systems; regional research; the development agenda and policy processes regarding Global Environmental Change and food security; and emerging issues and frameworks for analysis and policy development of adaptation options.

Details: Jane Rossiter, Food Security Conference Secretariat, 22a Pelham Road, London SW19 1SX, UK.

Fax: +44-2085-438443

Email: conferenceinfo@elsevier.com

Web: www.foodsecurity.elsevier.com

1st World Coal-to-Liquids Conference

Paris, France:

03-04-2008 to 04-04-2008

Organized by Energie Intelligence, a NGO established in 2003 which is devoted to energy and climate change policies, in recognition of the growing importance of coal-to-liquid as a component of energy policies. Topics covered in main sessions will include energy supply and demand (2010-2030) - stakes for nations and industries.

Details: Conference Office, First World CTL Conference 2008, c/o MCI, 24 rue Chauchat, 75009 Paris, France.

Fax: +33-1-53858283

Email: contact@energie-intelligence.org

Web: www.world-ctl2008.com

8th International Conference on Environmental Compliance & Enforcement

**Cape Town, South Africa:
05-04-2008 to 11-04-2008**

Main working theme of the conference is "Linking Concepts to Action: Successful Strategies for Environmental Compliance and Enforcement". Topics for discussion include: detecting non-compliance; biodiversity, ecosystems and enforcement; climate change and compliance; strategic management of environmental compliance and enforcement programmes; and, creating a culture of compliance.

Details: INECE Secretariat, 2300 Wisconsin Avenue NW, Suite 300B, Washington DC 2007, USA.

Fax: +1-202-3381810

Email: inece@inece.org

Web: www.inece.org/conference/8/index.html

International Workshop on Evaluating Climate Change & Development Alexandria, Egypt:

10-05-2008 to 13-05-2008

Workshop is being organized by the Evaluation Office of the Global Environment Facility. Intended to bring together practitioners from all over the world to discuss how best to undertake evaluation of climate change and development. Participants will also address the relevant needs and assessments that are needed to identify gaps in the field and potentially develop a network of professionals.

Details: Secretariat of International

Workshop, Evaluation Office of the GEF, 1818H Street NW, 20433 Washington DC, USA.

Fax: +1-202-5221691

Email: intorkshop@thegef.org

Web: www.esdevaluation.org

Corporate Climate Response

London, UK:

22-05-2008 to 24-05-2008

This is the sixth such event bringing together companies, regulators and other experts to discuss best solutions for companies looking to mitigate their carbon footprints. Expected that over 200 participants will attend. The event will include sessions on carbon footprint and life-cycle analysis, energy efficiency, offsetting and emissions trading, and climate adaptation. Will also present the latest updates in climate change policy and its impact on businesses.

Details: Conference Organizer, Greenpower Conferences, Shakespeare House, 168 Lavender Hill, London SW11 5TF.

Fax: +44-20-79001853

Email: info@greenpowerconferences.com

Web: www.greenpowerconferences.com/general/event_listings.html

3rd International Symposium on Environment

Athens, Greece:

22-05-2008 to 25-05-2008

Intended to act as a forum for all scholars, researchers and students in all disciplines pertaining to environmental is-

sues. Aims to bring together a wide range of participants to discuss and network on latest research, studies and findings. Conference proceedings will be published in a special edition. Will also include the option of an archeological tour on the evening of the 24th May. *Details: Gregory Patanikos, Athens Institute for Education and Research, 8 Valaoritou Street, Kolonaki, 10671 Athens, Greece.*

Fax: +30-210-3634209

Email: gtp@atiner.gr

Web: www.atiner.gr/docs/Environment.htm

7th International Workshop on Large-Scale Integration of Wind Power into Power Systems

Madrid, Spain:

26-05-2008 to 27-05-2008

Workshop will also include a conference session on "Transmission Networks for Offshore Wind Farms". On the 28th May there will be a field trip to a wind farm control centre for interested participants. Intended to provide a platform for exchanging knowledge, ideas and sharing experiences as well as in-depth discussions and brainstorming on key issues.

Details: Conference Organizer, Energnautics GmbH, Muhlstrabe 51, 63225 Langen, Germany.

Fax: +49-6103-982801

Email: info@energnautics.com

Web: www.windintegrationworkshop.org

3rd International BioEnergy Conference & Exhibition

Prince George, Canada:

03-06-2008 to 05-06-2008

Conference will begin with a forum discussing the issues and opportunities in the global wood pellet industry. Main themes will include: policy influences on the development of a bioenergy economy; a sustainable bioeconomy; technologies, energy and transportation issues; and the challenges and opportunities in future directions. There will be a forests and resources exhibition as well as options on taking industry tours.

Details: Cam McAlpine, 850 River Road, Prince George, BC V2L 5S8, Canada.

Fax: 1-250-7640533

7th World Wind Energy Conference & Exhibition

Kingston, Canada:

24-06-2008 to 26-06-2008

Working theme of the conference will be "Community Power" and will focus on renewable energy technologies for electricity generation. Co-organized by the World Wind Energy Association, St Lawrence College and the Ontario Sustainable Energy Association. Keynote speakers are Hermann Scheer and David Suzuki. Will include an exhibition as well as training sessions on project management, financing, governance and community engagement.

Details: 2008 Conference Organizer, WWEA Head Office, Charles-de-Gaulle Str 5, 53113 Bonn, Germany.

Fax: +49-228-3694084

Email: wwwec@ontario-sea.org

Web: www.wvec2008.com

Conserving Caribbean beaches

Gillian Cambers, Lillith Richards and Sharon Roberts-Hodge describe activities to conserve beaches and plan for climate change in several Caribbean islands

For the small islands of the eastern Caribbean, 1995 was a wake-up call. In a three-week period in September, two hurricanes and one tropical storm moved through the chain of Windward and Leeward Islands: Tropical Storm Iris, Hurricane Luis and Hurricane Marilyn. Hurricane Luis was a category 4 hurricane, which affected the northern islands from Dominica to Puerto Rico. After two decades of little hurricane activity (with significant exceptions such as Hurricanes David and Frederick in 1979 and Hurricane Hugo in 1989) islanders quickly realized that hurricanes were likely to affect their islands more frequently in the future.

Increasing hurricane activity

Research indicates that there is a cyclical pattern in Atlantic hurricanes with decades of frequent and intense hurricane activity followed by decades with less frequent

and less intense activity. For instance, major hurricanes (category three and higher) were more frequent in the 1950s and 1960s compared to the period between 1971 and 1994. From 1995 to the present, major hurricane incidences have increased. 2005 was the most active year in history with 23 named storms, 13 of which were hurricanes, and seven were major hurricanes. Researchers disagree about whether the increased

MAIN POINTS

- **The authors explain** how increasingly frequent and fierce hurricanes and storms are contributing to coastal erosion in the Caribbean.
- **They describe methods** adopted by island authorities to set back coastal de-

velopment to protect beaches and property from hurricanes and sea-level rise.

- **They caution that** measures taken in response to erosion itself may worsen the problem of erosion elsewhere.

intensity and frequency of hurricanes over the last 30 years is part of this cyclical pattern or as a result of rising ocean temperatures and global warming. The 2007 report of the Intergovernmental Panel on Climate Change predicts that future hurricanes will be more intense with higher wind speeds and heavier rainfall.

Anguilla, a small island in the northeastern Caribbean, was in the direct path of Hurricane Luis in September 1995. The winds battered the island for almost two days and the damage was widespread. Residents, however, thought that they were safe for another two or three decades, since the previous hurricane to hit the island had been Hurricane Donna in 1960. People thought they had another 20 to 30 hurricane-free years ahead. They were soon disillusioned when 1997, 1998 and 1999 brought more hurricanes to this part of the Caribbean.

Coastal damage and beach erosion

Regular monitoring of beach changes in ten Caribbean islands between 1985 and 1995 showed that 70 per cent of the measured beaches were eroding and retreating inland at an average rate of 0.3 metres per year. Islands directly impacted by hurricanes in this period showed erosion rates three times higher than average.

Following surveys of the hurricane impact in Anguilla in 1995, it was apparent that the most severe damage was in coastal areas where port facilities, hotels, tourism villas, condominiums, restaurants and bars were located. The Government of Anguilla requested assistance from the then British Development Division in the Caribbean to plan their rebuilding efforts so that similar damage scenarios would not be repeated in the future.

One component of the assistance programme was to design new guidelines for coastal development setbacks, so that new development would be situated a 'safe' distance from the beach. At that time, many Caribbean islands already had coastal development setback guidelines included in their planning laws although they were often not implemented.

A coastal development setback may be defined as a prescribed distance to a coastal feature, such as the line of permanent vegetation, within which all or certain types of development are prohibited. Such setbacks fulfil many functions. In particular, they pro-



Damaged beachfront buildings at Meads Bay, Anguilla, September 1995, after Hurricane Luis

Photo: © Gillian Cambers

vide buffer zones so the beach has the space to erode or accrete and can thereby protect beachfront property during high waves and hurricanes without the need for expensive sea defence structures. They also allow for improved views and beach access, and provide privacy to coastal property owners and beach users.

Expecting that the frequency and intensity of hurricanes would increase in the Caribbean, and knowing that sea-level rise was al-

ready a problem in the region, a protocol for coastal development setbacks was designed in 1995/6 that included adaptation to these two aspects of climate change. Recognizing that there was considerable variation from one beach to another, it was determined that coastal development setbacks needed to be calculated on a beach-by-beach basis. This would provide for greater setbacks on eroding beaches and smaller setbacks on stable or accreting beaches.

DISTANCES FROM THE VEGETATION LINE FOR COASTAL DEVELOPMENTS IN NEVIS

Coastal stretch	Setback distance (metres)
Pinneys Beach – Fort Ashby Pond to Pinneys Pond	37
Gallows Bay	37
Indian Castle Beach	37
Black Bay	37
White Bay	37
Longhaul Bay	18
Barnaby Bay	24
Nisbetts Beach – Barnaby Bay to Camps River	37
Camps River Beach	152
Newcastle – Camps River to Newcastle Bay Point	24
Newcastle Bay Point to Hurricane Hill	24
Mosquito Bay	24
Jones Bay	24
Cades Bay	24

A methodology was developed whereby development setbacks were determined for each beach based on, (1) historical coastline changes; (2) projected changes likely to result from a major hurricane; (3) coastline retreat resulting from sea-level rise in the next 30 years; and (4) specific geographical and planning factors. The methodology was based on the assumption that historical erosion rates would continue, and would increase as a result of

increased frequency and intensity of hurricanes and accelerated sea-level rise. The period of 30 years was selected because it represented the average economic life of a building or structure.

The following formula was developed: **coastal development setback = (a+b+c)d**, where the setback is measured from the line of permanent vegetation (the tree line or equivalent) and **a** is the projected change in coastline position over the next

30 years based on historical changes determined from beach monitoring data or aerial photograph comparison, **b** is the projected change in coastline position likely to result from a major hurricane (based on field measurements after the most recent major hurricane), **c** is the predicted coastline retreat by 2030 resulting from sea-level rise (based on the Bruun Rule), and **d** represents other factors of an ecological, planning and social consideration (essentially qualitative, but too important to be omitted). This latter category includes coastline shape and wave exposure, features such as sand spits and bars, offshore features such as coral reefs, anthropogenic factors such as sand mining and offshore dredging, and planning considerations such as lot size or national park designations. No development is permitted seaward of the vegetation line with the obvious exception of docking facilities such as jetties.

Applying setbacks in Anguilla

Using this methodology, coastal development setback distances were calculated for each beach in Anguilla. The Department of Physical Planning has used these guidelines since 1996 when considering applications for coastal development. In some cases, the recommended setback distances listed in the guidelines have been applied exactly as recommended, but for the majority of proposals, the Department



Barnes Bay, Anguilla, in 1994 (upper) and in 1995, before and after Hurricane Luis, respectively. In the second photo, the sand has been eroded and the palm trees destroyed, leaving a rocky outcrop and a few pockets of sand.

Photos: © Gillian Cambers

has found it necessary to customize the setback distances outlined in the guidelines on a site-by-site basis.

Developers usually wish to locate development as close to the vegetation line as possible on sandy beaches and on rocky shores. The Land Development Control Committee (the statutory body responsible for making decisions on physical planning applications) has often had to compromise on coastal setback distances, permitting a distance less than that recommended in the guidelines but usually greater than what the developer proposed.

When considering setback distances for coastal applications, the Land Development Control Committee would normally visit the proposed site and consider four main factors: the setback distance recommended in the guidelines; the setback distance proposed by the developer; the size of the land parcel, and; the setback distance of any other existing buildings close to the proposed site. Once they are satisfied that a structure built adhering to the derived setback would not compromise the free movement of sand on the beach or interfere with pedestrian movement on the beach or rocky shore the application would be permitted.

During the last four to five years, there has been an increase in coastal development and redevelopment of existing hotels. As a result, a distinct coastal setback pattern is emerging on once sparsely developed or

deserted coastal areas. The line of buildings is, therefore, relatively uniformly setback from the line of permanent vegetation.

The Department of Physical Planning has recognized that with coastal development on the rise, an agreed policy on coastal setbacks to protect coastal land is needed. The 1996 coastal setback guidelines are currently being amended and a policy drafted to reflect the modified setback distances that have been customized and applied over the past few years. Additionally, the policy will specifically address coastal 'hotspots' on the island and state setback distances that have already been established and tested. When completed, the draft policy will be submitted to the Chief Minister's Office to be taken to the Executive Council for approval.

Applying setbacks in Nevis

The 1995 hurricane, as well as several subsequent ones, also affected the island of Nevis, a part of the Federation of St Kitts and Nevis. Indeed, after Hurricane Luis in 1995, almost every building on the west coast of the island within 30 metres of the beach was badly damaged or destroyed.

The Nevis Island Administration (NIA) realized that much of the infrastructural damage could have been avoided had the building setbacks (91 metres from the high water mark) outlined in an earlier 1991 Zoning Plan Ordinance been implemented. There had, however, been considerable opposition to these setbacks, which were viewed by the



The Four Seasons Hotel at Pinneys Beach, Nevis, in August 1995 (upper) and in September 1995, two weeks after Hurricane Luis struck

Photos: © Gillian Cambers

public and developers as unrealistic. So in 1998, with the support of the University of Puerto Rico Sea Grant College Program and the United Nations Educational, Scientific and Cultural Organization, it was decided to revise the existing coastal development setbacks and design a system of setbacks for individual beaches using the same methodology as described above for Anguilla (see the table on page 20).

It was accepted that existing development in the coastal zone would remain in place, but that the 1998 guidelines would ensure that new developments did not exacerbate existing problems. These setbacks have been used as a guide by the Department of Physical Planning since 1998 and have recently been included in the Draft Building Regulations – Second Schedule (due to be passed into law in 2007).

Factors exacerbating coastal erosion in Nevis

Some measures taken in response to erosion itself may also worsen the problem of erosion. Lessons learned by the NIA over the years highlight three factors that exacerbate coastal erosion, namely: conflicts in the application of setback guidelines; the design and implementation of coastal protection measures, and; an *ad hoc* approach to coastal protection. These are detailed below.

The Department of Physical Planning has been largely successful with implementing the 1998 setback guidelines. In a few cases,

however, there has been conflict with federal law, namely the National Conservation and Environmental Protection Act of 1987, which provides for a 20-metre setback from the high water mark. At times, the former Building Board also did not support the application of the 1998 building setbacks. In 2005, a condominium project at Clifton Estate sidestepped the recommended setback of 37 metres from the permanent vegetation line. This highly controversial action catalyzed the NIA to eliminate conflicts in legislative authority by consolidating development administration under a single entity. In May 2005, the Physical Planning and Development Control Ordinance was passed into law, establishing the Department of Physical Planning and the Development Advisory Committee as the entity with control over land development. Further policy provided in the Nevis Physical Development Plan of 2007 to 2021, and the Draft Building Regulations - Second Schedule ensures that the 1998 development setbacks once used as guidelines will now be mandatory.

Much of the island's economic growth comes from coastal tourism developments, particularly from Pinneys Beach in the northwest and Almond Gardens in the north. The Department of Physical Planning, therefore, needed to establish a policy on coastal protection. It stated that “coastal protective structures will be allowed once the developer can show that their development is at risk from wave activity”, but no standards

were in place to guide the building of these structures. Developments built before 1998 were positioned at the 20-metre setback, but this is currently a critical concern as these structures now require protection. With no standards in place, improperly built coastal protection infrastructure is now a large problem: hardened shorelines lead to aggressive erosion and wave damage, groynes lead to localized erosion, and offshore breakwaters lead to changes in sediment accretion patterns.

In light of these observations, the NIA has established two initiatives to guide the development of coastal protection infrastructure. First, new maps based on aerial photography and infrared photos are being prepared. These will focus on the area from Fort Charles north to Potwork, and will show the location of sand for 2.4 kilometres offshore. Second, the Building Codes and inspection guidelines are being amended to address standards for developing coastal infrastructure. These will include standards for developing groynes, revetments, bulkheads and jetties. The aim here is to integrate coastal infrastructure development into the established Building Codes regime to remove problems associated with weak development standards and inadequate inspection routines.

The piecemeal approach to coastal protection is also being addressed. Since 1998, the NIA has received several applications for revetments and groynes. In all instances, these structures appear to transfer the problem of

erosion along the coast. Critical examples include the airport at Newcastle, in 1998, and Jones Estate, the Cliff Dwellers Hotel, in 2006. To avoid localized erosion resulting from this fragmented approach, a proposal for a Coastal Protection Plan has been prepared and funding is being sought. This project, which will be guided by an inventory exercise as well as the infrared images produced during the mapping project, will establish a single plan to guide the selection and placement of coastal protection. It will stipulate the types of structures to be used and their likely positions along the coast. This will both reduce the cost for private developers and also simplify the approach to coastal protection.

Conclusions

The problem of coastal erosion cannot be successfully solved in a single attempt. Experiences in Anguilla and Nevis show that administrative changes are required to enable technicians to apply new policies and regulations, and that education and awareness must be ongoing so that private landowners and the public can become proactive partners. With sea levels predicted to continue rising and hurricanes likely to become more intense as a consequence of climate change, the need to develop policies and measures to protect and conserve tropical island beaches becomes ever more pressing. ■

ABOUT THE AUTHORS



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FURTHER INFORMATION

● **On the Web:** The methodology described in this article has been published by UNESCO (*Planning for Coastline Change*, 1997) and is available for download at www.unesco.org/csi/pub/info/info4.htm.

DISCLAIMER

● The views expressed in this article are the authors' personal views and do not represent the views of their respective countries or the organizations supporting the research.

The Bali Roadmap

COP 13

The latest round of the climate negotiations took place in Bali, Indonesia, in December 2007. Tiempo editors Sarah Granich and Mick Kelly report.

The 13th Conference of the Parties to the United Nations Framework Convention on Climate Change and the Meeting of the Parties took place in Nusa Dua, Bali, Indonesia, December 3rd-14th 2007. A major theme of the meeting was “Forests for Carbon”.

The conference needs to deliver “a breakthrough in the form of a roadmap for a new international agreement on enhanced global action to fight climate change in the period after 2012,” when the first commitment period of the Kyoto Protocol expires, said Yvo de Boer, head of the United Nations Framework Convention on Climate Change Secretariat, as the Bali meeting opened. Though there was no expectation that the conference would result in a fully negotiated and agreed climate deal, the meeting would have to set the necessary wheels in motion if the negotiations were to

conclude in 2009 in order to allow time for ratification.

Just what the roadmap should cover was the subject of much debate. Whether or not to include specific emissions reduction targets proved a serious source of contention. The European Union favoured an explicit goal of a 25 to 40 per cent reduction in emissions below 1990 levels by the year 2020, but this was strenuously opposed by the United States. Japan also opposed the inclusion of explicit targets. The European Union's wish list also included strengthening the carbon market and boosting funding to help poor countries adapt.

After over-running by one day, the conference reached agreement on a roadmap, the Bali Action Plan. The agreed text of the roadmap only refers to the need for “deep cuts in global emissions.” But with this concession, as well as others, the United States has agreed to play a role in developing the post-Kyoto regime.

The Bali Roadmap commits negotiators to considering, on the part of developed country Parties, a commitment to “measurable, reportable and verifiable nationally appropriate mitigation commitments or actions, including

quantified emission limitation and reduction objectives,... while ensuring the comparability of efforts among them, taking into account differences in their national circumstances.”

The negotiators will consider “nationally appropriate mitigation actions by developing country Parties in the context of sustainable development, supported by technology and enabled by financing and capacity-building, in a measurable, reportable and verifiable manner.” Disagreement over the wording related to mitigation efforts by developing countries and technology transfer threatened to derail the process on the final day.

The development of international cooperation to support urgent implementation of various actions on adaptation is also on the agenda, focusing on the immediate needs of developing countries that are particularly vulnerable to the adverse effects of climate change.

Negotiations on the post-Kyoto agreement will be finalized in Copenhagen in late 2009. The first meeting of the AdHoc Working Group on Long-Term Cooperative Action, which will be responsible for the negotiating process, will take place no later than April 2008.

Agreement was also reached in Bali on the future of the Reduced Emissions from Deforestation in Developing Countries (REDD) scheme, with a commitment to “early action” ahead of the successor to the Kyoto Protocol coming into force in 2012. Methodological work will focus on assessments of changes in forest cover and associated greenhouse gas emissions, methods to demonstrate reductions of emissions from deforestation and estimation of the amount of emission reductions from deforestation. The ultimate aim is that credits will accrue from avoided deforestation, as from renewable energy projects under the Clean Development Mechanism.

“Every previous attempt to have a forest convention bombed because it tended to be a bunch of developed countries telling developing countries what to do,” commented John Lanchbery of the Royal Society for the Protection of Birds. “This was a developing country proposal. It was very cleverly done and avoids all the nasty pitfalls of previous attempts. It is nice and simple. It’s about reducing carbon emissions and climate; people can understand that,” he continued. The initiative was a favoured project of the conference hosts, Indonesia. The World Bank recently announced a new pilot scheme for entering forest-based carbon credits into the global trading market.

In a major development, the Kyoto Protocol’s Adaptation Fund will be managed by a new body, answerable to the Conference of the Parties to the United Nations Framework Con-

vention on Climate Change, rather than being run independently by the Global Environment Facility (GEF). “This is a major victory,” said Amjad Abdullah, chair of the Least Developed Countries negotiating group. “The African countries, small island states and least developed countries stuck together and fought for a dedicated secretariat with a representative governance board that has special places for the most vulnerable nations.”

The GEF will provide the Fund’s secretariat, which will report to a board consisting of representatives of all the world’s major regions, in addition to the countries most vulnerable to climate change. The majority of members will come from developing countries and, if decisions require a vote, this will be on the basis of one country one vote. The arrangement will give “developing countries a more direct and equitable voice in how funds are prioritized and spent,” commented South African environment minister Marthinus van Schalkwyk. The GEF’s role will be reviewed after three years.

“We now have a roadmap, we have an agenda and we have a deadline. But we also have a huge task ahead of us and time to reach agreement is extremely short, so we need to move quickly,” said de Boer, as the meeting ended. Within days, the United States had underlined just how much distance would have to be covered as the White House announced that it had “serious concerns” about the Bali agreement.

China announced that it was satisfied with the Bali Action Plan, but called on the United

States to do more. “The United States is an important contributor of emissions both in total and on a *per-capita* basis. It has both advanced technology and ample funds,” said Yu Qingtai, China’s climate change ambassador. “So on the issue of tackling climate change, America should display a more positive, more constructive role,” he continued.

On the precise nature of any emissions control commitments taken on by major developing nations such as China in a post-Kyoto agreement, and the related issue of technological assistance to developing countries, the Bali meeting rehearsed what may prove to be the key debate, if not deal-breaker, in the next stage of the negotiations. The United States has long stressed the need for the leading developing nations to accept some curb on emissions growth and, for their part, developing nations underline the need for technological and financial support from the industrialized world, responsible for the bulk of historic emissions.

● **Further information:** The Tiempo Climate Cyberlibrary provides hourly coverage of climate news at www.tiempocyberclimate.org/newswatch/newsfeed.htm. For further discussion of recent climate negotiating meetings, visit Earth Negotiations Bulletin at www.iisd.ca/process/climate_atm.htm.

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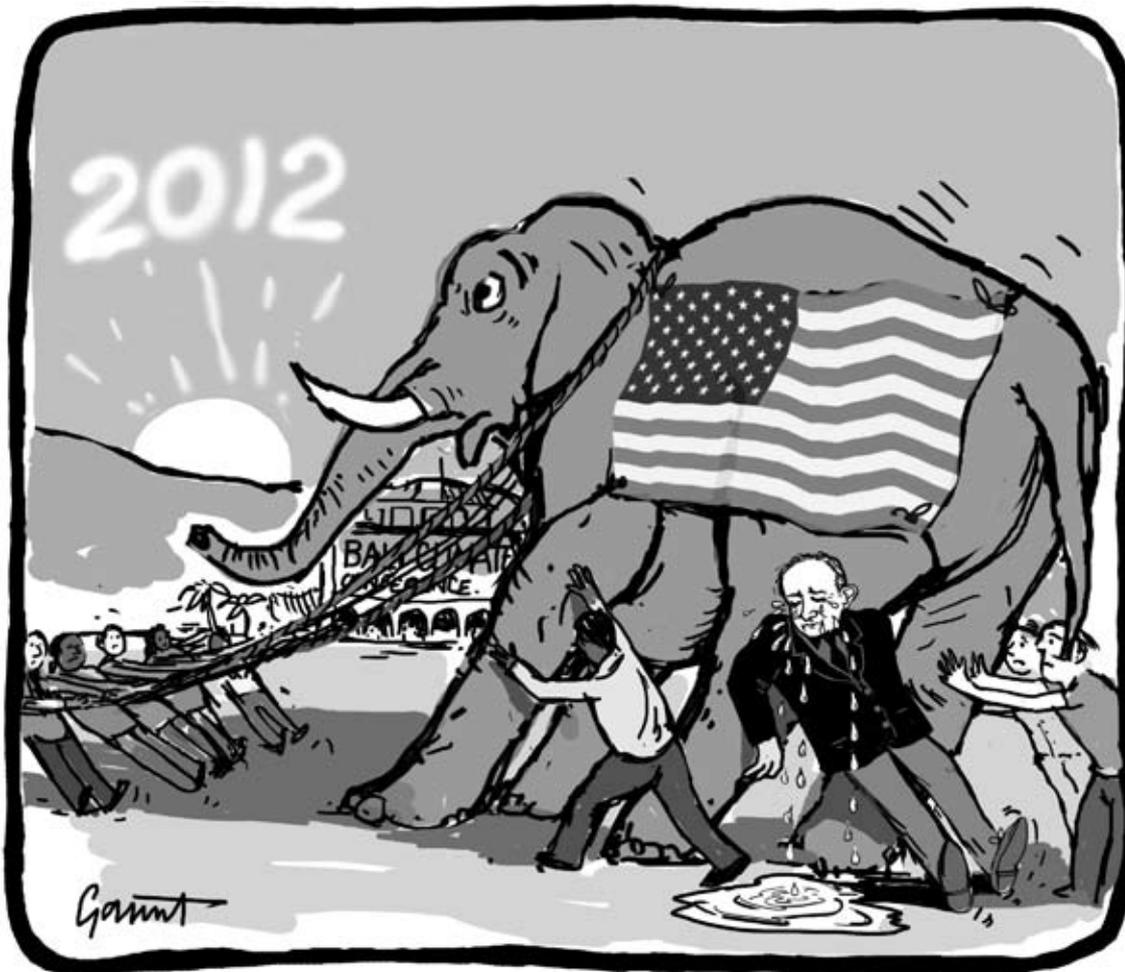
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Climate change and cities

Urgent action is needed in urban centres in Africa, Asia and Latin America to adapt to climate change. Such centres house three-quarters of the world's urban population and will house most of the world's population growth in the next few decades. They include most of the cities at greatest risk from the increased intensity of storms, flooding and landslides that climate change brings.

Most greenhouse gas emissions are generated from the processes that serve wealthy urban consumers, most of whom are in high-income nations. Less carbon-intensive urban lifestyles are needed, including energy-efficient buildings, transport and production systems. Cities in less wealthy nations have much lower emissions per person than wealthier nations, and adaptation to reduce risks from climate change impacts is more important. However, the development pathways of the larger population nations and the nations that achieve

economic success will significantly affect future emissions so cannot be ignored.

Cities in poorer countries have a large and growing proportion of the world's population most at risk. Countries like India, China, Bangladesh and Vietnam have large urban populations in low coastal zones vulnerable to

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David Satterthwaite explains why urban areas are central to adaptation and mitigation agendas

sea-level rise and storms. Coastal cities will also suffer from rising water tables undermining building foundations, saltwater contamination of groundwater, and damaged coastal tourism infrastructure and beaches. Many inland cities are at risk from flooding and mudslides. Glacial retreat will reduce water availability for many urban centres. Most cities will experience more heatwaves and air pollution, and warmer temperatures will extend the range of some diseases and increase risks from diarrhoeal diseases. Many city economies will suffer as agriculture in surrounding areas is affected.

Well-governed cities can reduce these risks, but in most African and Asian cities, 33-50 per cent of people live in illegal settlements which

lack good water and sanitation provision, paved roads and storm drains. Many settlements are on risky sites such as floodplains, coastal areas or unstable hillsides. Their inhabitants have limited capacity to invest in adaptation and city governments often refuse to work with them.

Most urban governments lack the competence and capacity to act on climate change and have huge infrastructure backlogs. But there are good reasons for taking action. Much adaptation is making cities work better for low-income groups – ensuring their homes and settlements have good provision for water, sanitation and drainage and that they can get land for housing that is not on risky sites. But too many city policy-makers see climate change as an environmental issue of little importance. And too many climate change specialists don't understand what constrains effective local adaptation.



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