



Environmental Vulnerability and Small Island States: The experience of Kiribati

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Summary

Small island developing states (SIDS) face grave and very real threats of global warming and subsequent sea-level rise. These threats pose particular challenges for Kiribati, one of the world's most vulnerable small island states. However, securing small island state futures also requires a continuing commitment to addressing the obvious and immediate threats of urbanization, pollution and sanitation. Looking specifically at pressures on freshwater, pollution and solid waste management this FDC Briefing note argues that development practitioners and aid donors cannot afford to ignore urban environmental problems and challenges. Sustaining the future of SIDS such as Kiribati requires a balanced development and environmental strategy.

Introduction

The threats to small island developing states (SIDS) from global climate and sea level change have been well-documented over recent years and have re-shaped a great deal of policy and aid priorities as a result.¹ This FDC Briefing Note argues that domestic impacts from unsustainable development, unmanaged urbanization (especially of crowded atoll islands such as South Tarawa, Kiribati) and a continuing crisis of inadequate sanitation, solid waste disposal and freshwater management offers equally immediate threats to SIDS. Dealing effectively with these growing pressures and demands is not only critical in itself, but also acts to reveal the challenges facing SIDS in developing effective environmental policy and governance frameworks.

Kiribati: the many vulnerabilities of a small island state

Consisting of 32 low lying atolls and reef islands and one raised limestone island (Banaba), the Republic of Kiribati is a Pacific Island Nation which encompasses a total area of over five million km². However, the total land area is only slightly more than 800 km². It is one of three atoll nation states ranked as a Less Developed Country (LDC) (alongside Tuvalu and the Maldives). Of all its islands, 12 are not permanently inhabited because of their small size and/or inadequate freshwater resources.

The physical geography of Kiribati (population 90,000) provides a number of very real vulnerabilities. These include limited arable soils, which constrain agriculture options; isolation, which impedes competitiveness in the global or even regional market; and environmental sensitivity exacerbated by population growth and concentration.²

Availability of freshwater in Kiribati is dependent on rainfall which recharges groundwater in the form of freshwater lenses. Other methods of obtaining freshwater such as rainwater catchments and importation of bottled water have also been implemented, however these are regarded as supplementary sources and the population still relies heavily on ground water access.

In Kiribati, particularly within the nation's capital and main urban center, South Tarawa (population 45,000), the pressures of development are formidable. They include severe overcrowding; a growing share of housing in informal and unplanned settlements; increased population pressure on urban water reserves; high levels of lagoon pollution, as a result of increased solid waste and continuing use of the lagoon for human waste; failing and unmaintained reticulated water and sanitation systems; and conflict over land.

Availability of potable water is a serious constraint to development and threat to health. Tarawa is faced with increased pollution and exploitation. The main areas of concern relating to water in Kiribati are pollution of the groundwater, lagoon and near-shore reef areas as well as over-extraction of freshwater from groundwater sources. Most pollution is from direct contamination of sewage and rubbish being dumped on the reef or on the edge of the lagoon.



From a health perspective, Kiribati has long faced problems of gastric disease caused by inadequate water supply and sanitation facilities. Statistics show that pneumonia and diarrhea, both of which have strong links to hygiene and water, are some of the leading causes of illness and death among children in Kiribati.³

Climate Change

The emphasis on environmental threats facing SIDS over the past decade has increasingly become concerned with climate change. This is particularly so with Pacific Island Countries (PICs), which are indeed at very high risk from the potential impacts of sea level rise and shifts in rainfall patterns. The calculated impacts on Tarawa from climate change by 2050 are estimated to cost between US\$8-16 million annually.⁴

Specifically regarding freshwater resources, climate change poses a threat due to the predicted increase in intensity and frequency of tropical storms and droughts.⁵ Periodic storm surges could cause up to 25-54 percent of South Tarawa to become inundated by 2050.⁶ Erosion, resulting from storm activity and sea surges will likely adversely affect the catchment area of freshwater lenses as land size is reduced. Several studies have concluded that sea level rise causing saltwater intrusion was not the major factor contributing to the vulnerability of the freshwater lenses. Risks from climate change are more likely to be from rainfall variations and shifts to island/atoll mass.⁷

In recent years, there has been a clear shift of emphasis in the environmental debate and aid support to mainstream climate change into national development planning and budgetary processes.⁸ In August 2009, leaders at the 40th Pacific Islands *Forum Pacific* meeting in Cairns, Australia called for a significant increase in climate change aid and the prioritisation of climate change assistance in national development policy. This followed resolutions made in Mauritius⁹ regarding threats to a number of SIDS from climate change and associated sea level rise, and the need for international support for both mitigation and adaptation initiatives.¹⁰

Climate change has undoubtedly shifted much of the environmental debate on small island states. While this is important, in terms of garnering support for mitigation strategies and global agreements, the perspective that

small Pacific Island nation sustainability is almost solely vulnerable to the impact of others', and thus essentially out of its control, potentially distracts from very real 'domestic' threats. This is emphasized well in the following quote from a former Kiribati president, Teburoro Tito on the external threats to the future of SIDS: 'It's like little ants making a home on a leaf floating on a pond. And the elephants go to drink and roughhouse in the water. The problem isn't the ants' behaviour. It's a problem of how to convince the elephants to be more gentle'.¹¹

Human impact and the future sustainability challenges of Kiribati

The threats facing fresh groundwater sources on Tarawa from human activity arguably pose an equal threat to sustainability, health and liveability for the atoll's escalating population. Water quality is threatened by both over-use and contamination through pollution. Poor water and solid waste management additionally pose pressures on environmental health, in providing breeding grounds for mosquitoes, rats and flies. Waste build up in South Tarawa also creates a serious hazard to freshwater lenses¹², especially given the limited depth from the surface to the water table¹³. This depth on atolls is often less than two metres. While this makes the process of extraction relatively easy and more economical, it also represents a serious hazard as surface soils are typically highly permeable and prone to contamination.¹⁴

Common sources of contamination frequently found on Tarawa include swamp taro pits excavated into the water table, pit latrines, septic tanks or leachate from solid waste sitting on the surface.¹⁵ Faecal and other waste creates a serious hazard as rainfall washes it through the porous soil to the water table where contamination of the groundwater occurs. Use of groundwater from nearby wells has been known to cause gastroenteritis and other diseases.

As the human and animal population continues to increase and concentrate in Tarawa, in large part resulting from failed decentralization policies, without improved waste management the amount of waste generated will also increase. Conventional sewerage systems are difficult to construct because of the amount of water needed to make them effective. Even though South Tarawa has introduced saltwater flushing systems at the main urban centres of Betio, Bairiki and Bikenibeu, other sanitation



methods including traditional defecation at the beach or in the bush and pit toilets are still the most frequent. Most sewage and solid waste continues to be dumped in open spaces and along waterfronts, and water catchments have been gradually overrun with informal housing. Infrastructure upgrading projects in past years have simply been unable to cope with increase demand and population growth, and have not been maintained.

Managing a sustainable future: the challenges for planning

The challenges outlined in this FDC Briefing Note take place in a context of weak environmental management, in part driven by a lack of data but also ephemeral commitment to environmental issues. There are several general factors which often constrain sustainable water management in the Pacific region and which are highly relevant to Kiribati. They include fragmentation in the water sector; inadequate water resources legislation, policy and planning; insufficient human resources; insufficient hydrological data available for analysis and planning; conflicts relating to the use of water resources or water supply systems on customary land; inadequate design and implementation of management projects; and insufficient community education, awareness and participation.¹⁶

Kiribati's creation of an environment unit and then the Ministry of Environment (MOE) in the 1990s, and the subsequent passing of the Environment Act in 1999 paved the way for more environmental policy to emerge. Still, progress has been uneven and many current regulations remain inadequate and priorities are only weakly reflected in the development policies of government.¹⁷ Public participation and debate in environmental policy formulation has also continued to be a problem. Overall there has been a broad reluctance to trade limited opportunities for economic growth with efforts at conservation. While Kiribati's report to the United Nations Framework on Climate Change identified public awareness (through increased education and publicity) as a major strategy for combating the effects of climate change¹⁸ to date such participation and consensus building has been a problem in environmental management and this has implications for any policy initiatives for mitigation and future adaptation to climate change.

Kiribati's lack of resources has meant that the country has had to rely heavily on international aid and donor agencies to assist with the development of environmental

policy. The programmes set up by these agencies often tend to be short term, narrowly focused and are coupled with their own agendas making them less efficient overall.¹⁹ In order to achieve sustainability within these programmes, strong community development is needed to ensure that local communities are both aware, as well as equipped with the ability to maintain ongoing development needs. To effectively achieve sufficient community awareness, longer-term programmes are needed in order to allow enough time to build trust and realise behavioural change. Yet, to date, community involvement in development programmes focusing on water and sanitation, specifically in the planning design and management of such programmes, has been minimal.²⁰

Conclusions: A sick body is ill-suited to fight new disease

With Kiribati's reliance on foreign aid, the issue of climate change will likely be used as a tool to leverage increased financial assistance in future years. While this extra economic gain may be beneficial, by potentially ignoring the hazards created by human impacts broader environmental needs will go unmet and the vulnerability of Kiribati will undoubtedly increase. This has been the case in South Tarawa where several groundwater lenses have become unusable due to contamination. Any future strategy for the sustainability and capacity to sustain viable populations must involve a prioritisation of threats faced based on hazard ranking and an appropriate allocation of resources.

Inherent tensions between limited domestic resources and demands for social and material improvement mean that many SIDS face difficult balancing acts between development initiatives and environmental impacts. 'Development' has clearly left much of Tarawa, and specifically its freshwater resources, extremely vulnerable to a number of both natural and human-impact hazards. Strategies implemented in Kiribati to promote sustainable development have proved very difficult in the past. There have also been clear policy and governance failures. Most strategies developed for Tarawa have lacked implementation pathways and support over time.

This Briefing Note has highlighted some of the specific environmental issues faced by SIDS, and the need for further discussion and debate surrounding what are considered 'best practice' development strategies within their unique scenarios. To achieve greater sustainability out-



environmental policy frameworks need to be analysed to ensure that they are addressing mitigation priorities and have potential for long-term sustainability. Suggestions for ensuring more sustainable futures for SIDS include:

- A more consistent and holistic approach be used for community development initiatives.
- Risk priorities be properly identified and recognized within policies and development plans.
- A mix of both mitigation and adaptation policies utilised to maximise the effective use of resources and produce the greatest positive impacts.
- Greater emphasis on non-linear programs that facilitate development which builds both formal and informal partnerships between institutions, communities and government bodies.

That there are real threats to SIDS posed by predicted climate change and sea level rise is not disputed, but even in small island states urban environmental issues cannot afford to be left outside of the concerns of governments, development agencies and donors. Indeed, developing an appropriately balanced environmental policy inclusive of both is essential if Kiribati is to adapt to change. Such analysis and policy must include a response to both climate change and human-induced impacts. While climate change initiatives and debates have moved to centre stage, strategies to facilitate better waste management and capacity remain manifestly inadequate. Adequately addressing both are critical challenges for future sustainability.

Note: A full version of this research is published as Storey, D & S. Hunter (2010) 'Kiribati: An environmental 'perfect storm'', *Australian Geographer* 41,2: 167-181.

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References

¹ United Nations 2005 *Report of the International Meeting to Review the Implementation of the Programme of Action for the Sustainable Development of Small Island Developing States*. Port Louis, Mauritius: 10-14 January 2005.

Barker H M 2008 *Vulnerable island nations at mercy of world's polluters*. Pacific Islands Report: retrieved 12 January 2009 from <http://archives.pireport.org/archive/2008/November/11-05-com.htm>.

Hood M 2008 *Tropical island states' desperate plea: we are drowning*. *Canberra Times*. 11 December.

UNFCCC 2008 *Vulnerability and Adaptation to Climate Change in Small Island Developing States*. Jamaica: Background paper for the expert meeting on adaptation for Small Island Developing States, 5-7 February.

² Thomas F 2003 Kiribati: *Some Aspects of Human Ecology, Forty Years Later*. Atoll Research Bulletin No. 501.

³ White I 2007 *Coordination of the Water and Sanitation Sector: Background to the Kiribati National Water and Sanitation Coordination Committee*. Australian National University.

⁴ World Bank 2000a *Cities, Seas and Storms: Managing Change in Pacific Island Economies*. Washington D.C.: Volume IV: Adapting to Climate Change. World Bank.

⁵ Scott D, Overmars M, Falkland A and Carpenter C 2002 *Pacific Dialog on Water and Climate*. Synthesis Report. SOPAC.

⁶ World Bank 2000b *Climate Change Vulnerability and Adaption Assessment Kiribati*. August 2000.

⁷ Alam K and Falkland A 1997 *Vulnerability to Climate Change of the Bonriki Freshwater Lens, Tarawa*. ECOWISE Environmental ACTEW Corporation.

Falkland A 2003 *Promotion of Effective Water Management Policies and Practices*. Kiribati Water Resources Assessment Report. Asian Development Bank.

Scott D, Overmars M, Falkland A and Carpenter C 2002 *Pacific Dialog on Water and Climate*. Synthesis Report. SOPAC.



- ⁸ White I, Falkland A, Perez P, Dray A, Metutera T, Metai E and Overmars M 2007 Challenges in freshwater management in low coral atolls. *Journal of Cleaner Production*. 15: 1522-1528.
- ⁹ United Nations 2005 Report of the International Meeting to Review the Implementation of the Programme of Action for the Sustainable Development of Small Island Developing States. Port Louis, Mauritius: 10-14 January 2005.
- ¹⁰ SPREP 2008 Climate change, variability and sea level change (<http://www.sprep.org/topic/climate.htm>) Accessed 3 July 2009.
- ¹¹ Kristof N 1997 In Pacific, Growing Fear of Paradise Engulfed. *The New York Times*. 2 March.
- ¹² Rokoua T and Kirata T 2002 Kiribati National Report to the World Summit on Sustainable Development. UN Department of Economic and Social Affairs, Division for Sustainable Development.
- ¹³ Dillon P 1997 Groundwater Pollution by Sanitation on Tropical Islands. Paris: International Hydrological Programme, The United Nations Educational, Scientific and Cultural Organization.
- ¹⁴ White I, Falkland A, Metutera T, Metai E, Overmars M, Perez P and Dray A 2007 Climatic and Human Influences on Groundwater in Low Atolls. Special Section: Groundwater Resources Assessment Under The Pressures of Humanity and Climate Change. *Vadose Zone Journal*. Published online August 23.
- ¹⁵ Metai E 2002 Vulnerability of freshwater lens on Tarawa – the role of hydrological monitoring in determining sustainable yield. Sigatoka, Fiji: Paper prepared for the Pacific Regional Consultation on Water in Small Island Countries., Ministry of Works and Energy Republic Of Kiribati.
- White I, Falkland A, Etuati B, Metai E and Metutera T 2002 Recharge of fresh groundwater lenses: Field study, Tarawa atoll, Kiribati. Paris, France: Hydrology and Water Resources Management in the Humid Tropics. Proc. Second International Colloquium Panama, Republic of Panama. UNESCO-IHP-V Technical Documents on Hydrology. 52: 299-322.
- ¹⁶ Falkland A 2002 From Vision to Action Towards Sustainable Water Management in the Pacific. Sigatoka, Fiji: Theme 1 Overview Report. Water Resource Management. Pacific Regional Consultation on Water in Small Island Countries.
- ¹⁷ Government of Kiribati 2008 Kiribati SoER Process and Policy Impacts. Presentation at the UNEP Regional Workshop to Review GEO-IEA Training Manual, Chiang Mai, 8-11 September.
- ¹⁸ Government of Kiribati 2008 Kiribati SoER Process and Policy Impacts. Presentation at the UNEP Regional Workshop to Review GEO-IEA Training Manual, Chiang Mai, 8-11 September.
- ¹⁹ White I, Falkland A, Metutera T, Katatia M, Abete-Reema T, Overmars M, Perez P and Dray A 2008 Safe Water for People in Low, Small Island Pacific Nations: The rural–urban dilemma. *Society for International Development*. 51: 282–287
- ²⁰ White I, Falkland A, Metutera T, Katatia M, Abete-Reema T, Overmars M, Perez P and Dray A 2008 Safe Water for People in Low, Small Island Pacific Nations: The rural–urban dilemma. *Society for International Development*. 51: 282–287