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Sustainable Development in Small Island Developing States

Issues and Challenges

Edited by
Janet Strachan and
Constance Vigilance

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Acronyms and Abbreviations

ACP	African, Caribbean and Pacific countries
ACCC	Adaptation to Climate Change in the Caribbean
ADEME	Agence de l'environnement et de la maîtrise de l'énergie
AIACC	Assessments of Impacts and Adaptations to Climate Change
AIMS	Atlantic, Indian Ocean, Mediterranean and South China Sea
bbl	barrel
bpd	barrels per day
BPoA	Barbados Programme of Action
CACC	Central Agencies Coordination Committee
CARICOM	Caribbean Community
CBDAMPIC	Capacity Building for the Development of Adaptation Measures in the Pacific Island Countries
CCCCC	Caribbean Community Climate Change Centre
CDM	Clean Development Mechanism
CER	Certified Emission Reductions
CFL	Compact Fluorescent Lighting
CHARM	Comprehensive Hazard and Risk Management
CIDA	Canadian International Development Agency
CIMC	Consultative Implementation and Monitoring Council
CPACC	Caribbean Planning for Adaptation to Climate Change
CROP	Council of Regional Organisations in the Pacific
CSO	Civil Society Organisation
EBA	Everything but Arms
EBM	Ecosystem-Based Management
EEBC	Energy Efficiency Building Codes
EE&C	Energy Efficiency & Conservation
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
ENSO	El Niño-Southern Oscillation
EPA	Economic Partnership Agreement
ESCO	Energy Services Company
EU	European Union
FFA	Forum Fisheries Agency
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	Greenhouse Gases
GSEII	Global Sustainable Energy Island Initiative
IPCC	Intergovernmental Panel on Climate Change
JPoI	Johannesburg Plan of Implementation

MACC	Mainstreaming Adaptation to Climate Change
MDG	Millennium Development Goal
MEA	Multilateral Environment Agreement
MSI	Mauritius Strategy for Implementation
MTDS	Medium-term Development Strategy
NAPA	National Adaptation Programme of Action
NBSAP	National Biodiversity Strategic Action Plan
NEC	National Executive Council
NEDO	New Energy and Industrial Technology Development Organisation
NGO	Non-Governmental Organisation
NSDS	National Sustainable Development Strategy(ies)
OFDA	Office of US Foreign Disaster Assistance
OTEC	Ocean Thermal Energy Conversion
OPEC	Organisation of Petroleum Exporting Countries
PCJ	Petroleum Corporation of Jamaica
PICCAP	Pacific Islands Climate Change Action Programme
PIESD	Pacific Islands Energy for Sustainable Development
PIF	Pacific Islands Forum
PIROP	Pacific Islands Regional Oceans Policy
PRD	Programme for Recovery and Development
PV	Photovoltaic
RCM	Regional Co-ordinating Mechanism
RET	Renewable Energy Technologies
SIDS	Small Island Developing States
SOPAC	South Pacific Applied Geoscience Commission
SPAC	Special Adaptation Project for the Caribbean
SPBCP	South Pacific Biodiversity Conservation Programme
SPC	Secretariat of the Pacific Community
SPREP	South Pacific Regional Environment Programme
START	System for Analysis, Research and Training
SWH	Solar Water Heater
TWAS	Third World Academy of Sciences
UNDP	United Nations Development Programme
UNECLAC	United Nations Economic Commission for Latin America and the Caribbean
UNDESA	United Nations Department for Economic and Social Affairs
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
USP	University of the South Pacific
WTI	West Texas Intermediate
WSSD	World Summit on Sustainable Development

1

Introduction

This volume is a tribute to the work of the late Dr Albert Nita, who was a senior lecturer at the University of Papua New Guinea from 1993 and a prolific writer and adviser on environmental and sustainable development issues. It was sparked by a presentation he made at a workshop on National Sustainable Development Strategies in Pacific Island States organised by the United Nations Department for Economic and Social Affairs (UNDESA), 4–5 May 2006.

It was clear from the workshop discussions that some interesting experience had been gained in small island states of the Pacific in sustainable development planning since the UN Conference on Environment and Development (the Earth Summit), held in Rio de Janeiro in 1992. But it was also clear that the lessons of the past needed to be consolidated and further steps implemented that would bring sustainable development principles and processes into the heart of national and regional development planning.

This report represents the preliminary publication of a wider set of experiences and lessons from small island developing states (SIDS) on integrated and participatory sustainable development planning. They are presented as a means of initiating a debate about what steps can be taken to support a new wave of sustainable development actions that will begin to reverse the continuing global decline in natural resources and the ecosystem.

While a range of different terms are used in describing sustainable development (a number of which are used in this report), the peoples of the Commonwealth face the challenge of pursuing development paths that are economically, environmentally and socially sustainable. In 1987, the seminal *Brundtland Report*[1] defined sustainable development as:

> … *development that meets the needs of the present without compromising the ability of future generations to meet their own needs*.

This broad definition of sustainability raises some interesting questions about how societies can deliver an equal range of development choices for both present and future generations, and what form or direction such development must take if it is to be sustainable.

Sustainable development broadly requires that the welfare of the present generation does not increase at the expense of that of future generations and that society's well-being does not decline over time. The next generation can only enjoy as much well-being as the present one if it has the same 'stock of capital' available to it. Capital stock can be thought of as comprising three kinds of capital: ***natural capital*** such as forests, air, water, soil and biodiversity (normally referred to as environmental resources);

human capital (human resources, skills, and knowledge);[2] and *human-made capital* (manufactured capital and goods, machinery, infrastructure and buildings).

Sustainability therefore requires that, at a minimum, a country should maintain a constant stock of aggregate capital over time. Decisions need to be taken about the acceptable limits of substitution between natural, human and human-made capital. The process of negotiation and decision-making, and the risks and uncertainties that it involves, is a political one that requires effective capabilities in governance and in science and technology.

The experiences of sustainable development planning examined in this volume highlight the critical role that effective institutional arrangements and 'voice' have in making sustainable development a reality. As Padma Narsey Lal states in Chapter 4:

> *The time has come to focus on the 'how' aspects of operationalising sustainable development*.

Fully integrated sustainable development is a particularly important concern for small island developing states, which are among the most vulnerable countries in the world. SIDS have a limited land mass, and this creates sharply competing demands and development pressures on natural ecosystems from economic activities and the need for shelter, water and fuel. It also brings the relationship between different sectors of the economy very close together. Poor farming practices which create soil run-off, or effluent discharge from hotels, can rapidly degrade coastal zones, affecting fisheries and tourism alike. Because of their size, SIDS are unable to capture economies of scale in their domestic markets, and their political, managerial and technical capacities. An integrated approach will help to address the administrative and financing constraints that SIDS face. They are also characterised by open economies in which international trade is more significant than it is in larger states, and they tend to rely on a limited number of external markets and a narrower range of commodities. Remoteness implies higher costs for energy, transportation and communications, while extreme weather events can sometimes eradicate a country's gross domestic product (GDP) overnight. Ocean and coastal zones form the basis for well-being and development in SIDS, so the health of these environments is critical. Coastal areas tend to be densely populated and may be low-lying, making SIDS especially vulnerable to rising sea levels, climate change and climate variability.

Saki Hirano reviews the steps that SIDS have taken in formulating national sustainable development strategies and shows that some key challenges remain. Among them are practical approaches that enable a wide range of stakeholders to participate in prioritisation and the allocation of resources, and to ensure that effective data are available to support decision-making.

Albert Nita uses a case study of Papua New Guinea's national sustainable development strategy to examine the important role of consultation and participation, not just by civil society, but by all relevant parts of the government and administration. He concludes that risks in the process are closely associated with institutional factors (includ-

ing inter-agency linkages), approaches to decision-making, monitoring and review, political stability and capacity.

Padma Narsey Lal reviews the significance of ocean and marine resource management to small states in the Pacific Ocean and emphasises the critical need for effective co-ordination among regional organisations and harmonisation of national planning and budgetary and prioritisation processes, including sectoral plans. Based on its past experience, the region has embarked on significant approaches encompassing national sustainable development strategies and ecosystem-based management, which have the potential to overcome past constraints to sustainable development.

David Barrett provides a detailed review of the policy challenges for small states in implementing renewable energy and energy efficiency and conservation (EE&C) technologies as part of their energy security and sustainable development strategy. He examines the requirements for policy support, process champions and appropriate financing mechanisms that will help them to overcome their dependence on conventional energy. He also stresses the need for national policies that will build capacity and communicate objectives in relation to sustainability.

Finally, Lino Briguglio, Kanayathu Koshy, Leonard Nurse and Poh Poh Wong provide a review of the programmatic and institutional approaches taken by small states at a regional level to address the threat of climate change. By its very nature, this issue is cross-cutting, integrated and brings together economic, social and environmental aspects of development. While small states face many challenges in mainstreaming climate change into development policies, the authors show that there are opportunities for improved sustainable development outcomes as a result of a focus on these concerns.

With the increasing emphasis on climate change, particularly in SIDS, it is important not to lose sight of the broader drive towards sustainable development, since this will provide a basis for resilience and adaptation. Some of the chapters in this volume show the important interrelationships between different sectors in small states. Societies need to be equipped to make decisions about sustainable development pathways not only within particular sectors such as fisheries or energy, but more generally as well. The report shows the critical importance of institutional and governance factors in underpinning this process, and the distance still to be travelled to synthesise the lessons learned so far. Ultimately, the aim must be to use these lessons to bring about change.

Notes

1 *Our Common Future*, Report of the World Commission on Environment and Development (also known as the *Brundtland Report*), Oxford University Press, 1987.

2 Increasingly, the concept of social capital, which includes culture, social cohesion and social stability, is also regarded as an important element of sustainable development.

2

The Development of National Sustainable Development Strategies in Small Island Developing States*

Saki Hirano

Introduction

A national sustainable development strategy (NSDS) is a co-ordinated, participatory and iterative process of thoughts and actions to achieve economic, environmental and social objectives in a balanced and integrated manner at national and local levels. The process encompasses situation analysis, formulation of policies and action plans, implementation, monitoring and regular review. It is a cyclical and interactive process of planning, participation and action, in which the emphasis is on managing progress towards sustainability goals rather than producing a 'plan' as an end product.[1]

There is no single approach or formula that fits all countries. Countries develop strategic approaches to the preparation, development and implementation of national sustainable development strategies according to their individual needs, priorities and resources. A national sustainable development strategy does not have to be a new document – an established framework such as a national vision, national agenda 21 or poverty reduction strategy can provide a good basis for strategic action towards sustainable development. The particular label is not significant in establishing a national sustainable development strategy: what matters is the approach used in its elaboration and implementation.

The significance of national sustainable development strategies lies in their integrative and comprehensive approach. Sustainable development issues are rarely sectoral and often require multi-disciplinary approaches. National sustainable development strategies address complex development dynamics that require integrated analysis and solutions. They are also participatory, with a broad range of stakeholders, including civil society and the private sector, participating in their design, formulation and implementation.

An NSDS defines the long-term vision and foundation of values for the country and specifies the policy instruments, tools and processes that are necessary to implement the process of change. The strategy is not a goal in itself: rather, it should be a living document that needs continuous monitoring and evaluation.

*The author would like to thank Birgitte Alvarez-Rivero of the Division for Sustainable Development, UNDESA for her helpful comments and suggestions.

International frameworks

The first call for the elaboration of national sustainable development strategies was made at the UN Conference on Environment and Development (the Earth Summit), held in Rio de Janeiro in 1992. *Agenda 21*, the landmark document that came out of the conference, calls on countries to adopt an NSDS that

> *… should build upon and harmonise the various sectoral economic, social and environmental policies and plans that are operating in the country … Its goals should be to ensure socially responsible economic development while protecting the resource base and the environment for the benefit of future generations*.[2]

The importance of sustainable development planning has been echoed throughout the follow-up process to the Earth Summit:

- The 1994 Global Conference on the Sustainable Development of Small Island Developing States recognised that small island states face special challenges in planning and implementing sustainable development because of their limited development options,[3] and adopted the Barbados Programme of Action (BPoA) to address their particular concerns.
- The 1997 five-year review of *Agenda 21*[4] set a target date of 2002 for the formulation and elaboration of national sustainable development strategies.
- Another target was set at the World Summit on Sustainable Development (WSSD), held in Johannesburg, South Africa in 2002, when countries were urged to take immediate steps to make progress in the formulation and elaboration of national strategies for sustainable development and to start their implementation by 2005.[5]
- Finally, a major international meeting held in Mauritius in January 2005 called on the international community to support SIDS in developing and implementing national sustainable development strategies by 2005.

Regional frameworks

In October 2005, at a Pacific regional meeting held to follow up the Mauritius Strategy, the importance of a national sustainable development enabling environment was emphasised. The meeting highlighted the need for implementation to be driven and co-ordinated at national level. Pacific Islands Forum (PIF) leaders adopted the Pacific Plan, a regional plan with a focus on stimulating and enhancing economic growth, sustainable development, good governance and security for Pacific countries through regional integration. The Plan called on all member countries to develop and implement NSDS by the end of 2008, using appropriate cross-cutting and Pacific-relevant indicators.[6]

Caribbean small states have established a regional co-ordinating mechanism (RCM) for sustainable development, in keeping with the mandate of the sixteenth intersessional meeting of the Conference of Heads of Government of the Caribbean Community

(CARICOM), held in Paramaribo, Suriname on 16–17 February 2005. The mandate states:

> … *particular attention should be paid to the key issue of an agreed mechanism to co-ordinate the implementation of the sustainable development initiatives in the Region following the Mauritius Strategy, ensuring in the process that maximum benefits are derived from the Region's scarce human and financial resources and that duplication is avoided* …

The mechanism was set up by a Caribbean regional follow-up meeting, hosted by the Government of St Kitts and Nevis on 5–7 October 2005. Its function is to assist in the monitoring and evaluation of the Mauritius Strategy, and it takes the form of a network of governmental, intergovernmental and stakeholder organisations working to provide, *inter alia*, technical expertise, financial assistance and capacity-building opportunities. The mechanism is a key instrument for the design of regional policies for sustainable development and facilitates the CARICOM Secretariat's mandate to co-ordinate policy on sustainable development. It is hosted by the United Nations Economic Commission for Latin America and the Caribbean (UNECLAC).

The successful implementation of this regional initiative requires concerted efforts and sustained commitment from member governments, and the involvement of sub-regional intergovernmental organisations and regional/international agencies) that are prepared to pool their resources to implement the SIDS Programme of Action and the Mauritius Strategy. The United Nations Environment Programme (UNEP) and the United Nations Development Programme (UNDP) have pledged their support for the Caribbean initiative specifically as it relates to the identification of UNECLAC as the Secretariat for the co-ordination of implementation of the the Programme of Action and the Mauritius Strategy in the sub-region.[7]

Planning for sustainable development

In many SIDS the concept of sustainable development is not new. They have long been aware of their small size, limited resources, remoteness from global markets, and environmental and economic vulnerability. Even before the Earth Summit in 1992 and the widespread international acceptance of the concept of sustainable development, many small states were already looking seriously at their development options. The Conference on the Human Environment in the South Pacific held in June 1982 decided to establish the South Pacific Regional Environment Programme (SPREP) to promote sustainable development in the Pacific region. St Kitts and Nevis has considered sustainable development issues to be a governmental priority since 1987, when it passed the National Conservation and Environmental Protection Act. Other countries, for example Papua New Guinea, took initiatives after the Earth Summit to streamline existing national programmes and policies in alignment with NSDS priorities.

Since then, many SIDS have attempted to implement sustainable development strategies, although countries are at different stages. Cook Islands, Fiji Islands, Nauru,

Niue, Tonga and Tuvalu all have developed NSDS or incorporated sustainable development principles into their national strategies and begun to implement them. Trinidad and Tobago has launched its Vision 2020 Draft National Strategic Plan, a national strategy for 28 sectors under the overall umbrella of sustainable development. Barbados has developed a national policy on sustainable development and other Caribbean SIDS, including Belize, Haiti, and St Kitts and Nevis, have begun implementing NSDS. Seychelles is implementing its Environmental Management Plan 2000–2010, which incorporates the principles of sustainable development and cuts across all sectors. A formal NSDS is under development and preparatory activities such as multi-stakeholder consultations and national workshops have already taken place.

Other SIDS are currently reviewing, or have plans to review, national development plans or strategies with a view to incorporating principles of sustainable development and moving on to the implementation phase of NSDS. Governments have proactively adopted or signed regional and international agreements committing themselves to pursue sustainable development objectives, including the development and implementation of sustainable development policies. Despite the progress that has already been made, challenges still remain in fully integrating sustainable development priorities into national development planning and moving from strategy development to strategy implementation. Many SIDS sustainable development strategies focus on economic and social development, and neglect the environment. Integration of the three pillars of sustainable development requires national planning processes to define economic, social and environmental objectives, revise decision-making systems to reflect and integrate environmental impacts, and ensure horizontal coherence across sectoral policies.

Consultation and participation

Many SIDS, including Cook Islands, Fiji Islands and Tonga, indicate that broad public participation in the development, formulation and implementation of national policies and strategies, including NSDS, have become standard practice in government initiatives. In these countries, extensive consultations at local, regional and national level are held with representatives of the private sector, non-governmental organisations (NGOs) and civil society organisations (CSOs), including youth, women and church leaders. Their comments and feedback are reflected in revised plans and strategies and circulated widely among all stakeholders. In Tonga, electronic comments on the structure and content of the country's NSDS were solicited through a website.

On other islands, multi-stakeholder consultations have been held, but on an ad hoc basis. For example, Nauru reports that consultations with a broad range of stakeholders are held at both regional and national level. However, such efforts are fragmented, with limited systematic feedback of public participation into national programmes and policies. Many countries cite the dispersion of island populations and limited financial resources as major challenges that hinder full participation of representatives of different groups in the decision-making processes.

Although in general civil society is consulted in the development of national strategies in many SIDS, few mechanisms are in place to encourage the participation of a wide range of stakeholders in the resource allocation process through the annual budget formulation. Many CSOs and NGOs lack the capacity, skills and experience to engage effectively in a constructive dialogue with the government in relation to prioritising and allocating resources. In addition, in many countries CSOs and NGOs are discouraged from becoming more involved in the budget process because of its technical, abstract and closed nature. By engaging CSOs in the budget process, governments will be better able to monitor the implementation of NSDS.

Institutional challenges

Another challenge for many SIDS is institutional capacity and putting in place effective institutional arrangements to implement sustainable development strategies and programmes. The Johannesburg Programme of Implementation states that an effective institutional framework for sustainable development at all levels is key to the full implementation of *Agenda 21* and the outcomes of the World Summit on Sustainable Development, and to meeting emerging sustainable development challenges.[8] The institutional aspect is often recognised as the fourth dimension of sustainable development. Development cannot be promoted and implemented by a single organisation, as the issues are multi-disciplinary and impact across organisations and sectors.

Many countries, for example Barbados, Belize, Fiji Islands and Jamaica, have established institutional structures such as national councils of sustainable development or commissions to promote the formulation and implementation of NSDS. Many of these do not have the capacity to respond effectively to challenges, because they are placed at the periphery of national development planning or because their roles and responsibilities need to be revised.

Data and indicators

Monitoring progress towards sustainable development and the implementation of NSDS, using appropriate indicators, is critical in ensuring accountability, aiding prioritisation, and reviewing and adjusting strategies. But SIDS commonly cite the need for assistance and training in data collection, analysis and management, and in the development of appropriate indicators. Lack of data, the low quality of existing data and difficulties in developing a meaningful set of indicators are all barriers to the overall goal of achieving sustainable development.

Partly in response to this challenge, the 1995 Mauritius Strategy calls upon states to develop appropriate national targets and indicators for sustainable development that can be incorporated into existing national data collection and reporting systems.[9] Millennium Development Goal (MDG) indicators and other general social and economic indicators are used by many SIDS to monitor and measure sustainable development efforts. However, as Papua New Guinea reports in its *National Assessment Report*,

MDG indicators do not provide a critical yardstick for measuring progress or useful learning tools from which to develop country-specific indicators. It remains a challenge to monitor and evaluate the complex web of social, economic and environmental developmental interactions that sustainable development encompasses.

Conclusion

For many countries, sustainable development is not a matter of choice: it is imperative. This is especially true for SIDS that are directly affected by climate change. Increases in storm surge, rising sea levels, the degradation of shorelines and the intrusion of salt water into wells – all consequences of climate change – will adversely affect the livelihoods and health of people living on small islands. At the 37th meeting of the Pacific Islands Forum in October 2006, government leaders reaffirmed their commitment to the implementation of the Pacific Plan, including placing priority on mainstreaming climate change into their national sustainable development strategies. At the first-ever high-level event on climate change, convened by the UN Secretary-General in September 2007, participants, who included more than 80 heads of state, expressed solidarity with the countries, in particular SIDS, that were most vulnerable to its consequences. For many SIDS, the adverse impact of climate change not only poses a major obstacle to achieving sustainable development, but threatens their very existence.

Sustainable development principles in SIDS are not new. However, a common challenge remains to address sustainable development issues over the long term, and to translate policies and strategies into programmes and initiatives that make a positive impact on societies and peoples. The implementation of NSDS needs to be an integral part of government policies, but it is not only up to governments. Sustainable development can only be achieved through the individual and collective efforts of all responsible actors, including the private sector.

Notes

1 *Guidance in Preparing a National Sustainable Development Strategy: Managing Sustainable Development in the New Millennium*, UN Department for Social and Economic Afffairs, New York, 2006, p. 8.
2 *Agenda 21*, UN Department for Economic and Social Affairs, New York, 1992, para. 8.7.
3 Report of the Global Conference on the Sustainable Development of Small Island Developing States (Barbados Programme of Action), Preamble 11. Bridgetown, Barbados, 25 April–6 May 1994. UN General Assembly, A/CONF.167/9.
4 Programme for the Further Implementation of *Agenda 21*, UN Department for Economic and Social Affairs, New York, 1997, para. 24.
5 Johannesburg Plan of Implementation, Chapter XI, para. 162(b).
6 Pacific Plan, Strategic Objective 5.1.
7 CARICOM Secretariat Report, February 2008.
8 JPOI, Chapter XI, para. 137.
9 Mauritius Strategy, Chapter XVI, para. 74(c).

3

Risk, Consultation and Participation in the Creation of a National Sustainable Development Strategy in Papua New Guinea

Albert Nita

Introduction

Sustainable development is the concept of the pursuit of long-term economic and social growth without reducing the quality of the environment. It is especially relevant to the survival of small states, although difficult to implement, even where it can be adequately defined for operational purposes. The successful outcome of the pursuit of sustainable development in small states requires an analysis of the capacities for action, the constraints and the inherent risks. One approach to achieving sustainable development takes place within government systems, where planning agencies are able to enhance their overall planning, implementation and monitoring roles by creating and implementing an NSDS through consultation and participation. This article examines the consultation and participation experience of Papua New Guinea and analyses the constraints, risks and lessons learned.

Consultation and participation in the creation of a national sustainable development strategy

Discerning the theoretical underpinnings of consultation and participation in the sustainable development discourse is imperative for the creation of a national strategy (Brodhag and Taliere, 2005; Melnick *et al*., 2005; United Nations, 2002). The focus on facilitating consultation and participation amongst the 'voiceless' has now shifted to include decision-makers and implementers themselves. Consultation means that decision-makers inform stakeholders, while participation is the involvement of stakeholders in decision-making. Consultation and participation should be a two-way interactive system of communication in which all stakeholders, including decision-makers, frequently interact, resulting in capacity building and empowerment, with a corresponding decline in vulnerability and risks (Cornwall, 2003; Harding, 1998; Morrissey, 1995).

The benefits of consultation and participation have been widely discussed and accepted. The tenth principle of the 1992 *Rio Declaration* calls unambiguously for public consultation in the sustainable development process. The 2002 World Summit on Sustainable Development called for partnerships and participation of all stakeholders (UN, 2002). The Mauritius Strategy (2005) and the Pacific Plan (2006) both value the underlying importance of consultation and participation of stakeholders in small states.

Furthermore, consultation and participation is critical to the achievement of the three principal multilateral environment agreements (MEAs) – the UN Framework Convention on Climate Change, the UN Convention on Biological Diversity and the UN Convention on Combating Desertification.

Despite prioritising consultation as an important input for sustainable development, the notion that institutional decision-makers are often regarded as the 'brains' behind sustainable development has received limited coverage in the literature. In the case of Papua New Guinea, policy-makers at the Department of National Planning and Monitoring operate with limited consultation with other key stakeholders.

In Papua New Guinea, sustainable development has been constrained by the lack of integration of policy priorities and budgetary allocations. The need for planners to understand the importance, strategic requirements and methodologies for integrating sustainability into national priorities cannot be overestimated.

A sustainable development framework, followed by programme implementation involving public consultation and participation, reflects 'development from within'. In the sustainability debate the contention that 'If you sew wings on caterpillars, you have not developed a butterfly' (Schoell, 1995) is convincing. If cash handouts or answers and solutions are given to people who have not developed the capacity to generate and sustain wealth and build their own solutions, this does not bring about the achievement of sustainable economic development. Instead, the seeds are sown of a dependent relationship.

For centuries, the people of Papua New Guinea have been industrious, innovative, productive and self-reliant. Their ability to adapt and make use of resources from their home environments reflects this capacity for sustainability and bears out the contention that 'true development grows out of people's own input – thinking, struggles, experiences and hard work'. In Papua New Guinea, public consultation is a decision-making tool to facilitate, educate, nurture, encourage and create a framework for sustainable development. Through participation, stakeholders are more likely to plant the seeds for sustainable development because 'true development is something that grows from within' (Schoell, 1995). Complementary to public consultation is the assessment of capacity and vulnerability of the country. These tools are essential to improving internal capacity and risk minimisation in developing and implementing sustainable development programmes. In the long term, both seek to enhance the overall sustainable development process in small developing states.

Experiences of public consultation and participation in Papua New Guinea

The period 1992–94 witnessed a high level of participation by stakeholders in support of the government's formulation of a framework for sustainable development. The University of Papua New Guinea played an active part in facilitating public participation in the discussion of sustainable development as a potential development strategy. In 1993 it hosted the 20th Waigani seminar, 'From Rio to Rai', which focused on development

and the environment in Papua New Guinea.[1] The formal discussions covered seven main themes:

- Revitalising growth with sustainability
- Sustainable living and health
- Human settlements
- Efficient resource use
- Managing chemicals and waste
- Popular participation and responsibility
- Essential means.

All the participants had something to say at this forum which made their participation meaningful.

However, the level of participation represented only an isolated case, where public involvement was relatively high. The experience has since been repeated in a limited way regarding strategy formulation on national issues. There are relatively few legal and institutional arrangements in Papua New Guinea for multi-stakeholder group consultation. Public participation is largely discretionary. Multinational corporations and the government (as a shareholder) facilitate, fund and sponsor public consultation in natural resource projects. It is difficult for this form of 'sponsored' participation to yield lasting solutions. Further, under the Mining Act 1992, public consultation is mandatory only during the negotiation stages of mining projects, after which landowners sign away their resource rights and remain passive observers for the rest of the project's life.

Similarly, the Environment Act 2000 provides for public hearings on all issues surrounding resource projects prior to the signing of agreements and issuing of licences. In both cases, there is low level consultation and participation. This type of participation serves as a rubber stamp for project approval, unlike in Western democracies where public consultation is a powerful tool for community advocacy. Consultation of landowners in project development is an isolated and one-off activity. Developers often use Acts of Parliament designed to facilitate project development to thwart landowners' demands for more consultation on the project's environmental and socio-economic impact and the distribution of benefits. The multi-sectoral and multi-dimensional nature of sustainable development inevitably requires multi-stakeholder group consultation and participation. This has been problematic in Papua New Guinea.

Towards the creation of an NSDS

The 20th Waigani seminar followed the Rio Earth Summit, held in 1992. The seminar led to:

- Recommendations for a national sustainable development strategy;

- Drafting of Papua New Guinea's NSDS in 1994;
- Endorsement of the NSDS;
- Creation of the National Task Force on Sustainable Development; and
- The establishment of the National Commission for Sustainable Development.

The seminar fulfilled one of the core principles of sustainable development in providing stakeholder consultation and participation. All sectors of society were invited to participate, including representatives of districts, provinces, the private sector, NGOs, churches and industry, and academics, policy-makers and politicians. This provided a strong sense of ownership, and a platform from which to convince the government to redefine development in a sustainable format was established. In 1994, the National Task Force on Sustainable Development and the Commission for Sustainable Development were created and housed within the Prime Minister's Department.

However, the institutional capacity to advise government, another key principle of sustainable development, has been relatively limited since the endorsement of the NSDS in 1994. Between 1995 and 2002 constant changes to the political and institutional leadership impacted upon the government's capacity to operationalise the NSDS. There were three different governments in this period and the country witnessed many institutional changes as the respective governments sought to place their own men in key positions.

Despite these constraints, the government of the day adapted the first medium-term development strategy (MTDS) 1997–2002, describing it as the 'bridge into the 21st century'. The MTDS reflected key elements of previous plans, including infrastructure development, particularly transport infrastructure, as a precondition for the acceleration of economic growth.

The MTDS recognised economic growth led by the private sector as the engine for broad-based social and economic development. Although environmental sustainability and sustainable development featured in a limited way in the MTDS, no programme was designed to promote sustainable development apart from the stalled NSDS of 1994. Despite these shortcomings, there have been some isolated but positive developments that have favoured sustainable development, including the MTDS 1997–2002, the Papua New Guinea *Human Development Report 1999* and the 2001 Poverty Reduction Strategy.

In 2002 the incoming government announced the Programme for Recovery and Development (PRD). The government wanted to maintain continuity with previous programmes such as those initiated under the MTDS 1997–2002 and some of its policies were reflected in the PRD, including export-driven economic growth, rural intervention, poverty reduction and good governance. However, by 2002 there had been no concrete attempt by the government to revitalise the NSDS process despite the UN Millennium Declaration of 2000 and the resultant Millennium Development Goals.

The current MTDS 2005–2010 was adopted by the government in November 2004.

It reflects elements of the previous MTDS and also repeats notable contradictions. It seeks private sector development to support export-driven economic growth, and green revolution objectives targeting agricultural produce, rehabilitation of transport infrastructure, health care, education and poverty reduction.

The MTDS 2005–2010 was formulated despite limited consultation between its advocates in the Department of National Planning and Monitoring and the 19 provinces which are home to 80 per cent of the population. The four regional workshops held prior to the drafting of the current MTDS involved province-based public servants. There was only limited grassroots consultation, which significantly reduced avenues for meaningful participation of people at the grassroots and prevented them from taking part in the design and implementation process.

This limited consultation impinges upon the capacity to form effective partnerships between key architects of the MTDS and the intended beneficiaries. The scenario applies equally to an NSDS. The Central Agencies Coordination Committee (CACC)[2] oversaw the drafting and implementation of the current MTDS, but there was no recognition that the advice given to the CACC by the Department of National Planning and Monitoring ran counter to the facilitation of partnerships among stakeholders.

In addition, 'environmental sustainability', which is a major component of sustainable development, did not feature in the MTDS 2005–2010 at all. By early 2007 the MTDS was already facing implementation problems despite the allocation of 650 million kina under the second supplementary budget handed down in August 2006. The third supplementary budget, passed in March 2007, allocated K600 million to the Prime Minister's home province, with only K50 million going to the remaining 18 provinces. This exemplifies the inherent risks in government priorities and underlies the capacity constraints discussed in linking development with expenditure priorities.

Creating a national sustainable development strategy

The spirit of sustainability is acknowledged in Papua New Guinea's Constitution through the five national goals and in particular the fourth goal. This states:

> *We declare our Fourth Goal to be for Papua New Guinea's natural resources and environment to be conserved and used for the collective benefit of us all and replenished for the benefit of future generations*.

Enshrined in the definition of the fourth goal is the vision of sustainability. The rest of the five goals are reflected in *Agenda 21*, the Johannesburg Plan of Implementation, the Mauritius Strategy and the Pacific Plan. Indeed, through the fourth goal, sustainable development was declared as a national objective under the Papua New Guinea Constitution 12 years before the publication of the *Brundtland Report* in 1987, which defined sustainable development for the global audience. So sustainable development in Papua New Guinea is not an entirely new concept. What is perhaps new is the language in which sustainable development is being communicated to the people and the way in

which the government is seeking to redefine development in sustainability terms.

While the 20th Waigani Seminar set the pace for introducing and drafting the Papua New Guinea NSDS in 1994, the NSDS lacked the political and institutional support necessary to drive it ahead. The experience of Papua New Guinea shows that the operational aspect of any national sustainable development framework requires political will and institutional capacity. Most importantly, the presence of a core group of like-minded personnel is required in key planning agencies such as the Department of National Planning and Monitoring. A similar group of like-minded politicians in government is needed to champion the NSDS cause. Further, the absence of a sustainable development branch in the Department of National Planning makes the NSDS agenda 'homeless'. Unless these gaps in the institutional system are filled, Papua New Guinea's attempts to create and implement an NSDS will continue to be problematic.

Although the MTDS 2005–2010 attempts to incorporate the five goals into its operational strategy, one of the significant differences between it and the five national goals, *Agenda 21*, the JPoI, the Mauritius Strategy and the Pacific Plan is the failure of the Papua New Guinea government (through its Department of National Planning and Monitoring) to consider 'environmental sustainability' as one of the pillars of sustainable development. Adapting the sustainable development framework will add value to the efforts of the national government to promote the MTDS or an equivalent strategy. It is therefore imperative for the government to either review the current MTDS in an effort to strengthen its capacity for promoting sustainable development or to undertake a comprehensive exercise to develop a national framework for sustainable development.

Constraints and risks in creating and implementing an NSDS

In small developing states, the outcome of an NSDS depends upon the social, political, economic and cultural environment in which it is created and implemented. Several critical issues in Papua New Guinea continue to make this process vulnerable to internal bureaucratic wrangling and political influence. There are five major constraints and risks that impede Papua New Guinea's efforts to create and implement a successful NSDS or its equivalent.

The first lies in Papua New Guinea's 'strategic planning' process and lack of conviction about the notion of sustainability and strategy development. Despite the decentralised nature of the planning process, strategic planning is dominated by the Department of National Planning and Monitoring. The Department has incorporated the principles of sustainability in a limited way, with the concept itself featuring relatively less prominently among its strategic planners. This is clearly demonstrated by the content of the MTDS 2005–2010, in which 'environmental sustainability' does not feature as a core strategic objective of the MTDS. Consequently, Papua New Guinea has witnessed limited success in achieving both domestic and internationally agreed objectives pertaining to *Agenda 21*, the MDGs and the JPoI.

Governance is the second critical challenge in creating and implementing an NSDS.

Transparency in decision-making, accountability in financial management, professionalism in the workplace, taking responsibility for decisions, respect for the rule of law and respect for professional positions are key elements of good governance. However, fulfilling these requirements in Papua New Guinea remains a major issue despite the widespread coverage given to the issue of good governance (Nita, 2006; Piest and Velasquez, 2003). The creation of an NSDS and its successful implementation will continue to face difficulties if governance issues are not first addressed.

Political stability remains an important precondition for creating, implementing and monitoring sustainable development initiatives. This is the third major risk Papua New Guinea faces. Stability in government is necessary to achieve medium- and long-term sustainable development goals, but constant cabinet reshuffles have introduced new ministers with new priorities; for example, the Department of National Planning and Monitoring has had seven different ministers since 2002.

Linked to all the major constraints and risks experienced in Papua New Guinea is the lack of capacity of national institutions in creating, implementing, monitoring and reporting sustainable development initiatives. The capacity limitations within line agencies (horizontal) and sub-national governments (vertical) are obvious. Effective inter-agency linkages remain central to capacity building, but the lack of inter-agency linkages to co-ordinate policy development and implementation is an example of the country's overall institutional weakness.

The Government has taken various initiatives to eradicate corruption – by strengthening the role of the Ombudsman Commission, the Auditor General's Office and the Public Accounts Committee. These are testimony to its resolve to improve the country's capacity to deal effectively with corruption.

An enabling environment

A sound political and institutional decision-making environment is imperative to enhance the capacity to create and implement sustainable development polices in Papua New Guinea. Parliament, and hence the National Executive Council (NEC), remains the highest decision-making body in the country. The Department of National Planning and Monitoring is the nerve centre for government planning and budgetary processes, but it has internal capacity constraints. All sectoral and provincial plans enter the national planning, monitoring and selection process at the Department. Furthermore, all foreign aid (both grants and loans) enters the country through the Department and aid is disbursed either through the annual budgetary process, the public investment programme cycle or directly into prioritised recurrent costs. However, the Department relies on sister agencies to input sectoral plans and budgets into the decision-making process. The information provided by sectoral agencies is invaluable in devising strategies to address sustainable development goals, including an NSDS.

The MTDS 2005–2010 reflects this process. The Department of National Planning drafted the MTDS for the medium term in consultation with key government agencies,

as well as with the wider community and donor partners. However, most government agencies were not exposed to arguments explaining the significance of incorporating sustainable development principles into their sectoral priorities. Consequently, the state agencies and provincial governments have been unable to effectively drive the sustainable development message within state agencies and at sub-national and local level.

In most cases, the working relationship between the Department of National Planning and Monitoring and the provincial governments is not conducive to the creation and implementation of an NSDS. Despite the passage of the Organic Law on Provincial and Local-level Government in 1995 to facilitate 'bottom-up' planning, in practice it is difficult to implement projects at provincial level.

The MTDS (and NSDS) have obviously suffered, given the existing tensions between the Department of National Planning and Monitoring and the provinces. It is imperative to consult and educate both leaders and policy-makers at the provincial and national levels about their roles and responsibilities in relation to the creation and implementation of an NSDS. Successful creation and implementation requires integration, co-operation and co-ordination among key line agencies (horizontally) and different levels of government (vertically). It may imply delegating some key functions to other agencies, including the universities, co-ordinated by the Department in order to monitor and evaluate progress on implementation.

Furthermore, the capacity for an efficient working relationship between the key agencies has not always been sound. The NEC and the Department of National Planning and Monitoring have established ad hoc structures for co-ordinating national strategy processes. The CACC lacks understanding of the reality of sustainable developmental needs at provincial and local level. The roles and responsibilities of the CACC, the Consultative Implementation and Monitoring Council (CIMC) or their equivalents need to be properly defined.

There is also often a conflict of interest between line agencies. Their roles and responsibilities are compartmentalised so that their ability to complement and support the MTDS and/or NSDS between and within sectors is constrained. The MTDS and NSDS deal with many cross-cutting priority issues which often require inter-agency commitment. This has been problematic. For example, the Department of Environment and Conservation is responsible for the environmental impact monitoring of resource projects, which requires co-ordination and collaboration between the Department and agencies implementing resource development projects, for example mining. The Department of Mining views its role as a developer and that of the Department of Environment and Conservation as an environmental manager. The perceived, yet contrasting, views of these key agencies make inter-agency linkages difficult.

Inter-agency linkages

The JPoI recognises the significance of promoting better integration of cross-cutting issues within a sustainable development framework. This is another crucial principle of

sustainable development. Cross-cutting issues that need sustainable solutions in Papua New Guinea include poverty, gender equality, environment protection, HIV-AIDS and health, unemployment and education. The need to establish linkages among key government agencies is paramount. It helps to understand the interrelatedness of key issues that require an integrated approach in reducing the risks pertaining to these issues.

Both a synergistic and co-ordinated approach is essential to facilitate inter-agency co-operation for a more cost-effective, negotiated decision-making, planning and implementation of policies. The MTDS 2005–2010 recognises the importance of developing better co-ordination between the three tiers of government, but it is limited in its practical application. The MTDS fails to prescribe specific mechanisms to effectively integrate policies and co-ordinate the country's institutional mechanisms, including legislation, work, culture, civil society and NGOs, in implementing sustainable development initiatives. Improved co-ordination of sustainable development activities at these levels and among line agencies minimises inadvertent conflicts between policies and strategies under different regimes.

In this context, in Papua New Guinea the CACC and the CICC have a fundamental role in co-ordinating and integrating cross-cutting policies both at the level of central government agencies, and between these agencies and provincial governments. Their functions are complementary: both tend to focus on the capital city, Port Moresby, rather than the provinces. Consequently, there is a weak legislative framework defining their roles and responsibilities, and this means that they are ad hoc agencies tasked only with overseeing the implementation of the MTDS or its equivalents in the medium term. Their role needs to be redefined and strengthened to achieve inter-agency co-ordination which will enable the creation and successful implementation of sustainable development strategies. Effective co-ordination and linkages will reduce emergent risks and vulnerabilities in public agencies.

Outcomes and means of implementation

Positive outcomes of sustainable development interventions result from effective implementation. Implementation, in turn, depends on institutional, financial and human resource capacities.

Sustainable development indicators provide useful tools to measure, evaluate and report on the implementation of key sectoral programmes. However, the MTDS 2002–2010 does not have its own set of indicators reflecting Papua New Guinea's social, economic, environmental and cultural landscape. Country-specific indicators, together with the MDG indicators, would include institutional and subsistence indicators reflecting Papua New Guinea's 80 per cent rural population. The underdeveloped nature of the country-specific indicators meant that the MTDS 2005–2010 adapted the MDG indicators without modification. Furthermore, there is relatively little monitoring by the Department of National Planning and Monitoring using indicators on a cross-sectoral basis and involving provincial governments. The indicators contained in the MTDS

need to be expanded to help define economic, social, institutional, cultural, political and environmental issues. This will assist decision-makers in Waigani and elsewhere to decide on the next level of sustainable development intervention.

It is not unfair to argue that the government's system of monitoring and evaluating performance indicators is underdeveloped. In addition, the reporting mechanisms of the CACC, CIMC and Department of National Planning and Monitoring, which provide information to decision-makers on emerging trends, need to be significantly improved. Both these weaknesses are significant impediments and highlight capacity constraints in supporting decision-making for sustainable development.

Lessons from the Papua New Guinea experience

Four important lessons emerge from this discussion of Papua New Guinea's capacity for creating and implementing a national sustainable development strategy. The first is the Government's limited capacity for achieving sustainable development through the MTDS. The Government's commitment to sustainable development has been made obvious by its international obligations and national priorities such as the MTDS. However, the capacity constraints inherent in Papua New Guinea's polity and institutions restrict the effective integration of sustainable development into policy priorities.

Second, there is a need to strengthen the current MTDS through a rigorous review process. This process should involve a consultation process targeting all stakeholders, especially peripheral government agencies and rural communities. It should establish a long-term framework for allowing local input into the planning process. The review process should highlight planning deficiencies at all levels, including the Department of National Planning and Monitoring, and capacity constraints in various agencies, and it should recommend appropriate capacity-building initiatives. The integration of 'environmental sustainability' into the list of government priorities is not an open option: it is absolutely necessary for economic growth, social progress and environmental protection.

Third, there is no section within the Department of National Planning and Monitoring which covers sustainable development issues and the NSDS. The Department would be the natural home of the NSDS, but its homelessness is a major constraint to creating a viable strategy and ensuring its effective co-ordination and implementation.

Fourth, there is no alternative option to creating an NSDS for Papua New Guinea. The process that began in earnest and tragically ended in 1994 needs to be revitalised. The establishment of a long-term sustainable development framework involves revitalising the NSDS with a series of medium-terms plans to drive the strategy. Mid-term review processes are necessary to identify capacity constraints and minimise identified risks which may affect the effective co-ordination and implementation of an NSDS. Policy-makers at the Department of National Planning should take responsibility for sustainable development; institutionalising sustainable development will only accelerate the pace for creating, implementing and co-ordinating an NSDS.

Finally, a comprehensive methodology for assessing strategic planning in the govern-

ment system is highly desirable to drive the review process forward. A review methodology is required to analyse the planning personnel and process within the Department of National Planning, sectoral agencies and provincial governments. An appropriate methodology, specifically designed to appraise the strategic planning process at the Department and elsewhere, should enhance the planning capacity at all levels. This may, in the long term, reduce political and bureaucratic risks.

Conclusion

Creating a sustainable development strategy for Papua New Guinea remains a 'no regrets option' for the long term and is a must. The creation of an NSDS does not prevent the government from reviewing and implementing the MTDS. Officials at the Department of National Planning should understand the complementary roles that the NSDS and the MTDS can play in promoting sustainable development. The MTDS remain the appropriate driver of an NSDS, but the latter has yet to be revitalised and implemented.

This discussion has revealed serious capacity constraints within Papua New Guinea's institutional and governance systems. The inherent capacity issues give rise to risks in creating, co-ordinating and implementing sustainable development programmes. An NSDS will experience similar risks to those currently faced by the MTDS if these issues are ignored. It is the task of the Government to enhance capacity within its planning, monitoring and implementation system as a precondition of the creation and implementation of a national framework for sustainable development.

Notes

1 The Waigani Seminar is a biannual seminar series held at the University of Papua New Guinea and sponsored by government, development partners, including donors, the private sector and NGOs. The title referred to Rio in Brazil and Rai, a village on the Rai Coast in Madang Province, Papua New Guinea.

2 The CACC is made up of all departmental heads, with the Chief Secretary as its head.

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4

Rethinking Oceans and Marine Resource Management

Padma Narsey Lal

Introduction

Strategic development and management of the Pacific Ocean's marine resources at national and regional level is critical to Pacific islanders' ability to meet their changing needs and aspirations and to maintain their unique lifestyle.

The Pacific region is renowned for its small islands and big ocean, and the natural beauty of its people, places and cultures. The Pacific community prides itself on its 'Pacific way' lifestyle, where communal living and reciprocal social relationships are emphasised, and which is often at odds with the pressures of individualism encouraged by market forces. The Pacific is also a region that is going through rapid change due to high population growth and the changing needs and aspirations of its people, including increasing consumerism. The people of the Pacific live in the modern world, but at the same time have strong traditional ties and have kept their culture alive. But traditional systems are being gradually weakened by the forces of globalisation and the market economy.

The coastal and marine environment, a source of subsistence as well as commercial activities, is an integral part of the Pacific lifestyle. The islands of the Pacific are renowned for their ecologically diverse environments and landscapes, and high biodiversity and endemism; in some habitats, such as coral reefs, the Pacific has the highest known biodiversity in the world. The natural beauty of the coastal areas and the islands and oceans, combined with the friendly people and traditional cultures, is a magnet for tourists from as far away as Europe and North America, as well as the more traditional markets of Australia and New Zealand. Most Pacific islands rely on their coastal resources to earn tourism dollars, which in 2003 contributed about $US1 billion, or approximately 5 per cent of the region's GDP.

With large exclusive economic zones (EEZs), very high sea-to-land ratios (Table 4.1) and relatively undeveloped natural environments, most Pacific island countries (PICs) rely on coastal and offshore fisheries and tourism as their main sources of income and export earnings. Pelagic tuna-based offshore fisheries contribute about 11 per cent of the gross domestic product of all the PICs (Gillet, McCoy *et al.*, 2001) and account for around 50 per cent of the region's total exports. On the other hand, coastal resources are the cornerstone of subsistence and domestic economic activities, contributing about 15 per cent of GDP.

Table 4.1: Sea-to-land ratio in Pacific Island Forum countries

Country	Land mass (km^2)	EEZ (million km^2)	Sea-to-land ratio
Cook Islands	236	1.8	7,627
Fiji Islands	18,272	1.3	71
Federated States of Micronesia	702	3.0	4,274
Kiribati	726	3.5	4,821
Marshall Islands	181	2.1	11,602
Nauru	21	0.3	14,286
Papua New Guinea	462,840	3.1	7
Samoa	2,857	0.1	35
Solomon Islands	29,785	0.6	20
Tonga	747	0.7	937
Tuvalu	26	0.7	26,923
Vanuatu	12,200	0.6	49

Source: Adapted from PIFS, 2000, www.ffa.int.wuw/index

Management challenges

Specific challenges in the marine sector have their origins in international as well as domestic development pressures. Pacific island countries' dependence on limited marine and other resource-based export commodities make them highly vulnerable to global forces, such as changes in fish prices and the effects of international trade liberalisation and increasing fossil fuel prices. Many of the Pacific island countries are also highly prone to regular natural disasters, such as cyclones, earthquakes and volcanic eruptions. They also face the emerging challenge of the increasing frequency of extreme climate events, coupled with rising sea levels resulting from global climate change. Such challenges are further exacerbated by the islands' geographical isolation within the region, as well as from the long distances to their main export markets. Poor domestic transport infrastructure and communications add to the problem of being made up of many small islands widely scattered across the ocean under one national jurisdiction. The growing populations of most PICs and the increasing emphasis on consumerism have encouraged them to emphasise economic development goals, often with only cursory regard for the impact on the environment or on social equity.

The Pacific island countries are also under constant international pressure to preserve their biodiversity and their natural ecosystems for the global good, since the Pacific is generally regarded as one of the the last remaining unspoilt natural environments. However, international calls for the protection of key species and their habitats are often at odds with the economic development desired by the people of the region and encouraged by its governments to meet the need for income for basic needs, such as education and children's clothing. Pacific leaders have recognised the need to maintain a balance between conservation in the international interest and economic development to meet the needs and aspirations of their citizens. Over the last decade or so, Pacific countries

have identified many common issues, including those related to offshore and coastal marine resources, which relate both to their own livelihoods and to the global good. This is reflected in the statement made by the then Prime Minister of Fiji Islands, Mr Laisenia Qarase, when he noted during the launch of the Pacific Islands Regional Ocean Policy in 2004 that:

> *We stand as the guardians of the Oceanic heritage. But we do this not just for ourselves – for the benefit of our sovereign nations. We act for the entire planet, knowing that the Pacific is a treasure for all humanity, a resource for the world.*

Offshore tuna fisheries

One of the ongoing concerns in the region is the sustainability of tuna resources; for many countries tuna is an important source of GDP, foreign exchange and employment. The value of the catch rose in the 1980s and 1990s – from US$375 million in 1982 to US$1.9 billion in 1998 (Gillet, McCoy *et al.*, 2001). However, since 1998 the value of the tuna catch has declined dramatically. The Western Pacific Regional Fisheries Management Council reports that the total value of the 2006 catch of the four main tuna species was US$1.1 billion, a 31.3 per cent decline from the 1998 figure. Skipjack tuna stocks are considered to be healthy, with potential for an increase in harvest. However, the larger tunas, including yellowfin, albacore and blue-eyed tuna, are considered to be fully exploited, with yellowfin and bigeye over-exploited. In addition to the problem of declining stocks, there are concerns about the effects of climate change on some tuna species due to El Niño/La Niña Southern Oscillation (ENSO), which affects sea temperatures. Fluctuations in fish stocks and a decline in tuna catches could have a devastating impact on small economies which depend on them for their export earnings and GDP.

Other issues of concern, particularly for the Pacific countries that have had a special trading relationship with the European Union (EU) as members of the African, Caribbean and Pacific (ACP) group, include the potential impact of globalisation and trade liberalisation. Papua New Guinea, Solomon Islands and Fiji Islands export their fish and fish products to the EU. Only Papua New Guinea and Fiji Islands are benefiting from the duty free and quota access provided by the EU. From 1 January 2008, under the Economic Partnership Agreements (EPAs), all the remaining countries that are non-LDCs reverted to the Generalised System of Preferences, and LDCs traded under the EU Everything but Arms (EBA) initiative. This, together with tighter sanitary and phytosanitary regulations, is expected to have a far-reaching impact, if favourable regional fisheries partnership agreements are not forthcoming and if countries are not more proactive in their ocean and marine resource management.

For many countries, the relatively low value of returns from their tuna resources is a growing concern. They receive only about 5 per cent of the value of tuna harvested from Pacific EEZs by distant water fishing fleets. Because of these low direct benefits, the domestication of tuna fisheries has always been an ongoing interest of most Pacific island countries. Many have considered going into joint venture arrangements or encouraging

domestic industry. However, the Pacific nations have so far found it difficult to realise their dream of having a local tuna fishing industry (Gillet, 2003), largely because of the high capital and technical know-how that would be necessary.

Coastal resources

Coastal resources throughout the region also face serious challenges. As the population increases and national economies grow, the pressure on coastal fisheries resources has gradually mounted and is expected to increase further, particularly within short distances of major settlements. Over-fishing of target fin-fish and non-fish species within the range of small motor-powered boats is expected to become more common (Box 4.1).

Box 4.1. Over-fishing of trochus and green snail in Vanuatu

Trochus and green snails, two of the main export products of Vanuatu, are in danger of becoming over-harvested. The commercial exploitation of trochus and the green snail fishery began in the 1920s with the demand for raw material for buttons, jewellery and ornaments, and inlay work for furniture. The industry has grown and the processed shells are exported to south-east Asia; together with smoked and dried bêche-de-mer, it was worth about US$3.7 million over the last ten years. These species provide an important source of income for rural isolated islands, which lack transportation, refrigeration facilities, and markets for fresh fish and agricultural products.

However, trochus and green snails are now scarce on many islands and are becoming difficult to find. A recent survey of trochus fisheries suggest that the industry has almost collapsed; the only surviving shell company has reported that it cannot find enough raw material to remain viable. The few viable stocks in remote areas are also seriously endangered. Over-harvesting, combined with the slow growth rate of the green snails, make them particularly vulnerable to extinction.

The Government has banned green snail exports, but the snail population is showing no signs of recovery. Efforts to transplant brood stocks of green snails have been unsuccessful. Similarly, mariculture of trochus and the release of larvae on outer reefs have been attempted, but as yet there has been no population increase.

Source: Lovell, Sykes *et al*., 2004, p. 350

The pressure on coastal resources is also expected to increase with changing international demand for key fisheries products from the Pacific (Box 4.2).

One of the effects of the over-fishing of key species is a shift in the dynamics of coral reefs and natural ecosystems, which have become more susceptible to overgrowth by macroalgae and plagues of coral predators, such as crown of thorn. Other pressures include the impact of land-based activities. Sediments from poor land use, deforestation and dredging smother coral reefs, and reclamation of mangroves and other habitats affects

Box 4.2. Impact of rising prices and over-fishing of bêche-de-mer in Marovo Lagoon, Solomon Islands

In Solomon Islands, bêche-de-mer, or sea cucumber, is a multi-million dollar industry and is second only to tuna as the country's most valuable marine resource. Because of the ease of harvesting and processing bêche-de-mer, it has become one of the largest sources of cash in many coastal communities throughout the islands. It is highly regarded by Asians as a delicacy, with powerful qualities as a traditional medicine and aphrodisiac. In addition, bêche-de mer is an important source of protein for the Solomon Islanders, who have one of the highest per capita seafood consumption rates in the world, with over 80 per cent of of the population deriving their protein from marine resources. Bêche-de-mer is an important source of livelihood for coastal villagers and during the recent political crisis was one of the stable sources of income.

Increased demand for bêche-de-mer, resulting in higher prices, has led to over-harvesting and a decline in stock of some species. In 1991, the white teatfish was valued at SI$30 per kilo but today it fetches about SI$220–270 per kilo. Because of the rising price, the teatfish has been over-harvested to such an extent that in recent years the catch has fallen. In 1999, more than 50 per cent of the total catch was white teatfish, but by 2002 this species accounted for only 2 per cent. Catches and exports of teatfish fell from 715 tonnes in 1992 to less than half this figure in 2005.

Rising prices have also led to an increase in dangerous fishing practices. It is noted that 'Ten years ago people were happy to free-dive or simply collect the sea cucumbers at low tide. Now people are night diving with torches, using weighted "bombs" with steel barbs, and even using dredges to harvest from deeper waters' (Ramofafia, a bêche-de-mer specialist). The growing use of 'hookah', or diving using air compressors and long hoses, has contributed to an increasing number of deaths in Solomon Islands' Western Province.

Source: Adapted from Steve Menzies, International Waters Programme Project media release, 7 July 2005, www.sprep.org, accessed on 29 October 2005

coastal productivity and species composition. Nutrient and chemical pollution from untreated and poorly managed human sewage and animal wastes, and wastes from agriculture and in limited cases industrial pollutants all have a negative impact on coastal ecosystems. Such effects are often localised and their cumulative effects can vary from low to very high within a country (Lovell, Sykes *et al*., 2004: 341). However, countries differ in the risks to which local inhabitants are exposed.

Ecosystems in the Pacific are affected in far-reaching ways by global activities, as well as by human activities within the region. Coastal ecosystems and coral reefs, especially, are under threat from climate change, including more frequent switches in El Niño and

La Niña, and increased frequency and intensity of tropical storms. Furthermore, climate change is expected to result in increases in dissolved carbon dioxide in water, which is believed to cause coral bleaching and coral mortality. Major bleaching was reported in 1998, 2000 and 2002. In 1998 alone, global coral bleaching throughout the world led to a loss of 16 per cent of the world's coral reefs. Fiji Islands reported serious coral bleaching in 2000 and 2002, with 40–80 per cent coral mortality on many reefs. Although some recovery has been reported, it is slow in some damaged areas, such as Beqa barrier reef and the western Astralobe reefs. Overall, only about 10 per cent of the coral reefs affected by bleaching in the south-west Pacific during 2000–2002 have recovered to their pre-bleaching levels (Lovell, Sykes *et al*., 2004).

Coral reefs and other habitats are under constant threat from wave and wind actions caused by extreme weather events, such as those recently experienced by countries such as Samoa, Nauru and Niue. In 2000, for example, cyclone Heta caused damage to 13 per cent of coral reefs in Samoa. In 2003, Nauru experienced major coral bleaching and mass fish kills, due possibly to elevated sea level temperatures.

Such changes in coastal ecosystems can have far-reaching effects beyond the decrease in the availability of fish. They can undermine the tourist industry, which relies on diverse colourful and healthy corals supporting a large diversity and abundance of coral and fish species, and the presence of megafauna, such as sharks, manta rays and turtles. For countries such as Cook Islands, where tourism is the backbone of the local economy, such changes can have a drastic impact on people's livelihoods. To address such pressures on oceanic and marine resources, including coral reefs and other coastal ecosystems, more stringent and strategic management is important; it should be based on an ecosystems approach and underpinned by reliable information. The issue will become more acute over time, as population increases and global attention shifts towards the last remaining relatively healthy tuna stocks and more dynamic coastal ecosystems.

Management responses

Pacific island countries have adopted both national and regional approaches to the management of their domestic oceanic and marine resources. Confronted by ever-increasing pressure from distant water fishing nations for increased access to pelagic resources, the Pacific island states have generally taken a regional approach without necessarily compromising their sovereign rights and interests. Much of the research and policy discussion has been supported by two regional agencies, the Forum Fisheries Agency (FFA) and the Secretariat to the Pacific Community (SPC), guided by their governing councils. These agencies hold annual scientific and policy meetings to guide member countries in their deliberations and negotiations with distant water fishing nations. Since 2006, discussions have also been held under the auspices of the Western and Central Pacific Tuna Commission, which includes distant water fishing nation representatives as members.

National programmes and policies to address such challenges vary across the region. Management of coastal and ocean resources has been predominantly sectoral in nature. Generally, the environmental aspects of the coastal and marine sector are managed inde-

pendently of the fisheries sector. Agencies that manage various aspects of the marine sectors are separate and operate under different legislation, with little or no co-ordination. Thus, for example, the fisheries harvest in Fiji Islands is managed by the Fisheries Department under the Fisheries Act, while coastal mangrove resources, which are important nursery grounds for fish, are managed by the Forestry Department under the Forestry Act. Pollution of coastal waters is either addressed under the Public Health Act or by municipal councils under town and country legislation. Some effort has also been made to use other instruments such as environmental impact assessment (EIA) procedures to screen projects. Usually, however, these have only been applied by the Department of Environment to very large projects, if at all.

The activities of these various organisations are often unco-ordinated, largely because each department operates within its narrow legislative mandate and there are no cross-cutting institutional mechanisms for the co-ordination of management response. In most cases, management relies on a top-down regulatory approach, using command and control strategies. In the case of coastal fisheries, instruments such as licences, size limits, bans on the harvesting of certain species, restrictions on gill net mesh sizes or restrictions on gear are commonly used. These have generally been found to be ineffective largely because government fisheries departments do not have adequate resources for monitoring and enforcement or because penalties are inadequate to act as deterrent (Box 4.3).

Box 4.3. Management of bêche-de-mer in Solomon Islands

Economically, bêche-de-mer is a very important resource for Solomon Islands, but the Government's 'top-down' approach to management has simply not worked. The Government does not at present have the capacity or resources to enforce regulations such as size limits, bag limits, gear restrictions and seasonal closures. In fact, there are no national regulations or guidelines to safeguard the fishery, except for a 1998 ban on fishing for sandfish, which was repealed in 2000. At the same time, the resources are owned communally under the traditional system of tenure, but people do not have much say in the management of the resources.

It is generally acknowledged that the only way to protect these resources is to actively involve fishing communities and resource owners in developing and implementing their own management strategies. Some have argued that management should be transferred to communities and that they should be responsible for enforcing regulations such as bag limits, gear restriction, seasonal closures, species rotation and area restrictions. These regulations should be implemented in accordance with the local system of customary marine tenure and the national government should develop policy and regulatory frameworks that help to support this community-based management.

Source: Adapted from Steve Menzies, International Waters Programme Project media release, 7 July 2005, www.sprep.org, accessed on 29 October 2005

Recently, countries such as Samoa, Tonga and Cook Islands have adopted integrated coastal zone management strategies and plans, although their implementation has from lack of resources and co-ordination among government agencies.

Some effort has been made to encourage greater community participation in coastal fisheries development and management, particularly with the assistance of development partners. Examples of this are the Samoan Fisheries Development Project, funded by AusAID, the Fiji Local Level Management Areas and a conservation area project in Vanuatu, carried out under the South Pacific Biodiversity Conservation Programme, funded by the Global Environment Facility (GEF). In places like Fiji Islands, local community members are also trained and hired as fisheries wardens to increase the effectiveness of the fisheries regulations. But such efforts have taken very sectoral approaches, with little co-ordination between different initiatives. In many instances, the link between coastal zone management initiatives and national development planning and budgetary processes is at best limited and in most cases non-existent.

Regional responses

The Pacific region has several regional intergovernmental organisations that provide technical advice and assist independent island nations and territories in the management of their coastal and marine resources, and their offshore tuna fisheries. However, countries face major challenges in making the most effective use of regional support. Nor do the regional programmes necessarily address country-specific priority issues; regional projects often depend on the availability of development partner support, which in many instances is for programmes that reflect international interests.

Regional marine resource and environment-related projects are primarily implemented by SPREP, South Pacific Applied Geoscience Commission (SOPAC), FFA and SPC, with the PIFS co-ordinating and providing policy advice to government leaders. These agencies tend to focus on areas of immediate interest as mandated by their governing councils. SPC, the primary regional organisation responsible for marine living resources, has until recently focused on coastal and offshore fisheries development and capacity building activities. FFA, on the other hand, has focused on helping countries with offshore tuna fisheries management, including access negotiation and technical backstopping in relation to monitoring and stock assessment (in collaboration with SPC). SOPAC largely deals with non-living aspects of the EEZ, including mapping mineral resources and defining maritime boundaries. SPREP addresses the environmental aspects of oceanic and marine resources, including protection of key species such as whales and turtles, and the effects of climate change.

With limited member contributions, each of the regional organisations relies largely on support from development partners and UN agencies under various multilateral environment agreements. As a result, their activities have tended to be stand-alone projects supported by development partners under different international instruments, particularly the GEF, established as part of the 1992 UN Convention on Biodiversity.

Many regional activities have focused on research, capacity development and regional action strategies. They include UNDP/GEF-funded national environmental management strategies, the National Biodiversity Strategic Action Plan (NBSAP), the South Pacific Biodiversity Conservation Programme (SPBCP), the National Adaptation Program of Action (NAPA), comprehensive hazard and risk management (CHARM) and the Pacific Islands Climate Change Action Programme (PICCAP).

Regional bodies which are agencies of the Council of Regional Organisations in the Pacific (CROP) have developed projects on themes that are of particular interest to development partners and open up funding opportunities. They should therefore be categorised as supply driven, although the projects have broadly reflected regional concerns. This situation is slowly changing and more specific activities are being carried out in response to national requests.

Overall, regional projects have produced some very valuable information and many technical reports, and have increased local awareness of specific resource and environmental management issues. However, many of the projects do not seem to have delivered on their stated objectives or produced the desired outcome.

Regional fisheries aquaculture projects, such as those for giant clam, implemented with the support of SPC and the International Center for Living Aquatic Resources Management, did not produce the desired replenishment of the giant clam on coral reefs for subsistence and much needed income. Despite the fact that over US$10 million has been invested from many different sources, very few countries have seen any marked change in their stocks of giant clams or any increase in commercial harvests. If anything, giant clam populations continue to decline. One of the reasons for this is that only the technical aspects of the culture have been looked at, without any explicit consideration of the slow growth rate, marine tenure or market conditions (Lal and Keen, 2002).

Other reasons include inappropriate project design and projects that do not adequately reflect the science-economics-policy continuum. Some projects have failed to focus on the agents of change and their incentive structures. Many ocean and marine strategies focused on command and control management without also using economic or financial instruments (Schoeffel, 1996; Veitayaki, 2000; Baines *et al.*, 2002; Lal and Keen, 2002; World Bank, 2005). In some cases, projects were designed on the basis of traditional management systems, disregarding the weakening of traditional systems, increasing individualism and erosion of tradition principles of reciprocity and redistribution (South *et al.*, 2004).

This is expected to change with the adoption of ecosystem-based management (EBM), endorsed by PIF leaders and adopted by FFA and SPC. However, operational challenges remains as to how this can be holistically and systematically applied.

The challenge of integrating science-focused projects into national policy processes, as well as mainstreaming sectoral programmes into national level planning and budgetary processes, remains a common theme throughout the region in all areas of natural resource and environment management. Successful completion of technical projects, albeit in the limited sense of scientific outputs, are noteworthy achievements supported

by the CROP agencies. However, unless they also address associated analytical policy issues and enabling institutional environments, as well as the social dynamics and incentive structures necessary to encourage individual behavioural change, such efforts are likely to continue to produce less than satisfactory outcomes and/or projects that do not deliver on the original stated goals.

These issues have recently been recognised by the CROP agencies and this has been explicitly reflected in the various regional policies, and frameworks and plans of action that have been developed over the last three years. The challenge remains to operationalise these regional frameworks at national level.

Regional policies and action plans

With the support of various development partners, particularly AusAID and NZAID, the CROP agencies have helped member countries to develop regional policies and plans of action, including the Pacific Islands Regional Oceans Policy (PIROP). PIROP comprises five guiding principles: improving the understanding of the oceans; sustainably developing and managing the use of ocean resources; maintaining the health of the oceans; promoting their peaceful use; and creating partnerships and promoting co-operation. Regional policies and plans of actions tend to reflect the issues emphasised in international agreements, as well as lessons learned from past development efforts in the region (Table 4.2). However, although many of these instruments have some relevance to coastal and marine resources and environment management, attempts to implement them have generally not been as systematic, programmatic and holistic as was agreed in the 2002 Johannesburg Plan of Implementation or the 2005 Mauritius Strategy for Implementation. Nor has much effort been made to appropriately sequence the development efforts to produce synergistic impacts and achieve the desired outcome.

National level implementation of these regional policies is the next set of challenges, particularly in bringing together appropriate government agencies and community-based stakeholders, together with development partners, to identify and implement an interdisciplinary programme of activities to achieve the desired outcomes in the most cost-effective manner.

International response

Pacific SIDS have also responded to international calls and have endorsed various instruments, such the Law of the Sea, the Barbados Plan of Action, the Johannesburg Plan of Implementation and the Mauritius Strategy. Common elements of these include the need for national sustainable development strategies, reflecting:

- A balanced focus on the three pillars of sustainable development – economic well-being, environmental conservation and social harmony;
- A programmatic whole-of-country approach to development and management;

Table 4.2. Principles, themes and objectives of regional policies, frameworks and plans of action

Regional policies, frameworks and plans of action	Key principles/themes/objectives/strategies
Pacific Islands Regional Ocean Policy	Improve the understanding of the oceans Sustainably develop and manage the use of ocean resources Maintain the health of the oceans Promote the peaceful use of the oceans Create partnerships and promote co-operation (CROP Marine Sector Working Group, 2002)
Natural Disaster Risk Reduction and Disaster Management Framework, 2006–2015	Improve governance and organisation, and institutional, policy and decision-making frameworks Improve knowledge, information, public awareness and education Undertake analysis and evaluation of hazards, vulnerabilities and elements of risk Adopt a holistic approach that includes planning for effective preparedness, response and recovery Develop effective, integrated and people-oriented early warning systems Reduce underlying risk factors (SOPAC, 2005)
Solid Waste Management Strategy	Develop and implement appropriate waste management infrastructures Develop practical, sound and effective waste management policies, legislation and regulations Implement appropriate communication strategies to support effective waste management activities Develop mechanisms that support waste management in a financially and economically sustainable manner Develop national capacity to assist Pacific islanders to manage their waste in an environmentally sustainable manner (SPREP, 2000)
Pacific Regional Action Plan for Sustainable Water Management (Pacific RAP)	*Water resource management:* water resource assessment and monitoring; rural water supply and sanitation; integrated water resource management and catchment management *Island vulnerability:* disaster preparedness; dialogue on water and climate *Awareness:* advocacy; political will; community participation; environmental understanding; gender *Technology:* appropriate technologies; demand management and conservation; human resources *Institutional arrangements:* institutional strengthening; policy, planning and legislation *Financing:* costs and tariffs; alternative models; role of donor organisations and financing Institutions (SOPAC, 2003)

- The use of market-based financial instruments, together with a command and control approach, including legislation, to address environmental problems; and
- A participatory process to improve integrated decision-making processes and environmental governance at all levels.

In many instances, international commitments have not been translated into national legislation and action or, where they have been translated, improvements at national level have been piecemeal and spasmodic, as in Vanuatu (McIntyre and Wilson, 2004). Only in limited cases has a national action followed a specific international commitment. Even then, implementation has not necessarily been followed through, as in the case of the live coral trade in Fiji Islands (CITES, 2002; Fiji Government, 2002). Where national legislation that is consistent with international commitments has been enacted, it has not always been implemented, or enforcement has been weak, as with EIA requirements for development projects. Capacity in government environment departments is often very low, and much staff time and energy is spent in attending international meetings or preparing reports to meet MEA requirements. Little time and resources have been available for the implementation of national work programmes.

In some cases, the international community has encouraged community-based development efforts in response to the lack of success of 'top-down' development and conservation assistance. Such top-down development efforts are often driven by political interests rather than by national priorities. Internationally, this has led to greater emphasis on stakeholder-based development planning and implementation.

At one end of the spectrum, the pendulum has swung towards community-based activities, which by their nature focus on local issues. These projects have had mixed success for several reasons, including a lack of adequate consideration of equity issues in their design and the scope for rent-seeking and free-rider behaviour. Community-based projects have also failed to include strategies for scaling-up experiences and lessons learned at a national level. Consequently, their impact has remained small, despite the expenditure of large sums of money. At the other end of the spectrum, greater emphasis has been placed on community consultation and the importance of a stakeholder-based planning process, such as developing a national sustainable development strategy.

In summary, the ocean and marine resource governance challenges outlined above are multifaceted. Although the details may vary between sectors and across member countries, there is a common set of governance challenges at the national level, regardless of which issue, sector or theme is considered. Among those identified by member countries are:

- The pursuit of the economic development of ocean and marine resources without consideration of its impact on the environment, and an emphasis on economic development, with low priority and thus smaller budgetary allocations given to environmental issues;

- A disconnect between national planning and budgetary processes and sectoral or thematic priorities;
- Emphasis on top-down planning and management with no regard for traditional decision-making processes;
- Emphasis on a bottom-up community level project development approach, without any explicit link to national decision-making and budgetary processes;
- Piecemeal and sector-based management with little cross-sectoral co-ordination;
- Limited capacity in integrated planning that reflects ecological and economic connectivity, economic planning and cross-sectoral planning;
- Inadequate analytical skills in integrated and interdisciplinary assessment and decision-making;
- Limited translation of international commitment into national legislation.

Regionally, the key challenges include:

- Lack of co-ordination of support amongst different regional organisations;
- Limited integration of scientific, economic and social analysis to underpin development and management advice;
- Absence of a programmatic approach to regional services.

Internationally, the challenges include:

- Limited co-ordination of the development support provided by different international agencies organisations;
- Failure of external support to reflect national development goals and priorities (CROP, 2005).

Lessons learned

Pacific island countries acknowledge that national sustainable development goals cannot be achieved without assistance from international development partners and regional organisations. Learning from past efforts – both the successes and the difficulties, the region has recently embarked on initiatives that show promise in overcoming some of the key constraints to achieving sustainable natural resource and environment management. These include a shift towards improving the decision-making process at all levels by developing national sustainable development strategies, placing greater emphasis on community-based management linked to national government efforts, utilising economic and financial instruments, and moving towards ecosystem-based management.

The endorsement of the Pacific Plan by the leaders of the Pacific island countries in October 2005 could help to improve the co-ordination of services provided to member

countries by regional organisations and collaboration with other development partners. Internationally, too, the adoption of the Paris Declaration on Aid Effectiveness and in-country adoption of national planning and budgetary processes linking sectoral and cross-cutting thematic plans and priorities shows promise. Through NSDS-linked sectoral priorities and budgetary processes, countries are more likely to utilise external support effectively to complement their own national efforts to meet the needs and aspirations of their people.

National sustainable development strategies

In response to the growing awareness of key constraints to sustainable development, Pacific island leaders have endorsed the adoption of a national sustainable development strategy process to improve their national planning and budgetary processes. They are attempting to improve decision-making at national, sectoral and community levels, reflecting the core principles of sustainable development and good governance (Box 4.4).

Box 4.4. The NSDS approach

As promoted in the WSSD, a sustainable development strategy is a set of co-ordinated mechanisms and processes that collectively offer a participatory approach to developing vision, goals and targets for sustainable development and to co-ordinating their implementation and review. In a national sustainable development strategy process, there is emphasis on:

- Society as a whole having the responsibility for development, rather than seeing the government as being exclusively responsible;
- Adopting a participatory process involving all relevant stakeholders in a concerted effort and in a transparent negotiation process, rather than having a centralised and controlled decision-making process controlled by the government;
- Adopting a holistic whole of country approach, and cross-sectoral level planning and management;
- A shift from a focus on outputs (projects, legislation and plans) to a focus on systems and outcomes (impacts) on people and/or the quality of the participation and management process; and
- Adopting an adaptive process that is continuously reviewed and improved, rather than developing and implementing fixed 'blue print' development plans.

Source: Adapted from Dalal-Clayton and Bass, 2002

Countries such as Samoa, Fiji Islands, Papua New Guinea and Tuvalu have taken the first steps towards this by adopting a participatory approach to developing their national

sustainable development strategies. Key stakeholder groups at all levels were involved in the consultation process that led to the identification of vision, goal and broad strategies and priorities that became part of the national plan. In countries such as Fiji Islands and Samoa, NSDS -linked sectoral plans and priorities were also developed for some key sectors, although these did not involve coastal and marine resources.

While it is too early to assess the effectiveness of such an approach, some tangible benefits can be discerned. The Fiji Government, for example, has called for sector level corporate plans to be developed in such a way that they closely reflect the priorities agreed to in the national strategic plan, and development projects and activities that focus on community-level outcomes. Samoa is using priorities identified during the development process and its national development strategy to achieve sector-wide donor round table agreements that harness and co-ordinate development partner support.

Recently, Tuvalu adopted a similar approach in relation to its education and health sectors in its annual donor round table discussion. As a result of this initiative, during the July 2007 donor round table talks, the Tuvalu Government was able to get a commitment from Australia and New Zealand to support its key education priorities for the first time in three years. Australia also provided indicative support for key priorities in the health sector, even though the sector was not listed as a priority area for Australia's bilateral support. By developing a prioritised list of activities for the health sector, together with a justification of the priorities, it was possible for the Tuvalu Government to argue for, and the donors to understand, the relevance of financial support under its fiscal management category of bilateral support.

At the donor round table, Australia and New Zealand, in particular, supported the priorities identified by the Government and asked for concept notes on each of the initiatives, with an indicative cost. During a follow-up meeting with AusAID and NZAID, the programme of priorities identified for 2008 has been given 'in principle' support, with at least three initiatives identified as 'early wins'.

Ecosystem-based management

A similar NSDS approach could also be adopted for the marine sector, together with an ecosystem-based approach. For the marine and coastal sectoral planning process, the use of an ecosystem-based approach could help address the issue of institutional misfit between ecological connectivity and government institutional arrangements. Pacific island countries have endorsed in principle the ecosystem-based management approach to coastal and offshore fisheries management. Ecosystem management is a process that integrates biological, social and economic factors into a comprehensive strategy aimed at protecting and enhancing sustainability, diversity and productivity of natural resources. The Ecological Society of America has identified eight key elements of EBM, guided by four key principles (Box 4.5).

Box 4.5. Core elements and guiding principles of ecosystem-based management

Core elements

1. **Sustainability:** Ecosystem-based management does not focus primarily on deliverables, but rather regards intergenerational sustainability as a precondition.
2. **Goals:** EBM establishes measurable goals that specify future processes and outcomes necessary for sustainability.
3. **Sound ecological models and understanding:** EBM relies on research performed at all levels of ecological organisation.
4. **Complexity and connectedness:** EBM recognises that biological diversity and structural complexity strengthen ecosystems against disturbance and supply the genetic resources necessary to adapt to long-term change.
5. **The dynamic character of ecosystems:** Recognising that change and evolution are inherent in ecosystem sustainability, EBM avoids attempts to freeze ecosystems in a particular configuration.
6. **Context and scale:** Ecosystem processes operate over a wide range of spatial and temporal scales, and their behaviour at any given location is influenced by surrounding systems. Thus, there is no single appropriate scale for management.
7. **Human beings as ecosystem components:** EBS values the active role of humans in achieving sustainable management goals.
8. **Adaptability and accountability:** EBM acknowledges that current knowledge and paradigms of ecosystem functions are provisional, incomplete and subject to change. Management approaches must be viewed as hypotheses to be tested by research and monitoring programmes.

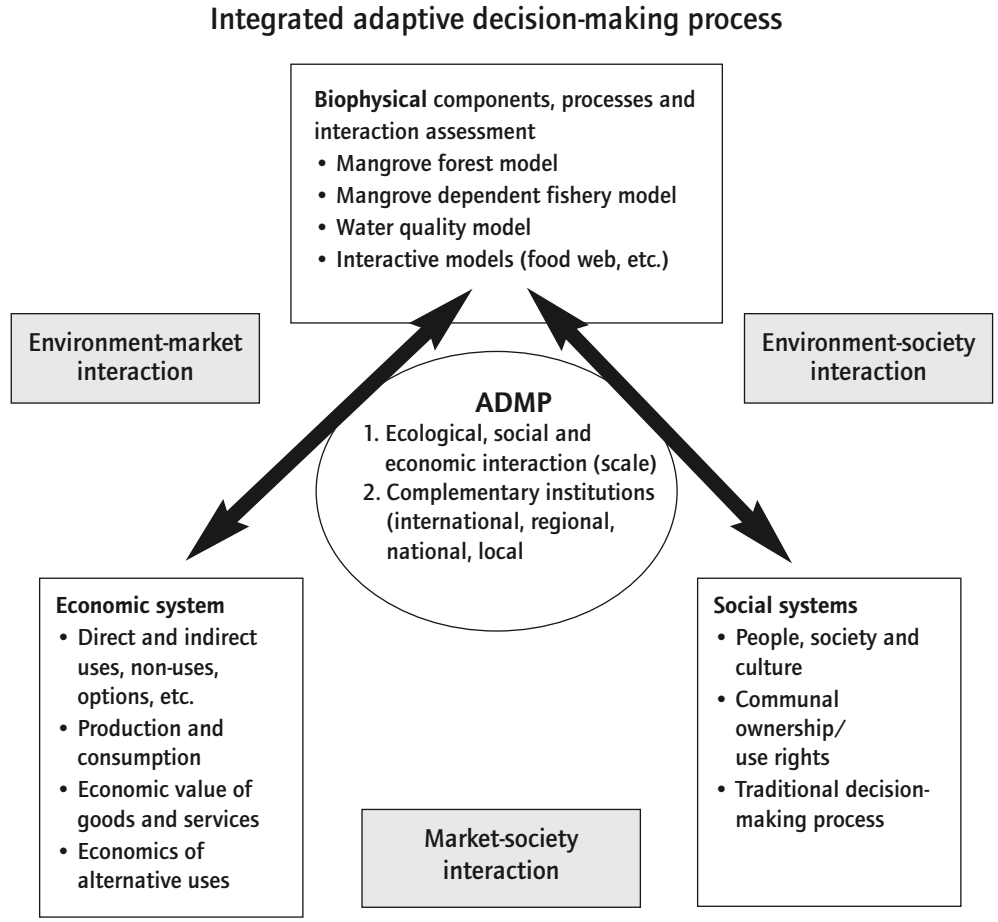
Guiding principles

- **Partnerships and citizen participation:** Work together with citizens, landowners, businesses, local governments, interested organisations and other agencies to address issues, identify opportunities and find common solutions.
- **Science-based approach:** Use the best available scientific knowledge (ecological, social and economic) as a foundation for decision-making and understanding natural resource relationships; focus on the sustainability of ecological systems.
- **Long-term view:** Establish long-term targets for desired ecosystem conditions that maintain the capacity of the land to sustain public benefits and opportunities.
- **Comprehensive perspective:** Find solutions that support economic prosperity, lasting livelihoods, and ecological health and sustainability.

Source: Ecological Society of America, 2005, 'Principles of Ecosystem Based Management' and 'Overview of Ecosystem Based Management', http://www.michigan.gov/dnr, accessed on 30 October 2005

The principles articulated in EBM are in many respects similar to the core guiding principles identified in the various regional policies, frameworks of action and plans already endorsed by the region. For example, when adopting the EBM approach under the Pacific Islands Regional Ocean Policy (Table 4.2), in the management of coastal mangroves, one would explicitly address each of the elements of the three pillars (biophysical, economic and social) and the interactions among them, as well as the underlying institution such as communal resource ownership, use and management rights as summarised in Figure 4.1). One would also identify management strategies that include organisational co-operation and economic instruments, complemented by formal rules and regulations supported by appropriate legislation and by-laws ((Lal, 2002).

Figure 4.1: Ecosystem-based management framework for making integrated adaptive decisions



Source: Lal, 2002

Such an approach will help systematically identify and analyse:

- Relevant government stakeholders, community stakeholders, including resource owners, and users who need to be involved in decision-making processes; and
- The dynamics of and interactions between the environment and society and between the market and society, as well as market forces and the environment, to identify the root causes of observed resources and environment status and to identify appropriate management strategies at national, regional and local levels.

It will also help managers take into account scientific and economic policy analysis and appropriate management approaches, from incentive-based management to command and control.

Several agencies in the region have explicitly embraced EBM, including the Forum Fisheries Agency and the World Wildlife Fund-Fiji. FFA, as part of its 2004 corporate plan, explicitly identified ecosystem-based tuna fisheries management and is working on developing specific country-focused work programmes. The World Wildlife Fund-Fiji is currently working with one of the local communities in the north of the island to develop a community-based network of marine protected areas, adopting an EBM framework.

National sustainable development strategy ecosystem-based management approach

Although EBM is in its early days, it shows promise in bringing together a number of apparently disparate strands – participatory, whole-of-country, intersectoral and integrated interdisciplinary and programmatic approaches that reflect the local and national social, economic and institutional context, as well as the international commitments made by member countries.

With the adoption of NSDS-linked sectoral plans and priorities and guided by EBM approaches, member countries hope to be in a strong position to mainstream the three pillars of sustainable development more systematically at all levels. This could also help to:

- Increase the effectiveness of limited national resources by directly linking national priorities to sector and community-level priorities;
- Increase the transparency and accountability of the government's budgetary decisions and development efforts;
- Guide a country in accessing development partner assistance that is consistent with its national priorities and complements its own efforts;
- Minimise the transaction costs of dealing with development partner assistance by serving as a platform for confidently negotiating with development partners and encouraging more joint, or at least co-ordinated and complementary, activities.

In effect, the use of the NSDS-EBM approach can help Pacific island countries in directly taking ownership of their own national development. Such an approach is expected to help countries better co-ordinate and complement their own development efforts with those provided by development partners, in addressing high priority projects and programmes.

Regional co-ordination and the Pacific Plan

The Pacific island states have endorsed the Pacific Islands Regional Oceans Policy, prepared with the assistance of regional organisations and development partners, to 'promote the Pacific region as an ocean environment in support of sustainable development'. The policy is based on the region's collective awareness of the transboundary and dynamic nature of the Pacific Ocean, the increasing number and severity of threats to its long-term integrity and the reality that sustainable economic and social development will be dependent on wise use of the ocean and its resources. It is also based on an awareness of the potential for fragmentation of programmes and for conflicting commitments in different sectors as ocean-related activities increase. This requires increased regional collaborative arrangements among Pacific island communities.

It highlights, as mentioned above, key principles and strategies: improving our understanding of the ocean; sustainably developing and managing the use of ocean resources; maintaining the health of the ocean; promoting its peaceful use; and creating partnerships and promoting co-operation. The PIROP is intended to guide member countries towards realising the vision of a healthy ocean that sustains the livelihoods and aspirations of Pacific island communities.

Although the PRIOP was endorsed in 2004, its implementation at national level has been limited to *ad hoc* individual projects, which usually depend on external resources. The Plan needs to be operationalised at national level, with countries systematically developing their own marine and ocean policies in a way that reflects its guiding principles. These national action plans should be linked to national development plans, NSDS and national budgetary processes.

The Pacific Plan

Building on regional activities over the last four or five decades, the Pacific region entered into a new era of regionalism in 2004. The 2004 Forum Leaders Meeting endorsed the development and implementation of the Pacific Plan. The Pacific Plan articulates the philosophy of creating stronger and deeper links among sovereign countries through regional co-operation and integration where they add value to national efforts, without compromising sovereign rights, responsibilities and obligations.

The main goal of the Pacific Plan is to enhance and stimulate economic growth, sustainable development, good governance and security through regionalism. Regionalism is defined as countries working together for their joint and individual benefit, and regional organisations' and development partners' support is aimed at complementing national development efforts.

The Pacific Plan identifies a number of regional activities, such as regional trade agreements, that will encourage expanded access to markets for Pacific goods, easier access to international financing, and greater co-ordination and harmonisation of development partner support. In the light of limited financial and human resources and technical capacity in the use of tools and models for addressing complex environmental and resource problems, increased co-ordination and harmonisation of services provided by the CROP agencies is also expected under the Plan.

This is a real challenge since much of the expertise is scattered across several regional agencies, located on seven campuses and resides in four different countries. In an effort to bring about co-ordination, the CROP agencies have recently agreed to undertake joint programming, an approach that was endorsed at the Forum Leaders Meeting in 2005 and reaffirmed in 2007. The challenge now is to put this into practice and collectively identify and implement technical assistance to member countries that is holistic, interdisciplinary and reflects the links between science, economics, policy and human activity.

Conclusion

The Pacific member countries are in a strong position to systematically address their national development goals using their own resources and development partner support, as recognised in their vision statement. With the strengthening of their national sustainable development strategies and the NSDS-linked ocean and marine sector action plan, they will be able to address the needs and aspirations of their peoples, using their limited domestic resources and co-ordinating and more effectively managing development partner assistance.

Sustainable development is a national responsibility, but due to limited financial and human resources, the Pacific island countries acknowledge that they cannot achieve it without support from development partners, regional institutions and NGOs. This is particularly relevant in relation to ocean and marine resources, because of the ecological connectivity that links the region.

In realising the vision of a peaceful region, the sustainable development of its natural resources and environment, including marine and coastal resources, is central. Through sustainable development, countries can expect in the long run to achieve their national development goals of poverty alleviation, equitable distribution of economic wealth, and minimising local conflict and threats to national security. It is also realised that in a globalised system, and because of the connections between the environment, economy and social systems, challenges in natural resource and environment management are multifaceted and multidimensional, involving issues at local, national, regional and international levels.

There is a growing awareness that one of the key obstacles to sustainable development in the Pacific is institutional and governance structures, and decision-making processes at all levels. At the national level, key constraints relate to institutional issues,

such as the lack of co-ordinated policies, strategies and lack of an integrated planning system that encourages the mainstreaming of environmental and social considerations in economic decision-making, as well as mainstreaming economic and social issues in environmental protection decisions. The mandate for action on the three pillars often rests with different organisations. Organisational arrangements are fragmented, with different government agencies focusing on different sectors, issues and policy aspects – a legacy of their colonial heritage.

Over the last decade and half in particular, the Pacific island countries have also acknowledged that social and economic development is inextricably linked to the sustainability of land and marine resources and the environment. Long-term sustainability is dependent on conservation (i.e. wise use and management) of marine and land-based resources and environment. The countries also recognise that human health, particularly in atoll island states, is directly also influenced by environmental pollution resulting from poor management of solid and liquid wastes of human and animal origin. In the long run, the resilience of local economies and communities in the face of external natural and market forces will rely on the health of the environment and the economy and their capacity to respond to and recover from the effects of these influences.

Realising the interdependence of social and economic well-being and environmental health, the Pacific island states have embraced the principles of sustainable development and good governance, and adopted ecosystem-based management. They acknowledge that the overarching objectives and essential requirements for sustainable development are poverty eradication, changing unsustainable patterns of production and consumption, and protecting the natural resource base of economic and social development. Bringing about such changes requires broad stakeholder consultation and participation in decision-making processes. At the regional and international level, also, there is a growing awareness of the need for increased co-ordination and collaboration among donors and service providers. A number of declarations, regional policies and strategies have been developed to identify what needs to be done.

The time has come to focus on the 'how' aspects of operationalising sustainable development, regional policies and frameworks, together with internationally agreed guiding principles for donor harmonisation at the national level.

To ensure that countries can achieve their desired national development goals in a cost-effective manner, a change is needed in the mindset of decision-makers at all levels. A shift towards a programmatic approach to development and the adoption of ecosystem-based adaptive management is also required. Such a shift in mindset and approach is needed within countries, as well in regional and international organisations.

A beginning has been made. The Pacific island countries have taken the first few steps towards adopting a two-pronged approach to national development – participatory NSDS-based planning and resource allocation at all levels, and participatory community-based economic development and environment conservation in an ecosystem management context. These can be further built on with the assistance of regional organisations and the support of development partners under the Pacific Plan.

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5

Renewable Energy and Energy Efficiency in Small States

David Barrett

Introduction

It has long been recognised that the sustainable supply of energy services is an imperative which delineates the viable developmental options which any sovereign island nation can select as it provides for current and future generations. Energy services – *the appropriate use of energy to achieve desired productive outputs* – play a crucial role in facilitating the implementation of nation-specific options for all small island developing state regions.

Implicit in the sustainable development of SIDS are global economic issues which give rise to special vulnerabilities, as identified in the 1994 Barbados Programme of Action. Strategies for economic survival and success include: the production of value added products as a competitive alternative to high volumes and low prices; niche marketing as a competitive strategy; producing an educated, skilled and trainable workforce to attract higher paying jobs and technologically driven markets; efficiency, productivity and energy conservation to maximise foreign exchange earning and retention while improving self-reliance; import substitution; and improving energy security.[1] The development of viable industries is also a critical component of sustainable economic development. All these strategies are energy dependent.

Sustainable social targets are also energy driven to a large degree. Strategies for improving the quality of life include modern, convenient and safe energy supplies, less labour intensive tasks, modern transportation services, up-to-date effective health services, improved life expectancy, effective education, reduction of poverty, improvement of national security, increasing food supplies and providing recreational or inspirational settings conducive to emotional health. These are are all energy reliant.

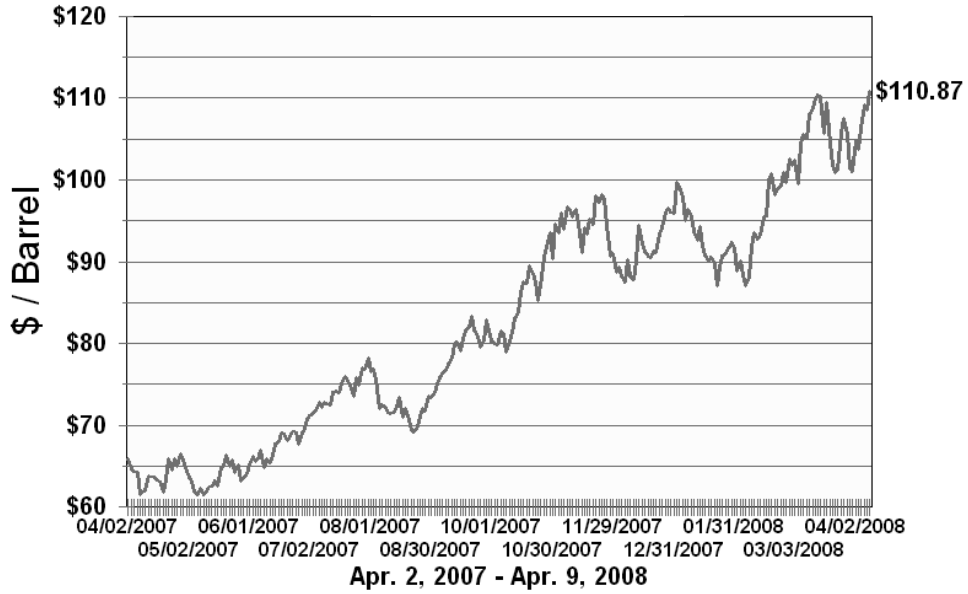
Environmental health depends on sustainable and cost-competitive energy options, careful selection of mechanisation for sustainable livelihoods, energy resources with fewer environmental aspects, lower and reversible impacts, and a reduced need for end-of-pipe treatment. In addition, energy options used for addressing environmental impacts should produce economic, energetic and productive collaterals.

Critically, the global phenomenon of climate change, to which SIDS are particularly vulnerable, is energy derived and exogenous. Collaboration in global energy strategies by SIDS is a proactive stance which addresses this concern.

Driving forces for implementing non-conventional energy options

The growing need for adequate energy services has been somewhat stymied as the conventional fossil fuels on which SIDS have depended are rapidly failing in volume of supply, stability of affordable prices and reliability of supplies.

Figure 5.1. NYMEX crude oil futures close (front month)



Source: WTRG Economics, www.wtrg.com

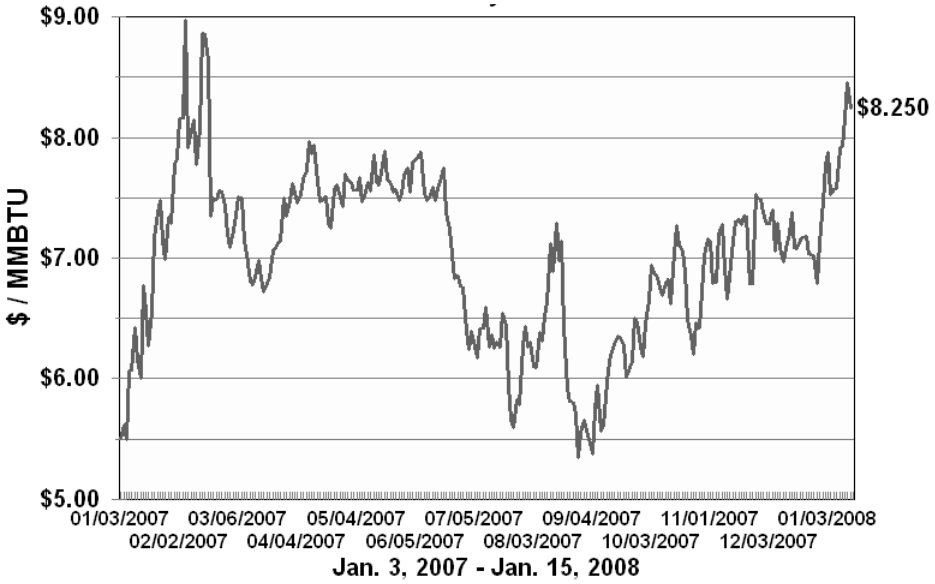
On the supply side, the energy security of SIDS is affected by the global scenario. World forecasts[2] project a demand of 87.5 million barrels per day (bpd) with supplies of only 86.4 million bpd (Standard Bank, 2005). This represents a 1.5 million bpd supply cushion or 2 per cent of 2005 global demand, which could easily be absorbed by the average global demand growth of approximately 2 per cent. We now live in the reality of the oil peak,[3] where the rate of new discoveries and production lags behind the rate of consumption of fossil fuels. Supply issues are aggravated by:

- Diminishing spare capacity of the Organisation of Petroleum Exporting Countries (OPEC);
- Pressure on lighter sweet crude, such as West Texas Intermediate (WTI) and Brent benchmarks for higher environmental and performance specifications, as proportionately more heavy and medium-sour crude is found;
- Decline of major non-OPEC production areas, such as the North Sea, US Gulf of Mexico and Alaska;

- Disruption of supplies by volatile geopolitical conditions and unpredictable weather incidents;
- Rapid economic growth of developing and industrialised nations;
- Aged infrastructure and decline in new exploration and refinery investments.

These factors have not only caused oil prices to break old price thresholds, but also created a new threshold of US$100/barrel (bbl) and sustained new price floors of US$30–35/bbl.[4] Now, more than ever, SIDS are reminded that 'energy dependence is a major source of economic vulnerability'.[5] Volatile fossil fuel prices have significantly challenged national development planning and economic strategies. In Jamaica, for instance, approximately 90 per cent of the energy mix comes from imported energy. Jamaica's current ability to meet developmental targets is severely hampered by the consumption of 65–70 per cent of its export foreign exchange earnings, or more than 15 per cent of its GDP, to import over 25.7 million barrels of petroleum products. Similarly, up to 40 per cent of national budgets, and 46 per cent of total national revenues, of Pacific islands are spent on the import of fossil fuels.

Figure 5.2. Natural Gas Spot: Henry Hub



Source: WTRG Economics, www.wtrg.com

Natural gas, a more price stable product over the long term, has surrendered to the vicissitudes of price movements. Though more steady in the market, coal prices have also risen dramatically. Continued dependence on fossil fuels is therefore contrary to energy security, not only because of price fluctuations, but because of other factors, not the least of which is climate change.

International efforts to stem global warming by reducing the use of fossil fuels have raised the demand for renewable energy, non-petroleum fuels and fuel blends, including biofuels. Stand-alone or distributed generation systems have also become a preferred option, because they are cleaner, less impacting and more viable.

In this context, the strategic sustainable development of SIDS lies firstly in the concurrent and strategic actions of:

1. Reducing the rate of growth of energy consumption (energy conservation); and

2. Producing more high value outputs from less energy (energy efficiency).

This is a near-term and sustainable solution for achieving full energy security, global competitiveness and rapid social and economic development against the backdrop of global energy events. Finance could initially be focused on making early large energy savings on the supply side to large-scale commercial and industrial sectors which skew national energy demand, e.g. heat and power demands by hotels, sugar cane processing and minerals, followed by transportation and domestic consumers. The proportion of energy costs relative to total production costs in the cement industry, for example, is approximately 55 per cent. However, the potential energy savings could be 10–50 per cent depending on energy efficiency and conservation application (Wright, 2003). In Jamaica, where the cement industry is responsible for coal imports equivalent to 1.2 per cent of national energy consumption, energy efficiency provides an opportunity for significant savings; bauxite/alumina processing consumes over 36 per cent of petroleum imports and has been responsible for a 50 per cent increase in energy intensity. Transportation, and commercial and residential buildings may consume in the order of 20 per cent and 30 per cent, respectively, of the energy used in island economies.

Secondly, the strategic sustainable development of SIDS should involve near-term application of renewable energy technologies (RET) (e.g. cogeneration and biofuels) to provide the additional energy required to close the gap between the current energy baseline demand and future demand. In the near- to long-term, renewables should also be used as a strategic option to replace fossil fuel when old systems are to be decommissioned and in meeting graduated fuel switching, especially in industry and transportation. The application of concepts of import substitution (Bruton, 1998) to energy security suggests that SIDS must protect their economies from harmful dependence on imported energy by harnessing an array of indigenous energy options to replace what they would otherwise import. The emphasis should be on increased energy self-reliance, as opposed to the exclusion of imports, as energy demand and supply must be met for development to be continuous.

Intra-regional collaboration and effective national policies are also crucial in accelerating implementation across SIDS in any given region.

Energy status of SIDS

With few exceptions, SIDS from the Caribbean to the Pacific are predominantly energy

(petroleum) importers and therefore energy insecure. Islands approaching 'sustainable energy island' status may include Faroe Island, Denmark, where wind supplies 100 per cent of electricity; Yakushima, Japan, where over 80 per cent of electricity comes from renewable energy technologies, especially hydro (56 MW); Dominican Republic with 45 per cent hydro (220 MW); and Guadeloupe, which utilises its wind (2 MW) and geothermal (5 MW) potential. On a smaller scale, Dominica's hydro resources (7.6 MW) provide more than 50 per cent of the total energy supplied to the national grid; in the French Overseas Departments, 45 per cent of fuel imports are from fossil fuels, and the balance comes from renewable energy technologies, including wind and hydropower.

More typical, though, is a low level of energy security predicated on fossil fuel imports. In CARICOM, hydrocarbons accounted for around 95 per cent of total primary energy supply, with renewables accounting for approximately 5 per cent (Detlef and Coviello, 2005; CARICOM Energy Policy, 2007). The US Virgin Islands depend on imported energy for 99 per cent of their needs and in some Pacific islands petroleum products account for almost 80 per cent of primary commercial energy consumption, while renewable energy technologies – mostly hydro – contribute less than 10 per cent of energy use (SPREP, 2006). The economic costs of failing to use indigenous renewable energy are inflationary prices induced by imported energy costs and reduced price competitiveness in global markets. The social cost is stagnation in health services, education and security, as debt repayments consume a greater portion of government national spending. The environmental challenge is failure to arrest natural resource damage induced by the transportation, storage and use of fossil fuels.

SIDS such as Jamaica and Grenada hope to improve energy security rapidly from potential oil and gas finds; others, such as Trinidad, Cuba and Barbados, hope to augment their current petroleum resources through exploration within their territories. However, these options are highly risky and expensive; prospects are assumed to be minor and cannot easily attract investment from oil and gas companies with the requisite financial and technical resources to make this a present reality. Although the option of new finds should not be excluded, energy efficiency and conservation, together with renewable energy technologies, remains the sure near-future option for SIDS. Energy security should therefore include utilising localised wind, geothermal and biomass options, proven for industrial, commercial and domestic uses, and petroleum for existing infrastructure. Solar and hydro will also be critical resources in meeting domestic and commercial demand.

Energy efficiency and conservation – the first line of defence

Energy efficiency plus conservation is an immediate to long-term strategy for SIDS to improve their market competitiveness. As energy prices increase, there is an external opportunity for energy efficient sectors within SIDS to maintain or increase production levels and profitability against less efficient counterparts (Wright, 2003). Efficient operations also lead to less environmental impacts, as pollution prevention and reduction techniques are successfully applied. Appropriate technologies and best practices for

energy efficiency and conservation can often be implemented in one or two years, as opposed to some large scale renewable energy technology projects, which may require between two and four years from feasibility study to operation. Energy efficiency and conservation not only reduces expenditure (making monies available for other key areas of national development such as education, health and social services), but allows for productivity levels that meet international benchmarks. EE&C gains can be most dramatic for SIDS with high energy costs (the Caribbean mean average cost is US$0.17/kWh) (Escalante, 2003), high industrial energy demands and vulnerability to oil price shocks.

Replacement of the EU/ACP sugar protocol from 1 January 2008 may impact on Caribbean sugar production, an important sector with high heat and power demands, with 'sudden' 37 per cent price cuts, market uncertainties and heightened competition from the entry into the EU market of new lower-cost ACP producers. In response, on-site cogeneration[6] and trigeneration in the sugar cane industry could be a potential internal strength to increase overall factory efficiencies by up to 80 per cent, reduce costs, provide additional income streams and, at a minimum, maintain market share. Incentives for EE&C in the CARICOM cane industry alone could mean the saving of over 125,000 jobs and income of approximately US$300 million per annum.

The hotel industry is also a major foreign exchange earner for SIDS. Energy accounts for over 70 per cent of the total utility costs at typical hotels, with equipment, appliances, air-conditioning and lighting being significant contributors (Escalante, 2003). With simple inexpensive devices and practices, such as monitoring energy use, insulation, use of natural ventilation and lighting, occupancy sensors, compact fluorescent lighting (CFL) lamps, maintenance and weather-stripping, hotels can reduce electricity consumption per guest night by 10–24 per cent, and save up to 19 per cent of their total electricity use. These savings can occur in just 18 months, and some payback periods are as short as four months, depending on the intervention.

Potential savings for industrial and commercial consumers are easily achieved through energy monitoring (10 per cent), corrective and preventive maintenance (15–20 per cent), awareness (10 per cent), reduced air infiltration into conditioned spaces (10 per cent) and energy efficient lighting and retrofits (40 per cent) (Eaton Haughton, 2003). For utilities, savings can be made from the supply side by reducing generation and transmission losses (16–20 per cent in the Caribbean). The main consumers of electricity should be targeted for special programmes.

With sectors such as transportation consuming as much as a quarter of imported fossil fuels, interventions must transform cultural barriers over time. Air transportation may impact on SIDS less than ground transportation, as fuel supplies are distributed over various international ports of call; costs of fuel are borne mainly by international carriers and in some SIDS the percentage consumption is relatively low (approximately 6 per cent of the total in Jamaica, compared with 24 per cent for road and rail). More significantly, the association of mass transport with a lower quality of life, and large engine private vehicles as the converse, presents challenges. In this context, attempts at improving mass transit efficiencies (e.g. fuel switching to natural gas), introducing car-pooling

and vehicle fleet shifts towards electric, hybrid or flexi fuel vehicles may be unsuccessful. Other measures, such as linking duties with engine sizes and rated fuel mileage, lower toll/road charges for utilising optimal seating capacities and congestion charges in cities may induce EE&C practices for motorists.

Very important in cost savings for implementing EE&C is an 'upstream' approach, by incorporating these aspects into building design. Energy Efficiency Building Codes (EEBC) (e.g. EEBC-94 finalised and approved as a voluntary standard in Jamaica with funding from the World Bank and the Canadian International Development Agency (CIDA)) or the Leadership in Energy Efficiency Design (LEED) protocol are important tools for facilitating opportunities and rewards for the building industry and private sector entities. Such tools are said to be able to reduce energy consumption by 30–36 per cent per annum and shave electricity peak demand by 24–29 per cent with only an initial 5 per cent increase in building costs.

Another upstream approach is the creation of a demand for energy saving through the engagement of more energy services companies (ESCOs) and energy auditors. ESCOs are driven by performance contracts to generate quantifiable energy or other savings for their client. Hilton hotel chains within Barbados, the Bahamas, St Lucia and Puerto Rico have benefited from energy management interventions. Retrofit markets can also have a fast uptake (e.g. CFL lamps, water savers and motion sensors), where tax and other incentives are applied and public education is dynamic.

With the current cost of money, competition for development funds and reducing unit cost of production in a global market, regional collaboration among SIDS has become critical in order to efficiently and cost effectively fast track energy efficiency. This has been recognised both in the Pacific (by the Pacific Energy Ministers Meeting held in the Cook Islands in 2007) and the Caribbean. A CARICOM Charter on Energy Efficiency has been promulgated and member states have agreed to promote high-efficiency power generation technologies (including combined cycle and cogeneration) and best practice industry standards, with the aim of reducing system losses in generation, transmission and distribution (CARICOM Energy Policy, 2007). Among other initiatives, the Pacific Islands Energy for Sustainable Development (PIESD) programme is targeting the power utilities of 14 south Pacific ACP members in an attempt to decrease costs and fuel consumption and improve the efficiency of power production, transmission and distribution, with a target of 30 per cent reduction in losses using supply-side management projects (Fairbaim, 2004).

Status and potential for renewable energy technology use in SIDS

Globally, renewable energy investments continue to increase significantly, amounting to over US$38 billion in 2005.[7] In the context of this favourable global growth rate, the potential for harnessing and renewable energy technologies in island states have to be carefully examined against the background of available natural resources. Most SIDS have varied but limited endowments of renewable resources and may not have the

potential to harness more than 25–30 per cent of renewable energy technologies for their national energy mix. It is important that when RET are considered, energy efficiency and conservation outcomes are fully integrated, or they cannot be considered truly sustainable and could be potentially as damaging to economies and the environment as non-renewable resources.

Renewable energy technologies for SIDS, such as solar, biogas, biomass and wind, when implemented with EE&C considerations, allow for the avoidance or removal of greenhouse gases (GHG), as well as effluents and solid wastes.

Possibly the most prolific application of RET, and a competitive strength for tropical SIDS, is solar energy.[8] With falling photovoltaic (PV) module costs (approximately 30 per cent – 60 per cent of total system costs), at prices around US$5.50 per peak watt (DBEDT, 2006), there are no restrictions on the application of PV systems in Pacific, Caribbean, African and Indian SIDS, sited on the roofs of buildings or on the ground. In Hawaii, 309 kW has been installed on the Ford Island's navy building in Oahu; 25 public schools have rooftop PV systems (in Oahu, Maui and Hawaii's Big Island); and 209 kW has been installed at the Parker Ranch. All the systems are grid tied (*Star Bulletin*, 2007; Power Technology.com, 2007), in addition to several thousands which are in remote subdivisions not serviced by the utility grid. It has been projected that solar panels will be installed in several thousand new homes in Hawaii over the next few years, totalling 6MW and a commercial 167 kW generation plant is to be installed on the roof of the Hawaiian Electronic Company's Archer sub-station, servicing up to 200 homes (*Star Bulletin*, 2007). The ADMIRE (Actions for the Development of Marshall Islands Renewable Energy) programme has a target of over 2,000 PV installations, with some currently installed on Wothoo and Wodmej. These installations have already improved academic performance in schools and the productivity of fisherfolk (GSEII, 2007). Solar PV is a proven solution to the challenge of bringing electricity to remote rural areas.

Solar thermal, the most widely used RET application in the Caribbean (especially for solar water heaters (SWH)), is one of the best commercial opportunities for SIDS. Barbados has developed its SWH industry, encouraging manufacturers (e.g. Solar Dynamics, SunPower and AquaSol), distributors and retailers. Over 40,000 solar water heaters have been installed in homes, commercial businesses and hotels in Barbados. For hospitals needing large volumes of hot water and power, and in islands such as Jamaica, Barbados, Mauritius and Seychelles where the tourism industry is significant, economies of scale generate the most meaningful cost savings and cut fuel imports. Hotels and bed and breakfast accommodation, depending on size and season, may spend approximately 20–30 per cent of their electricity costs on water heating (EHMS, 2003). Domestic payback periods may be around 3–4 years, but for commercial utilisation they can be only 2–3 years, especially when electric heating is replaced.

Islands with large land masses, highly varied topography and elevations, and limited karst rocks tend to have some hydropower resources. Cuba (57 MW), Dominican Republic (220 MW), Dominica (7.6 MW) and Fiji Islands (90 MW), by virtue of their

topography, geology and land mass, have adequate rainfall and can utilise dams and run-of-the-river-type mini-hydropower systems. The theoretical potential of these islands (e.g. Dominica (25 MW), Jamaica (82 MW), Fiji Islands (400 MW), Cuba (650 MW) and Dominican Republic (1,800 MW)) is constrained in practice by competing social uses, ecological water demands and insufficient technical information for analysis of potential.

Some Caribbean SIDS (Jamaica, Curaçao, Bonaire, St Lucia and St Vincent) are geographically positioned to take advantage of localised wind sources (e.g. sea and land breezes, and mountain and valley winds) and the prevailing trade winds, blowing from east to west. Others, such as Cape Verde and some Pacific Islands, are also able to utilise their wind potential. Hawaii's mountainous topography and strategic location within the northern Pacific trade wind belt creates an excellent wind resource; several megawatts of wind power have been installed at Kahuku, Lalamilo and South Point on Hawaii Island (Kaya, 1999).

Geothermal is an important heat and power source for industrial applications and therefore may be significant in displacing fossil fuels for heat and power generation. Commercial and industrial geothermal potential is restricted mainly to SIDS on the volcanic ridges of an archipelago (e.g. Guadeloupe (5 MW)) where tectonic plates are spreading or colliding. Puna, on Hawaii Island at the edge of the Kilauea volcano, is said to have one of the most significant geothermal resources at 676°F (358°C). Nevis estimates its geothermal potential at 900 MW and will soon construct a 50 MW plant, 35 MW of which will be exported to its neighbours (Isaacs, 2008).

Commercial biomass fuel plantations (e.g. cane, corn and sorghum for bioethanol; Jatropa and coconuts for biodiesel; trees for fuelwood) are mostly suitable for larger SIDS (e.g. Mauritius, Cuba and Dominican Republic), as they require contiguous land space to minimise transportation costs and obtain economies of scale for production and maintenance. Smaller SIDS also face dwindling land space, with competition from housing, landfills and the need for open space. Pre-existing competence in large scale mono-crop production with power generation (e.g. sugar cane in Mauritius and Fiji Islands) is also important in the application of biomass fuels. In the case of cane, some capital infrastructural costs have been written off or reduced over years of operation, potentially reducing the cost of biomass power generation. Cellulosic feedstocks (as opposed to edible crops) grown on marginal lands, with increased CO^2 sequestration and lower fertiliser costs, can increase ethanol production. In conjunction with newer conversion technologies, cellulosic feed stocks such as switchgrass, miscanthus or sorghum may yield a total of 2,000 gallons per acre (assuming 20 tons harvested per acre), while edible corns may yield about 900 gallons of ethanol per acre (*Green Chip Review*, 2007).

Biogas, though an proven technology for heat and power generation, is not a significant option for the national energy mix as centralised effluent flows are typically small and often do not justify the capital costs. Larger projects, such as the Soapberry Wastewater project (Jamaica), will treat over 20,000 imperial gallons of wastewater per day, using state-of-the-art biological aerobic technology (Kelly, 2007).

In considering the sustainability of biofuels, therefore, it is important to take into account other issues such as opportunity costs, especially for export crops, reduction of food crops and the energy needed for production.

Advanced technologies such as Ocean Thermal Energy Conversion (OTEC)[9] may be considered by SIDS with steep island shelves and sufficient water temperature differentials near shore. Open cycle OTEC has been demonstrated in Cuba, and closed and open cycle OTEC in Hawaii (52 kW and 210 kW at Keahole Point). Possibly such cutting edge technologies, which are not yet convincingly proven, should be reserved until proven and less expensive technologies have been utilised.

From this menu of indigenous energy resources, RET applications should be customised to take into account local issues. It seems that commercial power generation and transportation offer the greatest potential for RET applications in the next decade. Domestic and commercial use of solar water heating could also be important, together with small amounts of PV. In the meantime, some SIDS are aggressively exploring their petroleum potential to achieve greater energy security and reduce energy imports, as part of a holistic and viable solution.

Overcoming barriers to the implementation of RET and EE&C

Several issues negatively affect the implementation and proliferation of RET and EE&C. They include:

- Inadequate policy support
- Absence of a dedicated and empowered champion for RET and EE&C
- Absence of appropriate financing and accounting practices
- Inadequate expertise in resource mobilisation
- Cross-sectoral issues
- Public education and public awareness
- Influence of utilities
- Competition for scarce resources
- Scale of resources.

Energy policy support

In the last 3–5 years there has been a concerted effort to develop (or document) local renewable energy policies or policies which have committed sections for RET and energy efficiency. Examples of such efforts include:

- Jamaica – revising the Jamaica Energy Sector Policy 2006 and completing a study, *Renewable Energies Potential in Jamaica* (UNECLAC, 2005);

- Cuba – Law of the Environment with encouragement for renewable energy and an 'energy revolution';
- Barbados – comprehensive energy policy with recent updates; and
- Regional efforts that have produced, for example, a draft CARICOM Energy Policy.

From these initiatives, conclusions can be drawn about the elements that effective energy policies promoting RET and EE&C might usefully include, such as:

- Planning and evaluation tools, such as energy forecasting and balancing;
- Clear legislative and regulatory directives;
- Various financial incentives and special financing mechanisms for RET & EE&C in all sectors, including equity with existing incentives (such as subsidies) to existing users of conventional fuel, and differential taxation based on energy efficiency, availability and appropriateness;
- Contractually linked or binding specific targets for RET and EE&C applications, especially for the heat and power sector, including cogeneration and combined cycle technologies;
- Power generation incentives, including feed-in tariffs, capital subsidies, grants or rebates, special duties and tax concessions or credits;
- Net metering and net billing options for small distributed generation applications;
- Reduced or weighted influence of utilities in bid evaluation and selection for new generation;
- Public education, including development of a trained and skilled workforce;
- The development of market mechanisms for GHG emission reductions;
- Stimulation of upstream RET and EE&C demands (e.g. EEBC as a regulatory standard);
- Updated and appropriate emissions and fuel quality standards for all sectors;
- Use of RET for rural electrification;
- Development of appropriate models for energy sector liberalisation, decentralisation and privatisation;
- Use of full cost accounting and benefit cost to evaluate proposed new installations – accounting should consider all aspects of sustainability.

The result of clear policies and political will be the proliferation of RET and EE&C nationwide, as can be seen in Cuba and Japan. The Cuban energy revolution (a government policy) facilitated savings of approximately US$1 billion per year from RET, including 1,000 MW of wind, solar and hydro power (James, 2007).

A dedicated and empowered champion of RET and EE

The strategy of an 'internal catalyst'[10] (i.e. internal to the sovereign state) is a proven means of achieving RET and EE&C policy targets, and sustainable consumption and production targets. Without a sustained (over 10 years) agency, 'genetically linked' to the governments of SIDS to drive the objectives, a surge in implementation and cultural shift will not be achieved. Commitment and dedication must be endogenous factors for sustainability. While the private sector grapples with inherent conflicts between profit objectives and environmental and social responsibilities, central government is driven towards the development of social, environmental and political agendas with limited economic resources. NGOs and civil society do not have sufficient political and legislative influence or funding to achieve a sustained outcome. The profile of the champion or internal catalyst should therefore be a hybrid, drawing on the strengths of these three groups. With its origin in government, it needs private sector decision-making power and financing, and the liberty to lobby. This internal catalyst must have a clear transforming vision to catalyse sustainable consumption and production imperatives.

In the case of Jamaica, the champion was the Petroleum Corporation of Jamaica (PCJ). In Japan it was the New Energy and Industrial Technology Development Organisation (NEDO) and in the French Overseas Departments (Guadeloupe, Martinique, Réunion Island and French Guiana) it was Agence de l'environnement et de la maîtrise de l'énergie (ADEME).

The PCJ has a legal mandate for implementing the national energy policy, owns the nation's petroleum refinery (Petrojam Ltd) and petroleum marketing subsidiary (Petcom), both of which compete with private sector entities. It also regulates the current campaigns for oil and gas exploration. It lobbies for a reduction of Jamaica's high energy intensity, improvement in energy security and utilisation of supply and demand-side management techniques to increase energy self-reliance. In the French Overseas Departments ADEME, a public agency under three ministries, is committed to energy, research and the environment. It collaborates closely with public sector partners on research, with the European Commission on market incentives and with various councils for local implementation. Where there is no internal catalyst or champion for RET and EE&C, the successes demonstrated by these institutions in promoting RET and EE&C are not as likely to occur or be sustained.

Appropriate energy financing and the use of traditional accounting methods

The cost of renewables cannot be measured by monetised values alone, but must also incorporate the emergent negative and positive externalities. Whereas the capital outlay for RET options may be considered more expensive than that for traditional fossil fuels, full cost accounting methods (considering associated fuel generation, transport, storage, use and disposal issues) can show that renewables are competitive over the full lifecycle of the fuel. In this context, Jamaica's 20.7 MW wind farm, which received a grant of US$7 million to achieve energy costs of 5.6 cents/kWh, plus an estimated

income of US$3.1 million between 2004 and 2012 for certified emission reductions, is competitive with a fossil option. Interestingly, the typical threshold of 5–7 cents/kWh for the acceptance of some power generation projects using fossil fuels does not reflect the electricity prices of 20–35 cents/kWh experienced in many SIDS.

Biomass, using fuel cane, bagasse cogeneration and bio-ethanol production, will be critical in improving the US$300 million earnings and saving 125,000 cane industry jobs in CARICOM. Currently in Jamaica, wet ethanol is imported for the production and export of 100 million gallons of fuel grade anhydrous bioethanol (60 million gallons from Jamaica Broilers Group Ltd, a private sector agro-industry company). Local production of feedstock is the route to optimise social and economic gains. Prices are increasing from 85 cents/gallon in Brazil to $1.9/gallon in the USA and $2.8 /gallon in Hawaii (with production incentives and tax credits equal to about 4 cents per gallon),[11] making bioethanol more lucrative as a fuel.

Special low-cost loan facilities should be made available for RET and EE&C applications, recognising the cost savings in externalities and import substitution, and the potential for economic gains such as certified emission reductions (CERs) and employment benefits. ESCOs could also be utilised to create value-added linkages between improved efficiencies and investment dollars. The French Overseas Departments have made use of innovative fiscal incentives to proliferate wind and solar technologies. Long-term domestic loan facilities could be made available to residential users (e.g. in Jamaica, the National Housing Trust offers low interest long-term loans for solar water heating). As a tool to encourage serious EE&C applications, banks could consider energy audits before granting loans to business operations. Fiscal support should also be considered for local industries, including concessions, duty free import of SWH materials and partial or full tax deductions to consumers for the cost of heaters (UNDESA, 2000). With such support, Barbados has now become the largest CARICOM producer of solar water heaters, and has the biggest number of installed units per capita (1 unit per 18 households). Energy funds on a revolving basis can assist in providing capacity building in energy efficiency technologies, support small projects and drive market development. Special financiers such as E+Co can provide equity, loans, security and lines of credit from start-up through to implementation. Funds are available to ESCOs, financiers and end-users.

Whereas SIDS are often funded from external sources, it is important to ensure that national priorities and drivers are given sufficient weighting in selecting projects and providing fiscal incentives. The agreement on a Caribbean Single Market and Economy, growing support for PetroCaribe and a suspension of the common external tariff in the Caribbean Region are opportunities to explore the bundling of clean development mechanism projects under the Kyoto Protocol, so as to attain a critical mass of CERs which will enable projects from small states to enter the commodities market.

Adequate expertise for resource mobilisation

The application process for funding of □200 million through the EU Energy Initiative was so complex that only 10 per cent of SIDS were able to apply and those that did so needed European consultancies (GSII, 2007). Available funding without simplified procedures for proposal preparation or special assistance as part of the funding offer presents a barrier to the proliferation of RET.

Capacity building is also needed to develop engineering designs and modelling for project proposals, feasibility studies and business plans which are specifically suited for the peculiarities of SIDS. Historically, the economies of SIDS were managed on an expense budget as the offshore interests of empires, instead of on a 'zero' budget basis, and this may have reduced innovations in sourcing funds. Many SIDS are trailing behind European and North American states in their ability to mobilise resources. On the other hand, some SIDS have developed the competence and expertise to access clean development mechanism (CDM) financing for projects. Pacific Hydro negotiated CER carbon credits from the Netherlands-based ABN-Ambro for its Wainikasou and Vaturu (Fiji Islands) hydro projects; the Wigton Windfarm (Jamaica) also successfully negotiated financing from the Dutch Government (Dutch Development and Environment Related Export Transactions Programme) via an Oret/Miliev grant. Where experience has been gained, countries should make their expertise available to member SIDS as a gesture of goodwill, and also to attract further funding for their region by developing a positive investment climate for developed and industrial nations seeking locations for projects.

Harnessing cross-sectoral initiatives

Traditionally, synergies were not created between the sectors that generated and those that consumed energy. For example, cogeneration developed as a method of disposing of bagasse as solid waste. This should be be made efficient so that the sugar cane industry can produce ethanol and power from cogeneration for the power, spirits and transportation sectors, creating employment in each sector. Similarly, waste disposal in landfills should be transformed into a source of energy. New technology has made it possible to produce ethanol from cellulosic wood mass in a second generation biomass-to-liquids technology, thereby utilising waste biomass from forestry and agricultural processes, and the furniture industry (James, 2007). Similarly, the production of biodiesel (using Jatropa curca) in Dominican Republic, or over 100,000 gallons of coconut based biodiesel from the Tobolar coconut industry (GSII, 2007), can provide fuel for transportation, reducing imported diesel fuel and sulphur emissions, while creating employment opportunities in agriculture, processing and exports. Hydropower can provide irrigation, domestic water and power (as, for example, in the proposed Blue Mountain Multipurpose Scheme).

Public education and awareness

Staff awareness of EE&C technologies and practices in the hotel industry can generate a 10 per cent savings in energy costs. Awareness at every level, from the board room to

Parliament, will help to capture opportunities and benefits in using RET and EE&C for a number of reasons:

- In many cases the shift to RET and EE&C is a cultural one – cultural shifts may occur in the short term, but for them to be sustained, behaviour must be reinforced continuously;
- Advantages gained for conventional fuels (lower prices or the addition of new fuels to the energy mix, such as natural gas) may detract from renewables and EE&C;
- Creating awareness among the younger generation is essential to the creation of a sustainable cultural pattern;
- Technologies are changing rapidly and the benefits should be grasped to maximise new opportunities;
- On the expiry of the useful life of equipment that generates power from existing fossil fuel technologies, opportunities will emerge for new investments. Both local and foreign investors should have the appropriate knowledge to make decisions which yield optimal results (including social, economic and environmental benefits).

Public education should include a range of informal to formal educational options and deliver both information and competence for sustainability.

Influence of utility companies

Another barrier faced by RET is the influence of power generation and transmission companies. While there have been various degrees of privatisation, unbundling of monopolies and deregulation of the power sector in many SIDS, utilities continue to hold licences for large blocks of electricity supply and usually for all transmission. A small state's total power demand is often insufficient to make generation commercially viable for more than one generator, and dividing transmission would be unwieldy. This exerts an unusual influence on regulators and energy ministries to provide special consideration for the technical and fuel preferences of the operators over large blocks of generation using 'familiar' conventional fuel technologies. In some cases, the utility company is a deciding member of bodies that select new generation proposals. Energy efficiency may be seen by some to be contrary to the core business of energy supply and often EE&C is valuable in periods when expansion is not economically feasible and buffer capacity is approaching a critical low. While recognising the limits of competition in SIDS, it is also important that government interventions lead the way to national benefits, with the utilities acting in a supportive role.

Competition for scarce resources

The demand for renewable fuel sources often competes with other social, economic or environmental demands and may naturally limit which RET can be implemented. The

diffused nature of renewable energy sources such as solar and wind, as compared with the more energy-dense fossil fuels, also means that RET typically need to concentrate the energy source (using large volumes of water, hectares of space or multiples of turbines) before it can be applied in commercial settings. Competition for resources is therefore heightened and sometimes conventional energy-dense fuels are selected over RET. For example, hydropower considerations must now reserve 'environmental' and 'social' water demands (i.e. the minimum flows needed to maintain healthy ecosystem functions, social use or recreational benefits), as stipulated by water resources management agencies. This can affect projections of the economic viability of projects. Biomass plantations may compete with high-value crops for land and wind farm sites may compete with aesthetic features, especially in coastal areas.

The challenge of scale

With small populations and limited land space and surface water, the resources available for renewable options are often small compared with those in industrialised nations. For centralised power generation, waste-to-energy and other technologies, small populations may not provide adequate economies of scale to make investment attractive. Numerous feasibility assessments of the potential for using Jamaica's 900,000 annual tonnes of waste have determined that this is too small to fuel commercially attractive generation systems. Technologically advanced smaller modular systems can now utilise as little as 250,000 tons per year with an investment of US$1,967/ kW to warrant waste-to-energy power generation.

National benefits

Finally, in considering whether to make use of RET and EE&C, the potential gains should take into account national benefits. For example, SWH incentives in Barbados brought about a reduction in fossil fuel imports of 33,000 tonnes of fuel per year, a saving of about US$6.5 million (assuming an oil price of US$25/bbl and a population of 260,000). For the English-speaking Caribbean this would be an annual saving of US$125 million (assuming a population of 5 million) (INFORSE, 2007). A solar water heater of 100 litres has the capability to prevent the emission of 1.5 tonnes of carbon dioxide per year and 1,000 such units can shave 1 MW off peak loading: the Wigton Windfarm is estimated to save 52,540 metric tonnes of CO^2 equivalent per annum. The local environment and the utilities (private and public) would benefit from the installation of additional peak load capacity (Government of India, 2007), where RET are used.

Conclusion

Various regional and international accords have captured the challenges and plights of SIDS, and also provided useful frameworks for sustainable development. To fast-track the development of SIDS to the level of equitable partners on a global platform, increasing wealth, improving the quality of life and sustaining vulnerable environments, while

avoiding the mistakes of the past, SIDS must be selective in their strategies for achieving energy security and independence. Full appraisal and development of local resources is paramount in gradually replacing the imported energy used for long-term investments in heat, light and power generation. An emphasis could be placed on valuable local sectors which can experience transformation in the short term for the preservation of key economic earners, cultural heritage and the environment. Energy options which facilitate early shifts in the national energy mix towards dependence on sustainable indigenous energy resources should be pursued with alacrity.

The litmus test of energy efficiency and conservation should be applied to energy options which can be administered within a paradigm shift towards achieving and subsequently raising the benchmark for energy use. Achieving energy efficiency and conservation must therefore be the first objective in reducing the energy appetite of SIDS in order to enable them to achieve optimal gains from energy security advances.

Renewable energy options in small states are diverse, though there are limitations in any one approach, depending on the surface and subsurface features of the environment, geographic location and resource mobilisation opportunities. The optimal combination and proportion in the energy mix of sovereign states are best identified by the application of rigorous economic, social and environmental considerations and comparison of conventional options on the same platform, taking into account externalities and social, economic and environmental impacts. Tested and proven appropriate technologies should be a priority relative to new and cutting edge technologies, in order to avoid spending time and funds on unsuccessful attempts.

After a longstanding use of conventional energy resources, full cost accounting methods and access to special project funding are critical for levelling the conditions for the application of EE&C and RET. Building competencies for resource mobilisation and project development will be important, and collaboration between experienced nations and their neighbours will accelerate the transition.

National policies should be crafted and communicated to achieve these ends, with support from regional policies to encourage collaboration among sovereign states in achieving their transformational targets. Strategic buy-in by corporate 'citizens', special interest groups and the population at large is important for successful change, and is therefore an important part of the state communication process. Without a dedicated and empowered champion for RET and EE&C, efforts towards transformation may be weak and diffused at best, or costly and unsuccessful. However, there may be enough examples among the Caribbean, Asian, Pacific and other SIDS to facilitate transformation within each. Awareness and knowledge has grown, but methods for informing the public and decision-makers should be continuous, deliberately designed, implemented and sustained if they are to have a transforming and lasting impact.

Location, geology, climate and the global efforts to reduce GHG are internal strengths which can help SIDS to develop RET-based projects that can attract special funding. However, for most SIDS the historical barriers discussed above and limited resources of land and water have proved a challenge. Clear policy directives and plan-

ning tools can lead to the solutions that are needed. In the near future, some SIDS will decide if their cane industry can survive under favourable market terms with bioethanol and cogeneration as sweeteners; others will attempt to make biofuels and cogeneration the determining factor.

The future for the sustainable development of SIDS using RET and EE&C as platforms is favourable, but it will require clear vision, early action and a tenacious determination to succeed.

Notes

1 Energy security means the appropriate blend of energy forms, in adequate quantities and at affordable competitive cost, in a timely manner, meeting quality and functionality requirements, from a strategic blend of suppliers (supply buffer). More recently, the dimension of reducing unacceptable or irreversible environmental impacts over the long term has been added to address sustainable development requirements.
2 November 2005 EIA Forecast, 4Q05. EIA, IEA and OPEC projects 86.8 mbpd for 2007 (*Energy Economist*, 2007).
3 Colin Campbell indicated that an oil peak would be evidenced in the years 2006–2015.
4 NYMEX WTI for December 2007; Graph from *Energy Economics News Letter*, 2007.
5 Mauritius Strategy, para. 41.
6 Simultaneous production, usually of heat and power, from a single energy input; trigeneration is similar with heat, mechanical and power as the outputs.
7 REN21 – 2006 Update Renewables Global Status Report.
8 Experts Meeting on Capacity Building for Renewable Energy and EE in SIDS, Matavai Resort, Niue, 2003.
9 OTEC is a technology that generates electricity by using temperature differentials between deep and shallow waters in order to run an engine.
10 David Barrett, 'Catalyst Model for Sustainable Consumption and Production', Second International Experts Meeting on Sustainable Consumption and Production in Latin American Countries, Costa Rica, 5–8 September 2005.
11 William Maloney, Pacific West Energy LLC, 2006.

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6

Climate Change and Small Island Developing States*

Lino Briguglio, Kanayathu Koshy, Leonard Nurse and Poh Poh Wong

Introduction

About one fifth of all politically independent countries are small island developing states. They are found in all regions of the world, but most of them are located in the South Pacific Ocean, the Indian Ocean and the Caribbean. One of the greatest challenges faced by these states in achieving sustainable development relates to climate change. It is a matter of great concern to them that although they contribute very little to global warming, they will be harmed most by its effects.

Apart from rising sea levels, SIDS are likely to experience various other effects of climate change, including extreme weather events, water shortages and increased health risks from airborne diseases. These will also impact on larger territories, but the high population density of many SIDS, their limited resource endowments and the indivisibilities of overhead costs mean that SIDS are likely to be worse affected and will bear higher per capita costs.

Two major international conferences on the sustainable development of SIDS, the 1994 Barbados Global Conference and the 2005 Mauritius International Meeting, both convened by the United Nations, assigned major importance to climate change. The Barbados Programme of Action and the Mauritius Strategy recognised that climate change could delay or prevent sustainable development in SIDS and that they face special challenges due to their particular physical and geographic characteristics. Both conferences stated that the ultimate responsibility for sustainable development lies with the SIDS governments themselves, but called on the international community to co-operate in enabling SIDS to attain sustainable development goals.

Small island states and global warming

According to the Fourth Assessment Report (Working Group II) of the Intergovernmental Panel on Climate Change (IPCC) on impacts, vulnerability and adaptation (IPCC, 2007), the regions where most SIDS are located registered temperature warming trends during the 20th century, with some studies showing that this ranged from 0° to 1°C every two decades during 1971–2004. In addition, the report states that according

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to scientific projections based on sophisticated climate models, in the 21st century there will be a general warming trend in surface air temperature in all small island regions.

Table 6.1 shows projected changes in seasonal surface air temperatures for the three 30-year periods 2010–2039, 2040–2069 and 2070–2099, relative to the baseline period 1961–1990, for the sub-continental scale regions of the world where most SIDS are located.

Table 6.1. Projected increases in air temperature (°C) by region relative to 1961–1990

Region	2010–2039	2040–2069	2070–2099
Mediterranean	0.60–2.19	0.81–3.85	1.20–7.07
Caribbean	0.48–1.06	0.79–2.45	0.94–4.18
Indian Ocean	0.51–0.98	0.84–2.10	1.05–3.77
Northern Pacific	0.49–1.13	0.81–2.48	1.00–4.17
Southern Pacific	0.45–0.82	0.80–1.79	0.99–3.11

Source: IPCC, 2007

Small island states and rising sea levels

Based on the available scientific literature, the IPCC report indicates that during the last century there was an overall tendency for sea levels to rise in the Pacific Ocean, Indian Ocean and Caribbean regions. Rising sea levels are a major concern for SIDS, especially low-lying ones, due to the fact that human settlements and industrial concerns tend to be concentrated in the coastal zones.

The economies of many SIDS depend heavily on tourism; rising sea levels are likely to harm tourism facilities. However, other industries, including fishing, agriculture and manufacturing, and infrastructure such as ports, airports and coastal reservoirs will also be negatively impacted. The coastal areas of SIDS are also associated with socio-cultural developments, so rising sea levels will also have an impact on their cultural assets.

Rising sea levels will therefore lead to heavy material and cultural losses for SIDS and will affect practically all aspects of life. This problem is, of course, particularly severe for low-lying islands, the very existence of which may be threatened. This reality is particularly harsh for SIDS because the greenhouse gas emissions they produce themselves are negligible when compared to those emitted by larger developing and developed countries.

Unfortunately, the limited resource base of small island states constrains their adaptation and coping ability, especially when large overhead costs are involved. As is well known, certain costs are not divisible in proportion to the population, and infrastructural development is often very costly for small territories with small populations.

Mainstreaming climate change in small island states

Various studies have linked climate change with sustainable development (Hay *et al.*, 2003; Huq and Reid, 2004; Munasinghe, 2003; Koshy *et al.*, 2005). This linkage is espe-

cially relevant for small island states, where the climate is a major asset for tourism, fishing and other activities that are coastal in nature. Ronneberg (2004) explains the climate change/sustainable development link by referring to the Marshall Islands. He proposes a number of innovative solutions, including waste-to-energy and ocean thermal energy conversion systems, which could promote the sustainable development of some small islands and at the same time strengthen their resilience in the face of climate change. The sustainable development and climate change link is not only relevant for low-lying, tropical SIDS, but also for others that depend heavily on coastal activities. For example, Briguglio and Cordina (2003) have shown that the impact of climate change on the economic development of Malta is likely to affect all sectors of the economy, but particularly tourism, fishing and public utilities.

One way to address this link is to integrate mitigation and adaptation measures into sustainable development strategies. Such an argument was put forward by Hay *et al.* (2003), in the context of the Pacific small island states, suggesting that the most desirable adaptive responses are those that augment actions which would be taken even in the absence of climate change, due to their contribution to sustainable development and resilience building.

It can be argued that adaptation measures may be conducive to sustainable development, even without the connection with climate change. As the 2007 IPCC report argues, the link between adaptation to climate change and sustainable development, which leads to the lessening of pressure on natural resources, improvement of environmental risk management and bettering of the social well-being of the poor, may not only reduce the vulnerability of small islands to climate change, but also may put them on the path towards sustainable development. A good starting point would be an assessment of the climatic variables and the implementation of 'win-win' or 'no regret' adaptation options (Koshy *et al.*, 2006).

The experience of adaptation in small island states[1]

The Caribbean region

The SIDS in the Caribbean region include Antigua and Barbuda, the Bahamas, Barbados, Cuba, Dominica, Dominican Republic, Grenada, Haiti, Jamaica, St Kitts and Nevis, St Lucia, St Vincent and Grenadines, and Trinidad and Tobago. Some non-island states in the region, with characteristics similar to those of SIDS, are Belize, Guyana and Suriname. There are also many non-sovereign small islands which have similar problems.

Recognising the tremendous socio-economic and environmental risks posed by climate change, Caribbean governments have embarked on several important initiatives to enhance the region's capacity to respond.

Planning for adaptation to climate change

A major activity is the project entitled Caribbean Planning for Adaptation to Climate Change (CPACC), covering the period 1997–2001 and funded by the GEF. Its main

objective was to provide support to Caribbean countries in coping with the adverse effects of global climate change, in particular rising sea levels in coastal areas, through vulnerability assessment, adaptation planning, training and capacity building. CPACC consisted of four regional projects and five pilot schemes. The regional schemes involved the design and establishment of a sea level and climate monitoring network, the establishment of databases and information systems, preparation of a detailed inventory of coastal and marine resources, and formulation and initial implementation of adaptation policies at national level.

The five pilot projects consisted of coral reef monitoring for climate change (in the Bahamas, Belize and Jamaica), coastal vulnerability and risk assessment (in Barbados, Guyana and Grenada), economic valuation of coastal and marine resources (in Dominica, St Lucia, and Trinidad and Tobago), the formulation of economic and regulatory proposals (in Antigua and Barbuda, and St Kitts and Nevis) and the preparation of national communications to the UN Framework Convention on Climate Change (UNFCCC) (in St Vincent and the Grenadines).

CPACC was followed by another important project, entitled Adaptation to Climate Change in the Caribbean (ACCC), which lasted from 2001 to 2004 and was funded principally by the Canadian Climate Change Development Fund; its implementation was overseen jointly by the World Bank and CARICOM. The project was designed to build on activities initiated under CPACC and to address issues of adaptation and capacity building not undertaken by CPACC, thus enhancing regional capacity for climate change adaptation. It also sought to ensure the sustainability of future initiatives by developing a comprehensive business plan and strategy to support the establishment of a permanent entity for the co-ordination of activities to cope with climate change. It included project design and preparation of a business plan for a regional climate change centre, as well as public education and outreach. It also dealt with the integration of climate change into a physical planning process, using a risk management approach, and identification and implementation strategies for adaptation in the water resources sector. Of interest is that the project sought to develop linkages with academic, research and other regional institutions in the south Pacific island states for the pursuit of joint activities.

Together, the projects have generated significant outputs for the Caribbean region. Among their achievements are the establishment of a sea level and climate monitoring system. A total of 18 monitoring systems, together with related data management and information networks, were installed in 12 countries, and these have improved access to data and its availability. A major outcome relates to the development of an integrated database for the monitoring of the effects of climate change, established through the Inventory for Coastal Resources. In addition, these initiatives have led to the development of a regional public education and outreach strategy. This, in turn, has led to increased appreciation of climate change issues at the policy-making level. The CPACC has enabled more collaboration among regional partners and better articulation of regional positions in negotiations under the UNFCCC and the Kyoto Protocol.

Other benefits include the establishment of monitoring protocols and early warning capabilities, and the articulation of national climate change adaptation policies and implementation plans. Such policies and plans have been formulated in 11 participating countries and guidelines have been developed for incorporating climate change adaptation in environmental impact assessments.

Mainstreaming adaptation to climate change

This initial work led to the implementation of a third major regional initiative, the Mainstreaming Adaptation to Climate Change (MACC) project, initiated in 2004 with funding from the GEF and scheduled for completion in 2008. The overall objective of the project is to provide guidelines and processes for mainstreaming adaptation to climate change into national development planning. The project involves various initiatives, including the mainstreaming of adaptation to climate change in national development planning and public and private sector strategies, support for the formulation of a regional strategy on adaptation, and the implementation and monitoring of demonstration pilot schemes.

Spillover effects

These three projects have had a considerable effect in raising awareness of climate change in the Caribbean. They have also provided a solid foundation for the implementation of further intensive national and regional activities. One of these, recently approved by the World Bank and GEF, is the Special Adaptation Project for the Caribbean (SPAC), covering the period 2006–10. Its projected cost is US$5 million, of which the GEF is providing US$2.05, with CARICOM states and others providing co-financing of US$2.95 million. The project provides support to three CARICOM countries, Dominica, St Lucia, and St Vincent and the Grenadines, for the design implementation and monitoring of various measures for minimising the impact of climate change on coastal biodiversity and land degradation.

One of the most significant achievements in the Caribbean to date was the establishment of the Caribbean Community Climate Change Centre (CCCCC) in December 2003. The Centre, which is based in Belize and is now fully operational, was mandated by the CARICOM Heads of Government at their annual meeting in July 2002. It co-ordinates the regional response to climate change and is responsible for advising regional governments on all policy matters relating to the subject. It is the key node for information on climate change and the Caribbean's efforts to manage and adapt to its adverse effects. It also functions as a regional clearinghouse, and is a proactive information-exchange facility which co-ordinates the sharing and accessing of information by the general public, private sector and NGOs. In addition, the CCCCC is responsible for the co-ordination and mobilisation of funding and other resources for climate change activities. It also plays an important role in quality assurance. It is required to ensure the standardisation of procedures for the application of methodologies for vulnerability and risk

assessments, national greenhouse gas accounting and climate modelling, and to provide training in the interpretation and use of the outputs.

The region's leading tertiary academic institution, the University of the West Indies, has initiated an MSc programme in climate change. The course commenced with initial funding from CIDA in 2003 in the Centre for Resource Management and Environmental Studies at the Cave Hill Campus, Barbados.

The Pacific region

SIDS in the Pacific region include Cook Islands, Federated States of Micronesia, Fiji Islands, Kiribati, Marshall Islands, Nauru, Niue, Palau, Papua New Guinea, Palau, Samoa, Solomon Islands, Tuvalu, Tonga and Vanuatu. There are also a considerable number of non-sovereign small islands in the region that have similar problems to SIDS.

Traditionally, the peoples of the Pacific islands have lived a subsistence lifestyle with taboos and practices that ensured sustainability of resource use and allowed for natural adaptation to gradually changing environments. However, in a modernising world the Pacific SIDS have become exposed and increasingly vulnerable to a host of global change issues of which climate change is the most severe. Most Pacific island countries have already experienced its impact in the form of climatic extremes such as droughts related to the El Niño-Southern Oscillation, cyclone-related floods, rising sea levels and eroding coastlines. Internationally, the Pacific SIDS have been very vocal in negotiating global commitments to mitigation measures to reduce global warming resulting from increasing emissions of greenhouse gases. All Pacific island countries are parties to the UNFCCC and 13 have signed up to the Kyoto Protocol.

There have been a number of major initiatives by Pacific SIDS at the regional and national levels, including those described below.

Pacific islands climate change framework

At the regional level, a Framework for Action on Climate Variability, Climate Change and Sea-level Rise was developed in 2000 as a blueprint for collective action by Pacific island governments, organisations and individuals, and was supported by an annual multi-stakeholder round table meeting. After five years the Framework was revised through regional consultation and dialogue, and at the Pacific Islands Forum in 2005, regional leaders adopted the revised Pacific Islands Framework for Action on Climate Change 2006–2015.

The major goal of the Framework is to ensure that Pacific island peoples build the capacity to be resilient in the face of climate change by:

- Implementing adaptation measures;
- Good governance and decision making;
- Improving the understanding of climate change;

- Education, training and awareness;
- Contributing to the reduction of global greenhouse gases; and
- Partnerships and co-operation.

Currently, under the leadership of SPREP, negotiations are underway to develop an action plan and a round-table mechanism for the implementation of the Framework.

Community-based adaptation

The Capacity Building for the Development of Adaptation Measures in the Pacific Island Countries (CBDAMPIC) project was funded by CIDA and implemented by SPREP in Cook Islands, Fiji Islands, Samoa and Vanuatu as one of the first community-based adaptation implementation pilots. A fully community-based participatory methodology for community vulnerability and adaptation assessment and action was used in the project. To empower the communities to adapt, a collaborative bottom-up and top-down approach was adopted and adaptation measures were found to have maximum cost effectiveness when they were jointly executed. For example, in Samoa the cost of building a seawall was reduced by 50 per cent because the community provided labour and raw materials. In Torres Islands, Vanuatu, the CBDAMPIC project was only responsible for 30 per cent of the community's relocation costs. The importance of capacity building at all levels to mainstream climate change into national and community development strategies was highlighted throughout the project, which was rated as a successful example of climate adaptation implementation.

Capacity building for climate change

The Climate Change Vulnerability and Adaptation Assessment Research Programme was funded by GEF and UNEP and implemented by the System for Analysis, Research and Training (START) and the Third World Academy of Sciences (TWAS). It was completed with the development and hands-on use of the new generic modelling features developed for SimClim, both in the application and capacity-building contexts. With these tools, practitioners have acquired a much clearer appreciation of:

1. Vulnerability and the impact of climate change as a change in risks from extreme events, especially at the local or community level;
2. Adaptation as a means of reducing such risks, both from current climate variability and the incremental risks arising from a changing climate; and
3. How risk-based approaches to adaptation can enhance sustainable development. A training version of the model, TrainClim, has been incorporated into a new course on climate change at the University of the South Pacific (USP). The SimClim model has been used in vulnerability and adaptation assessments of pilot sites in Fiji Islands and Cook Islands as part of an Assessments of Impacts and Adaptations to Climate

Change (AIACC) project, and in the Federated States of Micronesia as part of a scheme funded by the Asian Development Bank. The model is now available for region-wide use on a case-by-case basis.

In 2004, the University of the South Pacific and the East-West Center, together with the New Zealand National Institute of Water and Atmospheric Research, developed a 12-day training programme, Pacific Island Training Institute on Climate and Extreme Events. Two related in-country training sessions were provided in Samoa (in 2005) and in Kiribati (in 2006). The training package has now been revised on the basis of feedback from the participants, and is now ready for wider use in the Pacific.

SOPAC offers short training courses as part of the community risk programme in order to build capacity. The main goal of a major USAID/Office of US Foreign Disaster Assistance (OFDA) Pacific Disaster Management Programme, co-ordinated by SOPAC, is to reduce the vulnerability of Pacific island communities to disaster by building sustainable regional, national and community level disaster management capacity through enhanced training, improved advocacy and strengthened local institutions.

The AIMS region

AIMS is an acronym referring to the Atlantic and Indian Oceans, the Mediterranean and the South China Sea. The following small states are included in the grouping: *Atlantic* – Cape Verde, Guinea Bissau, and São Tomé and Principe; *Indian Ocean* – Comoros, Maldives, Mauritius and Seychelles; *Mediterranean* – Malta and Cyprus; *South China Sea* – Singapore. As with other regions, in the AIMS regional grouping there are many non-sovereign small islands that share similar problems to those faced by SIDS.

The AIMS SIDS have also undertaken various adaptation initiatives. Various funding agencies, including GEF, UNEP, World Bank and UNDP assist them in addressing climate change issues, mostly on an *ad hoc basis*. However, unlike in the Pacific and Caribbean regions, there is no well-developed regional framework to co-ordinate these initiatives.

The Indian Ocean region

In the Indian Ocean region, the Indian Ocean Commission acts as a regional co-ordinator, but there is considerable scope for a well-developed regional strategy, given that all Indian Ocean SIDS face the threat of rising sea levels and that they are all heavily dependent on their coastal resources.

According to Ragoonaden (2007), precautionary measures are being taken in most of the Indian Ocean islands to address climate change and sea level rise. These include sensitisation campaigns to change the mindset of the population so that they save electricity by lifestyle changes and adopting environmentally sound technologies in the transport, industrial and domestic sectors. Mining of coral, used mainly as a construction material, has been banned in almost all islands; incentives are being provided to make optimum use of solar energy and the potential of wind energy is being explored.

In Mauritius, measures are being take to derive energy from bagasse, a biomass obtained from sugar cane; approximately 15 per cent of the island's energy requirements are now being met from this source and this proportion is expected to increase. Another interesting initiative relates to the use of cold water from the deep seas for air conditioning in coastal hotels.

Seychelles acceded to the UNFCCC on 22 September 1992 – the second country to do so. A major project in this small island state was one which enabled activities to prepare its initial national communication to the UNFCCC. The communication helped Seychelles to focus on issues that link climate change with sustainable development, a new theme for the island. This process has created awareness at all levels of government, among local communities, and in NGOs and the private sector.

In Maldives, the government has given serious attention to adaptation measures. A breakwater costing US$30 million has been constructed around the capital, Male, to protect the population and capital investment from high waves and rising sea levels.

Atlantic Ocean region

The Atlantic Ocean SIDS are also accessing support from the GEF to enhance regional synergy. For example, the GEF–UNDP project 'Adaptation to Climate Change – Responding to Shoreline Change and its Human Dimensions in West Africa through Integrated Coastal Area Management' seeks to mainstream adaptation into coastal area planning in Cape Verde, The Gambia, Guinea Bissau and other countries through the development of pilot adaptation activities in response to shoreline change. Given the extensive coastal continuity, in terms of sediment transport and river discharge, there is a strong rationale for addressing the issue of adaptation and shoreline change through the development of a regional approach in order to maximise available resources.

Mediterranean small island states

Two small island states in the Mediterranean, Cyprus and Malta, are EU members and are therefore considered as developed countries, with responsibilities for abating climate change in line with EU commitments. The EU has adopted a wide set of policy measures aimed at reducing GHG emissions, including the greenhouse gas emission allowance trading scheme, the Renewables Directive (which sets an indicative target of 22 per cent renewables by 2010) and the Framework Directive on the Eco-design of Energy-using Products, setting conditions relating to energy consumption and other products which affect the environment. Malta and Cyprus are therefore expected to promote climate-friendly, low-emission technologies and related research to encourage flexible market- and project-based mechanisms (Ecologic, 2007; European Commission, 2007).

Singapore

Despite sharing many of the physical characteristics of SIDS, Singapore has a very high GDP per capita and is a modern city state, with a virtually 100 per cent urbanised

population. Prior to 2006, its climate change policy focused on mitigation measures, with less emphasis on vulnerability and adaptation (Ministry of Environment, 2000).

After acceding to the Kyoto Protocol in 2006, Singapore formed the National Climate Change Committee, which focused on four areas:

- *Mitigation:* promoting greater energy efficiency and less carbon-intensive energy in key sectors;
- *Public awareness:* raising awareness among citizens and the private and public sectors of the impact of climate change and the opportunities arising from it, and the actions they could take;
- *Competency building:* building competency to better respond to climate change by promoting research and development of low-carbon technologies; and
- *Vulnerability and adaptation:* understanding Singapore's vulnerability and facilitating the adaptation actions needed.

Although the strategy is meant to be evolving, the emphasis is still on mitigation and economic opportunities. The impact of climate change will be most severe on the coast, because of the population, coastal reservoirs and economic activities. One study indicated that the high cost of coastal land justified the benefits of protection through the construction and heightening of seawalls (Ng and Mendelsohn, 2005). A vulnerability study was commissioned in March 2007. Given the need to protect water resources and reclaimed land, a new Singapore-Dutch research centre is evaluating hard protection measures, although other measures are not discounted. The 2004 Indian Ocean tsunami has given added urgency to the need to protect Singapore from rising sea levels.

Conclusion

Small island states are very vulnerable to climate change, even though their contribution to global greenhouse gas emissions is minimal. They are set to suffer great material losses from sea level rise and climate variability unless they put in place appropriate adaptation measures. Many initiatives have been taken by SIDS to foster an understanding of climate change and its repercussions, and to promote mitigation and adaptation strategies. Various adaptation procedures that can be put in place in anticipation of rising sea levels, water shortages and extreme weather events have been proposed (Klein, 2003; Sem, 2007; United Nations, 2007).

In many cases, adaptation measures, such as building infrastructures that withstand strong winds, clearing valleys to avoid floods in case of extreme weather events, preparing for eventual retreat from the beaches, withholding permits for building on low-lying areas and putting in place early warning systems, can be mainstreamed in development policies, so that their benefits can be enjoyed, even if climate change predictions do not materialise.

In practice, small island states face many constraints in trying to mainstream climate change into their sustainable development strategies, due mainly to their limited resources and indivisibilities of overhead expenditures, including those associated with infrastructural projects. It is for this reason that at the 1994 Barbados and 2005 Mauritius conferences, governments of developed and developing countries agreed that although SIDS themselves are ultimately responsible for their sustainable development, the co-operation of the international community is called for to enable them to attain this objective.

Note

1 Due to limitations of space, this section covers only a selection of climate-change related activities in SIDS.

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About one fifth of all politically independent countries are small island developing states. For these countries, sustainable development is not a matter of choice, it is imperative.

Highly vulnerable due to their size and isolation, small states have had to pursue development paths that are economically, environmentally and socially sustainable. They also face particularly stark impacts from climate change. This book details experiences and lessons from small island developing states in their efforts to balance environment and development needs, and getting these to work in harmony. Above all the message of this book is that this process still has some way to go, but we have learned valuable lessons that will help to support integrated and participatory planning for sustainable development in the future. In five chapters the expert contributors discuss:

- existing national sustainable development strategies
- Papua New Guinea's experience in implementing sustainable development
- the significance of ocean and marine resource management
- renewable energy, energy efficiency and conservation technologies
- the threat of climate change

This book seeks to initiate a debate on how to support a new wave of action for sustainable development.

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