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Small Island Developing States, disaster risk management, disaster risk reduction, climate change adaptation and tourism

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Summary

Small Island Developing States (SIDS) are found in the: 1) Caribbean, 2) Pacific, and 3) Africa, Indian Ocean, Mediterranean and South China Seas (AIMS) regions, and are vulnerable to a number of hydrometeorological and geological disasters and the extreme impacts of climate change. Shared structural disadvantages and characteristics place them at an economic disadvantage and prevent economies of scale, hindering sustainable development and making them less able to recover after a disaster than larger and more diversified economies. Consequently they are particularly vulnerable to the pervasive impact of natural disasters on their populations, environments and economies.

As entirely or predominantly coastal entities there is intense competition between land use options. Limited resources force economic dependence on one or two sectors such as tourism and agriculture. The concentration of population, agricultural land, civil infrastructure and economic development in the coastal zone exacerbates their inherent vulnerability to damaging natural disasters. Rising sea levels coupled with the impacts of climate change, further compound their vulnerability.

Tourism is a primary economic activity for many SIDS. Unfortunately international tourism trends and the policy of SIDS governments have created a dominant model of tourism that which supports a pattern of coastal zone tourist development by multinational companies and hotel chains. The latter follow a number of investment models seeking to minimise their exposure to disasters and financial risks by transferring them to the local community. The situation is exacerbated by weaknesses in government policy, legislation, regulations and enforcement of compliance. This means that the vulnerability of tourists, the local population, tourism superstructure and supporting infrastructure to natural disasters may continue to increase.

The tourism industry has an inherent interest in disaster resilience that minimises risks and losses thus limiting casualties and protecting the integrity of the industry's reputation. Therefore, there may be a case for industry self-regulation to improve delivery of prevention/mitigation, preparedness, response and recovery measures meeting the standards of international best practice. Such an approach would be especially pertinent where a SIDS public sector policy, legislation and enforcement of compliance is weak. However, evidence suggests that the economic business case for private investment in the resilience of tourism in SIDS has not yet been systematically made, weakening the case for voluntary self-regulated frameworks.

With profit maximisation the ultimate goal for the vast majority of corporations, private investors are likely to continue making decisions based on financial considerations, such as different timescales regarding the Return on Investment (ROI), rather than sustainability outcomes. Since a ROI on a tourism investment is often achieved after 5-10 years, there is a reduced concern for longer-term issues, especially in the case of overseas-based tourism operators. Consequently, business managers may not consider the prospect of a low-frequency high-impact event such as a tsunami or the long-term effects of climate change. Instead they will consider investments in longer term risk reduction uneconomical since the ROI on disaster risk reduction activities, based solely on the potential occurrence of a disaster, is anticipated as being insufficient.

Such business perceptions must be countered through increased tourism industry understanding of hazard concepts and terminology; and the quantification of the ROI for disaster risk reduction (DRR) measures and the economic impact of disasters on tourism investment.

In the meantime the ongoing demand for a tourism product centred on accommodation close to the high water mark remains a root cause of vulnerability and an impediment to effective DRR in SIDS. This demands innovative approaches to ensure new and legacy construction better able to deal with current hazards and accommodate future impacts.

At the same time some SIDS may have the potential to adopt alternative styles of tourism to the dominant beachfront holiday model. If sold to the industry and tourists alike such alternatives may reduce the level of demand for a 'sun, sea and sand' experience that

places tourists, tourism-related businesses and support staff, tourism superstructure, and supporting infrastructure in the vulnerable coastal zone.

Introduction

This paper provides information complementing the 2013 Global Assessment Report on Disaster Risk Reduction[1] (DRR). Content is drawn from a range of reports including two specifically commissioned by UNISDR (Mahon et al., 2012; Bernard and Cook, 2012) and interim 2011-2013 national Hyogo Framework for Action implementation progress reports (2011-2013 HFA reports) covering the latest in-country developments; 15 from the Pacific, four from the Caribbean, and two from the Africa, Indian Ocean, Mediterranean and South China Seas (AIMS) regions.

It focuses on the role of tourism in the development of Small Island Developing States (SIDS) and how the current dominant model of coastal tourism exacerbates vulnerability to natural disasters. The issues discussed, such as the use of Environmental Impact Assessment (EIA) to incorporate DRR measures into developments and the importance of robust information for effective decision-making, may equally apply to other sectors where associated activities, resources, superstructure and supporting infrastructure are exposed to physical hazards and potential disaster[2].

The use of the terms *disaster risk management* (DRM), *disaster risk reduction* (DRR), *climate change adaptation* (CCA) and *disaster management* (DM) is consistent with the definitions in UNISDR (2009), which are duplicated in Annex One.

DRM may be considered to be made up of two components: DRR and DM. DRR in turn is achieved through prevention/mitigation and climate change adaptation measures, which are most effectively applied at the prevention/mitigation phase of the conventional disaster management cycle (DMC). There are many synergies between DRR and CCA and many DRR measures can directly contribute to better adaptation. DM particularly focuses on the preparedness, response and initial recovery steps of the DMC. However, all components of DRM are linked. For example, disaster recovery should include elements of DRR and CCA (UNISDR, UNDP, 2012).

Background on SIDS and their vulnerability to natural disasters

SIDS are found in the Caribbean, Pacific, and Caribbean, Pacific, and Africa, Indian Ocean, Mediterranean and South China Seas (AIMS) regions and are vulnerable to damaging natural hydrometeorological (cyclones, storm surges, extended droughts and extensive floods) and geological (volcanic activities and emissions, earthquakes, tsunamis and landslides) disasters. All three regions are vulnerable hotspots in terms of the extreme impacts of climate change, such as rising temperature and sea-levels, increasing storm surges and inundation, coastal erosion and cyclonic wind damage.

Inter- and intra-regionally SIDS may differ significantly in size[3], topography, geology, human[4] and natural resources, economic development, and relative vulnerability to the different types of natural disasters. However, shared structural disadvantages and characteristics such as small land area and populations, limited natural resources, geographical dispersion

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[1] All definitions are taken from UNISDR (2009) and reproduced in Annex One.

[2] The paper uses the term 'physical hazard' rather than 'natural hazard' in line with the 2011 Global Assessment Report on Disaster Risk Reduction (See Annex One of the paper).

[3] E.g. the Cook Islands, in the South-West Pacific, has a total land area of approximately 240 square kilometres; by comparison Cuba, in the Caribbean, has a land area of 110,860 square kilometres (CIA, 2012).

[4] E.g. the December 2011 Cook Islands census recorded a total population of 17,791 (this preliminary figure includes visitors and tourists). Source: http://www.cookislands.org.uk/census2011.html#.UPLwxXfUREM. By comparison Cuba's estimated population in July 2012 was 11,075,244 (CIA, 2012).

and isolation from markets[5], vulnerability to trade-related shocks and other global conditions[6] beyond domestic control, place them at an economic disadvantage and prevent economies of scale. This hinders sustainable development and makes them less resilient and able to recover after a disaster than larger and more diversified economies.

Consequently SIDS are particularly vulnerable to the pervasive impact of natural disasters on their populations, environments and economies. This includes the diversion of development funds to immediate humanitarian relief, clean-up and rebuilding. Such impacts can have long-lasting economic, social and environmental consequences and rehabilitation costs that are high as a percentage of GDP[7]. The repeated effect of multiple small and medium events over time erodes development with accumulated impacts that may exceed those of large disasters.

SIDS are entirely or predominantly coastal entities and land is at a premium, a situation often exacerbated by land tenure systems, soil types, topography and climatic variation. This creates intense competition between land use options and limited resources force specialisation in, and economic dependence on, one or two sectors such as tourism and agriculture, themselves particularly vulnerable to natural disasters.

The concentration of population, agricultural land, civil infrastructure and economic development in the coastal zone exacerbates the inherent vulnerability of SIDS to extremely damaging natural disasters. Rising sea levels coupled with the impacts of climate change, which may, at least in the short to medium-term, increase the regional frequency, intensity or duration of extreme hydrometeorological events, such as droughts[8] (IPCC, 2011) further compound their vulnerability.

Tourism and development in SIDS

Tourism is a primary economic activity for many SIDS in terms of income generation, employment creation, and foreign exchange earnings with the potential to stimulate the

[5] E.g. the Cook Islands is made up of fifteen islands and has an Exclusive Economic Zone of 1,800,000 square kilometres. Transport between the main island of Rarotonga, in the Southern Group, and islands of the Northern Group is limited to sporadic and unreliable shipping services and charter air travel that is prohibitively expensive for regular/normal use.

[6] E.g. for a number of years the Cook Islands Government has supported the local tourism sector by subsidising the international airline Air New Zealand to provide otherwise commercially unviable, direct flights from Sydney and Los Angeles. In 2012 the subsidy for the Rarotonga - Los Angeles route was NZD13 million, a significant part of the country's national budget and reportedly a 50 percent increase from 2011 because global conditions had resulted in increased fuel prices and fewer passengers on the route (New Zealand Government, 2012).

[7] 1. In 2004 Hurricane Ivan caused billions of dollars of losses across the Caribbean. In both Grenada and the Cayman Islands losses were close to 200 percent of national annual GDP.

2. On average natural disasters annually cause an estimated USD284 million of damage in the PICs. In Fiji alone estimates of flooding losses in the last four years total approximately USD332 million or 16 percent of GDP.

3. The cost (direct and indirect) of the 2004 Indian Ocean tsunami to tourist resorts and loss of Government revenue from the tourism sector has been estimated to be in excess of USD300 million.

[8] In recent years severe droughts have occurred in the Pacific and Caribbean respectively: 1) Tuvalu declared a state of emergency in September 2011 after a severe drought affected local food crops and led to water rationing. The situation demanded donors providing shipments of water, water delivery trucks and desalination units to meet the needs of communities, schools and hospitals. 2) In 2010 Caribbean farmers in several countries including Trinidad and Tobago, Barbados and St. Lucia struggled to raise key crops in the face of a severe drought and imposed water rationing. Subsequent unprecedented flooding then drowned thousands of acres of vegetables. Such events affect inflation rates and increase the region's dependence on overseas food supplies.

development of other sectors[9]. The tourism sector can also be a driver demanding more sustainable management and use of resources from the production and service sectors that supply its needs (A/66/278).

However, despite its potential to contribute positively to economic development, it is ultimately a luxury item the demand for which at any location at any time is vulnerable to external factors such as a global or regional economic downturn, the range of cheap air travel options, changing tourism models and weather patterns. These factors may cause tourists to travel less, stay closer to home or explore en vogue destinations.

Investment in the sector should therefore be carefully assessed to ensure its sustainability within these constraints, and that it does not increase the risk of disaster impacts nor adversely affect the sustainability of other sectors, the wider environment and livelihoods.

Unfortunately international tourism trends and government policy have created a dominant model of coastal tourism in SIDS that runs counter to good sustainability and disaster risk practices.

Tourists continue to prioritise the sun, sea and beach tourism product over one emphasising disaster resistance (e.g. a hotel that has natural disaster plans, guarantees personal safety from natural disasters, and provides information about natural disaster events)[10].

Seafront resorts located close to the high water mark continue to generate significantly better economic returns than more landward ones. This encourages tourism developers to take a calculated risk and locate valuable plant and property on the seafront when government coastal planning and enforcement of regulations are absent (Mahon et al., 2012). Situations where developers can choose between considering DRR and operating a suitable distance inland or generating higher economic rewards by operating as close as possible to the high water mark seriously threatens effective DRR in the coastal zone.

Ultimately, SIDS that continue to invest in major coastal zone tourism development, without due regard to DRR measures, increase their exposure to the environmental, physical, and socio-economic consequences of coastal disasters and global climate change. However, government financial incentives for such development continue to support a pattern of coastal zone tourist development by multinational companies and hotel chains, which follow a number of investment models seeking to minimise their exposure to disasters and financial risks by transferring them to the local community. In these circumstances, developers and investors, with little commitment to the locale's long-term sustainability, have more control over the design process than architects or local managers. Design decisions are often taken far from the proposed development site and tend to replicate designs that have proven successful in very different conditions. Consequently, they may be inappropriate for local implementation.

Such practices are at odds with the global call for the promotion of investment in sustainable tourism through the creation of small- and medium-sized enterprises (UN General Assembly resolution A/RES/66/288).

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[9] The Caribbean is the world's most tourism-dependent region. In 2009 travel and tourism contributed 14.5 percent to the economy, represented 18.6 percent of total regional exports, generated 11.9 percent of total employment, and accounted for 22.1 percent of total regional capital investment (WTTC, 2009).

The Fiji tourism sector offers a full range of tourist options with accommodations ranging from cheap and basic to high-end luxury hotels. In 2011 the industry's total contribution to GDP was 35.4 percent, (WTTC, 2012).

[10] A survey of tourist attitudes in the Caribbean island of Tobago provides evidence that demand for the existing sun, sea and beach tourism product continues to dominate. 82.2 percent of participants rated hotel proximity to the beach as moderately to extremely important in choosing their accommodation. Respective figures regarding the importance of a disaster resistant product as provided by a hotel through 1) natural disaster plans, 2) a guarantee of personal safety from natural disasters, and 3) information on natural disaster events were 43.4, 43.1 and 39.2 percent (Mahon et al., 2012).

A legacy of coastal tourism development

A significant amount of tourism infrastructure currently exposed in the coastal zone of SIDS is the legacy of coastal tourism development that started in the 1960s and early 1970s when SIDS governments began developing international tourism as an important economic sector. At this time, land use controls, such as land zoning and Environmental Impact Assessments (EIAs), were rudimentary, and their use often non-mandatory or uncoordinated[11].

An economic reliance on tourism has seen SIDS governments provide national policy frameworks facilitating private development. These have often created policy distortions that emphasise economic growth generation through tourism development without factoring in the potential costs of environmental degradation and exposure to future disasters. Such political priorities have also seen attractive financial incentives and concessions to facilitate major tourist developments projects offered over many years (Box 1)[12].

Development policy/legislative/regulatory regimes lacking robust control tools and processes that specifically consider DRR and environmental impacts have resulted in significant levels of inappropriately designed tourism stock located in the ecologically sensitive and biophysically vulnerable coastal and floodplain areas of SIDS[13] to meet demands for the 'sun, sea and sand' tourism model that is firmly entrenched as the dominant form of tourism in SIDS. Based on the beauty of the coastal environment, often the only competitive advantage that SIDS hold in the international tourism market, the model demands resorts with beach/sea frontages, bungalows, hotel rooms and important amenities located either on or a short walk from the beach/sea; and white sand beaches - stony beaches do not sell!

Tourism projects continue to move further into these fragile and vulnerable areas because of continuing weaknesses in government development regimes, such as a lack of trained inspectors to enforce planning compliance.

Coastal tourism and its exposure to disaster and environmental impacts

Large concentrations of people (such as tourists, hoteliers, and service industry staff) and economic activities in the narrow hazard-prone coastal zone, often with limited evacuation options, create an intensive risk situation, increasing the chances of "potentially catastrophic disaster impacts with high mortality and asset loss" (UNISDR, 2009).

Tourism development too close to the shoreline can also exacerbate the vulnerability of coastal populations and tourism infrastructure to erosion, storm surge, and tsunamis as important ecosystem regulatory functions are lost. Practices such as the clearing of natural coastal vegetation (such as mangroves) to accommodate large tourist structures, and provide tourist access to the sea and the 'manicured natural' coastal environments promoted by the tourism industry, destroy natural buffering effects that are the first and often best line of defence against coastal hazard impacts. The result is an environment in which already high levels of overall risk are increased through the destabilisation of soil, the disruption or alteration of sediment circulation, etc. (Box 1).

A combination of vulnerable coastal infrastructure, increasing numbers of degraded coastal habitats, overexploited natural resources and growing conflicts between competing resource uses have the potential to undermine the sustainability of the tourist sector, as the services

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[11] For example, in Fiji the use of EIAs for projects "likely to cause significant environmental or resource management impact" was only mandated through the Environment Management Act in 2005. Supporting EIA Process Regulations, and Guidelines were established in 2007 and 2008.

[12] The strategic importance assigned to major tourism investments in SIDS is emphasised by decisions on tourism development applications involving the Minister of Finance, or an equivalent, as decision-maker or in consultation with a regulatory agency.

[13] For example, a 2000 World Bank estimate for the Caribbean, the world's most tourism dependent region, was that the typical tourism development was located on the coast within 800 metres of the high water mark. Approximately ninety percent of holiday accommodations in Barbados are located on the coastline (Daily Nation, 2006; cited in Mahon et al., 2012).

provided by intact and functioning ecosystems are lost[14]. Such coastal development can also have wider environmental and social impacts when it occurs in the absence of a high-level planning strategy for the wider surrounding area (Box 1).

The limited capacity of SIDS to absorb disaster impacts demands a commitment to effective DRR coupled with a scaling up of CCA efforts, if development is to be sustainable. This is particularly important for the tourism sector because of the significant proportion of hotels, supporting tourism services and infrastructure, and numbers of tourists concentrated in the coastal zone.

Increased application of integrated coastal, marine and water catchment management, often neglected due to factors such as overwhelmed government mechanisms, will strengthen the effectiveness of DRR and CCA efforts in this context. In Fiji the Integrated Flood Risk Management Nadi Demo Project (GEF, 2012) is taking an integrated resource management approach to redress a legacy of recurring urban flooding and land degradation impacting on livelihoods, many of which are related to the tourism industry built around the Denarau Island resort complex (Box 1).

Government and tourism sector engagement in disaster risk reduction

The tourist industry depends on four basic components: natural resources and environment; the built environment; transportation; and hospitality and cultural resources. The built environment includes basic infrastructure such as water supply systems, roads, and communication networks; and the superstructure, which includes facilities built specifically for tourism such as airports, parks, marinas, hotels and motels. Of course during a disaster its assets at risk include clients (tourists) using the industry's services.

Keeping tourists safe in the buildup to, during, and in the immediate aftermath of an extreme event disaster are of utmost importance to the tourist industry. However, in a time of advanced telecommunications and computer services and social networking this may not be adequate to maintain the international reputation of a particular resort, region or country as a desirable tourist destination. A client dissatisfied with their levels of safety, comfort and informedness in the buildup to, during, and after an extreme natural event can post their concerns via social media with the immediate underming of a destination's reputation. In contrast positive tourist experiences of how a hotel or wider destination handled such a situation may counter negative press reporting, for instance, boosting a location's reputation and attractiveness to potential tourists.

Because tourism may rely heavily on local infrastructure[15], such as roads, water supply and sewage systems, provided by the public sector the wider failure of such services will similarly have negative short- and potentially long-term repercussions for tourism.

Even with adequate management of a disaster by both the tourism industry and government agencies and adequate performance of local infrastructure there are likely to be short-term financial losses, associated with, for example, cancelled flights and accommodation bookings in the immediate aftermath of an event. However, these losses are likely to be significantly outweighed by long-term financial losses associated with the erosion of an international tourist destination's reputation and image. For instance, major flooding in the Nadi area of Fiji in 2012 confirmed the reality of reputational costs associated with negative press reporting. Managing the destination image in the disaster's aftermath proved to be a major challenge (Mahon et al., 2012).

[14] For example, buffering storm surge and attracting and providing tourists with local food, activities and experiences.

[15] Goeldner et al. (2000) classify tourism supply into four basic components: natural resources and environment; the built environment; transportation; and hospitality and cultural resources. The built environment includes the basic infrastructure including water supply systems, roads, and communication networks; and the superstructure, which includes facilities built specifically for tourism such as airports, parks, marinas, hotels and motels.

There is therefore a business case to be made for both private tourism sector and public sector investment in DRR. Investment in aspects of infrastructure such as water supply also has the potential to benefit the wider local community. An example is the recent launch of a major drainage upgrade for Nadi by the Fiji Minister for Local Government. The initiative is intended to mitigate the impacts of potentially damaging floods, such as those experienced in 2012 and should provide benefits for the Denerau Island Resort (Box 1) and wider population in the vicinity.

With the vulnerability of SIDS to natural disasters likely to increase with climate change both the tourism and public sectors would benefit from more systematic and strategic approaches to improving DRM. Partnerships between the public and private sectors (Public-private Partnerships or PPPs) can play an important role in this.

Box 1: Fiji: Loss of natural ecosystem regulatory mechanisms; tourism development incentives and mechanisms; and unforeseen environmental and social impacts of coastal tourism development

Loss of natural ecosystem regulatory mechanisms
Much of the 680-acre site of the upscale Denarau Island resort complex, close to Fiji's international airport on the island of Viti Levu, originally comprised old growth mangroves, swamps, low-lying small islands and mudflats. Development over forty-years has involved altering the course of the Nadi River, significant land reclamation with over 3 million cubic metres of soil brought into the site, clearance of large areas of old growth mangroves, dredging of tidal flats, and construction of foreshore protection. From 1988 to 93 alone USD100 million was spent on infrastructure. With the mangrove clearance, herons are no longer seen in the area and the attendant loss of the important regulatory role that mangroves play in tidal and sediment circulation is regarded by some as a factor in an increased frequency of extreme flooding in the region in 2009 and 2012. As a result the government flood mitigation programme has spent USD5 million on dredging the Nadi River in the last three years, the efficacy of which has been questioned on various grounds, including that of financial sustainability over the longer-term (Bernard and Cook, 2012).

Tourism development incentives and mechanisms
In 1996 the Fiji government introduced the Short Life Investment Package (SLIP), which included a tax holiday on investment, duty free status on capital equipment and the importation of construction materials, and an exemption from sales tax. The full-SLIP for a period of 20 years was available for investments of FD40 million upwards; and the half-SLIP for 10 years on investments of FD10-40 million. Currently only a 10-year package is available for investments upwards of FD7 million in the development of hotels, retirement facilities and hospital resorts (Fiji Revenue & Customs Authority, 2012).

Such financial incentives have facilitated the forty-year development of the Denarau Island resort, which also saw the optimisation of investor profit through a negotiated reduction of the native land lease; and, in 1996, the first Cabinet-approved land tenure reorganisation (or "land swap"), involving the trading of customary and government land (Bernard and Cook, 2012).

Unforeseen environmental and social impacts of coastal tourism development
The development of the Denarau Island complex has seen urban drift as businesses and jobseekers relocate to the Nadi area to supply goods and services, and pursue higher wages. Areas adjacent to Nadi's central business district (CBD) have been particularly heavily settled and poor planning controls are considered to have enabled inappropriate developments, which affect the ability of the environment to safely channel water to the sea (Holland, 2009).

In the 1-in-50 year flood event of March 2012 the CBD was submerged under 4 metres of water. Occupants in the adjoining areas sustained heavy losses, with small business owners and their local employees particularly badly impacted. The vast majority of those small businesses that had closed due to the damage were unlikely to open again. The floods also blocked airport access and delivery of hotel supplies. In contrast the high quality engineering and drainage of the Denarau enclave restricted damage to a minimum with minor inundation at high tide (Bernard and Cook, 2012).

Coastal tourism and disaster risk reduction

Despite the exposure and vulnerability of coastal tourism to a number of hazards disaster risk can be reduced through a number of protection, accommodation and retreat approaches that generally aim to: reduce exposure to hazards; reduce vulnerability of people and property; increase information-based prudent management of land and the environment; and improve preparedness for adverse events (UNISDR, 2009).

Such approaches employ different tools and techniques, applied either alone or in combination, across the prevention/mitigation, preparation, response, and recovery and rehabilitation phases of the Disaster Management Cycle (DMC) (Mahon, 2012: Table 12). Applying complementary technologies can reduce the risk of catastrophic failure and provide an added safety measure by addressing the issue of residual risk[16].

All phases of the DMC are important. However, , under a high climate change scenario risk mitigation initiatives can cost-effectively prevent up to 90 percent of national expected losses in 2030 (CCRIF, n.k). Increased investment in prevention/mitigation is therefore desirable and the public sector's role in determining the type and location of coastal tourism development particularly important.

Developing the most effective solutions is especially important. Country context will drive the need to tailor adaptations to local conditions and for technology selection to account for time, funding, personnel and institutional capacity constraints. Inappropriately applied practices based on poorly understood or blindly copied designs can easily result in exaggerated socio-economic and environmental costs.

DRR in the coastal zone is an ongoing process in which risks and opportunities are prioritised, risk reduction measures are implemented and the effectiveness of the outcomes reviewed. The performance of any DRR measure must be carefully monitored and assessed, and lessons learned fed back through the cycle to ensure the improvement of maintenance and future interventions (UNEP, 2010).

Approaches to coastal disaster risk management

Protection approaches seek to reduce or eliminate risk through defensive measures and other activities to protect areas against inundation, shore erosion, extreme wind and wave damage, tidal flooding, and so on. They may use *hard* structural solutions such as seawalls, revetments and armour units, to provide a solid barrier between the land and sea providing resistance to tidal and wave energy, and protecting the land and infrastructure behind them; or *soft* defences, such as beach nourishment, that adapt to and supplement natural processes (Annex Two).

Accommodation approaches enable coastal populations to continue to occupy vulnerable areas through tools 1) comprising physical changes to accommodate increased hazard (e.g. cyclone-proofing of buildings); and 2) information systems, enhancing understanding and awareness of coastal risks (e.g. use of hazard and risk mapping in community education); and enabling coastal populations to undertake appropriate responses (e.g. evacuation) to minimise the impact of these events (e.g. tsunami warnings).

Retreat approaches are proactive withdrawals from the coast to reduce the risk from extreme events. Governments generally use tools such as land acquisition, land use restrictions, prohibited reconstruction of property damaged by storms and reductions of subsidies and incentives for development in vulnerable areas to limit development (Annex Two).

Accommodation and *retreat approaches* are more effective when applied proactively. However, if employed at the post-disaster recovery phase of the DMC they will increase future resilience. Examples include rebuilding housing in compliance with a newly-imposed cyclone building standard (Cook Islands 2011-2013 HFA report); or ensuring coastal sub-division is above tsunami and storm surge levels (Fiji 2011-2013 HFA report).

[16] All definitions are taken from UNISDR (2009) and reproduced in Annex One.

In practical terms, some risks such as wind and flooding may be managed cost-effectively through improved coastal planning and strict enforcement of building zones, design and suitable building techniques (for example, flood-proofing measures may be effective in areas where flood depth is low). Others such as storm surges may require a combination of approaches such as the use of setbacks in conjunction with warning systems and planned evacuation procedures[17]. Still others such as localised tsunami may not have solutions beyond building public awareness, application of a tsunami warning system, and designated evacuation routes. In any case, crisis management systems must be developed and planned and be ready for implementation to minimise impact and facilitate recovery.

The need for a multi-hazard approach to disaster risk reduction

Historically, many SIDS have taken a DRM approach focused on one or two predominant and regularly occurring hazards. However, events such as the tsunami that followed the 2009 Samoa earthquake and caused substantial damage and loss of life in Samoa, American Samoa and Tonga, and the growing frequency and intensity of regional droughts across the regions, have contributed to a growing awareness of exposure to multiple hazards. To combat this SIDS need to implement a multi-hazard risk approach to DRM and regional initiatives (e.g. the Pacific Catastrophe Risk Assessment and Financing Initiative, PCRAFI) are important in providing necessary multi-hazard risk data.

The latest feedback from 22 2011-2013 HFA reports indicate that nine (three from the Caribbean, one from AIMS and four from the Pacific) SIDS have national multi-hazard risk assessments with a common methodology to inform planning and development decisions. Three also have agreed national standards for multi-hazard risk assessments and a common format for risk assessment. Of the 13 SIDS without common methodologies for national multi-hazard risk assessments, only one (from the Pacific) indicates that multi-hazard risk assessments are applied; this SID has also developed a national standard.

Field evidence indicates that tourism industry stakeholders (particularly hoteliers) in SIDS are able to manage both high-probability (frequent), low-consequence hazard events and low-probability (occasional), low-consequence hazard events sufficiently well to prevent significant business disruption.

However, disaster risk resulting from high-probability, high-consequence events (e.g. cyclones and hurricanes) and low probability, high consequence events (such as earthquakes and tsunami) is insufficiently addressed. Cyclones are almost guaranteed on an annual basis in parts of the Pacific but there are significant needs for increased resilience among coastal operators to the potentially devastating impacts of these events. Tthere is widespread under preparedness among coastal hoteliers for events such as tsunamis, especially where there is no recent memory of dealing with them and their impacts.

This is indicative of a short-sighted approach to disaster management, with tendencies to concentrate effort on the most recent hazards in memory, which in turn tend to be those most frequently affecting them. In the Caribbean this manifests itself in hoteliers focusing on severe weather systems and coastal erosion, with little regard to other less regularly occurring hazards, such as tsunami, to which they are also exposed. The situation may be addressed by updating the Caribbean Hotel and Tourism Association Hurricane Preparedness Manual used by many hotels, to integrate a multi-hazard approach (Mahon et al., 2012).

The public sector – guiding development of disaster-resilient tourism

Tourism development in the coastal zone should be founded on evidence-based planning decisions. It requires careful integration with constraints and opportunities provided by the prevailing economic, social development, environmental and cultural conditions if vulnerability to natural disasters is not to be exacerbated in the process of maximising economic and other benefits.

[17] Flood-proofing of buildings does little to minimise damage caused by high velocity waters and wave action.

The public sector has an important responsibility to make sure that planning and investment decisions ensure environmentally sustainable and disaster resistant tourism facilities.

While the public sector has a number of tools for guiding and influencing such decisions, it falls under the responsibilities of a number of government ministries and departments, because tourism development cuts across the economic, social and environmental dimensions of planning..

Some of these agencies may be marginalised and often they are operating in the absence of any mandate for cross-sector collaboration with the consequence that there may be little coordination and limited strategic vision across departments. This impedes operational best practice and undermines the mainstreaming of cross-sectoral disaster risk reduction initiatives into national development processes.

Disaster risk reduction and climate change adaptation[18]

Past coordination of the efforts of SIDS national government agencies and development partners to implement DRR and CCA has been hindered by significant country-level capacity constraints, including weak coordination between levels of government, poor communication between governments and local communities, funding gaps, limited human resources and expertise.

The evolution of separate Caribbean and Pacific[19] regional climate change and DRR frameworks, each with separate main regional coordination bodies, regional and national institutional arrangements, policies and action plans has further constrained progress.

In both regions there is now a growing momentum to better address these issues by developing sustainable linkages between DRM and CCA based on the synergies between the two and their common core focus on reducing community vulnerability (UNISDR, UNDP, 2012).

Mainstreaming DRR/CCA into financial and planning ministries

National governments must provide strong enabling environments built on relevant policy, plans and budgetary support that address any global and regional policy vacuums and local capacity constraints if DRR/CCA integration is to be successfully implemented (UNISDR, UNDP, 2012).

Finance and planning ministries must commit to ensuring policy coherence in national planning through budget processes and aid coordination. Such commitment is dependent on the mainstreaming of DRR and CCA into these influential ministries.

However, mainstreaming of DRR and CCA into planning and development often struggles to find traction in the national development agendas of SIDS. In the Pacific, where the drive to DRR and CCA integration has seen progress towards a post-2015 integrated regional policy framework for DRR and CCA, there remains the continuing perception among many development practitioners that greater investment in DRM and CCA does not add value to the economic development process. The resultant lack of political will is reflected in systemic operational flaws including weak national institutions and regulatory environments, disjointed policy environments, inadequate monitoring and enforcement, and a lack of funding, resourcing and prioritisation (UNISDR, UNDP, 2012).

This failure to acknowledge the worth of investment in DRR and CCA is often based on past evidence of the high inherent resilience and coping mechanisms of SIDS communities and

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[18] All definitions are taken from UNISDR (2009) and reproduced in Annex One.

[19] In the Pacific the high-level policy tool targeting action in DRM at the national and sectoral levels is the Pacific Disaster Risk Reduction and Disaster Management Framework for Action 2005 – 2015.

The high-level policy guidance on addressing climate change is provided through the Pacific Framework for Action on Climate Change 2006 – 2015 (PIFACC) and its associated Action Plan.

In the Caribbean the respective high-level frameworks are the Enhanced Comprehensive Disaster Management Strategy and Framework 2007 -2012; and Regional Framework for Achieving Development Resilient to Climate Change 2009 – 2015.

ecosystems in the face of extreme events and variability. Today these attitudes ignore the growing vulnerability of human and natural systems in areas where the range, intensity and frequency of extreme events are expected to increase in the foreseeable future.

Mainstreaming of DRR and CCA into the activities of finance and planning ministries and awareness of such trends in vulnerability need to be increased among development practitioners. It is important that DRM and CCA experts articulate the latest developments and thinking within their fields to counterparts in infrastructure, finance, and other line ministries at the national or sub-national levels, where budgets are set. Such advocacy must be supported by evidence that the apparently large costs of DRR and CCA are much lower than damages that will be suffered without adaptation[20]; and address the often enduring perception in SIDS that CCA is a development issue rather than purely an environmental one. The latter consigns climate change responsibilities to an environmental ministry with a relative lack of resourcing and influence over the development agenda.

In the Pacific, the development of Joint National Action Plans for DRM and CCA (JNAPs) is intended to mainstream and integrate DRM and CCA processes into national and sectoral planning processes and budgets. JNAPs replace previously used separate National Action Plans for DRM and National Adaptation Programmes of Action. They have the potential to address capacity constraints (such as limited financial, human and other resources) through improved coordination of programme and funding alignment, minimising duplication of effort and redundancies; and reducing conflicts in policy development (UNISDR, UNDP, 2012).

Community-level DRR and CCA

At the community-level it is largely immaterial if an event that negatively impacts on progress in the improvement of livelihoods is classified as a disaster or attributed to longer-term climate change. Community-based (bottom-up) approaches to DRR and CCA consequently can overcome barriers created by the unproductive distinction between CCA and DRR at national and regional levels. Such strategies have been increasingly adopted in recent years and found to be more cost-effective than top-down approaches in reducing weather and climate-related risks. They can also be more equitable than large-scale structural measures.

Civil society (including private sector and academia) and governments working in partnership will optimise outcomes by pooling resources and skills. Governments and their development partners must ensure adequate resourcing of communities and equip them with requisite knowledge, skills and technologies through constructive and productive relationships with community leaders to facilitate a timely and efficient flow of information and assistance.

Issues such as inadequate national budgetary support, lack of strategic management within a whole of government approach to community participation and decentralisation (Kiribati, 2011-2013 HFA report) and a lack of non-governmental organisations (NGOs) with the capacity to design, develop, implement and evaluate DRM programmes, continue to undermine the effectiveness of community-level initiatives. This may be addressed by national initiatives to provide capacity-building for NGOs and a more consultative and inclusive environment encouraging communities to pursue an integrated approach to DRR and CCA.

The need for robust information, data and monitoring

For DRM to be economically efficient and effective whatever tools are used to implement it, preferably at the mitigation/prevention phase of the DMC, it must be underpinned by relevant, accurate and up-to-date information to facilitate robust decision-making. Ongoing monitoring and evaluation of the outcomes, costs and benefits of DRR/CCA interventions enable the reprioritisation of risks and opportunities to achieve more targeted and cost-effective interventions.

In many SIDS resourcing constraints may mean that monitoring programmes are not in place or inconsistently administered. Consequently, good quality national scientific or historic

[20] UNDP (2012) estimates that every dollar spent reducing vulnerability to disasters will save an average future loss of seven dollars.

data necessary for robust DRR interventions may not be available. Limited national resources therefore make the work of regional programmes particularly important in making technical data and information available through databases and reports on measures of extreme events (such as thresholds for storm surge levels, tsunami run-ups, flood heights, and seismic intensity) and their impacts on natural physical systems.

In the Pacific technical and educational support in areas such as DRR, climate change, renewable energy and sustainable development are provided by organisations such as the Applied Geoscience & Technology Division of the Secretariat of the Pacific Community (SPC/SOPAC) and The Pacific Centre for Environment and Sustainable Development (PACE-SD).

In the Caribbean the Comprehensive Disaster Management Coordination and Harmonisation Council (CDMCHC) provides the overall management and technical guidance necessary to ensure the coordination and harmonisation of the implementation of comprehensive disaster management activities within and between countries and across different sectors. The Caribbean Disaster Emergency Management Agency (CDEMA) has lead responsibility for disaster management in the region and strategic partnerships with the Caribbean Community Secretariat and the Caribbean Development Bank chart an integrated approach to DRR and CCA. The Caribbean Community Climate Change Centre coordinates the Caribbean region's response to climate change, working on effective solutions and projects to combat the environmental impacts of climate change and global warming. It provides climate change-related policy advice and guidelines and is the executing agency for projects related to Climate Change in the Caribbean.to the Caribbean. The Regional Disaster Information Center Latin American and the Caribbean compiles and disseminates disaster-related information in Latin America and the Caribbean.

SPC/SOPAC was involved in the Pacific Catastrophe Risk Assessment and Financing Initiative (PCRAFI), which provided 15 PICs with Country Risk Profiles, significant risk exposure databases, data risk modelling to enhance disaster risk reduction and improve understanding of exposure to physical hazards. The modelling was based on exposure of residential, commercial, industrial, public assets, main infrastructure, major crops, and population to the shaking and tsunami associated with earthquakes and the wind, surge and rain associated with tropical cyclones.

Products like the Pacific Risk Exposure Database generated from the PCRAFI provide comprehensive disaster risk data. However, the responsible regional organisations (such as SPC/SOPAC) acknowledge the need to ensure the gap from science to policy is bridged (i.e. products assist development planners and DRM/CCA policymakers). This involves the ongoing development of tools and products to meet specific country needs and capacity development and education within countries to ensure products are adopted, sustained and applied.

Regional risk models and data and Geographic Information Systems (GIS) are useful but effective local-level DRR/CCA interventions are likely to require downscaled models and data that more accurately reflect local conditions. This makes dedicated local data collection programmes highly beneficial (Tonga 2011-2013 HFA report) and requires adequate funding of national meteorological services and departments responsible for hydrological monitoring services so that comprehensive local climate change and meteorological hazards records are established and maintained.

National agencies also need to share available data. While public agencies across multiple sectors may use risk and vulnerability information in planning decisions, their degree of collaboration varies widely. Poor communication between ministries, sectors and departments also undermines the use of outputs from programmes such as PCRAFI (Tuvalu 2011-2013 HFA report). Elsewhere private companies within particular sectors may be proactive but the tools and methodologies they apply may not be accessible to stakeholders in government or other sectors (Trinidad and Tobago 2011-2013 HFA report).

Inter-agency and national/local level planning, monitoring and evaluation may be strengthened through an increased use of GIS-based risk management tools. The shared development, use and maintenance of a comprehensive national database on past, current

and planned DRR and CCA activities is an example of an initiative to facilitate the implementation of integrated approaches. As with other factors, capacity issues related to database use and maintenance might need to be addressed. For maximum usefulness such a tool should be highly accessible to all relevant parties, both within and outside government (UNISDR, UNDP, 2012).

Rigorous economic studies and advice are needed in advocating for prevention and adaptation measures at national (or sub-national) levels, where budgets are actually set. They should also play a more significant role in supporting planning tools such as EIA to ensure major tourism developments are sustainable. A comprehensive cost-benefit analysis would account for topical demographic, socio-economic and environmental data; and internalise the costs of losing the regulatory functions of natural ecosystems, the impact of financial incentives on tax revenues, the significant leakage of generated earnings from the economy through imports of goods (for example,food and petroleum) and services, repatriation of profits by overseas-based resort developers and hotel owners, and remittance of funds by expatriate labour.

Early warning systems

Early warning systems encompass “the set of capacities needed to generate and disseminate timely and meaningful warning information to enable individuals, communities and organizations threatened by a hazard to prepare and to act appropriately and in sufficient time to reduce the possibility of harm or loss” and provide the means to achieve effective responses to warnings. A people-centred early warning system comprises knowledge of the risks; monitoring, analysis and forecasting of the hazards; communication or dissemination of alerts and warnings; and local capabilities to respond to the warnings received (UNISDR, 2009).

The effectiveness of the information disseminated to government agencies, emergency services, public and other sectors, including tourism, in preparation for appropriate response to an impending hazard event will often rely on coordination between national and regional agencies.

Cyclone information is communicated via advisories and bulletins generated by National Meteorological Services and worldwide tropical cyclone centres. These centres include the Regional Specialized Meteorological Centre (RSMC) Nadi - Tropical Cyclone Centre (Fiji) that covers the Southwest Pacific Ocean, and the RSMC Miami-Hurricane Center that covers the eastern Northeast and Southeast Pacific High Seas, the Gulf of Mexico, Caribbean Sea and Atlantic High Seas. Such warnings may allow several days of preparation time depending on cyclone course and speed.

The Pacific Tsunami Warning Center, in Hawaii, provides warnings for Pacific basin tsunamis that can cause damage far away from their source. These warnings go to almost every country around the Pacific Rim and to most of the Pacific island states. It is also the interim warning centre to countries in the Caribbean Sea and the Indian Ocean Tsunami Warning System. While tsunami travel at over 700 km/hr in a typical ocean depth of 4,000 km (U.S. Indian Ocean Tsunami Warning System Program, 2007) these far-source-generated tsunamis generally allow sufficient warning time so that emergency response plans can be based on evacuation out of the inundation zone.

Local tsunami generated within 100 km by an earthquake, volcanic eruption or landslide are the most destructive tsunami because the short travel time (generally less than one hour but can be considerably less) leaves little time for response. A recent assessment of a tsunami triggered by a small submarine slope failure in the Northern Group of the Cook Islands suggests that more attention could be given to the risk from this kind of tsunami. The Cook Islands has no seismic monitoring network and consequently no warning system for local seismic events that might trigger a tsunami. There is also an insufficient number of Deep-ocean Assessment and Reporting of Tsunamis (DART) network buoys in the South Pacific between the Cook Islands and seismic sources in the west, north-west and east to accurately capture information for refinement of estimates of tsunami source by the Pacific Tsunami Warning Center (Cook Islands 2011-2013 HFA report).

Other SIDS are linked to the Global Seismic Network and maintain regional seismic monitoring (e.g. the Tonga-Fiji Integrated Seismic Monitoring Systems Network). Barbados is implementing: a network of earthquake detection stations that will transmit information via satellite to the Caribbean Warning Centre, sea level monitoring, hazard assessment, national warning communications, modelling efforts and public education, with a view to having a functional warning system in place by the end of 2012 (Barbados HFA 2011-2013).

Command and control instruments - tourism development and DRR

Conventionally direct regulatory pressure is applied through command and control instruments to ensure developments incorporate required DRR features. Permission for developments may be refused outright if violating land use planning prescriptions (e.g. a certain distance to the shoreline), or allowed to proceed either unchanged or modified to incorporate required DRR features conforming to development planning standards (e.g. for building and engineering). Such an approach may use a toolset including legislation (e.g. a Town and Country Planning Act), policies (e.g. a national hazard mitigation policy), plans (e.g. a sector-specific sustainable tourism development plan), development planning standards (e.g. for site planning, building and engineering) and assessment tools (e.g. Environmental Impact Analysis (EIA)). A SIDS government may generate revenue to partially offset the recurring problem of insufficient resourcing (financial and human) of DRM at central and local government levels in SIDS, by charging for the provision of services such as Hazard Vulnerability Assessment (HVA) (e.g. British Virgin Islands 2011-2013 HFA report).

Environmental Impact Assessment – implementing disaster risk reduction

Many SIDS have introduced national legislation requiring EIA to be applied across all sectors, including tourism, for developments over a certain size or likely to have a particular environmental or social impact. An EIA assesses the possible positive or negative impacts a proposed project may have on the natural, social and economic aspects of the environment. It is intended to facilitate informed decision making, which includes setting environmental terms and conditions for implementing development proposals.

Ideally, overall tourism development plans are based on carrying capacity considerations and market factors and should be subject to strategic environmental assessments, accounting for the cumulative environmental and social impacts of multiple developments (A/67/228). However, much implementation of the EIA process in SIDS continues to be at project level.

An effectively implemented EIA provides a good mechanism for incorporating DRR measures into developments. However, a number of factors continue to undermine the effectiveness of a government's administrative systems and the EIA process in SIDS:

- DRR considerations may not be explicitly stated as a criterion for the assessment process. This may be remedied by amending the relevant EIA regulations (e.g. Samoa 2011-2013 HFA report).
- No mandatory legal requirement for EIA in specified circumstances exists. Progress is being made in this area. For example, the Anguilla Environmental Protection Act will be enacted in November 2013 and along with amendments to the Planning Act will shape the incorporation of EIA into developers' planning proposals: Anguilla 2011-2013 HFA report).
- No legal specification of the technique itself; and/or no (in)appropriate environmental quality or impacts specified.
- Responsibility for the EIA process residing in a government ministry, department or agency (e.g. a national environment service) with little influence on the economic planning process.
- Low levels of funding and associated lack of capacity building, and non-adherence to important aspects of the process, such as assessing alternatives, monitoring outcomes and consistent enforcement of consent conditions.

The general lack of appropriate enforcement of regulations through regular inspections and monitoring is a common theme in SIDS 2011-2013 HFA reports. With sufficient political will, many shortcomings in the process may be relatively simply remedied. However, they may be symptomatic of underlying systemic weaknesses, such as inadequate financial and human resourcing, in turn symptomatic of the low priority that central finance and planning ministries place on DRR compared to other development goals. Feedback from the 2011-2013 HFA reports also indicates a lack of engagement between the national agencies responsible for disaster management (e.g. a national disaster management office) and the administration of EIA (e.g. a national environment agency). Suggested improvements to the EIA would involve engagement, preferably official, between the concerned agencies to ensure a process properly informed by risk considerations, that more strongly and explicitly integrates hazard risk reduction screening measures based on consistent methodology and standards (e.g. Fiji 2011-2013 HFA report).

Given that often the policy environment in a SIDS is dysfunctional, it is important to stress that research on climate change impacts in the Caribbean suggests that such situations may be addressed at the operational level. This can be done through a government focus on a number of low regrets exposure and vulnerability options across a range of hazard trends; for example, revising a building code to address potential increases in wind speeds (Mahon et al., 2012: Table 6).

Market-based instruments - tourism development and DRR

As an alternative to command and control instruments, market-based instruments provide developers with negative (such as the threat of fines) or positive (flexibility in how a DRR objective is achieved) incentives to meet required DRR standards.

Both the regulatory and incentivising approaches can ensure DRR concerns are integrated with business goals and operational imperatives to ensure a robust resilient and sustainable tourism product. The two can be effectively employed together, as in Grenada, where a prospective tourism developer must gain approval for development from the Physical Planning Unit before qualifying for significant financial incentives from the public sector Grenada Industrial Development Corporation (Mahon et al., 2012).

The banking and insurance sectors - guiding disaster risk reduction

The banking and insurance sectors can play important roles in reducing disaster impacts. Both have the potential to address operational shortcomings in government regulatory processes and raise the disaster resilience of tourism building stock through incentives or enforcing compliance. For example, Cook Islands banks require a building permit before approving home loans (Cook Islands 2011-2013 HFA report); and in Fji where the banking and insurance sectors work together, the banks require compulsory insurance against specific physical hazards before lending and insurance is only available to a developer/operator on issuance of third party certification of building standards from an insurance industry-approved engineer. Unfortunately, in both these examples developers continue to bypass the system and undermine the standard of building stock: in Fiji a loophole in the process enables developers to secure insurance offshore with no requirement for local engineer sign off on building standards.

There is also evidence that disaster losses in hazard-prone areas may be reduced through a mechanism in which insurance premiums are reduced to reflect a reduction in potential losses through voluntary mitigation measures taken by a property owner (Kleindorfer and Kunreuther, 2000: cited in Mahon et al. 2012). However, few such incentives are currently offered and voluntary actions by business owners are uncommon.

The transfer of risk to facilitate post-disaster recovery

Insurance can also play an important role as a risk transfer mechanism facilitating post-disaster recovery. However, its contribution to DRM is often limited in SIDS where the level of insured households and small businesses (many of which may be connected to the tourism industry) may be very low due to unavailability or high cost. During 2009 flooding in Nadi, Fiji, only one percent of households and 12 percent of business operators had any

insurance. This prompted the Fiji government to express the need for a review of the insurance industry, which had withdrawn insurance in flood-prone areas (Holland, 2009).

Consequently, the opportunities for swift recovery are limited and often only the largest local and international businesses can restore operations quickly, often hazard-proofing their operations in the process. Many smaller businesses fail to permanently recover with an attendant loss of income for those generally struggling to stay above the poverty line. Any increase in the frequency of lower intensity events due to climate change therefore has the potential to significantly impact on poverty.

With the drop or disappearance of tourism in the event of a disaster the loss of tax revenue from government accounts can greatly impede the recovery of a SIDS with already limited financial resources and heavy dependency on tourism. Governments are therefore increasingly using mechanisms, such as domestic trust funds, that provide immediate post-disaster short-term liquidity to maintain essential government services and disaster mitigation funds to aid the recovery of the most disadvantaged. For example, in 2007 Barbados established the Catastrophe Fund to provide financial aid to low-income earners owning and occupying a chattel (wood and wall) house valued at not more than BD125 000, which is destroyed or damaged by a natural catastrophe[21].

The impracticability of establishing local insurance schemes because of the small base of many SIDS has also seen a move to innovative regional financial engineering solutions to their short-term liquidity needs.

In 2007 the Caribbean Catastrophic Risk Insurance Facility (CCRIF) was established, as the first multi-national and index parametric-based catastrophe insurance instrument backed by both traditional and capital markets. It originally covered only earthquake and hurricane-related losses so countries suffering losses from other extreme events (such as flooding) could not access the Facility[22]. Subsequently, in response to strong country and stakeholder interest in purchasing catastrophic flood coverage participating countries and stakeholders a new insurance product covering extreme rainfall events has been developed and is in the process of being launched.

CCRIF models the damage to physical infrastructure and damage estimates incorporate the effects of wind, storm surge and wave action, making it particularly relevant to tourism infrastructure located in the coastal zone.

The two-year Pacific Disaster Risk Financing and Insurance (PDRFI) Program was recently launched to explore Catastrophe Risk Insurance and financial risk sharing modalities for the region.

The vulnerability of the tourism sector to disasters

Tourism businesses represent a broad spectrum of small, to medium or large cross-sectoral enterprises (e.g. hotels, bus operators, museums) and may be inherent members of the local community (Cioccio & Michael, 2007; cited in Mahon et al., 2012). Small businesses are most likely to be vulnerable to disasters because of limited resources and knowledge of how to prepare for disaster impacts. Given the high percentage of businesses that never

[21] Commencing in financial year 2006- 2007 for five years the fund was to be augmented by annual contributions of BD2.5 million from Government and monthly contributions from employed and self-employed persons of 0.1 percent of the earnings on which they pay National Insurance (Eastmond Parris Law, 2008).

[22] For example the Jamaican Government was unable to access the CCRIF despite experiencing over USD 1.5 billion in rain and flood-related losses over four years (Jamaica 2009 – 2011 HFA report).

permanently recover from being struck by a disaster this has the potential to severely obstruct efforts to reduce regional poverty[23].

At hotel-level, the degree of vulnerability of large multi-national hotels differs from smaller locally owned hotels, with organisational differences in disaster performance being linked to issues with size, resources and associated capacity. Larger organisations will be in a better position to invest in DRR, having the resources to employ teams of multi-skilled professionals, enjoy better staff retention, and invest in risk transfer mechanisms such as insurance.

In contrast the limited resources of many small hotels mean they are under pressure just to maintain day to day operations. Consequently, the budget for DRR/CCA interventions is often not available even when there is an awareness of the need for such investment. Small businesses may also require technical assistance in preparing for disasters. Other factors undermining the effectiveness of DRR measures at the small business level are a lack of specific knowledge and staff resources. High turnover of staff at resorts may also be a serious impediment to improved DRR at the preparedness and response phases.

While the industry has shown itself to be relatively highly adaptive and able to cope with a range of shocks (for instance, the 2004 Asian tsunami) it does not appear to be overly concerned about disasters. There is also evidence of poor preparedness and limited knowledge of how to cope successfully with future climate regimes and broader environmental impacts and societal ramifications (Scott and Becken, 2010). Therefore a systematic and strategic approach is needed to development that embraces prevention/mitigation, preparedness, response and recovery (for example, a sectoral post-disaster destination marketing plan[24]) measures.

Tourists are particularly vulnerable to natural disasters. Their mobility means they are difficult to account for and to reach with relevant information or warnings, places them in unfamiliar environments often with a low-level of connectedness with local communities and language barriers to contend with. In a holiday mindset they may have difficulty absorbing information related to physical hazards or disasters (WTO, 1998: cited in Mahon et al, 2012).

Currently, at resort level the engagement in preparedness levels and response disaster planning has been found to depend on perceptions of physical hazard and disaster risk of individual managers and on the resources available to an organisation, rather than factors such as prior crisis experience. There is a clear need for measures to ensure that robust preparedness and response measures are more consistently and effectively delivered across the sector if the safety of tourists based in the vulnerable coastal zone is to be properly addressed.

Partnerships between the public and private sectors (Public-private Partnerships or PPPs) can play a role in this. For example, following the 2004 Indian Ocean tsunami the PPP between the Indonesian Ministry of Culture and Tourism and the Bali Hotels Association developed the 'Tsunami Ready Toolkit' to assist hotels to prepare for tsunami, and provide fact sheets and background information papers, Standard Operating Procedures and best practice examples. Other initiatives saw the creation of a common standard for evacuation route signs; and hotels making their premises available to local communities with few alternative evacuation options during emergencies (Mahon et al., 2012).

However, even where reasonably high levels of planning, including regularly updated crisis preparedness plans, exist amongst tourism businesses and organisations there is often room for improvement of notable weaknesses such as restricted scope of communication

[23] According to the US Federal Emergency Management Agency (FEMA) 40 percent of businesses struck by a disaster never reopen; of those that do, 25 percent permanently close within two years (Source: "Disaster planning means business," 2011: cited in Mahon et al., 2012).

[24] Samoa received marketing support from a bilateral aid donor to promote the islands as a tourist destination following the tsunami generated by the 2009 Samoa earthquake.

arrangements with emergency management agencies, and an absence of written plans addressing tourists (Mahon et. Al., 2012).

PPPs can also reduce the tourism sector's vulnerability to disaster risk across all phases of the DCM as illustrated by the Regional Disaster Risk Management for Sustainable Tourism in the Caribbean Project[25]. Outcomes included the development of the Regional Disaster Risk Management Framework for Tourism in the Caribbean (the Framework) as a Regional Public Good; a Strategy and Plan of Action for Standards for Conducting Hazard Mapping, Vulnerability Assessment and Economic Valuation for Risk Assessment for the Tourism Sector in the Caribbean; and institutional strengthening of the Caribbean Tourism Organization (CTO), the Caribbean Disaster Emergency Response Agency , and their stakeholders in DRM for sustainable tourism. Under the Framework a DRM Strategy and Plan of Action for the Tourism Sector was developed through the collective action of regional and national stakeholders in the tourism and disaster management sectors. The Strategy addresses the elements of: mitigation, preparedness, response and recovery (including rehabilitation, and reconstruction); and with the Plan of Action supports the provisions of the Comprehensive Disaster Management Framework, and the Caribbean Regional Sustainable Tourism Policy, prepared by the CTO (adapted from Mahon et al., 2012: Box 6).

The tourism sector - a potential case for self-regulation

In their report on investment in the disaster risk resilience of the tourism sector of SIDS, Mahon et al. (2012) explore the potential for the tourism industry to self-regulate to create a sector more resilient to disasters.

They argue that the rationale underpinning the business case for resilience is that a business better prepared to cope strategically with natural disasters improves its chances for long-term survival and preservation of value.

Despite this inherent logic public and private sector acceptance and adoption of DRR has been low and while many tourism businesses and organisations already prepare for current climate-related events there is a lack of explicit reporting of the sector's investment in DRR (Mahon et al., 2012).

The tourism sector has an inherent interest in resilience to disasters, managing risks and minimising losses. This will not only limit casualties but also protect the integrity of the industry's reputation, the loss of which can have serious ramifications for the industry and an already impacted SIDS economy. It would therefore appear prudent that, especially in a SIDS where public sector policy, legislation and enforcement of regulations is weak, the tourism sector ensure the safety of tourists in the coastal zone through a range of voluntary private sector strategies that deliver prevention/mitigation preparedness, response and recovery measures that meet the standards of international best practice.

Self-regulation is an industry response to established regulatory approaches to encourage, for example, certain environmental standards. It involves industry-initiated actions aimed at promoting beyond-compliance performance from the private sector. Programmes take the form of a consensus-developed, third party-verified, voluntary rating system promoting, for example, social and environmental responsibility (for example the Global Sustainable Tourism Criteria[26]).

A voluntary private sector preparedness certification programme, administered outside Government and based on robust and adequate indicators of preparedness (potentially across the four DMC phases) may achieve the linkage between business action and reward (e.g. by rating agencies and insurance companies, among others). Such a programme may provide opportunities to develop an effective and efficient methodology to: 1) confirm

[25] The project involved the Caribbean Disaster Emergency Response Agency with support from the Inter-American Development Bank and in collaboration with the Caribbean Tourism Organization, CARICOM Regional Organization for Standards and Quality, and the University of the West Indies.

[26] More information available from the Global Sustainable Tourism Council (GSTC) website: http://www.gstcouncil.org.

business preparedness on an operational basis (in the context of DRM) and 2) facilitate bottom-line benefits and incentives to the tourism sector (Raisch and Statler, 2008: cited in Mahon et al., 2012).

The Corporate Social Responsibility (CSR)[27] framework has been suggested as one such mechanism (Warhurst, 2006 : cited in Mahon et al., 2012) and it has been argued that companies should consider including natural disaster resiliency metrics in their CSR reporting or as part of their sustainability efforts (Raisch, 2007 and Raisch and Statler, 2008: cited in Mahon et al., 2012).

However, currently the economic business case for private investment in the resilience of tourism in SIDS has not yet been systematically made, with few examples of work explicitly considering DRR in the context of business sustainability or corporate social responsibility. There is also a lack of empirical evidence regarding disaster impacts on business, the contribution business involvement can make to disaster prevention, and the costs and benefits to business. This weakens the case for the development of certification programmes, or the adaptation of existing voluntary self-regulated frameworks, appropriate for the delivery of DRR in developing countries and the establishment of networks of disaster prevention partnerships.

Ultimately, profit maximisation remains the ultimate goal for the vast majority of corporations (Vitae Civilis, 2012). Private investors are therefore likely to make decisions based on financial considerations, such as different timescales regarding the Return on Investment (ROI), rather than sustainability outcomes.

While resort developers typically work with investment horizons of approximately 25 years a ROI may be achieved after 5-10 years. This reduces concern for long-term issues especially in the case of overseas-based tourism operators. With business interests thus governed by short time frames, business managers may not consider the prospect of a low-frequency high impact event such as a tsunami or the long-term effects of climate change. They will consider investments in longer-term risk reduction uneconomical because the ROI on disaster risk reduction activities, based solely on the potential occurrence of a disaster, is anticipated as being insufficient. Such a business focus on short-term horizons increases vulnerability (Becken, Hay & Espiner, 2011).

Such perceptions need countering through raised industry understanding of hazard concepts and terminology; and quantifying the ROI of DRR measures and the economic impact of disasters on tourism investment. This will require comprehensive technical reports that quantify and document the physical, social and economic impacts of natural disasters on SIDS' societies at the microeconomic (i.e. business) level. Current studies have been produced at sector level and rarely go beyond macro level analysis.

Cost benefit analyses are increasingly being developed by regional and international development organisations to aid the decision-making process of SIDS policy-makers. Analyses of DRR options somehow have to address the costing of the benefits of resilience initiatives in the coastal tourism sector because of the complexity of dealing with the experiences of tourists in a disaster situation, which have the potential to either boost or destroy the reputation of a SIDS as a tourism destination.

The tourism sector – alternatives to the current tourism model

The ongoing demand for a tourism product centred on accommodation close to the high water mark remains a root cause of vulnerability and an impediment to effective DRR in SIDS.

[27] ISO 26000 defines social Responsibility as "responsibility of an organization for the impacts of its decisions and activities on society and the environment, through transparent and ethical behavior that contributes to sustainable development, including health and the welfare of society; takes into account the expectations of stakeholders; is in compliance with applicable law and consistent with international norms of behavior; and is integrated throughout the organization and practiced in its relationships. NOTE 1 Activities include products, services and processes. NOTE 2 Relationships refer to an organization's activities within its sphere of influence."

In the absence of a major reconfiguration of tourist expectations or alternate revenue-generating tourism options, coastal tourism development will continue for the foreseeable future. Consequently, innovative approaches are required to ensure both new and legacy construction better able to deal with current hazards and accommodate new impacts in the future[28].

Hoteliers of legacy building stock in the coastal zone are likely to oppose corrective approaches to DRR, such as retrofitting, whether they are regulated or incentivised. The image such a resort presents often depends on its aesthetics and form tends to take precedence over function and physical building resilience (e.g. the incorporation of aesthetically pleasing shingles, with little cyclone resilience). Other retrofitting options, such as addressing future impacts of coastal inundation through conversion of ground floor rooms to less intensive, transitory functions such as car parking, will impact on a hotel's core revenue generating capacity and are unlikely to be welcomed or widely adopted by coastal hoteliers (Mahon et al., 2012).

Mahon et al. (2012) propose alternative styles of tourism to the dominant beachfront holiday model that if sold to the industry and tourists may reduce the level of demand for a 'sun, sea and sand' experience:

1. One such product could emphasise accommodation set back from the beach but lying in an area of natural beauty rather than the currently promoted heavily manicured 'natural' resort setting. Such an approach would retain the integrity of natural ecosystems and harness their regulatory mechanisms.
2. A retreat strategy, which promotes diversification away from the coastal tourism model through alternative sustainable tourism products such as ecotourism.

   An example is the PPP formed on Penang Island, Malaysia following the 2004 Indian Ocean Tsunami. The public sector authorities encouraged tourism product diversification through a focus on the island's heritage and culture as well as beach tourism. Stakeholders took the opportunity to enhance the tourism products available while reducing dependency on beach tourism (Ghaderi, 2012: cited in Mahon et al).
3. Stimulating market demand for a safe vacation experience by making tourists aware of the potential for disaster striking on a vacation in a hazardous region, may pressure the industry to provide a coastal tourism product with the aesthetic appeal of the existing one but centred on hotels that incorporate financially viable design features and are resilient to the range of coastal zone physical hazards.

   Currently a gap exists in terms of social research that supports a comprehensive understanding of tourist risk perceptions and the premium they would place on a disaster resistant product (Mahon et al., 2012).

Such prospective coastal tourism models may align more with the sustainable development products called for in A/67/228 and A/67/313. However, some SIDS may have limited options for delivering specialised tourism, such as ecotourism and cultural tourism because of factors including size, topography, lack of biodiversity, low numbers of endemic species, and difficulty of access. Cultural experiences may often be restricted to shows at local resorts and tourists are often more willing to pay for cheap imported items rather than a price fairly reflecting the materials, skill and labour put into a local product. However, niche markets may help diversify the product, minimising the effects of seasonality, and reducing pressure on popular areas by distributing tourists to lesser-visited locations.

Conclusion

SIDS are found in the Caribbean, Pacific, and AIMS regions. Shared structural disadvantages and characteristics hinder sustainable development and make them

[28] For example, a prospective CCA measure of adjusting elevation requirements to account for sea level rise has not yet been fully integrated into the SIDS planning system (Mahon et al., 2012).

particularly vulnerable to the pervasive impact of a number of hydrometeorological and geological disasters.

As entirely or predominantly coastal entities there is intense competition between land use options. Limited resources force economic dependence on one or two sectors and tourism is a primary economic activity for many SIDS. The dominant model of tourism in SIDS supports a pattern of coastal zone tourist development by multinational companies and hotel chains that follow a number of investment models seeking to minimise their exposure to disasters and financial risks by transferring them to the local community.

The situation is exacerbated by weaknesses in government policy, legislation, regulations and enforcement of compliance, meaning that the vulnerability of tourists, the local population, tourism superstructure and supporting infrastructure to natural disasters may continue to increase.

The tourism industry has an inherent interest in a sector resilient to disasters. By effectively and efficiently managing risks and losses the industry will minimise casualties and protect the integrity of the industry's reputation. A case for industry self-regulation to ensure the delivery of prevention/mitigation, preparedness, response and recovery measures meeting the standards of international best practice would appear particularly strong in situations where local public policy, legislation and compliance enforcement is weak. However, it appears that a strong economic business case for private investment in the resilience of tourism in SIDS has to be systematically made before the industry will embrace the concept of a voluntary self-regulated DRM framework.

Profit maximisation remains the ultimate goal for the vast majority of corporations and private investment decisions are likely to continue to be based on financial rather than sustainability considerations. Since a ROI on a tourism investment is often achieved after 5-10 years there is a reduced concern for longer-term issues, especially in the case of overseas-based tourism operators. Consequently, the prospect of a low-frequency high-impact event such as a tsunami or the long-term effects of climate change are unlikely to be considered. Investments in longer-term DRR activities then appear uneconomical since the ROI on them is seen as insufficient, based solely on the potential occurrence of a disaster.

Such perceptions need countering through increased tourism industry understanding of hazard concepts and terminology; and the quantification of the ROI for DRR measures and the economic impact of disasters on tourism investment.

The ongoing demand for a tourism product centred on accommodation close to the high water mark remains a root cause of vulnerability and an impediment to effective DRR in SIDS. Innovative approaches will be required to ensure new and legacy construction better able to deal with current hazards and accommodate future impacts.

Some SIDS may have the potential to adopt alternative styles of tourism to the dominant beachfront holiday model. If sold, to the industry and tourists alike, such alternatives may reduce the level of demand for a 'sun, sea and sand' experience that locates tourists, tourism-related businesses and support staff, tourism superstructure, and supporting infrastructure in the vulnerable coastal zone.

In the meantime it is important to continue building the capacity of SIDS governments to implement effective policy, legislative, regulatory and compliance frameworks. This will be facilitated by building on the synergies between DRR and CCA and the mainstreaming of DRR and CCA into finance and planning ministries.

Robust DRR-related decision-making depends on a strong evidence base. The work of regional technical organisations remains essential especially in bridging the gap from science to policy. Existing monitoring must be maintained, to ensure the availability of long-term datasets are available, and monitoring of previously unrecognised hazards, such as locally generated tsunami, must also be introduced as soon as possible. Given the financial constraints of SIDS the international development donor community will have an important role in supporting such initiatives.

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Annex One – Definitions

Climate change: A change in the climate that persists for decades or longer, arising from either natural causes or human activity.

Climate change adaptation (CCA): the adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities. Many disaster risk reduction (DRR) measures can directly contribute to better adaptation.

Disaster Management (DM): The organization and management of resources and responsibilities for addressing all aspects of emergencies, in particular preparedness, response and initial recovery steps.

Disaster Risk Management (DRM): The systematic process of using administrative directives, organizations, and operational skills and capacities to implement strategies, policies and improved coping capacities in order to lessen the adverse impacts of hazards and the possibility of disaster.

Disaster Risk Reduction (DRR): The concept and practice of reducing disaster risks through systematic efforts to analyse and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events.

Mitigation: the lessening or limitation of the adverse impacts of hazards and related disasters. For example, engineering techniques and hazard-resistant construction, improved environmental policies and public awareness.

Physical hazard: GAR11 uses the term physical (rather than natural) hazard to refer to hazardous phenomena such as floods, storms, droughts and earthquakes. Processes such as urbanization, environmental degradation and climate change shape and configure hazards, which mean it is becoming increasingly difficult to disentangle their natural and human attributes.

Preparedness: the knowledge and capacities developed by governments, professional response and recovery organisations, communities and individuals to effectively anticipate, respond to, and recover from, the impacts of likely, imminent or current hazard events or conditions. For example, contingency planning, stockpiling of equipment and supplies, the development of arrangements for coordination, evacuation and public information, and associated training and field exercises.

Prevention: the outright avoidance of adverse impacts of hazards and related disasters. E.g. embankments that eliminate flood risks; and land-use regulations preventing settlement in high risk zones.

Recovery: the restoration, and improvement where appropriate, of facilities, livelihoods and living conditions of disaster-affected communities, including efforts to reduce disaster risk factors. Recovery should be based on pre-existing strategies and policies that facilitate clear institutional responsibilities for recovery action and enable public participation. Recovery programmes offer the opportunity to apply the “build back better” principle.

Residual risk: The risk that remains in unmanaged form, even when effective disaster risk reduction measures are in place, and for which emergency response and recovery capacities must be maintained.

Response: the provision of emergency services and public assistance during or immediately after a disaster in order to save lives, reduce health impacts, ensure public safety and meet the basic subsistence needs of the people affected. The division between the response and recovery stages is not clear cut, with some response actions extending well into the recovery stage.

Annex Two – Additional information on coastal zone DRR approaches

Protection approaches
Traditionally 'hard' structural solutions have been employed in protection approaches to coastal DRR. However, they are associated with a number of problems: 1) they transfer erosion from the protected shoreline to the seabed immediately in front of the structure or the adjacent coast; 2) they impede dynamic coastal processes that would naturally occur in response to rising sea levels and wave climate; 3) they impede recreational beach use; and 4) they may be costly to construct and maintain.

Soft defences have been adopted in response to the negative impacts of hard defences, such as the disruption or alteration of sediment circulation. Beach nourishment is particularly attractive on wave exposed coasts with beaches, where it can help maintain the natural landscape and habitat function of the coast, reduce the impact of wave action, minimise environmental impact and potentially create tourism opportunities (e.g. recreational and eco-tourism through beach widening and/or targeted creation of sea turtle nesting sites). Inadequate project designs, however, may generate negative environmental effects including lethal or damaging doses of water turbidity, and altered sediment compositions.

Large-scale beach nourishments will typically require extensive engineering studies, specialised knowledge, monitoring and equipment. In SIDS smaller scale nourishment can be implemented at the local level using beach-grade sediment transferred from source by truck haul. Beach monitoring to evaluate its success and determine the need for re-nourishment may be at a local/community level with appropriate training and technology. However, if several community nourishment schemes are implemented over a wider area they must be evaluated as a whole.

Retreat approaches
An example of a retreat approach is the use of coastal setbacks, which may dictate, for instance, a minimum distance from a particular feature on the shoreline for new buildings or infrastructure facilities, or may state a minimum elevation above sea level for development.

The specification of distinct linear coastal exclusion zones along the whole of an administrative unit controls development and in the process protects tourism superstructure and infrastructure by ensuring they are not located in an area susceptible to coastal hazards.

Setbacks should preferably be established based on physical measures such as erosion rates or extreme water levels rather than adopting arbitrary distances which may not be truly indicative of the coastal hazards. In the Caribbean, for example, Anguilla employs a setback measured against the 100-year storm surge inundation line (Anguilla 2011-2013 HFA report).

To ensure an adequate balance between the cost and level of protection provided by a setback and the opportunity cost of foregone land-use opportunities setback lines should be optimal from an economic perspective. Recent economic modelling has shown the usefulness of defining setback lines based on their exceedance probabilities; and the exceedance probability of an economically efficient setback line to be of the order of magnitude of 1 in 100 annually (Jongejan et al., 2011).

The legacy of inappropriately located and designed older tourism stock sited in the coastal area of SIDS raises problems for governments applying DRR approaches such as setbacks, which may reclassify coastal areas as no-build zones. In such cases corrective approaches where governments regulate or incentivise suitable retrofitting to deal with current and predicted impacts of climate change would need to be applied.

While *accommodation* and *retreat approaches* are more effective when applied proactively but may be employed at the post-disaster recovery phase of the DMC to increase future resilience. Examples include rebuilding housing in compliance with a newly-imposed cyclone building standard (Cook Islands 2011-2013 HFA report); or ensuring coastal sub-division is above tsunami and storm surge levels (Fiji 2011-2013 HFA report).