Identifying Emerging Issues from the Perspective of the Small Island Developing States

Expert Group Meeting co-hosted by

United Nations Environment Program (UNEP) and

the United Nations Department of Economic and Social Affairs (DESA)

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General Introduction

The social, economic and environmental pillars of sustainable development are inextricably entwined, and nowhere is this more apparent than in Small Island Developing States (SIDS), where a decision made in one sphere can have a strong and immediate impact on the other two. From economic growth to climate change to food security, the issues facing SIDS are multi-dimensional and they require integrated action to address them.

Our current environmental crises have their roots in human economic and social activity, in an expanding human population with ever increasing consumption demands and production expectations. Understanding the human causes of environmental degradation is vital to finding solutions. Highlighting these social and economic impacts may spur policy makers to take action in ways that long-term environmental predictions may not.

On 14-16 May 2013, in Cambridge, United Kingdom, the Department of Economic and Social Affairs (DESA) and the United Nations Environment Program (UNEP) co-hosted an expert group meeting on "Emerging Issues in SIDS." The meeting was held in the midst of the UNEP-initiated "Foresight" process, which uses a methodology originally designed to identify emerging environmental issues. Because of this context, the meeting was initially organized with the environment discussion separate from the socio-economic discussion, with one short exchange on inter-linkages between them However, over the course of the meeting it was often difficult to make clear distinctions between the environmental issues and the socio-economic issues, and so while UNEP and DESA have developed separate lists of environmental and socio-economic emerging issues respectively, many of the social and economic issues have strong environmental components and vice versa. The experience of the expert group meeting is inspiring DESA and UNEP to explore a more integrated approach to identifying and refining emerging issues in the future, with great potential benefits for the advancement of holistic sustainable development in SIDS and beyond.

For the current exercise, the lists of environmental and socio-economic emerging issues remain separate and the format distinct but wherever possible the issues statements point out the close ties between the social, economic and environmental aspects. These will be refined in the coming months. In the interest of time, the co-organizers request the readers of this document who may be SIDS delegates and their partners to kindly understand that this does not yet represent a final product of the exercise but is made available as a provisional product as input into the SIDS regional and inter-regional preparatory processes.

Background on the UNEP Foresight Process

In 2011 UNEP carried out a rigorous Foresight Process to identify and rank the most important emerging environmental issues. The outcomes of the process were released in a report in 2012: 21 Issues for the 21st Century: Results of the UNEP Foresight Process on Emerging Environmental Issues . The report was widely circulated within and outside the UN system in the run-up to Rio +20 and at Rio +20, and has stimulated lively discussion about priorities for policy action.

At the heart of the 2011 Process was a Foresight Panel consisting of distinguished scientists from around the world. But would the list of emerging issues be the same if it was produced by experts from Small Island Developing States (SIDS)? Would the distinctive perspective of the SIDS provide new insights to policymakers? To answer these questions, UNEP recently launched a unique new Foresight Process to identify and prioritize global emerging environmental and sustainability issues from the perspective of the SIDS. The process will provide a significant new avenue for incorporating the viewpoints of the SIDS in global sustainability policymaking. It will also be a UNEP contribution to the preparation of the Third International Conference on SIDS in 2014, of which one of the four thematic foci is "Identify new and emerging challenges and opportunities for the sustainable development of small island developing States and ways and means to address them, including through the strengthening of collaborative partnerships between small island developing States and the international community". The output of the process will also inform the UN community, policymakers and other stakeholders in general about critical emerging sustainability issues that require immediate and/or adequate attention.

In the first step in the SIDS Foresight Process, UNEP solicited initial ideas on emerging issues in SIDS from experts in the three SIDS regions (Pacific, Caribbean, and Atlantic, Indian Ocean, Mediterranean and South China Sea). The SIDS Foresight Panel was established, comprising of ten experts from the three SIDS regions and whose expertise covers various aspects of the environment in the SIDS and its linkage with sustainable development. This was followed by the SIDS Foresight Panel meeting in May 2013 in Cambridge, UK, which brought together Panel members and UNEP experts to refine the preliminary list of emerging issues in SIDS. The list presented in this document is the results of the deliberations of the Foresight Panel. UNEP will soon launch an electronic online survey to receive further opinion on the identified issues.

Definition of Emerging Issues

In the context of this foresight process, an emerging issue is an issue that is:

- Critical to achieving sustainable development (positive or negative) in many parts of the world.
- Could be related to any of the three pillars of sustainability – environment, social and economic but should have particular relevance to the global environment.
- Recognized as very important by the SIDS, but has not yet received adequate attention from the policy community. Hence it is considered an "emerging issue" from the vantage point of the policy community and requires immediate and/or adequate policy attention. The definitions of very important and adequate attention are left open to participants in the process.
- Evidence-based, including scientific and traditional sources of knowledge.
- Recognised as 'emerging' based on newness, which can be the result of new knowledge; new scales or accelerated rates of impact; or a heightened level of awareness.

PART I

UNEP FORESIGHT PROCESS FOR SMALL ISLAND DEVELOPING STATES

LIST OF EMERGING ENVIRONMENTAL ISSUES[1]

A. Invasive Alien Species

B. Irreversible Loss of Tropical Montane Cloud Forest

C. Coastal Squeeze: Coastal Deforestation and Loss of Ecosystem Services

D. Pacific Deep-sea Minerals Mining and Associated Risks

E. Disproportionate Impact of Climate Change and Sea-Level Rise in SIDS

F. Intensification of Extreme Events and External Shocks and Increasing Vulnerability of SIDS

G. Accelerated Beach and Coastal Erosion and Breakdown in the Sand and Sediment Budget

H. Accelerating Decline of Ecosystem Functions Affecting Food and livelihood Security

I. Energy Dependency and the Need to Develop Renewable Energy Resources

J. Increasing Degradation and Scarcity of Water Resources

K. Reaching the Limit of Land Capacity

L. Waste for Resources

M. Indiscriminate and Increasing Use of Pesticides

N. Synergizing Local, Traditional and Modern Science as a Basis for Sustainable Island Development

O. Developing an Ocean-based Blue-Green Economy

P. Overfishing and Potential Collapse of Inshore Marine Ecosystems

Q. Unique Human Capacities for Island Sustainability

R. Climate and Environmental Change Driving Population Displacements

S. Exploring the Potential of Unexploited Natural Resources in SIDS

T. Global Contaminants Affecting SIDS

U. Impending Agro-ecosystem Breakdown and Loss of Agrobiodiversity

[1] Note that there is no particular order of priority

V. Beyond GDP- Appropriate Indicators for SIDS Sustainable Development Error! Bookmark not defined.

A.	Invasive Alien Species
DESCRIPTION	Findings of the Millennium Ecosystem Assessment strongly suggest that biological invasions will continue to increase with rising globalization. The range of problems associated with Invasive Alien Species (IAS) still lacks adequate political recognition and too few coordinated actions are in place, or are effective, in most parts of the world. SIDS, because of their fragile biodiversity and ecosystems, are particularly vulnerable to the potentially devastating impacts of IAS compared to continental countries. These invaders are on par with habitat loss as the lead driver of species extinctions on islands over the last 20 years and are one of the three main drivers of the breakdown in sustainable rural ecosystems on islands identified by the Japanese Satoyama-Satoumi Ecosystems Assessment. IAS account for a disproportionate number of all species extinctions, millions of dollars in losses of food and export crops, and extirpations and death of indigenous human populations in SIDS. There is also increasing evidence that marine IAS constitute an extremely serious, but less understood threat to marine ecosystems. IAS will continue to seriously undermine food, health and productive security and increase the vulnerability of most SIDS to environmental, economic and health changes beyond their control. Islands, however, offer great opportunities to eradicate or control IAS and prevent their introduction.
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Dulloo, M.E.et al. (2002) Impact and control of invasive alien species on small islands. International Forestry Review, Volume 4, Number 4, pp. 277-285(9).

B.	Irreversible Loss of Tropical Montane Cloud Forest
DESCRIPTION	Tropical regions and high islands have their equivalent of glacial retreat or snowpack melt in higher latitudes, in the form of the loss of tropical montane cloud forests (TMCF). Critical to the maintenance of global and island water cycles, TMCFs are also important sources of nutrients and are carbon sinks and biodiversity hotspots with high endemism. Yet, these forests are among the most imperilled and neglected ecosystems in SIDS. Retreat and disappearance of TMCFs from overexploitation, degradation and upward movement of their lower margins caused by rising temperatures reduce their "sponge effect" of extracting moisture from clouds and slowly releasing it into the hydrologic system. The resulting increase in shortage of freshwater and threat of downstream flooding add to the many environmental problems confronting SIDS. Moisture-sensitive plants and animals, many of which are high-altitude endemics, may experience water stress. With already limited freshwater resources and fragile biodiversity, loss of TMCFs is likely to have major adverse impact on sustainable development in affected SIDS.
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C.	**Coastal Squeeze: Coastal Deforestation and Loss of Ecosystem Services**
DESCRIPTION	Accelerating 'coastal squeeze' (from overexploitation or conversion to agricultural, aquacultural, urban, industrial, tourism and other uses) is increasingly destroying coastal littoral and mangrove forests – the two ecosystems that constitute islands' first line of defence against coastal erosion, sea level rise and salt water damage to inland areas. While the status of mangroves is more recognized, littoral forests are far more threatened, with populations of a number of the most economically, culturally and ecologically important species already extirpated. In SIDS, the ecosystem services of these forests are an important source of livelihoods, food security and protection from extreme climate-related events. They are also important carbon sinks and the main habitats for threatened species such as sea turtles, sea birds and land crabs. Many small islands, especially atolls, have no other forests except littoral and mangrove forests. Therefore, their loss represents the reduction of a significant portion of ecosystem services on these islands and can be one of the most serious contributing factors to the increasing vulnerability of island communities to biodiversity loss, climate change, sea level rise, accelerated coastal erosion, increasing salinization of freshwater supplies, and extreme events. The protection of coastal littoral and mangrove forests is considered a priority for all small islands.
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D.	Pacific Deep-sea Minerals Mining and Associated Risks
DESCRIPTION	Deep-sea mining is the new frontier in extractive mining and comes with rapidly evolving challenges. Papua New Guinea is the first of the Pacific SIDS to consent to exploratory activities for mining of seabed manganese nodules and rare earth elements, with the award of a licence to a Canadian-based company in 2010. Other countries such as Tonga and the Cook Islands may soon follow suit. The International Seabed Authority is developing legislative and regulatory provisions for environmental management of deep seabed mining including within national jurisdiction. Deep-sea mining, in areas both within and beyond national jurisdictions, is of concern to the people of the Pacific Islands as well as other SIDS regions who have high dependence on subsistence and commercial fishing. Experts have long cautioned that seabed mining will be very destructive and could have disastrous long-term consequences for the marine environment, including unique deep-sea habitats and species. The proposed mining technology has the potential to generate plumes of contaminants and wastes that could be difficult to contain. While the granting of licences requires conduct of environmental impact assessments, caution is advised in embarking on these new ventures. There is a critical need to develop protocols to ensure that the long-term environmental impacts are minimized if and when mining commences.
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E.	Disproportionate Impact of Climate Change and Sea-Level Rise in SIDS
DESCRIPTION	There is growing consensus that the magnitude and frequency of many weather- and climate-related hazards will increase as climate warming accelerates. Climate change and associated sea-level rise have disproportionately greater impacts on SIDS, particularly atolls, and other small island states that have high vulnerability but low adaptive capacity. Damage from extreme events, including salinization of freshwater and agricultural land, increased flooding and forced migration are among the challenges that SIDS are already confronting. Given the trajectory of global greenhouse gas emissions, these events will continue to adversely affect the environment and socio-economic development in SIDS. These countries have an urgent need to take pre-emptive adaptive measures based on their specific needs and available resources including local knowledge and traditional skills and technologies. Climate change adaptation strategies derived only from external agendas can lack a SIDS-specific focus, leading to inappropriate design, wasted resources, or worse, mal-adaptation. It is vital to ensure that the use of scarce resources (financial, technical, technological, etc) accessible in SIDS are optimized to address present-day challenges while building resilience to climate change impacts in the medium and longer term.
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F.	**Intensification of Extreme Events and External Shocks and Increasing Vulnerability of SIDS**
DESCRIPTION	There are clear signs of increasingly negative impacts of extreme climatic, oceanographic, geologic and other extreme events including droughts, floods, tropical cyclones, king tides, volcanic eruptions, earthquakes, tsunamis, fires and disease epidemics. Islands environments, biodiversity and populations are disproportionately vulnerable to such events, particularly on islands and low-lying coastal areas. Further, growing economic dependence on the outside world has increased SIDS' exposure to external economic fluctuations, thus undermining their resilience. The combined impact of this growing exposure to economic and environmental threats presents an increasing potential adverse impact on SIDS in terms of their capacity for trade, tourism, transport, energy supplies and food security. The small size and limited specialist technical capacities for disaster preparation and risk management inhibits their ability to avoid shocks, to confront extreme events and recover quickly from their impacts, in comparison with continental and more developed island states. A strategic approach to disaster risk reduction at regional, national and local levels is called for to ensure the development of adaptive measures that combine the best local and modern scientific knowledge to address these growing environmental threats to SIDS.
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G.	**Accelerated Beach and Coastal Erosion and Breakdown in the Sand and Sediment Budget**
DESCRIPTION	Many islands are irreversibly losing their white sand beaches. In low latitudes up to 100% of some beach, lagoon and offshore sand and sediment are biogenic, arising from the carbonate skeletal remains of dead calcareous marine organisms. Although beaches periodically disappear during storms, high wave events, tsunamis, etc., their recovery is being hindered on many islands. No doubt climate change and global warming play an important role, but increasing evidence points to the breakdown in biogenic calcification and in the biogenic sand and sediment budget. This is attributed to reduction in diversity and abundance of marine organisms that produce biogenic sand, due to a combination of human and natural pressures. Beaches and nearshore marine sediments make up a disproportionately high percentage of the total land and coastal area on islands, particularly atolls and smaller islands. They provide a range of services, including coastal defense against extreme events, habitats to a range of threatened species and filtering out or absorbing land-based pollution. Beaches also support a number of economic activities such as tourism, on which the economies of many SIDS depend. Therefore, further loss of beaches will have increasingly serious environmental, social and economic consequences for SIDS.
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H.	**Accelerating Decline of Ecosystem Functions Affecting Food and livelihood Security**
DESCRIPTION	Achieving food and livelihood security in SIDS is becoming increasingly difficult because of accelerating degradation of marine and terrestrial ecosystems (including biodiverse rural agricultural ecosystems) and associated impairment of ecosystem functioning. Human populations in SIDS have a high dependence on fishing, agriculture and the wild harvest for income, livelihoods and food security. But small-scale commercial and subsistence fishing is declining because of aquatic habitat destruction and fish stock depletion. Polycultural agricultural production is being reduced because of transition to export monoculture, loss of arable land, invasive species, extreme events and climate change. As a consequence, SIDS are increasingly unable to satisfy their full food and productive needs and their traditional social and cultural life-support systems are increasingly threatened. With a limited natural resource base, loss of essential natural and cultural ecosystem functions is a potentially serious constraint to sustainable development in SIDS. Measures to increase food and livelihood security, such as aquaculture and intensification of agriculture, come with certain environmental risks including land degradation, biodiversity loss, increasing incidence of invasive species as well as higher pesticide use and pollution, which could further threaten ecosystem functioning and productivity.
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I.	**Energy Dependency and the Need to Develop Renewable Energy Resources**
DESCRIPTION	Many SIDS have a very high dependence on imported fossil fuels, which adds to their vulnerability to external economic shocks and balance of payment deficits. Some SIDS are well endowed with renewable energy (RE) potential, including hydroelectric power, wind, sunshine, biomass and geothermal deposits as well as vast EEZs for ocean thermal and wind and wave energy. Yet, nearly all remain heavily reliant on imported fossil fuels and face volatile and increasing global energy prices and growing inequity in accessing affordable energy. Overcoming the barriers to harnessing their RE potential requires, *inter alia*, specific technological approaches adapted to the particular potential of each island and appropriate economic assessment of the cost of production and use and pricing of the ecological externalities of fossil fuels. Increasing the capacity for energy autonomy based on renewable sources should be a major goal of SIDS, as appropriate RE technologies could contribute significantly to improving their social, economic and environmental well-being. Doing so, however, while minimizing the environmental impacts, will remain an important challenge.
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J.	**Increasing Degradation and Scarcity of Water Resources**
DESCRIPTION	Most SIDS are experiencing increasing shortages of quality freshwater resources because of rising demand coupled with rapidly dwindling supply due to a number of factors. These include land use changes, limited surface area for harnessing runoff, leakage, overextraction, salinization and pollution of surface and groundwater supplies. For small islands and coastal areas surface and groundwater resources are limited and uniquely fragile and easily damaged by human or natural disturbance. This situation is set to worsen with climate change and sea level rise, which is one of the most pressing concerns for atolls, low-lying islands and coastal communities. The most critical threat for continuing human habitation of these areas is the likelihood of increasing groundwater salinization. Increasing water stress will have a wide-ranging adverse impact in SIDS, including on human health, agricultural food production and aquatic ecosystems. SIDS need to adapt by improving their water systems governance. Measures to increase water availability such as reverse osmosis and extraction of water from deep aquifers come with a high energy demand. Other options need to be explored, such as rainwater harvesting, water reuse and recycling and building synergies between the water and energy sectors.
REFERENCE	Chui, T.F.M. and Terry, J.P. 2012. Modeling freshwater lens damage and recovery on atoll islands after storm-wave washover. *Ground Water*, 50, 412-420. Dawoud M.A. and Al Mulla, M.M., 2012. Environmental Impacts of Seawater Desalination: Arabian Gulf Case Study. International Journal of Environment and Sustainability, Vol. 1 No. 3, pp. 22-37. ISSN 1927-9566 Elimelech, M. and W.A. Phillip, 2011. The Future of Seawater Desalination: Energy, Technology, and the Environment. Science 5 August 2011: Vol. 333 no. 6043 pp. 712-717 DOI: 10.1126/science.1200488. http://www.sciencemag.org/content/333/6043/712.short Terry, J.P. and Chui, T.F.M. 2012. Evaluating the fate of freshwater lenses on atoll islands after eustatic sea-level rise and cyclone-driven inundation: A modelling approach. *Global and Planetary Change*, 88-89, 76-84. Terry, J.P. and Falkland, A.C. 2010. Responses of atoll freshwater lenses to storm-surge overwash in the Northern Cook Islands. *Hydrogeology Journal*, 18, 749-759. The Habitable Planet, Unit 8: Water Resources // Section 6: Depletion of Freshwater Resources. http://www.learner.org/courses/envsci/unit/text.php?unit=8&secNum=6

K.	Reaching the Limit of Land Capacity
DESCRIPTION	Two of the most valuable natural resources of small islands – land and water – are rapidly being degraded. Increasingly, land is being converted for residential, industrial and agricultural purposes and degraded by waste, salinization and poor farming practices. The quantity and quality of freshwater continue to be reduced in many SIDS including from over-extraction and pollution. Land and water resources are also threatened by climate change and sea level rise. The consequence of these cumulative pressures is that the limit of land capacity is quickly being reached. This will seriously constrain sustainable development in SIDS, especially in view of the scarce land and water resources that characterize many of them. There may be tipping points where vital land and water resources degrade rapidly and threaten island habitability, which should be the focus of preventive or remedial action. Since there are tradeoffs between carrying capacity and lifestyle, more sustainable consumption and production can increase carrying capacity in SIDS.
REFERENCES	MacLeod, M. and J.A.G. Cooper. 2005. Carrying Capacity in Coastal Areas. p. 226 in M. Schwartz (ed.), Encyclopedia of Coastal Science. New York: Springer. http://www.springer.com/?SGWID=4-102-45-146652-p33627453. Roberts J L and I.Ibitoye. 2012. The Big Divide, Commonwealth Secretariat, e-book ISBN 978-1-84859-144-8. Zimmerer, K.S. 1994. Human Geography and the "New Ecology": The Prospect and Promise of Integration. Ann. Assoc. Am. Geog. 84(1):108-125. http://dusk.geo.orst.edu/prosem/PDFs/human_geog.pdf

L.	Waste for Resources
DESCRIPTION	Growing quantities of waste and its inappropriate treatment and disposal pose serious threats to human health and the environment in most developing countries. This takes on even greater proportions in SIDS, in view of a number of factors including limited land area for landfills, inadequate incineration facilities, fragile biodiversity and environment, growing population, trade, tourism and urbanization, and changing consumption patterns. But new technologies now present opportunities to transform this waste into resources, including recycled materials and renewable energy, while safeguarding human and environmental health. This is not without its challenges, however, such as overcoming barriers to technology transfer and limited economies of scale. National waste management policies and strategies are still largely focused on end-of-life responses or solutions. Life cycle waste strategies and new technologies offer opportunities to SIDS for sustainable material management and converting the current waste treatment approach to a waste to resource and new energy approach. SIDS can also address the problem up-stream by limiting imports or requiring the export of products/equipment/vehicles at the end of their useful life.
REFERENCES	Kahhat, R *et al.* 2008. Exploring e-waste management systems in the United States. Resources, Conservation and Recycling, 52:955–964. Mallawarachchi, H. and Karunasena, G. 2012. Electronic and electrical waste management in Sri Lanka: Suggestions for national policy enhancements. Resources, Conservation and Recycling, 68: 44–53. OECD. 2012. Sustainable Materials management: making better use of resources, OECD Publishing, http://dx.doi.org/10.1787/9789264174269-en UNEP 2012. SIDS-focused Green Economy: An analysis of challenges and opportunities. http://www.unep.org/pdf/Green_Economy_in_SIDS.pdf UNEP. Small Island Environmental Management, Problems in the small island environment, UNEP. http://islands.unep.ch/siemb1.htm

M.	Indiscriminate and Increasing Use of Pesticides
DESCRIPTION	Increasing use of pesticides, including insecticides, herbicides and other biocides is inflicting collateral damage on human health and fragile island ecosystems and biodiversity. Pesticides not only poison humans and cause soil and water pollution, they also usually destroy beneficial plants and animals and the natural predators of the targeted pests. The threat of pesticide pollution is particularly serious in small island environments with close interlinkages between terrestrial, freshwater and marine environments and limited or highly endemic flora and fauna. This is likely to get worse in view of the development of widespread pest resistance to pesticides and emergence of "superpests" that require increasingly potent pesticides to control them. Further, developing countries, including SIDS, increasingly rely on pesticides among which are those considered too dangerous for use in the countries that manufacture them. SIDS often have limited capacity to control and manage their use, including disposal of unused or obsolete pesticides, and management practices are variable. Eco-friendly approaches to controlling pests need to be more widely adopted.
REFERENCES	Burns, T. 2000. Management of Persistent Organic Pollutants in Pacific Island Countries. AusAID, Canberra. Mowbray, D.L. 1978. The Ecological Effects of Pesticides on Non-target Organisms: A Study of the Environmental Impact of Pesticides on Wildlife in the Namoi River Valley Cotton Growing Area, 1972-1976, Sydney University, Sydney Mowbray, D.L. 1988. Pesticide use in the South Pacific. UNEP, Nairobi. Pimentel, D., Mclaughlin, L., Zepp, A., Lakitan, B., Kraus, T., Kleinman, P., Vancini, F., Roach, W.J., Grapp, E., Keeton, W.S. and Selig, G. 1991. Environmental and Economic Effects of Reducing Pesticide Use. BioScience 41 (6):402-409. Thaman, R.R. 1984. The poisoning of paradise: Pesticides, people, environmental pollution and increasing dependency in the Pacific Islands. South Pacific Forum 1(2):165-200. Watt, M. 1994. Poisons in Paradise: Pesticides in the Pacific. Pesticide Action Network Asia and the Pacific, Penang, Malaysia

N.	**Synergizing Local, Traditional and Modern Science as a basis for Sustainable Island Development**
DESCRIPTION	Externally derived strategies to address sustainability issues in SIDS may not, on their own, be appropriate to the circumstances of small islands. New and innovative approaches and tools that are adapted to local conditions, cultures and community needs are required. Such innovation can be facilitated by harnessing the wealth of traditional knowledge in SIDS, which hitherto is largely underutilized, and integrating this with modern science. There are many examples where this approach has worked to produce effective solutions. More of this is needed. A critical emerging issue, however, is the loss of local and indigenous knowledge about island environment and island natural resource use. With the ageing and death of the older generation of knowledge holders comes the loss of many years of traditional knowledge. The youth should be empowered to participate in new innovations that are integrated with traditional knowledge. As stressed in the recent Japanese Satoyama-Satoumi Assessment, the conservation and enrichment of traditional polycultural rural agricultural and coastal ecosystems is seen as one of the best options for achieving sustainability on islands.
REFERENCES	Dahl, Arthur Lyon. 1989. Traditional environmental knowledge and resource management in New Caledonia. In R.E. Johannes (ed.), *Traditional Ecological Knowledge: a Collection of Essays*. IUCN, Gland and Cambridge. 64 p. http://islands.unep.ch/dtradknc.htm Dahl, Arthur Lyon. 2002. Linking science and traditional knowledge for local environmental management. Presented at World Summit on Sustainable Development, Johannesburg. http://iefworld.org/ddahl02b.htm Duriaippah, A.K., Nakamura, K., Takeuchi, K., Watanabe, M. and Nishi, M. (eds.). 2012. *Sataoyama ecosystems and human well-being; Socio-ecological production landscapes of Japan*. United Nations University Press, Tokyo, New York and Paris. Léopold, M., Herrenschmidt, J.-B. and Thaman, R. 2010. The Relevance of Traditional Ecological Knowledge for Modern Management of Coral Reef Fisheries in Melanesia. *Proceedings of the 11th International Coral Reef Symposium, Ft. Lauderdale, Florida, 7-11 July 2008.*Session number 22: pp. 1007-1011. MacArthur, Robert H., and Edward O. Wilson. The Theory of Island Biogeography. Princeton: Princeton University Press. Thaman, R.R. 2004. Sustaining culture and biodiversity in Pacific Islands with local and indigenous knowledge. *Pacific Ecologist* Autumn-Winter (7 & 8): 43-48. Thaman, R.R. 2007. Island biodiversity and ethnobiodiversity: Conservation, sustainable use and equitable sharing of biodiversity and ethnobiodiversity as a foundation for sustainable island life. In Tsai, H.-M. (ed.). Proceedings of the Inaugural Meeting of the IGU Commission on Islands: "Island Geographies" International Conference, October 29-

	November 3, 2007, Taiwan University, Taipei, Taiwan. Pp. D.4.1- D.4.34. Thaman, R.R., Tepaikea Puia, Wilson Togabaea, Ashley Namona and Teddy Fong. 2010. Marine biodiversity and ethnobiodiversity of Bellona (Mungiki) Island, Solomon Islands. *Singapore Journal of Tropical Geography* 31 (1): 70-84. UNESCO Local and Indigenous Knowledge Systems (LINKS) programme ***(www.unesco.org/links)***

O.	Developing an ocean-based blue-green economy
DESCRIPTION	Because of the inordinate importance of oceans to islands, a transition to a blue-green economy, rather than just a "green" economy can assist SIDS in addressing some of the most critical development challenges they face. SIDS have relatively unexplored opportunities for transitioning to an ocean-based blue-green economy. This is particularly important considering that many island countries are approaching the limit of land and nearshore marine carrying capacity and have few other viable alternatives. But ocean ecosystem services (except fisheries) have remained largely untapped by the SIDS themselves, especially in offshore areas. There are many important practical and political challenges, however, to transitioning to an ocean-based blue-green economy, including limited human and financial resources and access to appropriate marine technologies that are adapted to local conditions, improving ocean governance and strengthening cooperation with other SIDS and other developing countries, developing political weight in competition for offshore resources, and limited technical and capital resources for asserting governance in the face of international post-colonial pressure in sectors such as oil, off-shore mining and fishing. Commitment to facilitating technology transfer, relevant capacity development, and financial assistance are useful strategies to begin the transition.
REFERENCES	Sharma, Y. 2013. Small island states told to build wider ocean expertise. http://www.scidev.net/en/agriculture-and-environment/fisheries/news/small-island-states-told-to-build-wider-ocean-expertise-1.html UNEP 2010. Green Economy Report Preview. http://www.grid.unep.ch/FP2011/step1/pdf/032_UNEP_a_2010.pdf - Clean tech: Low carbon, high growth. http://www.grid.unep.ch/FP2011/step1/pdf/032_UNEP_b_2010.pdf. - Rasmussen Lokke Lars 2010 Deadline Copenhagen. http://www.grid.unep.ch/FP2011/step1/pdf/032_Rasmussen_2010.pdf UNEP, FAO, IMO, UNDP, IUCN, World Fish Center and GRID-Arendal. 2012. Green Economy in a Blue World: Synthesis report. http://www.unep.org/greeneconomy and www.unep.org/regionalseas UNEP, UN DESA and FAO, 2012. SIDS-Focused Green Economy: An Analysis of Challenges and Opportunities. www.unep.org/greeneconomy and www.unep.org/regionalseas UNEP, FAO, IMO, UNDP, IUCN, WorldFish Center, GRID-Arendal, 2012, Green Economy in a Blue World. www.unep.org/greeneconomy and www.unep.org/regionalseas

P.	Overfishing and potential collapse of inshore marine ecosystems
DESCRIPTION	That SIDS have an inherent and disproportionate dependence on inshore ecosystems and fisheries resources is indisputable. Yet, insufficient attention has been given to the impacts of overfishing on the highly bio-diverse near-shore and inshore habitats and freshwater species that underpin ecological sustainability and food and livelihood security in SIDS. Overfishing is a key factor in the degradation of near-shore coastal ecosystems. The combined impact of overfishing and other human and natural pressures are clearly hastening the collapse of these ecosystems. Increasing loss of food, health, livelihood security and ecosystem services and reduced resilience to climate, environmental, economic and social changes are among the consequences for SIDS. The demise of inshore ecosystems is encouraging the offshore displacement of fishing fleets, which in SIDS are usually small-scale and artisanal and lack proper equipment and technology. Further, there is limited knowledge about the possible impacts of fishing on offshore ecosystems. Appropriate policy and intervention options and the evidence of their effectiveness and examples of good practice should be examined. Without adequate information and proper management, offshore ecosystems are likely to suffer the same fate as those inshore.
REFERENCES	Allan, J. D., R. Abell, Z. Hogan, C. Revenga, B. Taylor, R.L. Welcomme and K. Winemiller. 2005. Overfishing of inland waters. *BioScience*, 55 (12): 1041 – 1051. Daskalov, G.M., A.N. Grishin, S. Rodionov and V. Mihneva. 2007.Trophic cascades triggered by overfishing reveal possible mechanisms of ecosystem regime shifts. PNAS 104 (25): 10518-23. Dayton, P.K., S. Thrush and F.C. Coleman. 2002. *Ecological effects of fishing in marine ecosystems of the United States.* Pew Oceans Commission, Arlington, Virginia. Gillett, R. and W. Moy. 2006. Spearfishing in the Pacific Islands: Current status and management issues. Food and Agricultural Organization of the United Nations, Rome. Goñi, R., A. Quetglas, O. Reñones and J. Mas.2003. Threats to the sustainability of *Palinurus elephas* fisheries. *The Lobster Newsletter* 16 (1): 2 – 5. Jackson, J.B.C., M.X. Kirby, W.H. Berger, K.A. Bjorndal, L.W. Botsford, B.J. Bourque, R.H. Bradbury, R. Cooke, J. Erlandson, J.A. Estes, T.P. Hughes, S. Kidwell, C.B. Lange, H.S. Lenihan, J.M Pandolfi, C.H. Peterson, R.S. Steneck, M.J. Tegner and R.R. Warner. 2001. Historical overfishing and the recent collapse of coastal ecosystems. *Science* 293:629-638. Kallesøe, M. F., Bambaradeniya, C. N. B., Iftikhar, U. A., Ranasinghe, T. and S. Miththapala (2008). Linking Coastal Ecosystems and Human Well-Being: Learning from conceptual frameworks and empirical results. Colombo: Ecosystems and Livelihoods Group, Asia, IUCN. viii + 49 pp. Myers, R.A. and B. Worm. 2003. Rapid worldwide depletion of predatory fish communities. *Nature* 423:280-283.

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Q.	**Unique Human Capacities for Island Sustainability**
DESCRIPTION	Just as the small scale of island systems creates unique challenges for sustainability, so also the human requirements for managing island ecosystems and societies under multiple pressures cannot be met by scaling down educational approaches and professional competences created in larger societies. The division of training into disciplines and specialities becomes increasingly inappropriate as island states become smaller, when the multiple functions of governance and environmental management fall on a few people. Island educational systems and training programs need more efficient and innovative ways to address the chronic lack of human capacity. Modern information technologies can now overcome past problems of access to information and integration of data, but they still need to be designed to support generalist managers and local resource users. Islands should give priority to communications infrastructure and education that open new possibilities for participation in the world information economy, oriented towards opportunities that will not threaten island environmental sustainability. Care must be taken to ensure that exposure to the global consumer society does not erode island sustainability values. Islanders need the capacity to bridge science and policy and to combine access to information and science with traditional knowledge and local cultures. They have to integrate the social, economic and environmental dimensions of sustainable development across all sectors of society. Training local people in using traditional and modern science will root sustainability in island communities and resource users thereby strengthening monitoring and local environmental management.
REFERENCES	Dahl, Arthur Lyon, and Augusto Lopez-Claros. 2006. The Impact of Information and Communication Technologies on the Economic Competitiveness and Social Development of Taiwan, p. 107-118, in Soumitra Dutta, Augusto Lopez-Claros and Irene Mia (eds.) The Global Information Technology Report 2005-2006: Leveraging ICT for Development. INSEAD/World Economic Forum. Hampshire: Palgrave Macmillan. Govan, H. A. Schwarz and D. Boso. 2011. Towards integrated Island Management: Lessons from Lau, Malaita, for the implementation of a national approach to resource management in Solomon Islands. WorldFish Center Report to SPREP. http://www.worldfishcenter.org/resource_centre/WF_2898.pdf ICSU. 2002. Science, Traditional Knowledge and Sustainable Development. Series on Science for Sustainable Development No. 4. Paris, UNESCO. 24 pp. http://portal.unesco.org/science/es/files/3521/10849767441ICSU_Report.pdf/ICSU%2BReport.pdf US Office of Technology Assessment. 1987. Integrated Renewable Resource Management for U.S. Insular Areas. chpt. 5, p. 129-140. Islands as Integrated Systems. Washington, D.C.: OTA, U.S. Congress. www.princeton.edu/~ota/disk2/1987/8712/871207.PDF

R.	Climate and environmental change driving population displacements
DESCRIPTION	The push of limited opportunities on islands combined with the pull of better horizons in foreign lands has long fuelled emigration from islands. Other push factors are now coming into play in the form of continuing environmental degradation as well as climate change and sea level rise, to which SIDS are particularly vulnerable. The prospect of islands becoming uninhabitable fuelling an even greater emigration rate is increasingly likely. Mechanisms are needed to effectively address this growing trend. Forced population displacement presents a number of challenges, both for the islands themselves and the host countries. For example, island countries have to ensure a demographic equilibrium across age groups, cope with the 'brain drain' that limits local human capacity, and maintain island heritage and cultural unity across the diaspora. The receiving country, on the other hand, must deal with the assimilation of island peoples while encouraging the persistence of island social structures and culture.
REFERENCES	Gemenne, François, Pauline Brückner and Dina Ionesco (eds). 2011. The State of Environmental Migration 2011. Institut du développement durable et des relations internationales/International Organization for Migration Study November 2012. Geneva: International Organization for Migration. http://publications.iom.int/bookstore/free/State_Environmental_Migration_2011.pdf Hodgkinson, David, and Lucy Young. 2012. "In the Face of Looming Catastrophe": A Convention for Climate Change Displaced Persons. ILO Asia-Pacific Migration Network, January 2012. http://apmagnet.ilo.org/resources/a-convention-for-climate-change-displaced-persons Rozdilsky, Jack L., and Gerhardus Schultink. 2008. Migration as a Coping Strategy for Environmental Hazard Mitigation on Small Islands: Environmental Risk Modeling of Monserrat's Volcanic Eruptions. Environment, Forced Migrations and Social Vulnerability International Conference, United Nations University, Bonn, Germany, 0ctober 2008. http://www.google.ch/url?sa=t&rct=j&q=&esrc=s&source=web&cd=6&ved=0CGEQFjAF&url=http%3A%2F%2Fwww.landpolicy.msu.edu%2Fmodules.php%3Fname%3DDocuments%26op%3Dviewlive%26sp_id%3D816&ei=YIN9Uf2aGOmI4ASXwYGIAQ&usg=AFQjCNEa1RNPNuLUvy19YjIMVRSwWW6h8g&sig2=zURvTHDS8beNRGKM7RkKfw&bvm=bv.45645796,d.bGE World Bank. 2011. Migration and Remittances Factbook 2011. http://siteresources.worldbank.org/INTLAC/Resources/Factbook2011-Ebook.pdf

S.	Exploring the potential of unexploited natural resources in SIDS
DESCRIPTION	While SIDS generally have limited natural resources, many of which have been already heavily exploited, they also possess hitherto unexploited natural capital including some mineral resources in terrestrial areas, EEZs and the deep-sea. Tapping into these resources could improve socio-economic wellbeing in SIDS, given that their livelihoods and food security are already being threatened by multiple anthropogenic and natural stressors. However, with this come responsibilities such as ensuring that available resources are exploited in an optimal and sustainable manner for the benefit of all stakeholders, identifying potential risks and benefits, protecting the intellectual property rights of genetic and other resources, biodiversity conservation and environmental protection, and providing a framework for sustainable resource management. It also places an obligation on SIDS to prepare and periodically update their resource inventories, which can be valuable tools for management decision-making.
REFERENCES	Bell, J. D. 1999. Aquaculture: a development opportunity for Pacific islands. *Development Bulletin* 49, 49-52. Hammar, L., J. Ehnberg, A. Mavume, C.C. Boaventura and M. Sverker, 2012. Renewable ocean energy in the Western Indian Ocean. *Renewable and Sustainable Energy Reviews* 16(7), 4938-4950. Maynard-Date, A. and N. F. Cartwright N. Farrell. 2011. "Geothermal Activity And Development In East Caribbean Islands." Paper presented at "Short Course on Geothermal Drilling, Resource Development and Power Plants", organized by UNU-GTP and LaGeo, in Santa Tecla, El Salvador, January 16-22, 2011, 8 pp.

T.	**Global contaminants affecting SIDS**
DESCRIPTION	Insidious and potentially harmful, substances such as microplastics, POPs and pharmaceuticals are arriving in SIDS in ocean currents and through atmospheric transfer from sources mostly beyond their borders. Global contaminants travel long distances and are persistent and bioaccumulative. Of particular concern are microplastics - emerging pollutants in the marine environment. Recent scientific findings indicate that microplastics adsorb and concentrate compounds such as POPs from the surrounding seawater and accumulate in ocean gyres in close proximity to SIDS. These compounds have potentially serious impacts on human health, the environment and living resources in SIDS, including through endocrine disrupting effects. The need is emerging for further research to identify the sources of these transboundary contaminants and their impacts on ecosystems and ocean food webs and on human health.
REFERENCES	Andrady, A.L. 2011. Microplastics in the marine environment. Marine Pollution Bulletin 62 (8), 1596–1605. Smedes, F., Geertsma, R. W., van der Zande, T., Booij, K. 2009. Polymer-Water Partition Coefficients of Hydrophobic Compounds for Passive Sampling: Application of Cosolvent Models for Validation. Environmental Science & Technology. 2009, 43 (18), 7047-7054.

U.	Impending agro-ecosystem breakdown and loss of agrobiodiversity
DESCRIPTION	The breakdown in traditional species-rich agro-ecosystems and the loss of their agrobiodiversity and ecosystem services is one on the most rapidly emerging threats to food and livelihood security in SIDS. This was identified as a priority for assessments by IPBES. Over the past 10 – 30 years, loss of agricultural and even wild biodiversity within agro-ecosystems has been accelerating. Yet, this issue has not been adequately addressed. For many countries, it is the agro-ecosystem that supplies the major proportion of all cash and non-cash income and important ecosystem services, and harbours a large percentage of biodiversity once provided by natural forests. SIDS already have limited land area for agricultural production and loss of agricultural diversity and impending irreversible island ecosystem breakdown represents a major threat to food, health, energy, livelihood, ecological and cultural security in SIDS. Further, importing agricultural commodities increases the vulnerability of SIDS to external factors and shocks. As stressed in the recent Japanese Satoyama-Satoumi Assessment, the conservation and enrichment of traditional polycultural rural agricultural and coastal ecosystems is seen as one of the best options for achieving sustainability on islands.
REFERENCES	Clarke, W.C. and Thaman, R.R. (eds.). 1993. *Pacific Island agroforestry: Systems for sustainability*. United Nations University Press, Tokyo. 297pp. Duriaippah, A.K., Nakamura, K., Takeuchi, K., Watanabe, M. and Nishi, M. (eds.). 2012. *Sataoyama ecosystems and human well-being; Socio-ecological production landscapes of Japan*. United Nations University Press, Tokyo, New York and Paris. Thaman, R.R. 1987. Urban agroforestry: The Pacific Islands and beyond. *Unasylva* 39(155):2-13. Thaman, R.R. 1988. Health and nutrition in the Pacific Islands: Development or underdevelopment. *GeoJournal* 16(2):211-227. Thaman, R.R. 1989. Agrodeforestation and the neglect of trees: Threat to the wellbeing of Pacific societies. *Ples: An Environmental Education Journal for the South Pacific Region* 5:48-64. Thaman, R. R. 2002. Trees outside forests as a foundation for sustainable development in the Small Island Developing States of the Pacific Ocean. *The International Forestry Review* 4 (4)(December): 268- 276. Thaman, R.R. 2005. Biodiversity is the key to food security. *Spore* 117 (June):1-3. Thaman, R.R.. 2007/08. Restoring the Pacific Islands' rich agricultural traditions: An urgent priority. *Pacific Ecologist* 15 (Summer): 51-57. Thaman, R.R. 2008. Pacific Island agrobiodiversity and ethnobiodiversity: A foundation for sustainable Pacific Island life. *Biodiversity: Journal of Life on Earth* (*Special issue: The value of biodiversity to food & agriculture*) 9 (1 & 2): 102-110.

V.	Beyond GDP- Appropriate indicators for SIDS sustainable development
DESCRIPTION	Current initiatives to evaluate development indicators do not adequately capture the cultural and social richness and priorities and unique natural environment and other non-monetary values of SIDS. Inappropriate development indicators mis-classify SIDS and lead to their marginalization and environmental degradation. A different approach is needed to re-classify SIDS using a wealth indicator beyond GDP that does not depend on only economic conditions. This can also help to mobilize mutual support and international cooperation. Efforts to develop "beyond-GDP" measures for SIDS require credible data and indicators. Therefore, the capacity of SIDS to identify, collect, test and validate more appropriate indicators should be strengthened. This would help to ensure that development pathways and monitoring and evaluation frameworks better reflect the realities, aspirations and sustainable development goals of SIDS. In addition, a SIDS working group should be established to complement that already working on fresh development indicators. The task should embrace economic, social and environmental issues relevant to SIDS, taking into account the environmental and economic vulnerability of SIDS and the other special features that are most relevant to their sustainability and conservation of their peculiar ecological assets.
REFERENCES	UN 2013. Report of the Expert Group Meeting on Small Island Developing States and the Post-2015 Agenda. UN Headquarters, NY. http://www.sids2014.org/content/documents/187SIDS%20and%20post-2015%20EGM%20FINAL%20(2).pdf Jabobs, J. and G. Cozijns. 2012. Sustainability and the SIDS context: Some nontraditional developments in economic research. http://sidsgg.webs.com/2012/proceedings/Jacobs%20Cozijns_Sustainability%20and%20the%20SIDS%20context.pdf Dahl, Arthur Lyon. 2012. "Achievements and gaps in indicators for sustainability." Ecological Indicators, vol. 17, p. 14-19. June 2012. http://dx.doi.org/10.1016/j.ecolind.2011.04.032 Dahl, Arthur Lyon. 2012. Right of Each Human Being to Enjoy Peace, Security and Welfare. Presented at ECPD Eighth Session on Reconciliation, Tolerance and Human Security in the Balkans, Belgrade, Serbia, 20 October 2012. http://iefworld.org/ddahl12l SOPAC. 2005. Environmental Vulnerability Index (EVI). South Pacific Applied Geosciences Commission and UNEP. http://www.vulnerabilityindex.net/ Stiglitz, Joseph E., Amartya Sen and Jean-Paul Fitoussi. (2009). Report by the Commission on the Measurement of Economic Performance and Social Progress. http://www.stiglitz-sen-fitoussi.fr

PART II

DESA SOCIAL AND ECONOMIC SESSION

LIST OF EMERGING SOCIO-ECONOMIC ISSUES*

1. **Need to diversify SIDS economies**
2. **Innovative approaches to debt relief**
3. **Shoring up traditional local and indigenous knowledge**
4. **Reinforcing social cohesion**
5. **Rediscovering opportunities for youth**
6. **New challenges in gender**
7. **Health challenges in SIDS**
8. **Preserving an authentic cultural heritage and identity**
9. **Making tourism sustainable**
10. **Climate and Economic Drivers of Migration**
11. **The future of food security in SIDS**
12. **Freshwater management for the 21st century**
13. **Need for enhanced disaster preparedness**
14. **Economic and social impact of climate change**
15. **Diminishing Resources for Development Financing**

* *Note: There is no particular order of priority.*

1. Need to diversify SIDS economies

In many cases, SIDS economies have developed by relying on a relatively narrow base of commodity exports as well as a small range of service sectors, notably tourism, real estate and construction. SIDS vulnerability to economic shocks has been recognized for decades, but the global financial and economic crisis highlighted this with new intensity as export earnings, foreign investment, and tourism revenue all fell simultaneously. In this context, SIDS are seeking to diversify more extensively into services and cultural industries, especially given their limited ability to capitalize on the economies of scale in the production of goods. Some SIDS have also invested in offshore financial services but this sector faces an uncertain future in light of heightened international concerns about the potential for these jurisdictions to act as tax havens.

Policy implications

To achieve diversified, sustainable growth, decision makers will need to pursue long term integrated policy planning, with transparent and inclusive governance as the starting point. Regional cooperation and sharing of best practices can lead to progress, especially as some SIDS create enabling environments for new investments and industries, including technology-based and service industries as well as renewable energy. Renewable energies are an area of great potential, especially given the high cost of fossil fuel exports; and ocean thermal, wind, solar, and others are being explored in SIDS. SIDS are also capitalizing on other areas of strength, including cultural industries such as performing arts, visual and media arts training, galleries, museums, festivals, music, and literary and film industries. These industries—as well as sports—are potentially powerful employment and economic engines, and decision makers are recognizing this potential. These and other approaches to economic diversification will be successful only with adequate investment in education, technology development, and research.

2. Innovative approaches to debt relief

In the aftermath of the global financial and economic crisis, many SIDS were saddled with high and unsustainable levels of debt. As in many parts of the world, the overall fiscal response, to cut spending and institute austerity, has inflicted damage on some SIDS societies and on their opportunities for economic recovery. In the case of the Caribbean, the designation as “middle income” countries disqualifies them for concessionary financing and further hobbles recovery and growth.

Policy implications

Some SIDS are exploring alternative responses to debt, including innovative debt swaps, in which the SIDS government agrees to institute an environmentally sound policy or initiative in exchange for a renegotiation of the debt. Environmental benefits can include preserving biodiversity, maintaining ecosystems, promoting responsible use of resources, and other conservation advances.

3. Shoring up traditional local and indigenous knowledge

As SIDS face the increasingly complex problems of the globalized modern world, they are finding that traditional and indigenous knowledge systems have a great deal to offer. Through the process of globalization, much traditional and indigenous knowledge has been lost. But the keepers of local and indigenous knowledge are cognizant of its value and are working to preserve it in areas as diverse as disaster preparedness, health and wellness, construction practices, and conservation. Communities in all SIDS are recognizing the irreplaceable value of traditional knowledge and are promoting a "third way," combining traditional knowledge with modern science to address the challenges of the 21st century.

Policy implications

Mapping local and indigenous knowledge is a vital first step to preserving these systems of knowledge and learning. Regional and SIDS-SIDS cooperation can be valuable in this context. Creating seed banks can protect biodiversity of native plants, and consideration should also be given to protecting the rights of indigenous communities to the genetic resources of their traditional plants.

4. Reinforcing social cohesion

While the weakening of societal and family structures is not in itself a new issue for SIDS, its impact is being felt more than ever before in a range of realms, from gender relations to crime and violence to reduced opportunities for youth to migration. The breakdown of social cohesion is defined by the loss of traditional societal (e.g. family, gender, class, culture, and generational) structures, and the process is often influenced, reinforced, and hastened by external shocks and globalization. For example, the global financial and economic crisis is increasing economic inequality, widening the gulf between rich and poor within a country. And

as the crisis and high debt levels lead to government budget cuts, the social protection mechanisms provided by the state are withering. In some cases, alternative and informal support systems, including gangs and other anti-social structures, can rise to fill the void. Or, the breakdown can spur emigration, which can tear the bonds between generations or neighbors, which can remove community safety nets, which can, in turn, drive individuals to low self esteem or crime or domestic violence.

Policy implications

This is a deeply complex and multi-faceted challenge, complicated by the fact that loss of social cohesion is both a cause and an effect of a host of other social problems. Ideally, the old structures could be bolstered by improved, inclusive, and culturally-rooted social models, but little progress can be made without enlisting a wide variety of stakeholders. Enhancing the role of civil society and religious groups, fostering positive role models in the worlds of arts and sports: these are concrete steps that may help to address the reality of a breakdown in social cohesion. In many cases, governments may also choose to devote new and additional resources to social services.

5. Rediscovering opportunities for youth

Declining levels of youth employment and opportunities can accentuate the breakdown in social cohesion described above. The lack of opportunity for youth is a dire crisis for SIDS because when educated youths fail to find employment, and are unable to envision a future at home, they will leave their home island, leading to “brain drain,” sapping the island’s future. In some SIDS, young men, including educated men, are entering prison at alarming rates. Youth are also suffering from diminished opportunities for informal and traditional education within communities.

Social media and information technology can take on a particularly important role in the youth of SIDS, given their remoteness and small population pool, and in this context it is important to note both the threats and the opportunities presented by technology.

Policy implications

Beyond addressing the economic realities that limit the employment opportunities, SIDS could invest in civil society support, leadership training, and formal and informal education for youth.

6. New challenges in gender

Emerging issues in gender vary from SIDS region to SIDS region, and the goal will be to address the problems without losing sight of the progress and positive developments. Traditional gender roles are changing in all SIDS regions, often to the benefit of women. Women are becoming educated, owning land, and entering the workforce in higher numbers than ever before, and, in some cases, in higher numbers than their male counterparts. At the same time, economic opportunity in general is shrinking, especially during and in the aftermath of the global economic and financial crisis.

While data shows that in fact women are still more likely to be unemployed than men, and are lower paid, many men are not able to find work. This lack of economic opportunity can exacerbate a "crisis of masculinity" arising from a weakened breadwinner role, and this can give rise to hopelessness, crime, and violence—including domestic violence, which undermines women's empowerment in other spheres.

Policy implications

It is important for decision makers to recognize both sides of the gender equation: the changes that benefit women and men and those that may destabilize them. SIDS have indicated a desire to continue the collection and analysis of gender disaggregated data, the implementation of CEDAW, and an increase in the prominence of women in all levels of government.

7. Health challenges in SIDS

As SIDS are increasingly integrated into the global economy and culture, SIDS populations are threatened by many of the same health concerns facing the rest of the world. Non-communicable diseases including diabetes, obesity, and heart disease are afflicting SIDS as they adopt the poor dietary habits and nutrition choices of the developed world. Trauma, too, is an in increasingly significant problem, with traffic accidents, violence and natural disasters all on the rise. In many cases, the health care infrastructure is not equipped to deal with these new

stresses, and so people do not always get the care they need. Preventive health care is particularly lacking.

Policy implications

SIDS can explore regional cooperation, sharing of expertise and best practices, to address these new health care challenges. In addition, traditional and indigenous knowledge should be integrated into the responses.

8. Preserving an authentic cultural heritage and identity

SIDS have developed distinct cultural heritage, from music and dance to the traditional knowledge and practices mentioned above. This culture is central to SIDS identity in many cases, and it feeds the world's perceptions and projections of island society. As mentioned above, cultural industries can be sources of employment and powerful drivers of economic development. However, while SIDS may capitalize on these "national brands" to advance tourism, SIDS people are increasingly conscious of the potentially deleterious impact they may have on SIDS sustainable development and authentic cultural identity.

Policy implications

By promoting island culture, SIDS governments are celebrating and maximizing aspects of what makes SIDS unique. Decisions will be made to emphasize the authentic value of SIDS culture while guarding against over-simplification and stereotyping that can dilute and blur SIDS identity.

9. Making tourism sustainable

While tourism forms the backbone of many SIDS economies, it can also be potentially damaging to SIDS natural resources and cultural identity. Certain kinds of tourism can be especially resource intensive with little economic upside, including all-inclusive cruise and tour companies that bring visitors who spend little money in the islands themselves and also bring the invasive species that are wreaking havoc on native flora and fauna.

Policy implications

SIDS can determine the tourist carrying capacity of their island and can impose caps on numbers that exceed that level. Impact fees, charged to tourists to offset the damage they may inflict on the islands they visit, are another way to mitigate the damage. Decision makers could continue encouraging tourism that respects and celebrates the unique culture of SIDS, including by promoting the UNESCO World Heritage Sites in SIDS, and by advocating to move those sites on the "Tentative List" into full UNESCO recognition status. Expanding specialized tourism sectors, such as medical-, spa-, and eco-tourism, can also bring new opportunities for skilled employment and encourage development-friendly growth.

10. Climate and Economic Drivers of Migration

Peoples have always moved in and out of small island developing states, but a number of 21st-century realities are contributing to new levels and patterns of migration. Climate change and extreme weather are driving migration, as storms destroy homes and infrastructure, and as prospects for the future dissolve in rising sea levels. In addition, the economic realities of many SIDS are compelling people to leave, giving rise to "brain drain," and, for those who stay behind, "brain stretch." The selective immigration policies of developed countries reinforce this tendency, as only the most highly educated individuals are welcomed as immigrants.

Those who leave the SIDS—the diaspora—may face challenges integrating into their new communities in some countries. In addition, when SIDS are the *recipients* of migrants, whether from SIDS or other states, they may face competition between immigrants and native populations, a strain on infrastructure, and resulting social and cultural tensions.

Policy implications

Policies encouraging "brain circulation"—so that those who emigrate can return, or at least share their skills and expertise with their home countries—could help address the harmful effects that migration can have on SIDS. The goal is not to prevent people from leaving but rather to continue integrating the diaspora into the society and economy of their home countries, not only through remittances but also through "diaspora bonds" and other innovative mechanisms. Migration can potentially create fertile ground for SIDS-SIDS cooperation, and the sharing of best practices, technology and training. The historical and strategic position of SIDS in trade and travel routes can be capitalized upon by fostering a dynamic and mobile society in which individuals may leave but continue to support and invest in their home country.

11. The future of food security in SIDS

The concurrent financial and food crises that started in 2008 highlighted the vulnerability created by the dependence of SIDS on food imports. For years, many SIDS had moved resources away from local and traditional food production—agriculture and fisheries—toward investments in tourism and in some cases industrial and urban development. This left SIDS vulnerable to spikes in food prices, and, in the aftermath of the crises, has led decision makers to contemplate the future: whether to continue down the current path or to consider a return to more local food production. These decisions will also have significant impacts on biodiversity and traditional knowledge.

Policy implications

Land use policies will be central to ensuring the food security of SIDS populations, all the more so because of the limited land resources of SIDS. Land, especially coastland, is in high demand by the tourism industry, foreign investors, and others, and SIDS will be making important decisions on land use in the coming years. An integrated approach to food security will address not only *adequate* food supply but *high quality, safe, nutritious* food, including that produced by organic methods. On the global level, developed world policies including deregulation and agricultural subsidies have a significant impact SIDS food security and should be reexamined.

12. Freshwater management for the 21st century

With sea level rise, salt water intrusion, and extreme weather events including flooding and draught, the supply of quality drinking water will be an increasingly difficult issue in the coming years. The concept of “peak water” shows that the globe may have already passed the level of greatest possible rate of consumption. SIDS are on the front lines of water scarcity, and SIDS water management must reflect this fact.

Policy implications

Integrated water management, including innovative approaches to water recycling will be key. In particular, some SIDS can share best practices in recycling gray water as well as in advocacy

and education campaigns that support water conservation. Policy makers will likely seek to balance the need for innovative management approaches with the risks posed by the privatization or commoditization of water.

13. Need for enhanced disaster preparedness

SIDS have always suffered from extreme vulnerability to natural disasters. Beyond the environmental damage sustained, the small size of SIDS economies mean that a single storm can devastate a SIDS national economy.[2] With the expansion of coastland development, for the tourism industry and other sectors, the economic impact of storms increases every year. This new development usually follows the high-impact approach of modern construction practices and not the traditional, low-impact approaches that have historically served SIDS communities well. As climate change makes storms more intense and more frequent, the economic impact can be catastrophic.

As mentioned above, much of the traditional and indigenous knowledge around disaster preparedness and risk reduction has been lost. Whether reading the cues of animals to help predict storms, or using storm-resistant construction practices, communities have relied on knowledge passed down from generation to generation to protect their homes and families and build resilience. As this knowledge fades, vulnerability increases. Disaster resilience thus represents a nexus of cultural, social, economic and environmental challenges, and addressing all the issues in a holistic manner is an emerging imperative for SIDS.

Policy implications

In all areas of disaster preparedness, from early warning systems to improved planning and management approaches, SIDS governments are sharing best practices and cooperating within and between regions.[3] In the political realm, SIDS will need to continue addressing issues of governance and policy planning to minimize the vulnerability of SIDS communities and businesses to disasters. Industry leaders in tourism and other sectors will likewise need to make informed decisions on coastal construction and land use. And as the costs of rebuilding after

[2] When Hurricane Ivan struck Grenada in 2004, for instance, the island sustained US$800 million in damage, which was twice Grenada's GDP. Nearly 85 percent of the nutmeg crop suffered some damage, and 60 percent was destroyed, and 89 percent of the country's housing was damaged (World Bank, 2005)

[3] The Intergovernmental Coordination Group for the Tsunami and other Coastal Hazards Warning System for the Caribbean and Adjacent Regions of the Intergovernmental Oceanographic Commission is one such mechanism encouraging regional cooperation.

natural disasters continues to increase, SIDS will need to include this in their economic planning and budgets. This issue links to the broader question of responsibility for climate change adaptation costs, discussed below.

14. Economic and social impact of climate change

Climate change is certainly not an emerging issue, especially for the SIDS who are in so many ways on the front lines of its devastating effects. Also very familiar are the ways that economic activity—industry, food production, transport—and social developments—population growth, increased urbanization and rising standards of living—contribute to climate change. But the expert group meeting highlighted a deepening understanding of the ways that climate change itself is, in turn, damaging SIDS social, cultural and economic structures, and the increasingly dire forms this damage will take in the future.

Agricultural production, fisheries, and related sectors will change and decline as the climate changes, threatening livelihoods and economic growth. The economic implications of sea level rise, destruction of the coral reefs, and loss of biodiversity are massive and potentially devastating. In addition, extreme weather spawned by climate change is destroying SIDS land, real estate and infrastructure, with economically catastrophic effects. In the most dire cases, SIDS governments are contemplating purchasing land in the other countries to prepare for the eventuality of territory loss. But even in SIDS not taking these drastic steps, decision makers are faced with an increasingly urgent need to enact policies addressing climate change.

As illustrated in the statements above, many of the emerging issues in SIDS are rooted at least in part in the impacts of climate change. An elaboration of a few sample issues follows.

- **Traditional sources of food security**: Climate change undermines SIDS fisheries and agricultural production.[4] As the ocean temperatures rise, fish stocks move or die, and subsistence SIDS fisher folk struggle to adapt to the new reality. In some cases they may be able to follow the fish, but more often they lack the tools or technology to make those changes, and their livelihood and food supply are decimated. Similarly, for agricultural communities, the changing weather and climate may render their traditional crops and farming techniques obsolete. As the sea level rises, SIDS lose land, which further threatens food production. Draught and flooding, collateral effects of climate change, also reduce

[4] Even though, as discussed in statement 11, these traditional sources of food may not provide the bulk of food in all SIDS, they are nonetheless critical to SIDS society and culture.

agricultural productivity and threaten food security. And communities based around the rhythms of artisanal fishing or farming are losing the cohesion that was rooted in their common experiences, leading to multitude of social challenges discussed in statements 4, 5, and 6, above.

- **Migration:** As mentioned above, climate change is creating situations of forced migration. Already, people are leaving SIDS as the islands lose territory to the rising sea levels. This will only increase in the coming years, as young people leave their home islands, unable to see a viable future. As they migrate from their home communities, they may lose the the local and indigenous knowledge passed inter-generationally. Ironically, that local and indigenous knowledge has traditionally included approaches to disaster preparedness, construction, and land use that would be all the more vital now that climate change is intensifying SIDS vulnerability.

- **Tourism:** Tourism forms the foundation of many SIDS economies, and the impact that climate change is having and will have on the tourism industry is undeniable. Coral bleaching will destroy one of the major assets drawing visitors to SIDS. Tourists are also discouraged from travelling to SIDS for fear of yet another violent and life-threatening storm. And as valuable coastland is lost to sea level rise, the resorts and hotels that often occupy that prime real estate will be all the more vulnerable to storm surges and other extreme weather events. If the tourism industry contracts, SIDS economies will suffer devastating losses.

Policy implications

The environmental facts of climate change—loss of biodiversity, degradation of ocean health, destruction of natural habitats—are tragedies in and of themselves, but it may be the accompanying social and economic upheavals that drive SIDS policy makers to act, (and to exert the moral pressure on the non-SIDS governments more responsible for the emissions that create the problems). SIDS actions toward mitigation can serve as examples or pilot cases for the rest of the world, but since SIDS together create less than one percent of global emissions, even the most aggressive mitigation efforts will have almost no impact on the planet's climate.

SIDS leaders will therefore act rather to adapt to climate change and its social and economic costs. The question then becomes who will pay for adaptation, and not only the immediately apparent measures like building sea walls or moving communities to higher ground, but also those myriad social and economic effects that appear two or three links down the causal chains. Consideration must be given to the question of who bears the

financial responsibility for climate change, ultimately with financial mechanisms put in place that reflect this responsibility.

15. Diminishing Resources for Development Financing

Underpinning all of the challenges outlined above is the fact that SIDS are finding it increasingly difficult to access financing for development. During and after the global economic and financial crisis, economic activity in many SIDS has been shrinking and debt levels rising. Investment flows and donor resources from abroad have likewise been contracting. SIDS governments have been forced to make difficult budgeting decisions and to undertake monetary and fiscal tightening. As discussed above, social services and other building blocks for sustainable development have suffered.

Policy implications

Financing for development is a multifaceted issue that must be approached holistically in order to yield effective progress. Domestically, SIDS governments may look to create enabling environments for small and medium-sized enterprises, emphasizing inclusive growth through access to financing but also to savings, insurance and other services. Strengthening governance and addressing corruption issues will further bolster inclusive growth. The international community must likewise foster inclusive growth in SIDS, by increasing consistency and effectiveness of the international monetary, financial and trading systems as well as the international financial architecture. This will include a hard look at agricultural subsidies and other protectionist measures, which increased in the aftermath of the economic crisis. Globally, official development assistance (ODA), still stands far below the 0.7 percent of GDP goal set in Monterrey in 2002. Increasing ODA, especially if done hand-in-hand with expanded technical cooperation and other partnerships, will improve the landscape for ongoing sustainable development in SIDS