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ANALYSIS

Sustainable development in small island developing states: Agricultural intensification, economic development, and freshwater resources management on the coral atoll of Tongatapu

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ABSTRACT

Small island developing states (SIDS) are vulnerable due to their small size in both bio-physical and socio-economic senses. They are increasingly confronted with the environmental consequences through utilisation of their fragile natural resources for economic development. Here we illustrate the dilemmas experienced by SIDS associated with sustainable economic development. Our focus is the main island of the Kingdom of Tonga, Tongatapu, located in the South Pacific Ocean. We analyse the intensification of agriculture and the attendant pressures on the islands freshwater resources. We combine environmental and economic data. Tongatapu (256 km²) is a raised coral atoll and the freshwater resources exist as lenses that float on top of denser salt water underneath the island. Since 1987 Tonga has exported squash pumpkin solely to Japan. Over the last 10 years, these exports have accounted for more than 40% of total export earnings, and represent 60% to 70% of GDP derived from agricultural export. This increase in exports is matched by an abrupt increase in the import and usage of agricultural chemicals. The island's freshwater lenses are increasingly under pressure from agricultural intensification. In the economic decision process, environmental impacts are not taken into account. This is partly because of overlapping institutional responsibilities of water management, and opaque institutional structures which are highlighted in the paper. The environmental consequences experienced by SIDS in terms of primary production stresses the need of taking natural capital into account when the benefits from international trade are evaluated. At the same time pollution will result in irrecoverable losses in terms of tourist potential. Improved agricultural practices have to be implemented through educational tools to ensure continuing economic prosperity derived from agricultural exports. Economic development of SIDS should also focus on the maintenance of kin relationships overseas, securing rent incomes and regional cooperative development efforts.

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1. Introduction

The meeting for the 10-year review of the Barbados Programme of Action (BPOA) for the sustainable development (SD) of small island developing states (SIDS) was recently held in Mauritius. At that meeting the Mauritius Declaration was signed to reaffirm the international commitment to further implement the BPOA (1994). Climate change remained the most controversial item on the agenda. Special attention was given to investigate means to unite and protect SIDS against events similar to the tsunami that struck South-East Asia in December 2004.

Currently, there is no generally accepted definition of a SIDS. Small island developing states are not a uniform, undifferentiated group (UNCTAD, 2004). However, SIDS have been recognised as a political identity since the establishment in 1990 of the Alliance of Small Island States. This currently comprises 39 members, including the four low-lying coastal states of Belize, Guinea-Bissau, Guyana and Suriname, but excluding Bahrain and the Dominican Republic. SIDS can be considered as a subset of small states.

Since Barbados, the international community has become more aware that traditional concepts of sustainable development (SD) are not applicable to SIDS. This is directly related to the small size of SIDS with their small populations, limited natural resources and undiversified economies. Further, SIDS often have weak institutional capacity in both the public and private sectors. They also suffer from the “tyranny of distance” and have a limited range in production and exports. They are vulnerable to external economic shocks and are susceptible to natural disasters and climate change as they have fragile land and marine ecosystems. UN Secretary General Mr Kofi Annan remarked that: “... as a result, their economies, including trade, financial flows and agricultural production, show greater volatility than those of other countries”. One of the challenges SIDS face is to balance economic benefits with environmental pressures arising from their industrial and agricultural endeavours. Maintaining resilience is often identified as the main strategy of sustainable management of ecosystems (Scheffer et al., 2003). Natural resilience on a small island is low, so the environment is vulnerable. Their constrained nature makes them well suited to illustrate the issues at the biophysical and socio-economic interface. A disadvantage for such an investigation is the lack of basic information available on SIDS. This further hampers policy formulation by SIDS.

The characteristics mentioned above are not exclusive to SIDS, and hold for micro-states in general. The economic performance of small economies is strongly influenced by their inherent diseconomies of size (Armstrong and Read, 1998). Since domestic demand lies below the minimum efficient scale, large-scale manufacturing is limited. Also, domestic competition is limited. So, the creation of indigenous research and development, technology acquisition, and technical progress is often impeded (Armstrong and Read, 1998; Briguglio, 1995).

Some advantages of being small could include a greater degree of social homogeneity and cohesion. This would encourage the growth of social capital, as well as a greater flexibility and decision-making efficiency (Armstrong and Read, 1998; Armstrong et al., 1998). However, the closeness between decision-makers and their constituents, as well as between ordinary

members of society, may actually encourage divisive rent-seeking behaviour based upon family ties, or clientelism (Armstrong and Read, 1998). Also, Bray (1992) notes for the sake of stability and compromise inhabitants of SIDS “... become experts at muting hostility, deferring their own views, and avoiding dispute”.

A balance between economy and environment underpins sustainable development. UNEP (2004) stated that: “... economic development as a measure of human welfare is unsustainable in the presence of persistent deterioration in environmental and natural resource capital”. There is wide variety of definitions of SD and such discussions may be found elsewhere. We adopt Holling’s (2001) definition of sustainable development as being “... the goal of fostering adaptive capabilities and creating opportunities”. Sustainable development is also perceived as necessarily being an integrative concept across scales and sectors (Robinson, 2004). We illustrate the issues of sustainable development facing SIDS in the Pacific Ocean. Our case study is the Polynesian Kingdom of Tonga with its exports of a mono-culture crop, and the consequent impact on its freshwater resources. Currently there is a lack of detailed analysis combining economic and environmental data of SIDS in the Pacific Ocean.

2. Pacific islands

An estimated number of 20,000 islands are located in the Pacific Ocean (181 million km²) that cover less than 1% of the total surface area. These islands generally have a limited capacity to buffer against environmental hazards and they possess a low resilience to disturbance. They contain a high number of endemic plants and vertebrates (Myers et al., 2000). The Pacific islands have made, after sub-Saharan Africa, the least progress among the world’s regions towards achieving the “Millennium Development Goals”. The struggles of these SIDS to become part of the global economy, along with misplaced perceptions of self-reliance (Bertram, 1986), often have led them to evolve from functional and traditional practices to less sustainable ones. Traditional subsistence agriculture is being replaced by the production of mono-cultural cash crops for export (Murray, 2001). Utilisation of natural resources for export through agriculture and fisheries are seen, next to tourism, as the main ways of economic development and diversification. Unfortunately, these developments lead to environmental impacts on water resources, along with pollution, degradation, erosion, and loss of biodiversity. One of the main actors to influence water resources is agriculture. Water management in SIDS is influenced by a number of other development issues, including coastal construction works plus solid waste and sewage disposal. Maintaining the quality of water is a necessity for societal well-being, the environment and exploitation of the island’s tourist potential.

3. Case study: Tongatapu, The Kingdom of Tonga

3.1. Island characteristics

Tongatapu (175°12’W, 21°08’S) is the main island of the Kingdom of Tonga, which is located in the South Pacific. The

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