Editorial: Sustainable environmental management in small island states and territories: technological issues, applications and solutions

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Biographical notes: Calbert H. Douglas is a Senior Lecturer in Environmental Management. His small islands research work covers sustainable development, capacities and strategies; built environment issues, technology and applications, and health and environmental impact assessment. His other research interests in the UK include corporate social responsibility, environmental management systems and patient-centred built healthcare designs.

All countries, large, small, landed continental states and Small Islands Developing States (SIDS) face economic development pressures, which threaten their ecological and human environments. Researchers have shown that in comparison to large states, small islands face pronounced risks due to their relatively high economic, environmental and social vulnerability (Briguglio, 1995; Pelling and Uitto, 2001; Armstrong and Read, 2002; Douglas, 2006). Climate change and transboundary pollution from the industrial nations, affect the ecology and economies of small islands. Fourteen years have passed since the 1994 United Nations global Conference on the sustainable development of SIDS, which agreed the Barbados Plan of Action (BPOA). The Conference pointed out that SIDS were among those particularly vulnerable states that need assistance under the United Nations Framework Convention on Climate Change, including adaptation measures and mitigation efforts. The detailed agenda focused on issues such as climate change, sea level rise, natural disasters, waste management, water resources, energy, technology, sustainable development, and tourism.

In 2004, the Commonwealth Secretariat in reviewing the Barbados Plan of Action stated that the characteristics that shape sustainable development concerns in SIDS were their small populations, remoteness, prevalence to natural disasters, extreme weather events and the openness and small base of their economies. Accordingly, these factors, along with their small size and inability to capture economies of scale in their domestic markets, political, managerial, and importantly technical capacities, make SIDS amongst the most vulnerable states and therefore a special case for sustainable development and environmental management considerations (Commonwealth Secretariat, 2004).

The 2004 United Nations meeting in Mauritius on SIDS reaffirmed the BPOA commitments to sustainable development. The meeting provided two key documents, the Mauritius Declaration and the Mauritius Strategy. The former, established that the BPOA was still valid as the blueprint for providing the fundamental framework for the sustainable development of SIDS. The latter further confirmed this and provided discussion and strategies related to a wide variety of actions set out under 20 broad headings (The United Nations in Vienna, 2005).

This special issue of the journal comprises a selection of papers from academic researchers and practitioners in the fields of environmental protection and management, environmental technological innovations and applications, water resources, capacity building, project management and environmental assessment in small islands. They discuss different perspectives on the management of environmental issues, the application of technologies to the problems encountered, associated project management challenges, and their resolutions in small island contexts.

Kaldellis *et al*. discuss the case of the Aegean Sea islands. The availability and costs of electricity are issues considered. The authors investigate the idea of an integrated electrification solution based on a photovoltaic generator along with an appropriate energy storage device. Given the high solar potential of the islands they consider photovoltaic systems, which they argue are characterised by low maintenance support requirements which also help to minimise the negative impact of thermal systems on the unique character of the islands.

The focus of the paper by Fu *et al*. is trans-boundary ozone, particulate matter and acid deposition. The paper discusses research in which the authors conducted an air quality modelling assessment of trans-boundary air pollutants from the Asian continent to Taiwan and the small Taiwanese Islands by applying an advanced multi-scale air quality modelling system developed originally by the US Environmental Protection Agency. The model was designed to simulate air quality, by including state-of-the-science capabilities for tropospheric ozone, fine particles, toxics, acid deposition, and visibility degradation. It is capable of guiding policy-makers in small island environmental protection agencies in developing control strategies and measures to improve air quality.

Smith's paper discusses the situation in the small island Western Pacific communities of Chuuk, an island country among the least wealthy, most remote and resource-poor states. The small landmasses, geologic composition, geographic isolation of these islands and their weak educational, technological and financial resources constitute significant barriers to building capacity for improving access to safe drinking water. Considering technology transfer possibilities, Smith argues that high technology, high-cost, and complex Northern models for mitigating water resource problems are inappropriate and unsustainable. The paper discusses ideas for addressing these water issues utilising a multi-scale approach for improvements at subnational environmental management capacity level and low technology and low cost mitigation measures at the village scale.

Koria presents a review of development project management in the SIDS of Vanuatu, an archipelago of 83 islands in the South Pacific. In examining the delivery of an educational development project in the Republic of Vanuatu, the paper explores a number of key themes, including the case for institutional development, integrated approach to project management, procurement & logistics and developing host capacity in project control. Of importance is the consideration of the applicability and appropriateness of

current theoretical thinking on project management practice. The paper provides useful lessons concerning the developmental significance of sustainable project management principles and the potential to enhance capability and administrative innovation.

The application of new technologies and Information Communication Technologies (ICTs) are important to SIDS in their economic competitiveness in the international context. The paper by Kaushalesh analyses the intensity of the adoption and the diffusion of information technologies in Small and Medium Enterprises (SMEs) in Mauritius and Jamaica. Using discriminant analysis, the author shows that factors such as openness of island economies and human resource development infrastructure emerged as important factors in explaining the varying levels of ICT use by SMEs in the two island states.

Ramos *et al*. in discussing environmental assessment in the Portuguese island territories of the Azores and Madeira undertook qualitative comparisons and evaluation of EIA project decisions. The authors argue that there is a new challenge for policy-makers to adapt EIA models to respond to the unique needs of SIDS and island territories. Understanding local socio-economic factors, local governance, institutional frameworks and relationships among small islanders are important to the environmental assessment process. Larger developed countries environmental and sustainability assessment practices are not directly transferable to the unique nature and context of SIDS. The development imperatives of the tourism industry and the scenario of unclear processes and controversial projects approval, which lead to land use conflicts, biodiversity disruptions and unsustainable infrastructures compromise the sustainability of small island regions.

Researchers in their respective sustainable development and environmental management discourses, and particularly in the case of their research concerning SIDS and other small island territories, have paid scant attention to the role of technology, technological applications and techniques in their development. Yet technological applications play an important role in their environmental management practices and in the policies and strategy responses that decision-makers and national and international agencies that support sustainable development initiatives put forward. The authors of this special issue presented discussions on issues and responses concerning electricity generation, air pollution, technology transfer possibilities, education and development project management, ICTs and environmental assessment practices. The topics addressed provide a snapshot from the wide-range of environmental protection, management and sustainable development challenges that face SIDS and small island territories. The common theme through the papers was that of the role of technology and technological applications in the development and management of the natural and human environments in these unique island places.

This special issue recommends a number of important areas for future research in SIDS context in which technological applications are important. They include the management of the natural and human environments, economic and sustainable development planning, responses to climate change and sea-level rise, production and distribution, transport and communication, pollution control, water and waste management, environmental monitoring, capacity development and knowledge management.

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