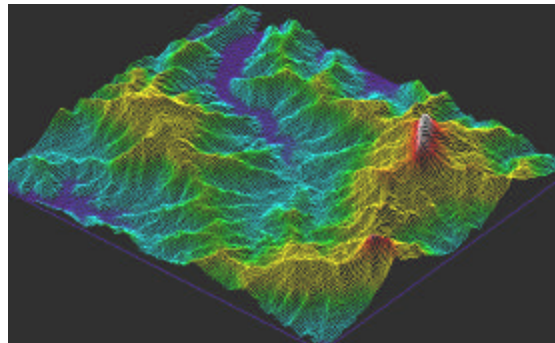


**Organization of Eastern Caribbean States
Natural Resources Management Unit**



**Proceedings of the
Regional Policy Dialogue on
Watershed Management in Small Island States**



**Eastern Caribbean Central Bank
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1.0 Introduction

Watersheds as hydrological units provide the focus for conceptualising and implementing development investments in Small Island States such as those in the Caribbean. The rationale for a watershed management approach in small islands has to be explored in the context of physical, economic, social and political linkages. This physical and sectoral connectivity should take into account a management continuum, which stretches from ridge to reef.

Discussions on watershed management in the Caribbean are generally dominated by concern about physical linkages related to the movement of soil and water within drainage basins. While the significance of the hydrological cycle for water resource planning cannot be overstated, research and project experience, however, show that conventional approaches to watershed management are the political, economic and social imperatives and the linkages between upstream and downstream.

Using the foregoing as a framework, the OECS through its Natural Resources Management Unit (NRMU) embarked on a Watershed Management Initiative. This Initiative is made up of four parts: Community participation, technology generation, public awareness, and policy formulation. On site activities have been undertaken in three of the Member States; public awareness campaigns have been undertaken regionally and in five of the Member States; and two types of simple, community-based technologies have been developed for riverbank stabilization and for contour planning.

2.0 Policy Dialogue Goals and Objectives

The overall goal of the policy dialogue was to develop a common vision for watershed management in the OECS region and to identify key elements in the formulation of a regional watershed management policy.

The specific objectives were as follows:

- i. To exchange experiences in watershed management initiatives across the OECS;
- ii. To examine impacts of stakeholder interests within watersheds and their respective roles related to capacity to address watershed degradation issues;
- iii. To review emerging strategies and technologies in watershed management planning, soil and water conservation and community participation approaches across the region;
- iv. To brainstorm and obtain consensus on the elements of the proposed watershed management framework;
- v. To determine the way forward towards formulation of the policy framework.

The workshop was structured into two main components: (1) technical sessions and (2) work group sessions.

This report compiles the proceedings from the policy dialogue. Synopses from the technical sessions are presented in Section 3 and summaries emanating from the work group sessions are presented in Section 4.

3.0 Technical Presentation Summaries

3.1. Overview of Watersheds

Objective: To provide an understanding of the physical characteristics and functions of watersheds with reference to small island states.

3.1.1. General Features of Watersheds in Small Island States

Julius Polius, Ministry of Agriculture, St. Lucia

A watershed is defined as an area of land drained by a river system. Geomorphology of the landscape characterizes how water flows within the drainage basin. Watersheds in the Caribbean islands are typically 'pear-shaped', broad along the upstream divide and relatively narrow near the drainage outlet. In the volcanic Windward Islands, watersheds are characterized by steep terrain and are deeply dissected. The drainage density in terms of the number of channels per unit area is relatively high. Flow tends to be relatively rapid due to the steep terrain. In the corraline/limestone Leeward Islands, slopes within watersheds tend to be shallower and the landscape characterized by relatively low drainage densities.

Soils and geology influence drainage patterns and vulnerability to degradation in terms of the volume and erosivity of overland flow. In watersheds underlain by limestone, a significant volume of flow is subsurface, contributing to groundwater reserves. In the volcanic islands a large component of the water budget is surface flow. Land use is among the most influential factors in determining flow regimes within watersheds. For example, removal of forest cover tends to reduce percolation rates and storage within the watershed, which often translates to more rapid runoff and increased potential for surface erosion. Understanding the basin hydro-geomorphological characteristics is important in developing watershed management interventions.

Stream order is used to characterize the degree of branching of tributaries from the main channel. Drainage networks in small islands are typically first and second order. The predominant types of drainage patterns are dendritic. Stream channels in the small islands tend to be relatively short given the small landmass areas, and given the youthful geomorphology, channels are relatively straight with few meanders. Slope and aspect affect the runoff regimes within watersheds. Steeply sloped watersheds have high runoff rates and erosion by water is of concern. The aspect or general orientation of the watershed on the island affects the distribution of rainfall. Watershed reaches on the windward side of the islands tend to be relatively drier than areas on the leeward side.

3.1.2. The Economics of Watershed Protection

John Dixon, World Bank Institute

Watersheds may be used as the logical organizing units in environmental economic analyses. These analyses are usually performed within a benefit-cost analysis (BCA) framework. Economic analyses are differentiated from financial analyses with respect to determining net returns to society versus individuals, use of undistorted shadow prices versus market prices and cost of capital in terms of discount rates.

Benefits in terms of goods and services may be classed in terms of location; on-site versus off-site, and valuation; marketed versus non-marketed. From the watershed perspective, on-site goods and services that have defined market value such as crop value are usually considered in economic evaluations. In some instances marketed off-site goods and services such as hydroelectric power generation, water and tourism, may be included. However, to adequately account for all elements, non-marketed values such as ecosystem health, aesthetics should be included. Externalities are the negative consequences resulting from inadequate accounting, where stakeholders are excluded from the decision process.

Watershed management interventions typically imply trade-offs between upstream or on-site versus downstream or off-site net benefits and that information to drive the decision process must facilitate generation of win-win situations. Active government intervention is usually required to ensure mutual benefit distribution out of improved watershed management.

3.1.3. A GIS-Assisted Approach to Sustainable Rural Watershed Management Planning

Christopher Cox, Ministry of Agriculture, St. Lucia

Watershed management interventions should be harmonized in the context of a plan, which directs location of best management practices over the landscape. This is important in the context of deployment of available human and financial resources. Geographic Information Systems (GIS) are computerized mapping tools often used in modelling applications where large volumes of spatial data are required as inputs in decision processes.

Land capability is an evaluation of most suitable land management regimes given physical characteristics within the watershed. A land capability evaluation was carried out for St. Lucia using a scheme proposed by N. Ahmad (UWI) as an alternative to the USDA land capability classification system. Two criteria formed the basis of the classification scheme; slope and soil erosion stability. These criteria represented as digital map coverages

were combined using GIS spatial analytical tools to generate a land capability coverage.

Each land capability had an associated best land management regime. Superimposing the digital land capability coverage with areas identified as special management zones (catchments for water extraction, riparian buffers, forest reserves, etc.), a land zoning digital map was generated identifying the precise spatial extents of recommended land management regimes over the island. Spatial decision support tools available in the GIS were also used to derive crop suitability zones for annual and perennial crops using FAO agro-ecological criteria. Suitability scores for each crop group were derived through combination of climatic and edaphic factors based on relative importance in the context of crop productivity.

Land tenure data for a major watershed was superimposed over the recommended land management coverage to illustrate how this data may be translated to individual land parcels in the context of guiding management interventions at the farm scale.

3.2. Watershed Management in the Caribbean

Objective: To review a selection of initiatives and experiences in the Caribbean in order to identify appropriate policy indicators for watershed management.

3.2.1. The OECS Watershed Management Programme Experience – St. Vincent and the Grenadines

Fitzgerald Providence, Forestry Department, Ministry of Agriculture, Lands and Fisheries, St. Vincent

St. Vincent is of volcanic origin, some 344 km² in area and dominated by rugged terrain. Annual rainfall varies from 1,500 mm within the coastal belt to 7,000 mm within the interior. The island is divided into 13 watersheds; some of the more important include the Colonarie, Buccament, Cumberland and the Marriaqua. Deforestation for agriculture within private lands and forest reserves is a major problem in upper watershed areas.

The Marriaqua watershed was selected to pilot a watershed management initiative financed by the OECS-NRMU. The 23 km² watershed, located in the southeastern part of the island, contains the typical range of land management regimes found in the island. The watershed accounts for 18% of the total banana production, and constitutes 40% and 60% of the total dasheen and peanut acreages respectively. The two major sub-watersheds, the Majorca and Montreal supply roughly 24% of the domestic water for the island. Other economic and social benefits derived from the watershed include fishing, eco-tourism, biodiversity conservation and local recreational activities.

The key issues the project sought to address included deforestation within the water catchment areas, squatting on government lands, poor agronomic practices, solid and agrochemical pollution, sedimentation of the lower river reaches, and poor stakeholder and agency collaboration in defining solutions. The project commenced with a fact-finding component to evaluate the condition of the watershed, collect data on physical features and socio-economic parameters. This was followed by community consultations and the formation of a core group comprising of representatives of key stakeholders. Rapid environmental assessments were carried out to determine the nature of required management interventions. Conservation measures such as grass barriers were established on denuded slopes and bioengineering soil stabilization techniques were installed along degraded riverbanks. In addition, a public education programme was mounted targeted at the general public, local communities and students.

Problems in the project execution included lack of sufficient community mobilization and lack of effective empowerment within the core group itself. Stakeholder contribution to the workings of the core group was low. The farmers on whose land conservation measures were installed displayed low commitment to the utilization and maintenance of the bioengineering control measures. The running of the project was also hampered by two government elections.

The experiences from the project highlighted several key issues in the formulation of watershed management policies. Land use policies, with emphasis on protection of natural resources are required to address land use issues particularly within critical watershed areas. Policy must point towards empowerment of communities in participatory management of natural resources, and address the elements of poverty alleviation since many of the problems within watersheds result from choices made by poverty-stricken persons. Finally, there needs to be a unified approach to watershed management, integrating stakeholders, human resource capacities and legislative support.

3.2.2. Watershed Management of the Northern Range in Trinidad and Tobago

Sheriff Faizool, Forestry Division, Ministry of Environment and Public Utilities, Trinidad & Tobago

The Northern Range is one of the three mountain ranges of Trinidad, occupying an area of 1,111 km². The terrain is generally rugged with very steep slopes and has an average annual precipitation of 2000 mm. Land clearing for agriculture occurs in the foothills and agricultural squatting is relatively common in the higher elevations.

Major environmental problems in the watersheds within the Northern Range include squatting, fires, shifting cultivation, quarrying, improper agricultural practices, improper solid waste disposal and poorly planned housing development. The combination of these factors typically results accelerated soil erosion and uncontrolled runoff particularly during the rainy season. Secondary effects include increased flood risk, degradation in water quality and quantity, declining soil productivity along with loss of biodiversity.

Various forest and watershed management projects have been undertaken to address the many environmental degradation issues within the Northern Range. Three key projects outlined included the Northern Range Reforestation Project (1972-1989), the Upper Watershed Management and Planning Project (1982-1988) and the Eastern Northern Range Planning Project (1989-1995).

A revised forest policy is in its final states of approval by Cabinet. The Upper Watershed Management and Planning Project has established guidelines for integrated management planning within the Maracas watershed along with the training of technical and professional staff. Research on watershed hydrology was carried out along with extensive reforestation activities and protection against forest fires. Soil and water conservation measures on hillside cultivations were established in several areas and agro-forestry systems are being promoted.

The primary policy elements in watershed management include consideration of socio-economic factors, stakeholder participation, research, land tenure and ownership and legislation.

3.2.3. Watershed Management in Jamaica

Learie Miller, National Environment and Planning Agency, Jamaica

Jamaica is a mountainous country with 60% of the country in excess of 250 m above sea level, the interior terrain characterized by steep slopes in excess of 20 degrees. The country is subject to all the adverse environmental impacts associated with unsustainable land management practices such as slash and burn cultivation, deforestation (timber, fuel wood and yam sticks), uncontrolled illegal hillside settlements, poor road construction and unapproved quarrying and sand mining. Some of the main watershed degradation issues include reduced water availability and quality, reduced land productivity, contamination of rivers and marine environments by sediment and agrochemicals, increased flood risk, habitat loss and general increase in health risks.

Jamaica has had a long history of watershed management initiatives. Prior to 1970, institutions such as the Forestry Branch (1937), Soil Conservation Division (1941), Forestry Department (1942) and the Yallahs Valley and Christiana Area Land Authorities (1951) were established. The Watershed Protection Act was effected in 1963. Between 1970 and 1990 focus was on integration of engineering measures in rural development projects. From 1990 there was a shift to emphasis on agronomic practices and fostering increased community participation in watershed management initiatives. Several projects evolved including the Trees for Tomorrow Project, Hillside Agricultural Project and the Ridge to Reef Project. The National Integrated Watershed Management Council is a multi-disciplinary and multi-sectoral entity and has the mandate for controlling the implementation of the National Integrated Watershed Management Program.

The main objective of watershed management in Jamaica is to promote the integrated protection, conservation and development of land and water resources in watersheds for their sustainable use and for the benefit of the nation as a whole. Watershed management is guided by key principles which

include long-term continuous investment, planning and design of watershed management interventions, stakeholder participation, consideration for sustainable livelihoods while ensuring resource conservation, application of land utilization criteria, close intersectoral coordination and collaboration, incentive measures and research and monitoring. Some key strategies identifies to achieve management objectives include development of a national watershed programme, establishment of a coordinating watershed council and local watershed management committees, ranking of watersheds based on priority for management interventions (Jamaica's land area has been divided into 26 watershed management units, several units combining multiple drainage basins), financing, training, public education, public participation, monitoring and research.

3.2.4. Environmental Externalities in a Costa Rican Watershed

John Dixon, The World Bank Institute

The principles of environmental accounting were illustrated for a watershed in Costa Rica under a multiple use management regime. Within the watershed the major stakeholders included cattle (dairy) ranchers, a hydropower company, crop farmers, tilapia farmers and fishers in the coastal zone. Forest reserves were within the upper reaches of the watershed and a wetland and national park was situated downstream. These stakeholders were quantified in terms of relative numbers and qualified in terms of relative political and economic power. Forestry concerns (loggers) represented a small minority and wielded little political and economic power. In the middle of the spectrum were the irrigated farm owners who accounted for a moderate proportion of the total stakeholders and had a moderate degree of political and economic power. The hydropower company constituted a single stakeholder but had the greatest relative political and economic influence within the watershed system.

The baseline payoff matrix method for evaluation of externalities was presented. Benefit evaluations were derived for all stakeholders based on their economic contributions. Externalities were negative impacts each sector had on each other, valued as negative costs. Positive impacts between interacting sectors were positively valued. The net benefits of each sector were derived as the arithmetic sum of the sector contribution and the externalities and positive interactions.

This approach was able to identify the winners and losers and opportunities for gain. From the analysis it was possible to determine that electricity generation and irrigated farms provide 90% of the benefits within the watershed, although irrigation had high negative impacts. High externalities were associated with cattle ranching, suggesting that policy directives should therefore seek to restrict further expansion in this sector. Major losers were the electric company, fishermen and wetlands.

The financing of forest conservation from benefits accrued from power generation was evaluated. Consumers are charged the environmental cost of the forest as a producer of water, the money channelled back into compensation of landowners involved in protection of forests. Based on land use opportunity cost for dairy production, quantity of forests, water quantity and quality generated from forests, a precise unit volume cost to compensate landowners was derived.

3.3. Approaches to Watershed Management

Objective: To review watershed management approaches in order to mitigate the negative impacts associated with poor watershed management practices particularly in small island states.

3.3.1. Challenges of Participatory Approaches in the Development of a Policy and Watershed Management

Michael Andrew, Forestry Department, Ministry of Agriculture, Forestry and Fisheries, St. Lucia

Watershed management is a challenge to forest managers, planners, water users and extractors and resource managers primarily due to the diversity and complexity of stakeholders involved in the process. In many instances the target groups, usually farmers and CBOs involved in the implementation of conservation measures and management practices are not the main direct beneficiaries. The true beneficiaries of these positive actions in terms of water conservation are usually urban dwellers, hotels and the commercial sector. The watershed management policy process must therefore consider the provision of incentive measures to those stakeholders charged with protection of the upper watersheds and water catchment areas. Watershed management initiatives must bring economic benefits to land owners within the upper watershed. An example of such a strategy is the commitment by the hotel sector to purchase agricultural produce from farmers working within the protected catchments on private lands. Another strategy is the introduction of a water levy the funds from which may be used to plough back in to management initiatives.

An essential component of watershed management is the development of a mechanism that encourages and facilitates the participatory process towards watershed policy development and watershed management. This mechanism must consider all the relevant stakeholders ranging from formal to informal groups and private individuals. There must be transparency and information sharing in any decision processes, one in which all stakeholders must be provided with up to date information on a timely basis. Effective communication is essential if partnership and trust is to be developed between CBOs, NGOs, civil society and government. Interested individuals and core groups should be involved in monitoring and evaluation activities.

An important consideration in watershed policy development is advocacy of delegation of authority to CBOs and civil society and empowering them to become ex-officials in the implementation of legislation and regulations that guide the protection and management of watersheds. Institutional coordination between governmental agencies, NGOs and CBOs is essential

in participatory watershed management in which capacity building and definition of roles are important considerations.

3.3.2. The Talvan Experience in Community Watershed Management

Claudia Roberts and David Lewis, Talvan Water Catchment Group and Forestry Department, Ministry of Agriculture, Forestry and Fisheries, St. Lucia

The Talvan catchment is located in the Marquis watershed and is a major source of potable water to the northern municipal supplies. The catchment is approximately 200 hectares and is predominantly under intensive banana cultivation. The broad range of environmental problems associated with poor land management occur within the catchment and affects the quality of water extracted. A project to improve the quality of water extracted at the intake was developed by the Talvan Water Catchment Group (TWCG), a local CBO, with technical backstopping by the Forestry Department and the Agricultural Engineering Division of the Ministry of Agriculture. Collaborators in the project included the Water and Sewerage Company and the Ministries of Health and Community Development. Bioengineering soil erosion mitigation measures, untested in conventional soil conservation strategies in St. Lucia were used to stabilize eroded sections of riverbank.

In the project planning stages a database of all the landowners within the catchment was created to determine the relative location of land parcels with respect to watercourses and other degraded areas. A walking reconnaissance of the riverbanks was carried out to determine the type and extents of remedial measures to be undertaken. Riverbank tree planting and bioengineering measures were installed. Several community and farmer sensitisation workshops and consultations were held over the project period. Specific areas covered included group strengthening, project management, technical implementation and project monitoring.

Achievements included the installation of approximately 1.1 km of bio-engineering control measures, including gliricidia wattles and geotextile mat along the banks of the river upstream of the water intake. Tree crops including mango and citrus were established. Poorly constructed outdoor latrines in close proximity to the watercourse were relocated and re-built using the ventilated improved pit (VIP) system. Billboards displaying conservation messages were erected at select locations along roadsides and river crossings. Media attention and increased involvement by the wider community has lead to greater societal awareness. The TWCG has acquired formal registration as an NGO.

Some of the main lessons learnt from the project included the need for ownership of the initiative by the community, the need for empowerment and cohesiveness among group members. Education of the wider community

was critical and the group saw incentives and public recognition through the media as important motivating elements in realizing the project goals.

3.3.3. Ecotourism as a tool for Watershed Management: Wingfield Watershed Management Experience

Bryan Farrell, Ministry of Health and Environment, St. Kitts-Nevis

The Wingfield watershed is approximately 9 km², the upper reaches at an elevation of 3000 m above sea level, and is the major surface source of potable water in St. Kitts. The watershed has several natural and man-made heritage sites including trails, waterfalls, estate ruins and Amerindian petroglyphs. Over 60% of the watershed is forested and the remaining under mixed management regimes. One of two remaining areas of intact virgin forest is located within the headwaters. The uniqueness of the watershed, its importance for water and potential for ecotourism utilization has made it the most studied watershed on the island. The Wingfield watershed was declared a national park in 1986 and all lands with the exception of the Old Road Town urban area are government owned.

The Wingfield watershed has experienced some degree of land degradation; the primary issues including poor agricultural land use practices, pollution of the watercourses within the urbanized areas and solid waste assimilation along trails. The complexity of land management issues within the watershed and its significant development potential led to selection of the watershed as a model for the development and implementation of a watershed management project. A proposed management plan was drafted in 1998 and subsequent inventories conducted in 2000.

The project is now being financed through the OECS/NRMU with ecotourism development as a central theme in conservation of the integrity of the watershed. The project goal is the promotion of sound environmental policies and practices for the adoption of nature heritage tourism initiatives in the watershed. The project is being implemented by a local core group of community members and guided by a national steering committee providing technical and institutional support.

The strategy identified in attainment of the project goals included the identification and prioritization of issues through stakeholder consultations and public/private sector partnerships, promotion of the area as a nature heritage site and identify tangible opportunities for benefits from ecotourism, development of a land use zoning plan, formulation of a National Park Authority, foster community participation, and public education. Specific activities to be pursued include promotion of the participatory approach at the community level, maximizing stakeholder involvement, trail / facilities development, production of printed promotional material, generate local employment opportunities and guide training.

3.3.4. Watershed Management and Pollution Abatement – A Caribbean Environmental Health Institute (CEHI) Perspective

Vincent Sweeney, Caribbean Environmental Health Institute, St. Lucia

The Caribbean Environmental Health Institute (CEHI) was established by the governments of CARICOM in the late 1970s, its mission being to provide environmental health leadership in order to improve and support policy development consistent with the goals and targets of the Caribbean Cooperation in Health (CCH) initiative. The agency has historically been involved in coral reef, coastal pollution, beach debris and other general environmental monitoring. The current focus of CEHI is on water supply, water resources and waste management. CEHI has been identified as the lead agency designated by Ministers of Environment for water resources management for the Caribbean SIDS/POA. CEHI's present areas of involvement include the co-executing agency (along with UNEP/RCU) for Global Environment Facility (GEF) project on Integrating Watershed and Coastal Area Management in Small Island States in the Caribbean, OAS project on Fresh Water Resources Management in Small Island Developing States. CEHI serves as the focal point and regional coordinating mechanism for several other initiatives the Inter-American Water Resources Network, Inter-American Dialogue on Water, the Model Water Sector Policy and the Caribbean Environmental Forum's Climate Change and Water dialogue.

Cognisant of the many adverse effects associated with poor agricultural practices, improper land coastal development and the possible impacts of global climate change, CEHI recognizes several approaches in tackling these issues should feed into watershed management programmes. Some of the key approaches include the general promotion of sustainable environmental management practices, improved capacity in watershed programme management, installation of improved water and sanitation systems (low-cost flush and efficient community sanitary systems), solid waste audits, implementation of biological soil conservation techniques, introduction of disease resistant crops, integrated pest management and design and implementation of best management practices. Recommended approaches in water quality monitoring include the upgrade of lab facilities, introduction of biotic monitoring and implementation of water quality monitoring information systems.

Under the Integrating Watershed and Coastal Area Management (IWCAM) in Small Island States in the Caribbean project (financed under the GEF) CEHI's role includes building awareness of the importance of integrated watershed and coastal area management, strengthening capacity towards improved water resource protection and sustainable development of watersheds and coastal areas. The goal of this project is to strengthen the participating countries (including 6 OECS territories) to implement an integrated approach to the management of watersheds and coastal areas. The project has been

under development since 1998 and has been in the GEF Block-B Phase since 2000. The project is to be submitted to the GEF Council in 2002. The major steps to be undertaken in this initiative includes the formation of National Coordinating Groups, identification of demonstration ideas and drafting of project proposals and implementation of demonstration projects.

3.3.5. Community Based Technologies: Experiences from St. Lucia and St. Vincent and the Grenadines

Cornelius Isaac, Forestry Department, Ministry of Agriculture, Forestry and Fisheries, St. Lucia

The Caribbean states are faced with rising populations and access to suitable lands for agricultural expansion is a major issue. Lands available for agriculture are often on steep slopes, and intensive hillside cultivation under poor land management regimes leads to a range of environmental problems related to soil erosion, agro-chemical pollution, excessive and uncontrolled runoff and general water quality and quantity degradation. Soil and water conservation technologies focus on altering runoff rates through physical retardation of runoff and increased percolation to reduce the erosive potential of overland flow and stabilization of soil aggregates against raindrop impact. An important consideration is the careful selection of the most appropriate vegetation cover to fulfill soil and water conservation demands. Implementation of these measures can improve the utility of steeper slopes on a more sustainable basis.

Traditional soil and water conservation measures have often been based on installation of physical structures under the direction of conservation specialists through subsidized government support. In this approach however, lack of stakeholder participation and community ownership of such initiatives has always been a problem. In St. Lucia and Grenada two community-based soil and water conservation initiatives are being piloted involving the application of alternative soil and water conservation measures that are simple and implementable by community-based stakeholders. Some of the biological conservation measures being explored include vegetative wattles, grass strips and barriers, mulching and trash barriers, with emphasis on rehabilitation of watercourses. Geo-textile matting is a low-cost technology being experimented with in riverbank stabilization. Other measures to be incorporated include contour drains, stone barriers and terraces.

Community-based collaboration in such initiatives is favourable over individual efforts from the stand-point of spreading work-loads, creation of collective appreciation toward land stewardship issues, building sense of ownership, strengthening community cooperation and highlighting the roles of women.

3.3.6. Market-based Approaches for Watershed Land Use

George Alcee, Organization of Eastern Caribbean States, Natural Resource Management Unit, St. Lucia

The agricultural sector is charged with the responsibility of contributing to food security in a sustainable manner while making significant contributions to public revenues and providing gainful employment to stakeholders who depend on the sector. The sector has the ultimate responsibility for protecting the natural resource base to ensure maintenance of viable agricultural production and continued flow of benefits such as water, clean air etc. The socio-economic status of farmers determines their ability to address conservation issues in watersheds. Small producers and landless farmers are primarily concerned with improving their scant livelihoods and their role in conservation of natural resources is constrained by factors beyond their control. Medium to large commercial producers tend to be concerned with economic and financial sustainability and may not give consideration to sustainable social and environmental goals.

The overall watershed management objective is to contribute to economic and social development in an environmentally sustainable manner, addressing the problems of land degradation stemming from inappropriate land use. The market-based approach to watershed land use implies a level of utility of the watershed attributes and necessitates secure land title. In the OECS there are many imbricating titles and concomitant conflicts over land parcels as a result of traditional systems and archaic inheritance laws. Situations where land owners grant access to their lands by others, or access lands of others through insecure tenure or reciprocity obligations, where landless farmers squat on private or crown lands, or in cases where kinship ties give all family members access to a single parcel, provide the main ingredients for natural resource depletion.

Land use patterns within watersheds are often reflected in the degrees of uncertainty associated with the market economy. High price variability and imperfect market knowledge result in sub-optimal decision-making at the micro-economic unit scale of production and the unwillingness to invest in new technologies. Several aspects need to be addressed if proper land management regimes are to be effected, and include adoption of multidisciplinary approaches in developing farming systems, the analysis of natural capital (land, water etc.) and its ability to sustain enterprises, analysis of human capital (labour, education, skills etc.), review farmer financial resources, identify social capital requirements, arrange production schedules for enterprises, engage in economic modeling of farming enterprises and fully integrate farmers in the market economy.

In policy support to the process of sustainable watershed management the following needs to be considered. Political support must be mobilized to

place watershed management goals high on the political agenda. Sustainability indicators to capture values associated with biodiversity protection must be developed. Policies should be developed to reduce externalities associated with agricultural production and incentives for upper catchment protection should be provided. Squatters and landowners in environmentally sensitive areas should be relocated to less sensitive areas. Land redistribution systems giving land access to targeted beneficiaries should be considered. Finally, interventions to generate revenue from natural resources (e.g. heritage tourism and recreational activities) should be encouraged.

3.3.7 Formulation of the Grenada Forestry Policy

Gordon Patterson, Forestry and National Parks Department, Ministry of Agriculture, Grenada

Grenada's forest resource was being threatened by deforestation accompanied by problems associated with land degradation. The problems arose primarily from users utilizing the resource unsustainably, unplanned housing and infrastructural development, in the absence of a national land use policy. It was recognized that multiple-use forest management had to be based on a holistic approach involving stakeholders, and that a national forest policy was necessary.

The first national forest policy was drafted in 1984, however it gave the Forestry Department the mandate to work only within forest reserves and generally overlooked the stakeholders' needs from the forest and their management concerns. A policy review process was initiated with strong emphasis on wider participatory input. A two-day visioning workshop with senior staff of the Ministry of Agriculture was conducted to determine how the approach may be effected, and to identify the range of stakeholders. The Forest Policy Development Committee was formed, representing the broad range of interest groups, with two members from the Forestry and Parks Department. The broad-based, multi-sectoral support for the process facilitated decision-making by consensus, and gained strong political support.

To gather data to support the process, fourteen community consultations were held in Grenada, five in Carriacou and Petit Martinique. The public was polled by questionnaire, and phone-in radio programmes on forestry issues were organized. In addition, Forestry Department staff prepared nine sub sector policy papers. This was followed by a five-day consensus-building workshop. A drafting committee was set up and prepared the draft policy document based on data gathered in previous exercises. This draft document was reviewed in a one-day feedback workshop and subsequently submitted to the cabinet of Ministers. The Grenada Forest Policy was approved in 1999.

The stated goal of the policy is to maximize the contribution of forests for environmentally sound social and economic development. The objectives of the policy are to:

- Conserve species, ecosystems and genetic diversity;
- Maintain, enhance and restore the ability of forests to provide goods and services on a sustainable basis;
- Optimize the contribution of forest resources to social and economic development;
- Maintain a positive relationship between the Grenadian people and their forest environment.

4.0 Findings from workgroup sessions

The purpose of this session was to develop a set of recommendations to guide the OECS in the formulation of a common watershed management policy.

The workshop participants were formed into 4 work groups. The deliberations were guided by a series of questions relevant to the policy formulation process. The findings and recommendations for the four groups are summarized below.

4.1 *What are the main problems and causes pertaining to watersheds and watershed management in the OECS in terms of physical characteristics and functions?*

The participants identified several discrete but interrelated problems and causes:

PROBLEM: Rural land degradation related to agricultural development (soil erosion and mass wasting, loss of soil productivity and declining agricultural yields, siltation of watercourses from upland erosion and associated increased flood risk and damage to property and loss of life)

CAUSES:

- **Poor agronomic practices** including wanton deforestation of fragile areas for agriculture, intensive grazing, lack of soil conservation measures, shifting cultivation, indiscriminate burning;
- **Lack of institutional human and financial resources** to effectively manage activities within watersheds. Ineffective extension services (in terms of inadequate personnel, capacity, confidence and trust) to guide farmers in adoption of soil conservation measures;
- **Lack of knowledge and skills** to design watershed resource conservation strategies and implement appropriate mitigative measures;
- **Land fragmentation** into smaller, increasingly marginal units for agricultural production as lands are passed down through inheritance. Increasingly difficult to coordinate soil and water conservation remedial measures among spatially diverse agricultural production systems and owners;
- **Insecurity of land ownership** and associated lack of commitment to long-term conservation strategies. This problem is of greatest concern for undivided family-owned lands where individual commitment is generally absent. Lands occupied by landless farmers are also of concern;
- **Socio-economic status** of small farmers often inhibits adoption of conservation-oriented agricultural systems. Large, typically wealthy landowners often occupy a larger proportion of the most arable lands while the more numerous poorer farmers tend to occupy smaller marginally productive parcels. Small farmers often have less access to credit required to support implementation of conservation measures.

PROBLEM: Solid and liquid waste pollution from agricultural lands (threat to human and ecosystem health)

CAUSES

- **Misuse and abuse of agrochemicals** and fertilizers within cultivations;
- **Unchecked runoff containing animal waste** from livestock holding facilities and animals pastured near on within watercourses;
- **Inappropriate disposal of agricultural solid waste** such as land clearing debris within river channels which often impedes drainage and increases flood risk;
- **Limited resources** to effectively manage waste disposal and enforce legislation.

PROBLEM: Effects of unplanned or inadequately planned infrastructural development (related to housing, commercial/industrial, roads, etc.)

CAUSES:

- **Unchecked discharge of solid and liquid waste** from inappropriately sited urban and commercial/industrial developments. Main impacts include increased flood-risk (improper drainage, solid waste disposal in watercourses) and pollution. Existing capacities to effectively deal with waste disposal are often inadequate and poor planning aggravates the situation.

PROBLEM: Diminishing availability of fresh water resources (with respect to human health i.e. potable water, and ecosystem health)

CAUSES:

- **Solid and liquid waste pollution discharge** into watercourses and aquifers resulting from intrusion of agricultural, urban, commercial/industrial development in close proximity to watercourses and above ground-water aquifers;
- **Salt-water intrusions** in coastal areas caused by excessive pumping of ground water aquifers;
- **Deforestation and improper land use practices** in upper watershed reaches that reduce percolation and storage and increase runoff.

PROBLEM: Threat to integrity of terrestrial and marine ecosystems

CAUSES:

- **Pollution** by agro-chemicals and sediment in watercourses and near-shore environment result in ecosystem degradation;
- **Deforestation** resulting in direct loss of terrestrial habitats;
- **Lack of a valued biodiversity resource inventory** resulting in non-accounting for ecological functions within watersheds;

- **Inadequate or lack of monitoring of ecosystem health** and poor information management and information dissemination in support of decision-making.

PROBLEM: Ineffective information management

CAUSES:

- **Lack of, or poor level of information sharing** and reporting, and inadequate stakeholder consultation prior to decision-making;
- **Lack of, or inadequate research** and routine data collection on environmental quality parameters.

There were several crosscutting issues that underpinned all of the above-noted problems:

- **Lack of land use policy** results in generally unregulated or poor regulatory framework. Lands are often utilized beyond capability;
- **Lack of, or inappropriate/ineffective legislation** results in unsustainable development and exploitation of natural resources (e.g. deforestation, pollution, sand mining, quarrying);
- **General lack of enforcement of existing legislation** leading to violation of building and general infrastructural development criteria;
- **Lack of awareness** across all socio-economic strata on cause-effect of land management regimes. Often environmental issues are given low priority at political and private sector levels. There are often insufficient resources to conduct extensive education and consultation programmes. There is insufficient integration of environmental education within the school curriculum;
- **Inadequate institutional framework and capacity;**
 - **Lack of integrated multi-disciplinary planning** and clearly articulated objectives and approaches. Segregated planning and turf-guarding are key problematic areas, along with incompatibility of data collection, variation in perceptions of what is priority and lack of programmatic budgeting approaches;
 - **Limited human and financial resources** to dedicate in planning and monitoring of various aspects as they impact on watersheds;
 - **Lack of formalized linkages** between agencies, NGOs and CBOs in watershed management;
 - **General lack of political will and institutional commitment** particularly as it relates to making decisions under highly conflictive circumstances;
 - **Lack of clarity in defining roles and responsibilities** of stakeholders in addressing watershed management concerns;
 - **Inadequate community participation** where community groups are sometimes perceived by agencies as threats to authority. Many institutions have inadequate capacity to effectively deal with community issues in natural resource management.

4.2 How can the causes of each of the problems be mitigated?

Agricultural land degradation

- Land use based on land capability and land suitability criteria to foster appropriate agronomic and other land use practices. Work in collaboration with stakeholders (farmers/landowners) to develop appropriate agroforestry systems and nature-based ecotourism initiatives where possible;
- Provision of incentives to encourage proper conservation measures. Incentive measures could be tied to environmental levies where funds are cycled into incentive measures;
- Establishment of a land bank where land is leased to landless farmers; lease purchase agreements should be explored;
- Identify and establish forest and other protected reserves to conserve soil, water and biodiversity resources in critical areas; land acquisitions, land exchange arrangements should be explored.

Solid and liquid waste pollution

- Develop proper waste disposal systems and improve capacity for waste handling;
- Aggressive education among all levels of society;
- Review and upgrade existing legislation and enhance enforcement capacity;
- Encourage use of organic fertilizers and pesticides and incorporate bio-safety standards.

Unplanned infrastructural development

- Development of zoning criteria and zoning plans;
- Thorough reviews of development projects by concerned agencies;
- Adherence to zoning criteria.

Water availability

- Improve capacity to manage waste discharge associated with agricultural and other development;
- Close monitoring and controls on rates of extractions from aquifers;
- Reforestation and reforestation within catchments determined to be critical for maintenance of surface flows and aquifers for water supply.

Threat to integrity of terrestrial and marine ecosystems

- Improve capacity to manage waste discharge associated with agricultural and other development;
- Establishment of reserve areas encompassing ecologically sensitive areas to minimize potential degradation;
- Develop valuation techniques for assessing ecological functions and values;
- Establish monitoring systems to determine health of ecosystems to inform management interventions.

Information management

- Review and harmonize data collection/archiving protocols;
- Establish information dissemination mechanisms among governmental, non-governmental organizations, community-based organizations and other users to enhance informed participatory decision-making;
- Establish programmes for monitoring environmental quality indicators.

Cross-cutting issues related to inadequate institutional framework and capacity

- Development of a national land policy to guide implementation of best land management strategies in the interest of soil, water and biodiversity conservation;
- Define land management criteria to guide national land zoning schemes in support of land policy;
- Comprehensive legislative review to identify inadequacies and gaps in existing legislation and identify approaches for improved enforcement and community participation. Review and update enforcement of Planning Acts and regulations. Institute compulsory environmental impact assessments for proposed developments within critical watershed areas;
- Enhance community participation in watershed management initiatives. Approaches include re-tooling of technocrats vis-à-vis community animation/outreach, training, identification of mechanisms to institutionalize participatory processes within organizations. Aggressive, sustained community education programmes should be developed;
- Improve inter/intra agency collaboration through formal memoranda of understandings between agencies. A coordinating entity at the national level should be established with the human and financial resource capacity to ensure harmonized watershed management planning across all sectors;
- Establish broad-based educational programs targeted at key stakeholders. The school curricula should be augmented with environmental education to extend outreach.

4.3 What should be the objectives of a Watershed Management Policy in the OECS?

An overall goal was articulated;

To optimize the economic and environmental goods and services derived from watersheds through promotion of integrated protection, conservation and development of land and water resources on a sustainable basis in support of national development.

Specific objectives were identified as follows:

- To conserve and protect soil and water resources to maintain agricultural production and general quality of life;
- To protect and preserve wildlife and endangered species for future generations;
- To provide opportunities for employment in rural communities;
- To mobilize and obtain necessary political support;
- To enhance the potential of watersheds to contribute to sustainable socio-economic development by addressing existing and potential challenges;
- To develop appropriate multiple use activities within watersheds.

4.4 *What should be the elements of a watershed management policy in the OECS?*

- Identification and demarcation of drainage basins, assessment of threats, land use, quality and quantity of ground and surface water within watersheds;
- Land management plans for watersheds;
- Sound land use policies taking into account management of public and land tenure issues;
- Legislative support in the areas of enforcement; review and enhancement if existing instruments and enactment of new laws where necessary;
- Effective arrangements to improve mechanisms for intra- and inter-institutional collaboration;
- Establishment of a cooperative committee consisting of key stakeholders and agencies responsible for implementation of watershed policy;
- Stakeholder identification, participation and community management approaches;
- Establishment of watershed management authorities;
- Research, data management and decision support systems towards assessment; definition of research priorities, monitoring, selection of appropriate technological tools, establishment of cooperative research agreements with regional and international institutions;
- Financial and socio-economic incentive measures, user fees, poverty alleviation measures, exploration of mechanisms for ploughing finances into watershed resource conservation, sourcing financial assistance internationally, and locally from utility companies and industries in support of management initiatives;
- Human resource capacity building and training at institutional and community levels;
- Public awareness and education at all societal levels including at the political level using all available media;
- Infusion of appropriate technologies, specifically physical remedial measures that are low cost and easily implemented. Technology transfer using demonstration plots.

4.5 Identify the main approaches for each of the elements.

Sound land use policy

1. Status assessment; policy issues to be addressed
2. Societal dialogue based on findings
3. Drafting of policy paper; review and redraft
4. Final adoption by Cabinet

Legislative support

1. Review of current legislation with respect to policy support
2. Identify gaps and deficiencies in legislation
3. Draft/redraft new and existing legislation
4. Adoption of legal instruments

Institutional arrangements

1. Review of existing arrangements; roles; capacity
2. Identify gaps and deficiencies in existing capacities
3. Recommend capacity building measures; alternative workable arrangements; protocols; resources

Stakeholder involvement and community management

1. Stakeholder identification and assessment in terms of capacity; socio-economic (participatory rural appraisal)
2. Problems/issues identification
3. Identify strategies to address issues
4. Education/training; build capacity and equip community-based groups with appropriate tools for addressing issues

Research, data management and decision support systems

1. Data needs assessment -; routine physical environment assessment (rapid appraisal)
2. Define criteria for establishing research priorities
3. Establish research, data collection protocols; harmonize at national/regional levels
4. Selection of appropriate tools for monitoring and to support decision making

Financial and socio-economic measures

1. Resource economic assessment
2. Identify desirable options; review costs of implementation
3. Identify revenue sources
4. Develop financing mechanisms; fees, taxation measures, levies
5. Explore trust fund possibilities

Capacity building

1. Needs assessment; identify gaps in management capacities
2. Identify training, resources required

Public awareness/education

1. Identify awareness level; surveys of populace
2. Develop and prioritize messages
3. Develop programs, targeted to specific sectors; select appropriate media

Appropriate technology

1. Review effectiveness of existing mitigation strategies/technologies
2. Research low-cost alternatives with emphasis on user-friendliness; oriented toward bio-technologies
3. Evaluation and feed-back mechanisms for assessment of effectiveness

4.6 *Should the policy be harmonized throughout the sub-region or should it be developed individually by each member state?*

The policy should be harmonized throughout the sub-region. However, provisions (*possibly in the form of Addenda*) should be included for watersheds that show varying characteristics/functions due to land size and/or composition. It is recommended that individual OECS countries should develop their own watershed management policies.

4.7 *Which agencies should be involved in the formulation of the harmonized policy?*

All agencies (governmental, non-governmental, NGOS, CBOs, etc) with jurisdiction over environmental and support sectors should be involved in the formulation of a harmonized policy. Some the key agencies are listed below :

- OECS-NRMU as the overall co-ordinating agency;
- Local government authorities and quasi-government agencies including:
 - Ministries of Environment, Planning, Agriculture, Education, Health, Tourism, Community Development, Communications/Works
 - waste management agencies
 - water and electricity companies
 - national parks
 - national security, disaster management agencies
- NGOs and CBOs such as;
 - farmers associations
 - environmental organizations
 - civil society organizations

- Private Interests including:
 - life science research institutions
 - banana companies
 - resource users
 - financing institutions

4.8 What preparatory work is necessary for the formulation of the Policy?

Information gathering

- Review existing OECS regional environmental policies;
- Review existing national policies and legislative instruments;
- Review past experiences from watershed management pilot projects;
- Research and develop methodologies for economic appraisals associated with watershed management initiatives;
- Explore potential market-based benefits emanating from watershed management interventions;
- Develop criteria for spatial definition of watershed management units;
- Review existing scientific criteria that may be applied to define priorities for watershed management interventions;
- Determine and categorize management interventions; estimate cost outlays and extent of involvement by stakeholders in context of demographics and socio-economic circumstances.

Financing

- Pursue financial and logistical arrangements for development of the policy.

Institutional support

- Commitment from national governments;
- Determine responsibilities of member states (identification and designation appropriate national lead agency);
- Inclusion of policy development in OECS-NRMU 2nd 5-year operational program; OECS-NRMU to play catalyzing/coordinating role in timely development of the policy;
- Categorize stakeholders and roles;
- Establishment of National Facilitating bodies/Committees etc.;
- Formation of Watershed Policy Network.

Identify feedback mechanisms

- Assess existing mechanisms for public participation in decision-making processes;
- Assess feed-back mechanisms at the institutional levels in decision-making;
- Identify strategies aimed at enhancing institutional collaboration and public participation in decision-making.

4.9 What are the next steps in formulating a Watershed Management Policy?

- Obtain mandate from the political directorates within territories based on the guiding principles contained within the St. Georges declaration and other international/regional multilateral environmental agreements such as the United Nations Convention to Combat Desertification (UNCCD), the United Nations Convention on Biological Diversity (UNCDB), the United Nations Framework Convention on Climate Change (UNFCCC) and other relevant agreements and protocols;
- Identify and engage a multidisciplinary (technical working) team to collate the findings and recommendations from this and other initiatives to draft watershed management policy framework;
- Set up national steering committees to assist in compilation of local inputs;
- Present to civil society for consultation and feedback;
- Prepare draft policy documentation for review and feedback by Heads of Government;
- Further review by technical working team for policy document finalization; resubmission for final stakeholder input and approval by Heads of Government;
- Implement the Policy (in the context of harmonizing all development initiatives in accordance with the principles of sustainable watershed management).

The work group discussion session closed with immediate follow-up actions facilitated by the OECS-NRMU:

- Formulation of guiding principles in the development of draft regional watershed management policy document. A small working group is to be convened to draft a document by March 31, 2002;
- Develop watershed categorization and assessment guidelines based on similar criteria developed for Jamaica;
- Create a database of regional experts in various areas of watershed management;
- Identify potential watershed management pilot projects.

ANNEX 1

Regional Policy Dialogue on Watershed Management in Small Island States

Eastern Caribbean Central Bank

Bird Rock

St. Kitts & Nevis

25th to 27th February 2002

LIST OF PARTICIPANTS

1. Mr. Rodney Rey
Permanent Secretary (Ag.)
Ministry of Natural Resources
P.O. Box 60
The Valley
ANGUILLA
Tel: (264) 497 2318
Fax: (264) 497 3389
Email: chief-minister@gov.ai
2. Mr. William Vanterpool
Director of Agriculture
Department of Agriculture
The Valley
ANGUILLA
Tel: (264) 497 2615
Fax: (264) 497 0040
Email: vanterpool@anguillanet.com
3. Mr. Walter Christopher
Agricultural Engineer
Ministry of Agriculture, Lands &
Fisheries
P.O. Box W233
St. John's
ANTIGUA & BARBUDA
Tel: (268) 462 1372
Fax: (268) 462 6104
Email: chrisfam@candw.ag
4. Mr. Hollis Henry
Permanent Secretary
Ministry of Agriculture, Lands &
Fisheries
Temple & Nevis Street
St. John's
ANTIGUA & BARBUDA
Tel: (268) 462 1213
Fax: (268) 462 6104
Email:
5. Mr. Dennis Leland
Engineer
Department of Agriculture
Paraquita Bay
Tortola
BRITISH VIRGIN ISLANDS
Tel: (284) 495 2532/2110
Fax: (869) 495 1269
Email: ldennis@surfbvi.com
6. Ms. Lynda Varlack
Environmental Education Officer
Conservation & Fisheries Dept.
Ministry of Natural Resources & Labour
P.O. Box 3323, Road Town
Tortola
BRITISH VIRGIN ISLANDS
Tel: (284) 494 5681
Fax: (284) 494 2670
Email: lvarlack@gov.vg
7. Mr. Arlington James
Forestry Officer
Forestry, Wildlife & Parks Division
Ministry of Agriculture & Environment
17 Botanical Gardens
Roseau
COMMONWEALTH OF DOMINICA
Tel: (767) 448 2401
Fax: (767) 448 7999
8. Mr. Mark John
Head
Environmental Coordinating Unit
Ministry of Agriculture & Environment
17 Botanical Gardens
Roseau
COMMONWEALTH OF DOMINICA
Tel: (767) 448 2401
Fax: (767) 448 7999
Email: agriext@cwdom.dm

9. Mr. Raymond Baptiste
Chief Land Use Officer
Ministry of Agriculture
Ministerial Complex
Tanteen
St. George's
GRENADA
Tel: (473) 440 3083
Fax: (473) 440 4191
Email: raybap@hotmail.com
10. Mr. Gordon Patterson
Head of Watershed Management Unit
Ministry of Agriculture
Forestry & National Parks Dept.
Queens Park
St. George's
GRENADA
Tel: (473) 440 2934
Fax: (473) 440 6197
Email: fnpd@caribsurf.com
11. Mr. Lloyd Martin
Forest Technician
Ministry of Agriculture, Lands,
Housing & Environment
Brades, P.O. Box 272
MONTserrat
Tel: (664) 491 2546
Fax: (664) 491 9275
Email: lloydie27@hotmail.com
12. Mr. Gerard Gray
Director of Agriculture
Ministry of Agriculture, Lands,
Housing & Environment
Brades, P.O. Box 272
MONTserrat
Tel.: (664) 491 2546
Fax.: (664) 491 9275
Email: graycialcandw.ag
13. Mr. Elvis Newton
Permanent Secretary
Ministry of Health & Environment
Basseterre
ST. KITTS
Tel.: (869) 465 2521
Fax.: (869) 465 8574/466 3915
Email:
14. Mr. Crispin Boon
Delegate
St. Kitts Watershed Programme
Old Road
ST. KITTS
Tel: (869) 465 4962
Fax: (869) 465 4962
Email: becs@caribsurf.com
15. Mr. Raymond Solomon
Director
Department of the Environment
Ministry of Health & Environment
Pelican Mall
P.O. Box 132
Basseterre
ST. KITTS
Tel: (869) 465 4040
Fax: (869) 466 3915
Email: sknmtcce@caribsurf.com
16. Ms. June Hughes
Chief Conservation Officer
Ministry of Health & Environment
Pelican Mall
P.O. Box 132
Basseterre
ST. KITTS
Tel: (869) 465 4040
Fax: (869) 466 3915
Email: sknmtcce@caribsurf.com
17. Mr. Bryan Farrell
Conservation Officer
Ministry of Health & Environment
Pelican Mall
P.O. Box 132
Basseterre
ST. KITTS
Tel: (869) 465 4040
Fax: (869) 466 3915
Email: sknmtcce@caribsurf.com
18. Mr. Lindsey Archibald
Conservation Officer
Department of Environment
Ministry of Health & Environment
Pelican Mall
P.O. Box 132
Basseterre
ST. KITTS
Tel: (869) 465 4040
Fax: (869) 466 3915
Email: sknmtcce@caribsurf.com

19. Mr. Michael Andrew
Deputy Chief Forestry Officer
Ministry of Agriculture, Forestry
and Fisheries
The Waterfront Block B
Castries
SAINT LUCIA
Tel: (758) 450 2078
Fax: (758) 450 2287
Email: mauby@hotmail.com
20. Ms. Claudina Roberts
Talvan Watercatchment Area
Fond Assau
Castries
SAINT LUCIA
Tel: (758) 453 5877
21. Mr. Christopher Cox
Chief Agricultural Planning Officer
Ministry of Agriculture, Forestry
and Fisheries
The Waterfront
Castries
SAINT LUCIA
Tel: (758) 452 2526
Fax: (758) 453 6314
Email: c&tcx@candw.lc
22. Mr. Cornelius Isaac
Forest Officer
Department of Forestry
Ministry of Agriculture, Forestry
and Fisheries
The Waterfront
Castries
SAINT LUCIA
Tel: (758) 450 2078
Fax: (758) 450 2287
Email: corneliusi@hotmail.com
23. Mr. David Lewis
Forestry Officer
Department of Forestry
Ministry of Agriculture, Forestry
and Fisheries
The Waterfront
Castries
SAINT LUCIA
Tel: (758) 450 2078
Fax: (758) 450 2287
Email:
24. Mr. Julius Polius
Director of Agricultural Services
Ministry of Agriculture, Forestry
and Fisheries
The Waterfront
Castries
SAINT LUCIA
Tel: (758) 452 2526
Fax: (758) 453 6314
Email:
25. Mrs. Cheryl Biddy
Assistant Secretary
Ministry of Agriculture, Lands
and Fisheries
P.O. Box 1335
Kingstown
ST. VINCENT & THE GRENADINES
Tel: (784) 456 1410
Fax: (784) 457 8502
Email: agrmint@caribsurf.com
26. Mr. Casmus McLeod
Forestry Officer 111
Forestry Department
Ministry of Agriculture, Lands
and Fisheries
Kingstown
ST. VINCENT & THE GRENADINES
Tel: (748) 457 8594
Fax: (784) 457 8502
Email:
27. Mr. Fitzgerald Providence
Forestry Supervisor
Forestry Department
Ministry of Agriculture, Lands
and Fisheries
Kingstown
ST. VINCENT & THE GRENADINES
Tel: (748) 457 8594
Fax: (784) 457 8502
Email: forestrysvg@vincysurf.com
28. Mrs. Dauphine Cato
Representative
Marriaqua Watershed Management
Project
C/o Ministry of Agriculture, Lands
and Fisheries
Kingstown
ST. VINCENT & THE GRENADINES

29. Mr. Sheriff Faizool
Director of Forestry
Forestry Division
Ministry of the Environment
and Public Utilities
Long Circular Road
Port of Spain
TRINIDAD & TOBAGO
Tel: (868) 622 4860
Fax: (868) 628 5503
Email: forestry@tstt.net.tt
30. Dr. John Dixon
Lead Environmental Economist
World Bank Institute
The World Bank
1818 H Street N.W.
Washington, D.C. 20433
UNITED STATES OF AMERICA
Tel: (202) 473 8594
Fax:
Email: jdixon@worldbank.org
31. Mr. Learie Miller
Director
Conservation and Protection Division
National Environment & Planning Agency
10 Caledonia Avenue
Kingston 5
JAMAICA
Tel: (876) 754 7534
Fax: (869) 754 7594
Email: lmiller@nepa.gov.jm
32. Mr. Vincent Sweeney
Executive Director
Caribbean Environmental Health
Institute (CEHI)
The Morne
P.O. Box 1111
Castries, SAINT LUCIA
Tel: (758) 452 2931
Fax: (758) 453 2721
Email: cehi@candw.lc
33. Dr. Richard Beales
Senior Natural Resources and
Environment Advisor
British Department for International
Development (DFID)
P.O. Box 167
Bridgetown, BARBADOS
Tel: (246) 430 7947
Fax: (246) 430 7959
Email: R-Beales@dfid.gov.uk
34. Dr. Vasantha Chase
Head of Unit
OECS-NRMU
The Morne, P.O. Box 1383
Castries, SAINT LUCIA
Tel: (758) 453 6208/21847
Fax: (758) 452 2194
Email: vchase@oecsnrmu.org
Oecsnrmu@candw.lc
35. Mr. David Popo
Programme Officer
OECS-NRMU
The Morne, P.O. Box 1383
Castries, SAINT LUCIA
Tel.: (758) 453 6208/21847
Fax.: (758) 452 2194
Email: dpopo@oecsnrmu.org
36. Mr. Keith Nichols
Programme Officer
OECS-NRMU
The Morne, P.O. Box 1383
Castries, SAINT LUCIA
Tel.: (758) 453 6208/21847
Fax.: (758) 452 2194
Email: kenichols@oecsnrmu.org
37. Mr. George Alcee
Agricultural Economist
OECS Secretariat
P.O. Box 179
Castries, SAINT LUCIA
Tel: (758) 452 2537 / 38
Fax: (758) 453 1628
Email: galcee@oecs.org
38. Ms. Tadia Xavier
Secretary
OECS-NRMU
The Morne P.O. Box 1383
Castries, SAINT LUCIA
Tel: (758) 453 6208/21847
Fax: (758) 452 2194
Email: txavier@oecsnrmu.org
39. Mrs. Anselma Fevrier
Administrative Assistant
OECS-NRMU
The Morne, P.O. Box 1383
Castries, SAINT LUCIA
Tel.: (758) 453 6208/21847
Fax.: (758) 452 2194
Email: afevrier@oecs-nrmu.org

ANNEX 2

Regional Policy Dialogue on Watershed Management in Small Island States

Eastern Caribbean Central Bank
Bird Rock
St. Kitts & Nevis
25th to 27th February 2002

OPENING CEREMONY Programme

Chairperson	Mr. Elvis Newton <i>Permanent Secretary, Ministry of Health and Environment</i>
National Anthem	Ms. Eulynis Browne
Invocation	Rev. Terrance Rawlins
Welcome Remarks	Chairperson
Cultural Presentation	Students <i>Tyrell Williams Primary School</i>
Remarks	Dr. Vasantha Chase <i>Head of OCES- Natural Resource Management Unit</i>
Remarks	Mr. Dick Beals <i>Senior Advisor, British Department for International Development in the Caribbean</i>
Feature Address	Dr. the Hon. Earl Asim Martin <i>Minister of Health and Environment</i>
Vote of Thanks	Mr. David T. Popo <i>Programme Officer, OECS Natural Resources Management Unit</i>