



**CARIBBEAN NATURAL RESOURCES INSTITUTE
(CANARI)**

**INCENTIVES FOR WATERSHED MANAGEMENT IN
GRENADA: RESULTS OF A BRIEF DIAGNOSTIC**

**Vijay Krishnarayan
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Incentives for Watershed Management in Grenada: Results of a Brief Diagnostic

Vijay Krishnarayan, Caribbean Natural Resources Institute

1. Summary and overview

There is a keen appreciation of the importance of watersheds in Grenada, which is shared among a broad range of governmental, non-governmental and private sector stakeholders. Seasonal variations in supply have over time heightened levels of awareness of watershed management issues. Over the past ten years the reliability of supply has improved and the number of Grenadians that enjoy access to safe, clean water has increased. Grenadians are proud of the general quality and “sweetness” of their water. Against this generally bright backdrop concerns remain over levels of pollutants and turbidity, and parts of the island still endure shortages during the dry season. There are also concerns at the state of the island’s water storage and distribution infrastructure. The demand for water is set to increase with a growing population as well as plans for development, which favour irrigated agriculture and the expansion of the tourism sector.

Government responses to these challenges have focussed on strengthening the agencies with lead responsibility for watershed and water resources management: the Forests and National Parks Department - FNPd) and the water company (the National Water and Sewerage Authority – NAWASA). The introduction of metering for domestic users has had a profound impact on perceptions of water as well as patterns of consumption. The development of a national policy for Grenada’s forests has given impetus to the creation of an Upland Watershed Management Unit within the Forestry Department. It has also provided opportunities for inter-agency co-operation and a focus for dialogue between stakeholders on watershed issues.

There is a consensus among the lead agencies regarding the practices that need to be encouraged and discouraged to ensure the supply of safe potable water. While the use of market based mechanisms is not appropriate in Grenada for political and economic reasons, there are signs that the Government is willing to encourage the greater use of incentives to encourage good stewardship in watersheds. The experience of using these approaches could provide valuable lessons for others in the region working in this field.

This paper presents the findings of a brief study conducted under Phase I of a global initiative of the U.K. Department for International Development, *Developing markets for watershed protection services and improved livelihoods*, which is being implemented by the International Institute for Environment and Development (IIED) in collaboration with local partners. The project is summarised at Appendix 1. Grenada is a three-island state. The hydrological and institutional issues for watershed management for the larger island of Grenada and the small islands of Petit Martinique and Carriacou are distinct. This study focussed the resources available on the island of Grenada because of its value as a comparative case in a regional context.

The study consisted of a literature review and interviews with a selection of key actors during the week of 10-12 July 2002 (see Appendix 2). The paper looks at watershed management in Grenada from an incentives-based perspective, and identifies opportunities to strengthen existing and proposed watershed management initiatives through the use of incentives. It also suggests

the ways in which Grenada could benefit from the establishment of a Caribbean learning group on incentives for watershed management, and through that in the larger global initiative of DFID and IIED.

2. Context

The water cycle

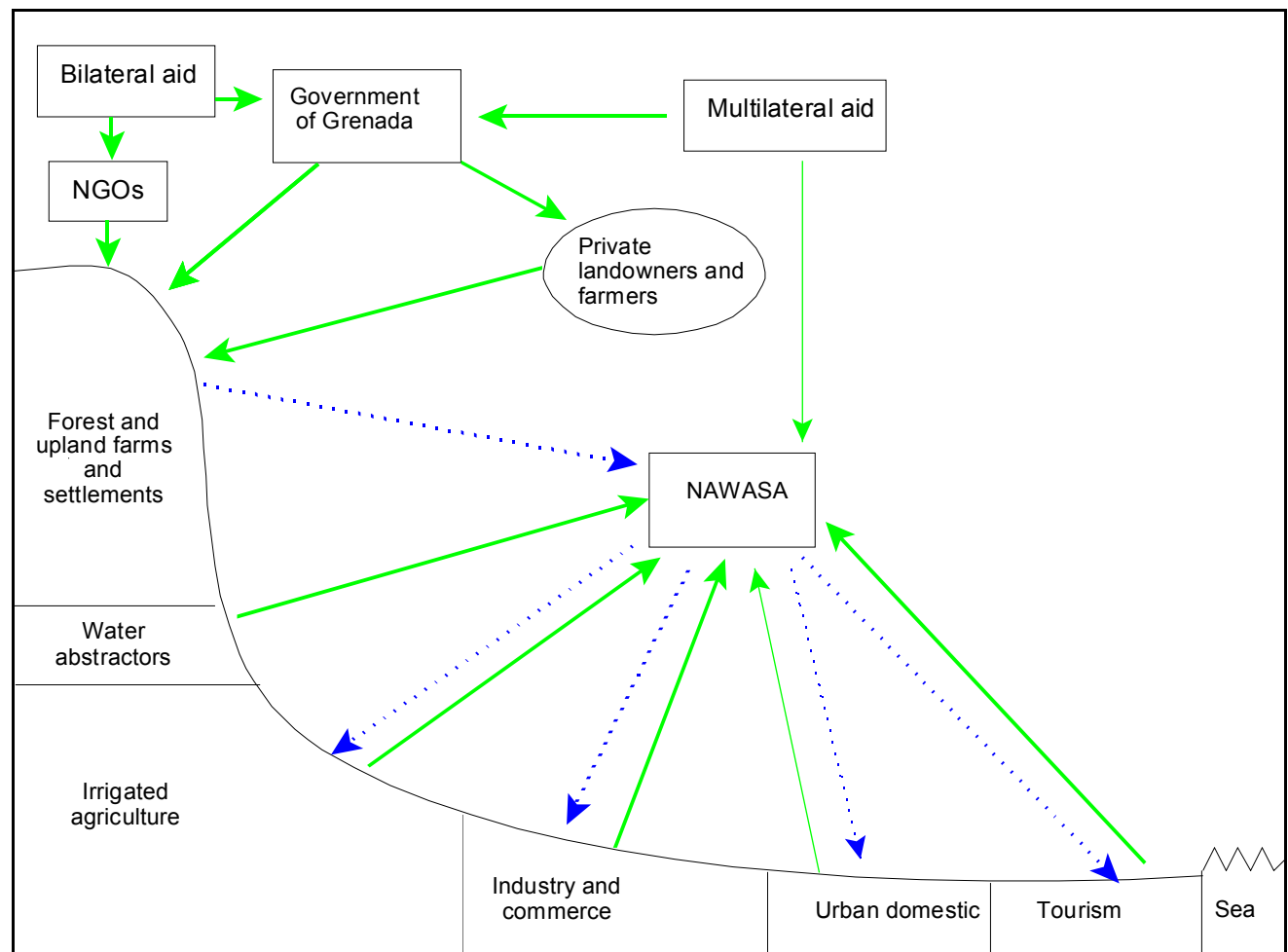
Water is seen as a public good, with the state being responsible for ensuring that Grenadians enjoy access to safe water. NAWASA has been granted exclusive authority over all water (on state and private land, above and below the surface) in Grenada. Surface water provides 90% of the island's potable water, with groundwater sources augmenting supplies during the dry season. Water collects in the hilly interior, which provides the main focus for watershed management activity, particularly at the Grand Etang Forest Reserve, and Mount St. Catherine. The Great River is by far the largest watershed and feeds the island's major natural water storage reservoir at Grand Etang. Water is abstracted exclusively by NAWASA from upland streams. It is treated at supply facilities and delivered to users.


Water users in Grenada are categorised as domestic and non-domestic. The former classification includes agricultural users and in 1991 accounted for c3 million cubic metres of water. In the same year non-domestic users accounted for c1.5 million cubic metres of water (44% commercial users, 22% industrial, 21% hotels, 10% schools and 3% public service) (Government of Grenada 2001). It is estimated by NAWASA that 35% of all treated water is currently unaccounted for (down from 55% in 1994).


The system of tariffs introduced with the NAWASA Act 1990 was designed to recover the water company's full costs. Following a particularly harsh dry season in 1994 a pilot project funded with French development assistance introduced metered domestic use in southern Grenada. By 1996 the principle of metering had gained acceptance (largely based on the experience of 1994, which convinced many that water resources had to be managed more efficiently). The majority of the island's domestic users are now metered. These tariffs fund NAWASA's revenue costs, but capital expenditure on infrastructure is mainly financed externally through loans.

The classification of farmers as domestic users means that they are supplied with potable water (that may not be needed for agricultural use) and they pay the same metered rate as household users. It has been argued that this system has forced some small scale farmers out of business, as they have not been able to afford the new tariffs. Rural users in upland areas have also complained that although their areas produce water for the urban and tourist area around the capital of St. Georges, they are the first to experience breakdowns in supply. Figure 1 shows that while upland stakeholders are providing watershed services, downstream consumers are not paying the full price of production. The growth of demand for and expectations of a reliable water supply, as well as a functional system of metering means that there is scope to recover costs that are currently considered externalities.

Figure 1: Simplified diagram of the water cycle



Money flows 

Water flows 

The main stakeholders

The main stakeholders in the water cycle as described in Figure 2, include:

- Forest and upper watershed managers: the agencies with statutory responsibilities including the FNPd (with responsibility for forest protection, the management of forest reserves and acknowledged as the focal point for watershed management) and the Physical Planning Unit (with responsibility for land use planning).
- Resource users and advocates for watershed management: these include upland farmers (producing bananas, cocoa and nutmegs) and the residents of isolated rural villages, as well as civil society organisations. Grenada has a tradition of activism and there are a number of vibrant rural development organisations (e.g. the Agency for Rural Transformation - ART and the Grenada Community Development Agency - GRENCODA).

- Abstractors: NAWASA is the primary abstractor and has sole authority to grant licenses for private abstraction (e.g. to the one bottled water company, which abstracts from a spring in St. Patrick north east of Mount St. Catherine).
- Water users: industry (e.g. the Carib brewery) commerce, tourism and household users. These are concentrated in the south east of Grenada. It is estimated that 85% of water for non-domestic use is consumed in the parish of St. Georges.

There are no formal mechanisms that bring these stakeholders together although the newly established Upland Watershed Management Unit is committed to maintaining dialogue with stakeholders. There have also been some moves to coordinate mapping activities between NAWASA, the telephone company (Cable and Wireless), the electricity company (Grenlec), the Land Use Division in the Ministry of Agriculture and the Physical Planning Unit.

Figure 2: Main stakeholders in the water cycle

Stakeholders in watershed management: upstream to downstream	Desirable watershed management activities	Constraints/ disincentives	Incentives: current (planned)
Forest managers (government agencies and private foresters)	Encourage and ensure good stewardship of forest resources Maintain and increase forest cover through planting, and encouraging others to do the same Enforce existing forest protection legislation. Control agro-chemical usage	Insufficient human and financial resources in public sector agencies Institutional arrangements for watershed management unclear	Seedlings made available to private landowners at a subsidised price with technical assistance for establishment
Upland farmers	Maintain and increase tree cover (fruit crops) Adopt practices that use water efficiently, minimise erosion, sedimentation and chemical run-off	Markets for bananas and cocoa no longer attractive leading some to abandon their farms Lack of markets for other produce	Seedlings for fruit trees made available to farmers at a subsidised price with technical assistance for establishment Concessions on the payment of duties on equipment imported for use for reforestation or improved agricultural practice Concessions on water rates for farmers that adopt good land stewardship practices

Stakeholders in watershed management: upstream to downstream	Desirable watershed management activities	Constraints/ disincentives	Incentives: current (planned)
Upland settlements	Plant trees on slopes in and around settlements Control building on slopes Practice proper sanitation	Variable service from water company does not encourage participation in watershed management Inadequate sewage treatment facilities “Bush” perceived as legitimate dumping site	Grants from development agencies to NGOs and CBOs to encourage tree planting and provide environmental education
Water abstractors	Monitor water quality (bacteria, agro-chemicals and heavy metals) Minimise wastage when abstracting and supplying water to consumers Pay (and recover) full environmental and social costs of water production)	Social and political constraints to increasing water rates substantially Tools for calculating actual costs of water services not readily available Data for planning and management lacking	Metering of domestic use could provide more scope for use of incentive-based approaches leading to a reduction in the costs of the water company
“Domestic” farming	Adopt practices that use water efficiently, and minimise erosion and chemical run-off Maintain agricultural drains Pay full costs of water	Short-term market considerations determine type and scale of agricultural production Water rates to agriculture perceived as high, forcing some to leave the sector Water for irrigation (i.e. non-potable) not easily available	Metered use for agricultural users encourages efficiency
Industry and commerce	Use water efficiently Avoid contamination of water sources and drains Pay full costs of water	Lack of business support services that encourage and support water efficiency Cost saving imperative	Metered tariffs encourage efficient use of water Making cheaper water available for non-potable uses
Urban domestic	Use water efficiently Re-use “grey” water Lobby for improved water services Understand water cycle and full costs of water services	Partial understanding of water cycle	Metered tariffs encourage efficient use of water Education and awareness programmes by schools, NGOs and government agencies Making equipment for water conservation available to households

Figure 3. Agencies with remits that impact on watershed management

<i>Relevant Agencies</i>	<i>Main activities concerning watershed management</i>
National Water and Sewage Authority (NAWASA)	Managing water resources (with powers to make regulations prescribing water and sewage rates and charges)
Physical Planning Unit (within the Ministry of Finance)	Land use planning and regulation
Land Use Division (within the Ministry of Agriculture, Lands, Forestry and Fisheries - MALFF)	Regulating the development, management and use of state-owned land including the management of forest resources below abstraction points, as well as: <ul style="list-style-type: none"> ▪ agricultural land use planning and zoning ▪ conducting hydrological studies ▪ mapping (e.g. soil surveys and agricultural capability)
Pest Management Unit (within MALFF)	Advising farmers on approaches and methods for pest management (with an emphasis on integrated pest management)
Agricultural Extension Division (within MALFF)	Providing extension services related to plant propagation, agronomy and conservation Making recommendations for approvals of duty-free concessions on equipment for farmers
Forests and National Parks Department (within MALFF)	Managing forest reserves, national parks and government-owned lands, with limited responsibilities related to private forested land. Managing forest resources above abstraction points Managing plantations (planting, weeding, logging and extracting)
Environmental Health Department (within the Ministry of Health and the Environment)	Regulating the management and disposal of solid and liquid waste Monitoring the quality of water
Grenada Handicraft Association	Encouraging the use of non-timber materials as an alternative to traditional timber usage
Minor Spices Cooperative Marketing Society	Encouraging and supporting the production of crops with good soil and water conservation properties
Agency for Rural Transformation (ART)	Assisting rural communities through practical development projects and advocacy with a sustainable development focus
Grenada Community Development Agency (GRENCODA)	Mobilising small farmers, women and young people around rural development initiatives with a sustainable development focus

Threats to watersheds and management responses

The agencies with responsibility for watersheds (the FNPD and the Land Use Division in the Ministry of Agriculture) have a shared understanding of the management challenges that they face and have worked together to develop common approaches to meet them. Traditionally the responses have focused on the establishment of forest reserves for example at Grand Etang. There is a high incidence of private landownership and this has posed particular challenges in the establishment of protected areas (e.g., at Levera). This is one of the factors that has encouraged a trend towards stakeholder involvement in planning, awareness raising and improving the delivery of services where possible. These approaches have been adopted by the FNPD for example in developing management plans for critical watersheds such as Annandale. The specific issues of concern include the following:

- Poor agricultural practices especially among short crop farmers result in agro-chemical pollutants and sediment draining into surface water dams and contaminating ground water sources as well as increasing the susceptibility of land to erosion. The Ministry of Agriculture (through the FNPD, the Land Use Division and the Extension Division) has been actively working with small-scale farmers in critical watersheds as well as those in close proximity to dams and abstraction points to discuss ways in which stewardship can be improved.
- There has been a general downturn in agriculture. There are instances of banana farms in particular having been abandoned. Reaction to this trend has been positive and negative. There is some feeling that a reduction in banana farming could lead to a reduction in the levels of agro-chemicals found in watercourses. On the negative side, the slump in agriculture has been blamed for the neglect of drains and other features that support soil and water conservation.
- Unplanned and indiscriminate land use has given rise to concern about the integrity of watersheds. The main cause for concern is the loss of tree cover for housing at lower elevations (including the cutting of vegetation to improve aesthetics and vistas). The need to strengthen Grenada's land use planning system has been recognised and this has led to a review of development control legislation, the drafting of a national physical development plan (which makes provision for the establishment of national parks and conservation areas to protect water resources), and the establishment of a Physical Planning Unit within the Ministry of Finance.
- Poor sanitation and waste disposal practices persist. These include the dumping of industrial and household refuse despite an improved collection service and a high profile public awareness campaign run by the Ministry of Health and the Environment, which has included radio and television features as well as a schools programme

Factors that constrain improved management

In the face of these threats, the responses of management agencies have been constrained by policy, institutional and organisational factors.

The process of developing a policy for Grenada's forests mobilised a wide range of stakeholders, particularly around watershed management issues, but barriers to implementation include the lack of guidance on the specific technical challenges associated with improving watershed management, and the lack of mechanisms for ongoing stakeholder participation.

There is a freeze on recruitment to the public service and this means that there are vacancies that are not being filled. As one worker in the Ministry of Agriculture said “*is a long time since we see a new face here.*” The newly established Upland Watershed Management Unit requires additional staff to become fully operational, which is a concern as it has a pivotal role to play in facilitating and coordinating planning and management activities.

Inter-agency cooperation and coordination remains informal and ad hoc. While this works well for sharing operational information on a day-to-day basis, it prevents the systematic sharing of data and the development of joint approaches to planning and management. Linkages within the Ministry of Agriculture (especially between the Land Use Division and the FNPD) are strong, but the lack of an interface with other agencies is a fundamental barrier to improved watershed management.

Factors that constrain the behaviour of other stakeholders

Against the backdrop of a general downturn in agriculture it has been suggested by extension workers that farmers are only amenable to adopting soil and water conservation practices when the sector is buoyant. In addition, the pace of rural-urban migration has increased, depriving agriculture of the younger farmers that are more likely to adopt new techniques.

In an attempt to revive the flagging fortunes of the banana industry, new investments in irrigation have been proposed. In addition to having a major impact on the demand for water, the encouragement of irrigation could have an adverse impact on efforts to improve water conservation practices.

The partnership approach to forest resource management was a recurring theme during the forest policy process but this has not fed through to its implementation. The capacity of the FNPD to implement the policy has been enhanced through a UK Department for International Development funded project but similar inputs are required for civil society organisations if they are to play their part in forest resource management.

The level of awareness of the relationships between the upland producers of watershed services and downstream consumers remains poor among the general public and policy makers. Larger scale investments are planned (e.g. for irrigation and in tourism) without adequate regard for the impacts on supply in upland areas. Conversely, in the dry season there have been reports of farmers damming watercourses to feed their crops without regard to the impacts on communities downstream.

Constraints to implementing cost recovery measures

The metering of domestic supply has radically altered the way that the general public perceives and uses water. Water is now valued as a commodity rather than consumed as a right. Most households are metered, but there are parts of the island that are still governed by a flat rate tariff. When coverage is complete NAWASA will be in a position to recoup most of its recurrent costs. Water is still being lost through leakages before it reaches Grenadians’ taps and this remains the main constraint to full cost recovery for the water company.

Metering provides a mechanism for full cost recovery, but the inclusion of production costs in water tariffs is a distant prospect. The lack of dialogue between the water company and the agencies responsible for watershed management has prevented the principle of full cost recovery from being established. In addition the specific tools that would enable production costs to be accounted for by watershed managers are not available.

3. Progress and opportunities

In the face of these constraints and building on Grenada's experience of stakeholder involvement, the need to employ a range of policy tools to improve the management of forest resources has been recognised. Incentives have not been built into the framework for management, but small steps have been taken and there are signs that their use could feature more prominently in the future of watershed management. Experience to date includes:

- the sale of seedlings through the Ministry of Agriculture's propagation station at a subsidised price to farmers and private landowners, combined with technical assistance from the FNPD and Extension Division to help with establishment;
- the encouragement of banana farmers to diversify by making soft loans (up to c\$US 2,000) available through the Extension Division for the establishment of fruit tree orchards (citrus, mangoes, cherry, golden apple and avocado) from one acre upwards;
- the provision of funds through development agencies and the cocoa and nutmeg marketing boards to farmers to clean and maintain drains;
- the provision of technical assistance through the Pest Management Unit to encourage the adoption of integrated pest management practices by farmers.

The process of developing a national policy for Grenada's forest resources has had a profound impact on the prospects for stakeholder participation in management. A review of policy was initiated to optimise the contribution of forest resources to environmentally sound social and economic development. The process of policy review and development:

- raised levels of awareness among a wide range of stakeholders of the importance of forest resources to development. During the process a survey of over 400 people revealed that most people felt that soil and water conservation should be the main priority for management in uplands;
- provided a catalyst for collaboration between stakeholders. The process consolidated linkages within the Ministry of Agriculture, but also provided an entrée for private sector interests (specifically from the tourism sector) to become more engaged in forest management.

The policy that resulted from this highly participatory process made specific recommendations for improved watershed management. These included a call for the adoption of a structured approach to integrated watershed management as well as an explicit reference to the need for incentives to encourage appropriate watershed management practices. Following the adoption of the policy by Cabinet the FNPD embarked on a strategic planning process, designed to enable it to respond to these new challenges. This resulted in the establishment of a number of specialised focal points within the Department including the Upland Watershed Management Unit.

During the period 1993-1998 Grenada was infested with the Pink Mealy Bug (*Maconellicoccus hirsutus*), which posed a major threat to the island's agriculture sector and resulted in a loss of tree cover. This was linked to increased levels of siltation and associated water treatment costs. The problem was eventually managed using biological controls and this success won many farmers over to the use of integrated pest management techniques. Building on this experience Grenada has taken the first steps towards establishing a market for organically produced goods.

By the end of 2001 150 acres of land at the River Antoine estate in the parish of St. Patrick were under cultivation for organic bananas for sale to J. Sainsbury (one of the largest supermarket chains in the UK). With support from the Windward Islands Banana Development and Exporting Company (WIBDECO) farmers are now exploring this potentially lucrative market, which provides a return on the value added to fruit by sustainable farming practices.

4. Needs and directions

This review of experiences, opportunities and constraints has revealed the following needs:

- i. *Improve the technical capacity of management agencies:* specific tools are needed by managers to help them achieve their goal of integrated watershed management. In the first instance there is a need for methods and approaches that can help to identify the various stakeholders in watershed management and understand their interests and interrelationships. With regard to the development of incentive-based approaches, there is a need for tools that would enable managers to value watershed services. The principle of valuing critical ecosystems is supported in Grenada's Biodiversity Strategy and Action Plan.
- ii. *Establish a forum for stakeholders:* a mechanism that can facilitate shared watershed management is urgently needed so that agencies and water users can be brought together. Such a forum should address the need to coordinate management approaches (in the first instance between the Ministry of Agriculture and NAWASA), share data (e.g., to help map watersheds, and exchange information on water quality monitoring), and hear the concerns and issues raised by consumers (e.g., the disappearance of standpipes associated with domestic metering).
- iii. *Maintain the momentum of the forest policy process:* the policy process was highly participatory and provided the basis for a sharing of forest management roles and responsibilities among a broad range of stakeholders. The gains made during that process must be consolidated by agencies with statutory responsibility by creating opportunities for participation and collaborative management. If this is not done, management will be seen once more as the sole domain of public sector agencies and regulatory approaches.

5. Incentive possibilities to explore

In recognition of the need for incentive-based approaches to watershed management, the FNPD has joined with the UK-based Centre for Ecology and Hydrology to find out how the actions of various stakeholders in watersheds impact on each other. Having established these interrelationships, the research will inform the development of compensation mechanisms aimed at changing practices that impact adversely on watersheds. In October 2002 the Department will be making a request to Cabinet for the approval of two incentive based measures:

- the establishment of a voluntary tourism donation programme that would finance a trust fund to be used to meet critical needs of rural communities in support of better watershed management. It is envisaged that the project would fund infrastructure (for example storage tanks that could help communities cope with dry season shortages) or help identify key concerns (such as the provision of improved sanitation facilities);
- the introduction of a mechanism that would enable farmers that have adopted good stewardship measures (e.g., introducing and maintaining check dams) to have their water bills

reduced as an inducement to adopt new practices and to compensate them for any additional costs they may incur.

If these measures are granted approval, the FNPD has indicated an interest in having the impacts of these initiatives monitored, evaluated and documented.

6. Conclusion

The IIED/DFID project *Developing markets for watershed protection services and improved livelihoods* coincides with the proposed introduction of specific incentive based approaches aimed at improving watershed management and is therefore timely. The project aims to establish a learning group of interested Caribbean countries, within a larger global learning group. Grenada is well placed to share the experience it gains from adopting incentives-based approaches and could learn from others as it seeks to integrate these into its forest resource management policies and programmes. The specific ways in which Grenada might participate should be included in a regional proposal for Phase 2, which should be developed by September 2002.

Appendix 1.

Markets for watershed protection services and improved livelihoods *Summary of an IIED project supported by DFID*

Phase I: Exploration of the potentials

A central plank in strategies to reduce poverty is to improve access to reliable supplies of clean water. Another is to reduce vulnerability to environmental risks such as flooding, landslides and water pollution. Both of these require better management of watersheds. Today, services provided by watersheds are often under threat, and existing regulatory approaches to addressing the problems are often insufficient. Yet participatory and market-based approaches are also emerging throughout the world.

IIED, with its partners in developing countries, have identified the need to integrate and promote all approaches which can improve watershed land use and livelihoods – fitting new market-based approaches together with existing policies, incentives and institutional mechanisms that work. DFID shares these concerns and has commissioned IIED to explore how to do this. CANARI and SEDU-UWI have been identified as regional partners to help in this exploration in the Caribbean.

A four-year programme of research and action in a range of countries is therefore proposed to increase understanding on how market-based approaches can support better watershed land use and improved water services for the benefit of poor people – and where they cannot. The programme will include international network building, experience sharing, and an action-learning component involving people in regions that can gain from working together. Four action-learning regions are proposed – South Africa, India, Indonesia and the Caribbean – to be co-ordinated by regional partners, with back up from IIED. Substantive Phase 2 work in the action-learning regions will depend on the support of the relevant DFID country/regional programmes, or other development assistance agencies.

The aims of Phase 1 are:

- To explore the relevance of the project in the Caribbean, building on preliminary IIED exploration in January 2001, which identified interest in Grenada, Jamaica, St Lucia and Trinidad;
- To conduct brief national diagnostics in four Caribbean countries to assess the links between suppliers and users of watershed services, to map out related initiatives, and to identify learning needs and opportunities
- To explore what a regional project might do, to develop and share learning on the potentials and limits of market-based approaches
- To identify key partners and resource people for moving forward

Appendix 2.

People met with, 10-12 July 2002:

Arlene Outram, Permanent Secretary (Ag.), Ministry of Agriculture, Lands, Forests and Fisheries

Patrick Moore, Operations Manager, Grenada Solid Waste Management Authority

Alice M. Thomas-Roberts, Executive Director and Lawrence Lambert, President, Grenada Hotel and Tourism Association

André M. Worme and Allan Edwards, Senior Environmental Health Officers, Ministry of Health and the Environment

Paul Graham, Pest Management Officer, Pest Management Unit, Ministry of Agriculture, Lands, Forestry and Fisheries

Gordon Paterson, Watershed Resources, Forests and National Parks Department, Ministry of Agriculture, Lands, Forestry and Fisheries

Randolph Shears, Extension Division, Ministry of Agriculture, Lands, Forestry and Fisheries

Andrew Alleyne, Director (Ag), Lands and Surveys Department, Ministry of Agriculture, Lands, Forestry and Fisheries

Judy Williams, General Secretary/ Terrence P. Smith, Chairperson, Grenada Community Development Agency

Sandra Ferguson, Secretary General, Agency for Rural Transformation

Cecil Frederick, Senior Planning Officer/ Fabian Purcell, Planning Technologist Physical Planning Unit, Ministry of Finance

Christopher Husbands, Manager of Planning and Design, National Water and Sewage Authority

Raymond Baptiste, Chief Land Use Officer, Land Use Division, Ministry of Agriculture, Lands, Forestry and Fisheries

Documents consulted:

Bass, Stephen. 2000. Participation in the Caribbean: a review of Grenada's forest policy process. Policy that Works for Forests and People series no. 10. International Institute for Environment and Development. London.

Caribbean Conservation Association and Island Resources Foundation. 1990. Draft Grenada Environmental Profile.

Dunn, Robert. 1998. Timber harvesting and processing options in Grenada: a study for the forest policy review process.

Government of Grenada. 2001. National Report: integrating management of watersheds and coastal areas, Grenada. Ministry of Finance.

Joseph, A.G. 1998. A participatory approach to review and formulation of Grenada's forest policy. Unpublished MSc thesis. University of Reading Agricultural Extension and Rural Development Department.

Paterson, Gordon. 1998. An overview of watershed management in Grenada and issues affecting their conservation and management, as related to water supplies and quality. Document prepared for forest policy review process. Forestry Department.

Appendix 3.
Questions guiding the brief diagnostic for Grenada

1. What are the big watershed issues?

- Reliability of water supply?
- Water quality?
- Landslip, erosion, etc?
- What services are scarce?
- What are the ‘priority’ watersheds and how determined?

2. Where has watershed management (WM) improved?

- What improvement (re scarcity)?
- How, by whom, through what kind of activity?
- [Any particular project, programme, incentive responsible?]

3. Is there good information correlating land use to watershed services?

- Generally, and in specific places?
- Who generates it and how?
- What form does it take?
- Any watershed valuation work?
- [Any particular project, programme, incentive responsible?]

4. What groups have been targeted to improve WM?

- Who are the producers of watershed services (small farmers in uplands, forestry)?
- What are their motivations in relation to WM?
- Who are the users of watershed services (irrigated plantation agriculture, tourism, industry, government services, domestic)?
- What are their motivations in relation to WM?
- What key behaviour changes are required for each (encouraging good practice, stopping bad practice...)? And who has decided this?
- Who has been actively targeted – as a group, or within a geographical area?
- [Any particular project, programme, incentive doing such targeting?]

5. What incentives have been proposed or used to improve WM?

- Who has been pushing incentives approaches and why?
- Type of incentive used in practice? (intangible, physical, information, training, rights, financial, market-based)
- Who targeted (supply-side, demand-side)?
- Period/regularity?
- Awareness of incentive by target group and take-up levels?
- Constraints to take-up e.g. rights, resources?
- Compatibility with other sustainable development objectives and participatory approaches?

6. What impacts have incentives had?

- On changed WM practices?
- On the quantity and quality of watershed services?
- On other environmental variables e.g. biodiversity?
- On economic objectives (sector/livelihood)?
- On social objectives e.g. equity?
- Distribution of costs, benefits and risks?
- How is information on impacts being generated?

7. What are the relations between producers and users of watershed services?

- Where there is competition or conflict between users, how is water allocation determined?
- Is there competition between suppliers – in what form?
- What means of communication/intermediaries link stakeholders?
- Local institutions to bring stakeholders together – role and effect? Links to other local institutions?
- National institutions to bring stakeholders together – role and effect? Links to other national institutions?

8. How can learning/capacity for incentives for WM be improved?

- What kind of learning does Grenada already offer?
- What kinds of capacity are in place to handle incentives?
- What further learning needs are there – from the Caribbean, globally?