



**CARIBBEAN NATURAL RESOURCES INSTITUTE
(CANARI)**

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

**Vijay Krishnarayan and Dennis Pantin
September 2002**

Prepared through the project "Markets for watershed protection
services and improved livelihoods"

CANARI Technical Report No. 316

Incentives for Watershed Management in Trinidad: Results of a Brief Diagnostic

Dennis Pantin, University of the West Indies' Sustainable Economic Development Unit
Vijay Krishnarayan, Caribbean Natural Resources Institute

September 2002

1. Summary and overview

The supply of water throughout the year is a perennial concern for the majority of Trinidadians, but there is little evidence to suggest that this has been linked to issues associated with watershed management. The issue of water supply has been framed by widespread concern at the condition of the distribution infrastructure. Nearly all Trinidadians have access to water connections, through internal plumbing, yard taps or standpipes, but although service coverage is high, reliability of service is variable and water supplies are inadequate. It is estimated that about half of water supplied is unaccounted for.

Water quality has not been an issue in recent times, however concern has been expressed at the potential for groundwater contamination as a result of limited sewage treatment as well as non-point industrial and agricultural pollutants. Threats to surface water quality include uncontrolled discharges and erosion in upland watershed areas.

There is a difference in perception of supply between the residents of suburban Port of Spain, and people throughout the rest of the island. This geographic disparity has also been an important factor in shaping water policy. There is also a direct correlation in the minds of policy makers and the public at large between the seasons and the status of supply. The principal government efforts at improving supply have focussed on capital programmes. In the past these have included proposals for large-scale investment in desalination plants, and more recently a commitment to upgrading the existing infrastructure.

The demand for water is set to increase as a result of a growing population and an expanding manufacturing base. Concern is being expressed at the status of the upland areas that collect water. It has been reported that total forest cover in Trinidad and Tobago has decreased from 170,000 ha in 1990 to 161,000 ha in 1995. Unregulated development for housing (both low cost and upscale) on the slopes of the Northern Range has also prompted campaigns by environmental advocacy groups.

The institutional landscape for watershed management is highly fragmented, with no overarching policy or governing mechanism. The need for better institutional co-ordination has been recognised and tentative steps have been taken that could lead to an improvement in the framework for management.

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 in Appendix 1. The hydrological and institutional issues for watershed

management for the islands of Trinidad and Tobago are distinct. This study focussed the resources available on Trinidad 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 29 April and 6 May 2002 (see Appendix 2). The paper looks at watershed management in Trinidad from an incentives-based perspective, and identifies some limited opportunities to strengthen existing and proposed watershed management initiatives through the use of incentives. It also suggests the ways in which Trinidad 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 and its agencies playing key roles at each stage of the water cycle. There are 55 catchment areas in Trinidad, with water collecting in the island's aquifers, rivers and reservoirs (or dams). There are three reservoirs: Caroni, Hollis, and Navet. There has been no formal prioritisation of watersheds, but those on the central and eastern Northern range, which feed the Caroni and Hollis dams are seen as the most important by natural resource managers. These dams supply the island with most of its potable water.

The water company (the Water and Sewerage Authority – WASA) is the primary abstractor in watersheds, although corporations and farmers also abstract for industrial purposes and irrigation. Of the water that is accounted for, the main consumers in 2000 were: domestic (63%), major industry – associated with the industrial estate at Point Lisas (27%), other industry (5%), and agriculture (5%) (Water Resources Agency 2001). Unlike many other Caribbean countries, Trinidad's tourism industry is not a significant economic sector, or water user.

Charges are levied for providing a supply, but these tariffs do not reflect the real costs of abstracting, treating and distributing water. The revenues that are collected are insufficient to cover the costs of capital programmes, which are underwritten by central government. Watershed management costs are not factored in to charges and are also borne directly by central government (mainly through subventions to the Forestry Division and other agencies with management responsibilities). There is no direct economic linkage between the upstream producers of water services and downstream consumers and this is depicted at Figure 1.

The main stakeholders

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

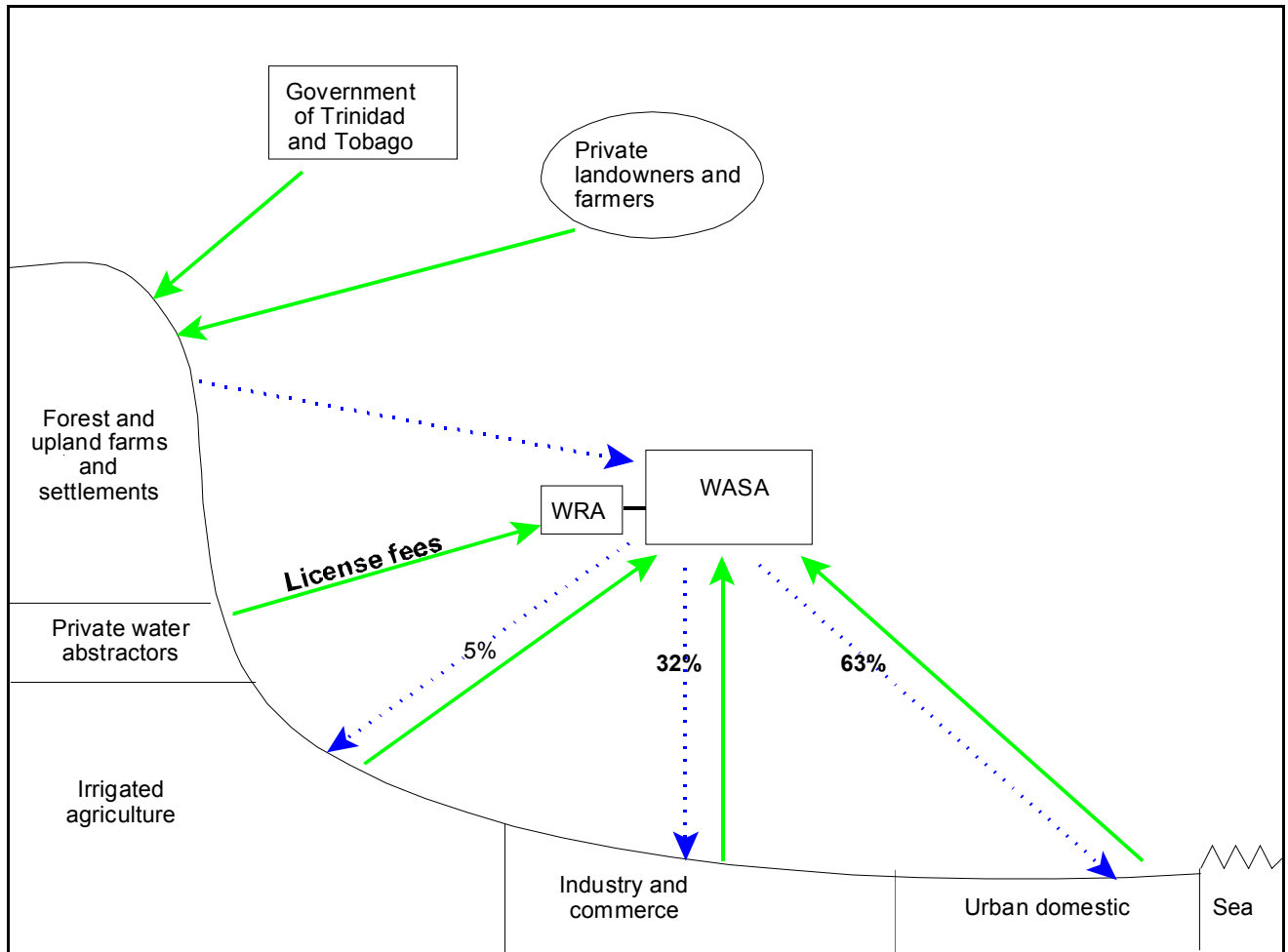
- Public sector forest and upper watershed managers: including the Forestry Division, the Ministry of Agriculture (especially the Lands and Surveys Department and the Land Administration Division) and the Environmental Management Authority. Between them these agencies have statutory authority for upper watershed management. The Ministry of Public Utilities and the Environment has overall responsibility for water policy, but does not have a role to play in the regulation of the sector at present.
- Non-governmental watershed stewards: private landowners, farmers (legal and illegal), squatter communities (e.g. at Fondes Amandes), NGOs (e.g. the Caribbean Forest Conservation Association). These stakeholders either have a direct impact on watershed management or have the ability to lobby for improved watershed services. The Northern

Range, where priority watersheds are located is largely state land; however it is estimated that 20% of the western half of the area is under private ownership. In this area private landowners are the predominant interest group.

- Water abstracters, distributors, and regulators: the main abstracter is the Water and Sewerage Authority (WASA), but there are 2,300 private operators (domestic, agricultural and industrial) licensed and regulated by the Water Resources Agency (WRA). The WRA is housed within WASA (which does not pay an abstraction charge). This arrangement undermines the credibility of the WRA as an effective abstraction regulator.
- Water users: domestic, industrial and agricultural.

There is no overarching mechanism that brings these stakeholders together, nor is there a forum for inter-agency co-ordination. The Water Resources Management Unit (WRMU) within the Ministry of Public Utilities and the Environment (the focal point for water resources management within the government) is responsible for the development of water strategies and policies. It has spearheaded the development of a draft water policy that advocates bringing together the functions of the WRA and the WRMU in an independent Water Resources Management Agency. Although this agency has not been established, the Director of the WRMU also serves through a split assignment on the staff of the WRA. The government agencies with remits that impact on watershed management are listed at Figure 3.

Figure 1: Simplified diagram of the water cycle



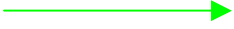

Money flows 
Water flows 

Figure 2: Main stakeholders in the water cycle

Stakeholders in watershed management: upstream to downstream	Desirable watershed management activities	Constraints/ disincentives	Incentives: current (planned)
<p>Forest managers (government agencies and private foresters)</p>	<p>Maintain and increase forest cover through planting, and encourage others to do the same.</p> <p>Enforce existing forest protection legislation.</p> <p>Regularise the land tenure of squatters as a means of ensuring good stewardship of forest resources</p>	<p>Insufficient human resources in public sector agencies</p> <p>Institutional arrangements for watershed management unclear</p>	<p>Seedlings made available to private landowners at a subsidised price with technical assistance for establishment</p>
<p>Upland farmers (legal and illegal)</p>	<p>Maintain and increase tree cover (fruit crops)</p> <p>Adopt practices that use water efficiently and minimise erosion, chemical run-off and the risk of forest fires</p>	<p>Farmers without security of tenure plant short crops</p> <p>Government agencies will not engage with squatters who are deemed illegal</p> <p>Land prices in Northern Range push agricultural land into use for “upscale” residential development</p>	<p>Seedlings made available to <i>bona fide</i> private landowners (i.e. those with leases or titles) at a subsidised price with technical assistance for establishment</p> <p>Small financial incentives available to private landowners for cutting fire lines and establishing nature trails</p> <p>“Letters of comfort” can be issued to farmers without title to provide protection against eviction pending “regularisation”</p>
<p>Upland settlements (legal and illegal)</p>	<p>Plant trees on slopes in and around settlements</p> <p>Control building on slopes</p> <p>Practice proper sanitation</p>	<p>Land values in Northern Range encourage residential development rather than tree planting</p> <p>Sewage treatment facilities are inadequate</p> <p>“Bush” perceived as legitimate dumping site</p>	<p>Grants from development agencies (and potentially the Green Fund, see Fig. 3) to encourage tree planting by NGOs and CBOs as well as environmental education</p>

Stakeholders in watershed management: upstream to downstream	Desirable watershed management activities	Constraints/ disincentives	Incentives: current (planned)
Water abstractors (public and private)	<p>Monitor water quality (bacteria, agro-chemicals and heavy metals)</p> <p>Minimise wastage when abstracting and supplying water to consumers</p> <p>Pay (and recover) full environmental and social costs of water production)</p>	<p>Social and political constraints to increasing water rates substantially</p> <p>Tools for calculating actual costs of water services not readily available</p>	<p>Major government funded investment in distribution infrastructure</p> <p>(Proposed arrangements under a new Water Resources Management Agency could provide more scope for market based incentives by rationalising water resources management and in particular by consolidating policy development and implementation functions)</p>
Irrigated farming	<p>Adopt practices that use water efficiently, and minimise erosion and chemical run-off</p> <p>Maintain agricultural drains</p> <p>Pay full costs of water</p>	<p>Short-term market considerations determine type and scale of agricultural production</p> <p>Water rates to agriculture reduced to encourage growth in the sector</p> <p>Water for irrigation (i.e. non-potable) not easily available</p>	<p>Metered use for agricultural users encourages efficiency</p>
Industry and commerce	<p>Use water efficiently</p> <p>Avoid contamination of water sources and drains</p> <p>Pay full costs of water</p>	<p>Lack of business support services that encourage and support water efficiency</p> <p>Cost saving imperative</p>	<p>Most industrial users are metered and tariffs for large scale industrial users (at Point Lisas Industrial Estate) are higher than for other business users, encouraging more efficient use of water</p>
Urban domestic	<p>Use water efficiently</p> <p>Re-use “grey” water</p> <p>Lobby for improved water services</p> <p>Understand water cycle and full costs of water services</p>	<p>Most households not metered, discouraging efficient use of water</p> <p>Poor understanding of water cycle</p> <p>Urban elite insulated from water issues</p>	<p>Education and awareness programmes by schools, NGOs and government agencies</p>

Figure 3. Government agencies with remits that impact on watershed management

Relevant Agencies	Main activities concerning watershed management
Forestry Division (within the Ministry of Public Utilities and the Environment)	Forest and wildlife management on state-owned lands
Water and Sewerage Authority (WASA)	Water abstraction, treatment and distribution and wastewater utility
Water Resources Agency (within WASA)	Water resources management – surveying and monitoring, research, water demand analysis, planning and allocation, abstraction licensing
Water Resources Management Unit (WRMU) (within the Ministry of Public Utilities and the Environment)	Water resources management – overseeing the development of the National Water Resources Management Strategy, and focal point for implementation
Lands and Surveys Division (within the Ministry of Agriculture, Land and Marine Resources - MALMR)	State land management – verifying and approving surveys, valuations, executing leases, ensuring lease conditions are fulfilled
Land Administration Division (within MALMR)	State agricultural land management – facilitating leasing process and monitoring fulfilment of lease conditions
Environmental Management Authority (EMA)	Monitors environmental standards and enforces regulations
Green Fund Agency	Established to administer funds collected via the environmental levy (Green Fund), providing funding for NGO and community reforestation and remediation projects – not yet functional
Drainage Division (within the Ministry of Works)	Planning and management of drainage, flood control, erosion control, irrigation measures

Threats to watersheds and management responses

There is concern at the state of Trinidad’s watersheds among conservationists and water managers. Studies undertaken as part of the development of a national water resources management strategy in 1999 found evidence of the loss of topsoil in catchment areas and the need for conservation measures. There is a growing consensus among the responsible agencies that land use and tenure issues pose the principal threats to watershed management, but it is not clear what evidence this is based on, as the impacts of development and squatting are not monitored on a systematic basis. The following specific threats can be identified:

- The development of the western Northern Range (where lands are largely under private ownership) has resulted in a loss of forest cover for high-income residential accommodation and squatter settlements. The associated infrastructure of roads and drains has also impacted on watersheds by increasing run-off and erosion.
- Fires, whether set for short-term agriculture or not, are regular occurrences during dry seasons in upland areas resulting in a loss of tree cover.
- Mining for aggregates also poses a threat to watersheds. Limestone is particularly sought after and is only found in certain locations.
- Sanitation facilities in upland areas are inadequate given the current and projected levels of development. Poor disposal practices also contribute to increasing levels of faecal coliform in watersheds.

- Hillside squatting preoccupies many of the agencies that are a part of the watershed management institutional landscape. Squatters who were previously encouraged to establish small holdings in the Northern Range through patronage or as part of a concerted development thrust, now find themselves cast as villains and practitioners of slash and burn agriculture.
- Hillside agriculture can have an adverse impact, particularly when soil and water conservation measures are not employed. An emphasis on short crops that meet immediate market demands also has an impact on soil cover. Chayote (*Sechium edule*) is increasingly seen on steep slopes at the expense of tree cover and is grown with nitrogen rich fertilisers.

Management responses have emphasised the need for enforcement, but this has had little impact in halting what is seen as a general decline in the state of Trinidad's watersheds. Latterly the Forestry Division (the agency nearest to having lead responsibility for watershed management) has expressed a willingness to adopt participatory approaches to engage with community-based organisations to provide watershed protection services. The Division has also adopted the use of incentives on a small scale to encourage tree planting and establishment.

Legislation is now in place (Environmental Management Act 2000, Certificate of Environmental Clearance – CEC Rules 2001) that requires developers to obtain a CEC from the Environmental Management Authority (EMA) prior to commencing any one of 44 different kinds of activity. In some instances the EMA may require an Environmental Impact Assessment (EIA) to be undertaken before granting a CEC. This is seen as a positive step in systematising the approach to incorporating environmental considerations into the land use planning system.

Factors that constrain improved government management

These incremental responses have been constrained by a range of institutional and organisational factors:

Policy overlap and institutional ambiguity: Watershed management is affected by separate pieces of legislation dealing with water, environmental management, environmental health, land use planning, forests, agriculture and state lands. Each of these pieces of legislation identifies different lead agencies and militates against an integrated approach by prescribing institutional arrangements without adequate reference to existing or similar arrangements.

The institutional problems constraining watershed management are exemplified by the locus of the Forestry Division, which is often cited as the agency with lead responsibility. Legislation only provides the Division with authority over the trees on state land. The land is managed by the Ministry of Agriculture's Lands and Surveys Department (LSD). This means that the Division is powerless to act over illegal settlements that it encounters in forest reserves, while the LSD is in practice more concerned with administering land (i.e. allocating and verifying titles and deeds) than managing it. No agency has clear authority for watershed management on private lands, which is a critical issue in the western Northern Range.

Limited capacity: All of the state agencies involved in watershed management suffer from limited capacity and in interviews most cited the lack of personnel as the main constraint. Morale in the public sector is low and it has struggled to compete with other sectors for human resources. The prioritisation of critical watersheds could help to marshal resources. Management agencies are also incapacitated by a lack of basic information on the status of watersheds, which

are not mapped or monitored systematically by any agency. This has also resulted in a lack of hydrological information.

Political vacuum: The general election of 2001 resulted in a dead heat between the two main parties, resulting in a temporary government that was unable to convene parliament and a political stalemate. The enduring political crisis affecting the country has also prevented policies, including the water resource management policy spearheaded by the WRMU, from progressing beyond the stage of drafting. New land use legislation was placed before the House of Representatives, just before the current political stalemate ensued.

Without direction or a parliament, officials within the relevant state agencies operate according to guidelines, which they consider defensible in an uncertain political climate. For example key agencies have an ambivalent attitude towards squatters, who are acknowledged as stakeholders in watershed management, but staff members from the Forestry Division and the Lands and Surveys Department are reluctant to engage with them, as they believe that this would amount to state endorsement of illegal activity.

In the scramble for votes, successive political parties have chosen to pour money into capital works rather than invest in rationalising the institutional arrangements for the management of water. There is no formal water policy in place, but statements from successive governments have emphasised the need to improve the geographic distribution of supply. For example a recent manifesto commitment from one of the main political parties was presented under the heading “water for all.” In April 2002 the Minister for Public Utilities announced a TT\$ 500 million, three-year package of investment consisting of pipe laying, the rehabilitation of pump stations and wells.

Factors that constrain the behaviour of other stakeholders

The overarching development thrust in Trinidad and Tobago is one that favours rapid economic expansion rather than sustainable development. A “Singaporean” model of development has often been touted. Policies and incentives for industry and agriculture tend to favour expansion rather than wise use.

Many of the people that have settled in areas in and around watersheds are among Trinidad’s poorest, living a “catch and kill” existence. They do not enjoy security of tenure and have no immediate interest in or the means to make investments in soil conservation or waste management.

In upland suburban areas that have been settled by affluent middle class residents there are also signs that soil conservation and waste management are not a priority, with evidence of dumping and the removal of tree cover perceived as “bush.”

The level of understanding among the general public of the water cycle remains poor. There is little awareness of even the most direct linkages between the upstream producers of water services and downstream consumers. This means that water issues are dominated by concerns about access to water and distribution. People who do not enjoy access to a regular supply attribute their problems to the inadequacies of the water company, and the lack of rain. Few make the link with watershed issues.

Constraints to implementing cost recovery measures

Water is perceived as an entitlement rather than a commodity that has to be paid for. This perception is reinforced by a universal tariff for domestic users, which does not reflect the full costs of distribution and does not encourage the efficient use of water.

The water company has historically been unable to recover costs from customers, although this has recently improved following limited private sector inputs to a project (Severn Trent Water 1996-1999) that focussed on improved service delivery and cost recovery.

3. Progress and opportunities

There is an awareness of the need for a multi-sectoral and participatory approach to the management of water resources on the part of decision makers, yet there is little evidence that they are willing to invest in institutions. In April 2002 a ministerial statement called for “the adoption of an integrated approach to the management of [our] water resources, and the willingness and commitment of all stakeholders to work together in the national interest” (Government of the Republic of Trinidad and Tobago. 2002). The same statement announced a major capital investment programme, but there was no indication of support for institutional reform.

There has been limited use of incentives to encourage good land stewardship among farmers with security of tenure and the private owners of forested land. A summary of the use of incentives is set out in Figure 4.

Figure 4: Policies and programmes that have advocated the use of, and implemented, incentives for watershed management

Year	Policy/Projects	Key agency	Relevance to incentives for watershed management
1990s	Tropical Forest Action Plan	Forestry Division (FAO/UNDP-funded)	Proposed that state lands be rented to farmers. Incentives given to plant timber species and to practice agro-forestry. Funds were solicited from donor organisations and lodged in an agro-forestry/reforestation fund with disbursements to individual farmers.
1992	Agricultural Investment Programme	Land Tenure Center, University of Wisconsin	Proposed investment programme to regularise tenure of farmers under revised leasehold system
1992	Administration and Distribution Policy for Land	Ministry of Planning and Development	Reaffirmed the allocation of state land using short-term leases
1995	Agricultural Sector Reform Programme (ASRP)	Land Administration Division, Ministry of Agriculture, Land and Marine Resources (MALMR)	Provided for state agricultural land to be leased under 30-year leases with automatic right to renewal for a further 30 years
1998	Farmers' Registration Programme	Incentive Unit at the Forestry Division	Subsidised seedlings given to authorised occupiers of land

Incentives have taken the following form:

- Under the Agricultural Incentive Programme 1999 incentives were made available to encourage soil conservation practices. These include subsidies for the construction of: storm and contour drains; contour banking, ridging and bench terracing; contour barriers; terrace outlets; and check dams. In 2001 the sum of cUS\$ 4,000 [sic] was set aside to pay for these incentives (there is provision for this annual sum to be raised according to demand).
- The Forestry Division has the power to grant: rebates on 25% of establishment costs to a maximum of cUS\$ 400/ ha; rebates on establishing perimeter fire lines to a maximum of cUS\$ 40/ km; a subsidy of 15% for the establishment of nature trails to a maximum of cUS\$80/ km; a 50% subsidy on all equipment used for re-forestation; and subsidised seedlings, sold at cUS\$.25 each. In addition the Division provides technical assistance and advice (Pantin and Tyler 2002).
- Stewardship concerns are factored into the process of regularising squatters (i.e. granting leases to occupy state land). Applicants to the Land Administration Division (LAD) within the Ministry of Agriculture (the agency with responsibility for regularising agricultural squatters) are obliged to provide five-year agricultural plans for the initial period of their 30 year lease. This provides the LAD with the basis for negotiating improved farming practices (e.g. terracing and inter-cropping).

The use of incentives is therefore limited and piecemeal, lacking adequate resources and an overarching watershed management framework. The take up of the incentives available through the Forestry Division is low and the LAD lacks clear guidelines as to the nature of the conservation measures they should be negotiating with farmers.

Against this generally bleak backdrop there are some encouraging signs:

Civil society action: Non-governmental and community based organisations in Trinidad and Tobago have traditionally played an important part in advocating for conservation and the collaborative management of natural resources. They have also demonstrated what can be achieved with vision and meagre resources.

In the late 1970's at Fondes Amandes, at the northern end of the St Ann's valley in the western Northern Range, a community of squatters established themselves on 15 acres of state land, planting short-crops. They lived with the constant threat of forest fires (the area is classified as fire climax) and took action by planting hardwoods and fruit crops. The Fondes Amandes reforestation project was established in 1982. The squatters still faced periodic harassment from WASA as the area was also classed as an important filter bed. With NGOs acting as intermediaries, the water company and nearby residents have come to accept and value the work of the squatters, who have attracted financial backing from local private foundations. The squatters have been regularised and the project aims to become self-sustaining based on the sales of fruit and other non-timber forest products.

Green Fund: In 2000 the government's budget speech announced the introduction of a levy on businesses to finance the creation of a "Green Fund." This tax has been collected from all registered companies at 0.1% of gross receipts since 1 January 2000 (the rate was reduced in the 2002 budget). The Fund was set up to enable grants to be made to civil society organisations to encourage communities to undertake environmental remediation, reforestation and beautification

projects especially in ecologically important areas such as watersheds. It is estimated that the Fund currently stands at US\$ 14.5 million, but it has not started making disbursements, possibly on account of the uncertain political climate, and business interests are now calling for the levy to be abolished.

4. Needs and directions

Based on this review the following needs for improved watershed management can be identified:

- i) The policy for water resources management must provide a framework for watershed management, which would enable the development of range of policy instruments (regulations, incentives and awareness raising). The draft policy developed by the WRMU is being made available for public comment; however a “champion” is needed to press for this kind of framework. At present there is no coherence to the approaches adopted (e.g. some advocate the bulldozing of squatter settlements, while others try to reconcile squatter aspirations and environmental concerns).
- ii) The respective roles and responsibilities of the actors in watershed management must be rationalised and understood. There are several state agencies with partial and overlapping responsibilities for watershed management functions. Presently there is no clear lead agency and consequently watershed management in Trinidad lacks a “product champion” capable of catalysing, facilitating and mobilising the participation of stakeholders from the range of sectors involved.
- iii) The information base that informs watershed management must be improved. There is need for basic data on watersheds to enable policy development as well as improved planning and management. Where information does exist there is little evidence to suggest that it has been shared between agencies. In the context of the use of incentives specific technical information (including hydrological linkages such as that between land management and water delivery) is also required to develop a pricing policy that reflects the costs of production and distribution of water.

5. Incentive possibilities to explore

Consistent with the fragmented approach to watershed management the use of incentives in this field has been limited, but their relevance has been recognised and small steps have been taken. The main lessons from experience to date are that incentives need to reflect market conditions (especially the marginal utility of forested land) and they need to be located within a broader coherent institutional framework.

Policy instruments are urgently required to encourage and ensure the provision of watershed services on the 20% of forested areas that are privately owned (primarily in the western Northern Range) and state land that is occupied illegally. Current incentives available through the Forestry Division are not attractive enough and only private landowners are eligible. Effective mechanisms are required that encourage the range of private actors (whether they be owners or managers) to provide watershed services.

Against this backdrop the research team, drawing on the outcomes of the interviews, identified the following ideas for incentive based approaches:

- Use site value based taxation as the basis for concessions or rebates to the managers of forests on private lands in priority watersheds;
- Establish collaborative management arrangements with community-based organisations and forest resource users to manage forests on state lands (particularly those that have been illegally occupied). This could be financed through the Green Fund;
- Involve the private sector in purchasing privately owned lands in priority watersheds with a view to restoring tree cover through tax incentives. The oil and natural gas industry could be specifically targeted as they are significant actors in the local economy and make constant reference to their commitment to the environment; and
- Ensure that the continuing process of regularising squatters explicitly addresses the provision of watershed services.
- Build on existing but limited awareness campaigns, which focus on encouraging water efficiency among domestic users during the dry season, to improve levels of awareness of the hydrological cycle.

6. Conclusion

In a scan of Trinidadian natural resource management concerns, watershed management can at best be described as a neglected issue. No single agency lays claim to it and it lies too far “upstream” from issues of distribution to be of popular or political concern. The proposed establishment of a Water Resources Management Agency (WRMA) referred to in the draft water policy offers the prospect of institutional coherence and the draft water resources management policy should provide a framework for an integrated approach. In developing its approach to leading the implementation of the policy the WRMA would benefit from a range of regional experiences.

The IIED/DFID project *Developing markets for watershed protection services and improved livelihoods* is therefore timely. The project aims to establish a learning group of interested Caribbean countries, within a larger global learning group. Trinidad could learn from others as it seeks to incorporate incentives-based approaches into its watershed management policies and programmes. The specific ways in which Trinidad 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, 29 April to 6 May 2002:

Jacqui Ganteaume-Farrel, Director, Land Administration Division (LAD), Ministry of Agriculture

Dr. Robin Rajack, Director/ Wayne Huggins, Senior Research Analyst/ Shrikant Bharate, Senior Research Analyst, Research and Communications Unit of the Land Settlement Agency (LSA), Ministry of Housing and Settlements

Tyrone Leong, Director, Land and Surveys Department (LAS), Ministry of Agriculture

Keith Meade, Hydrologist, Water Resources Authority (WRA) and Water Resources Manager, Water Resources Management Unit (WRMU), Ministry of Public Utilities and the Environment

Wayne Rajkumar, Technical Co-ordinator, Environmental Management Authority

Matthew Lee, Acting Assistant Director, Planning Division, Ministry of Agriculture

Kenny Singh, Deputy Conservator, Forestry Division, Ministry of Public Utilities and the Environment

Documents consulted:

Government of the Republic of Trinidad and Tobago. 1998. Draft forest policy of Trinidad and Tobago. Ministry of Agriculture, Land and Marine Resources, Forestry Division.

Government of the Republic of Trinidad and Tobago. 2002. Draft national water resources management policy, April 2002. Ministry of Public Utilities and the Environment, Water Resources Management Unit.

Government of the Republic of Trinidad and Tobago. 2001. National report on integrating the management of watersheds and coastal areas in Trinidad and Tobago. Ministry of the Environment, Water Resources Agency.

Government of the Republic of Trinidad and Tobago. 2002. \$500 million water plan announced. Government Information Service. <http://www.gov.tt/news/500milwaterplan.asp>

Pantin. D. and S. Tyler. 2002 United Nations Convention to Combat Desertification: first national report of Trinidad and Tobago. Ministry of Public Utilities and the Environment.

Appendix 3.

Questions guiding the brief diagnostic for Trinidad

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