

DRAFT WATERSHED POLICY

PREFACE

"Water is life" is a popular slogan in Jamaica, our "land of wood and water". This slogan and the meaning of the Taino name for the island, underscore the importance of water as a natural resource, as well as the linkage between the availability and quality of water and the state of our watersheds.



Given its importance, the active management of our watersheds to ensure sustainability in terms of the quality and quantity of water, is, should and must be, a national priority. This is one of the major challenges facing the Jamaican government and civil society as we enter the 21st century. In responding to this challenge, this policy document states the essential elements of a national watershed management initiative. It seeks to define opportunities for the people, government and non-government organizations and the international community, to participate in the sustainable management and conservation of Jamaica's watersheds in the interest of water supply and bio-diversity.

Part I of the document provides an overview of watershed problems, past interventions, current international trends in watershed management. Part II highlights the major challenges facing the country with respect to watershed management and part III the key principles and strategies being employed by the policy to address these challenges. Options for obtaining funding for policy implementation are also suggested in this section. The requirements of the policy in terms of the development of watershed legislation are also noted. Finally, Part IV of the policy document sets out the essential elements of the institutional framework required for the attainment of policy objectives.

A participatory process was used by the NRCA and its Watershed and Protected Areas Committee of the Authority to develop this policy. Many individuals and organizations contributed a considerable amount of time and effort to the preparation of this document, enabling the document to benefit from the valuable inputs of government and non-government members, and members of the private sector and the international donor and lender community.

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INTRODUCTION

Over fifty percent of Jamaica's terrain can be described as hilly or mountainous. This feature of its landscape and its extensive network of rivers give Jamaica a distinct beauty for which it is world famous. The entire island may be considered a watershed based on its topography and hydrology. A watershed can be described as the area of land that delivers runoff water, sediment and dissolved substances to a river.

Watersheds provide a number of important functions such as the protection of the coastal zone, and as a habitat to diverse species. Upper watersheds are of particular importance because they

serve as recharge areas for most aquifers and as source areas for rivers which supply water for urban, industrial and agricultural purposes. In addition, upper watersheds provide suitable conditions for the growth of many domestic and export crops in addition to valuable forestry, energy, mineral and recreational resources.

Watershed Management consists of applying known skills to land use in such a way as to minimize or repair degradation and ensures that the capability of the land is continued beyond its present use. One of the main objectives of watershed management is that of securing sustainable yields of good quality water for domestic and productive purposes.

Given the complex interactions between physical, biological and socio-economic factors in watersheds, an integrated approach to watershed management is essential for the sustainable use of natural resources and the minimization of undesirable environmental impacts. In this connection, the Forestry Land Use Policy, the National Land Policy, the Beach Policy, the System of Protected Areas Policy and the Watershed Policy all embrace the integrated approach to natural resource management. The elements of each policy are mutually reinforcing and form an overall policy framework which guides the Natural Resources Conservation Authority (NRCA) in the management of Jamaica's natural resources.

In order to manage and protect the island's watershed fully and effectively, a clear policy is required which will emphasize *inter alia* a coordinated and integrated approach, local participation, manpower and resource building, land use planning, among others. The policy will seek to address the most severe constraints to watershed management and will seek to employ strategies which will ensure the sustainable use and development of watersheds.

The Government of Jamaica (GOJ) is therefore pleased to present this draft Watershed Policy which will play an important role in the management of Jamaica's watersheds for years to come.

LIST OF ACRONYMS

CBO's	Community-based Organizations
CIB	Coffee Industry Board
CIDA	Canadian International Development Agency
CIDCO	Coffee Industry Development Company Ltd.
COL	Commissioner of Lands
FAO	Food & Agriculture Organization (UN)
FIDCO	Forest Industries Development Company Ltd.
FD	Forestry Department (MOA System)
GOJ	Government of Jamaica
IFAD	International Fund for Agricultural Development
IICA	Inter-American Institute for Co-operation on Agriculture
MOA	Ministry of Agriculture
NGO	Non-governmental organization

NRCA	Natural Resources Conservation Authority
NRCD	Natural Resources Conservation Division
NWC	National Water Commission
RADA	Rural Agricultural Development Authority
RPPU	Rural Physical Planning Unit (MOA)
UNDP	United Nations Development Program
USAID	United States Agency for International Development
UWI	University of the West Indies
WRA	Water Resources Authority

1.1 Physical Settings

Jamaica is primarily a mountainous country with over sixty percent of the island having an altitude of over 230 metres above sea level. The mountains are characterized by a central ridge that transverses the length of the island. In the east, the crest of the ridge exceeds 2,100 metres above sea level for at least 16 kilometres, with the highest summit in the Blue Mountains.

The Blue Mountain Range, which is to be found at the eastern end of the ridge is composed of igneous and metamorphic rocks and is dissected by a network of steep sided ravines. This type of land formation gives rise to surface drainage by a large network of streams and rivers. The remainder of the island is composed of limestone with a few scattered occurrences of igneous and metamorphic rocks. Surface drainage in the form of rivers is far less dominant in these limestone areas.

The island is divided into twenty-six (26) Watershed Management Units (WMUs) comprising all the land from the mountains to the sea and containing over 100 streams and rivers. These WMUs are essentially composites of river basins which fall within ten (10) hydrological basins (regions). The land in the upper part of the WMUs is characterized by steep slopes usually in excess of 20 degrees. Limestone derived soils cover about 65% of the watersheds and the remaining areas are composed of soils derived from weathered igneous and metamorphic rocks.

1.2 Watershed Conditions and Problems

Landslides and slope failures are very common in the non-limestone watersheds due to the presence of steep slopes, thin or erosive soils. This situation is further compounded by heavy and high intensity rains in the upper watershed areas, soil erosion, and susceptibility to earthquakes. These natural conditions of instability are aggravated by the inappropriate use of slopes. Farming activities on the slopes have long been recognized as the single most important cause of the degradation of watersheds in Jamaica. Upwards of 170,000 farmers cultivating just under 245,000 hectares, and using unsuitable agricultural practices have contributed to massive soil loss through soil erosion, siltation of drains and rivers and destructive flooding downstream. Depending on crops and practices, the average soil loss reaches approximately 30 tons per hectare per year according to some statistics (NRCA, 1997). Due to a lack of intensive agricultural extension, incentives and the insecurity of land tenure, most small farmers and other land users do not consider protection and conservation of natural resources in a watershed to be a priority.

With the growth in industrial and agricultural activity over the years and the corresponding increases in population and urbanization, the demand for and pressures on land and water resources have become greater. As a result of crop expansion and the increased use of industrial and agro-chemicals and the improper disposal of sewage effluents, water pollution has drastically increased. Rivers, beaches and harbors have

become polluted and coral reefs degraded, ultimately affecting the tourism industry adversely.

The large-scale removal of trees for resettlement programmes and for squatter settlements, and the illegal removal of forest cover for lumber, charcoal production and yam sticks have greatly contributed to the relatively high rate of deforestation. Although the actual rate has not yet been determined (O. Evelyn, 1997) it could be 2 % or more, having increased significantly in the last two decades. Forest fires have been contributing more and more to deforestation due to the extended periods of drought.

All of the above-mentioned factors have resulted in heavy siltation of rivers, reservoirs, irrigation canals and water intakes, as well as harbours. Surface runoff is greatly increased due to excavation of slopes, diminished vegetation cover, compacted soils, and many other activities that reduce water intake to the soils. During heavy rains and hurricane seasons, floods become more frequent and severe, whereas in dry seasons, water shortages become a serious problem. Over the last two decades, the incidence of serious floods has increased significantly resulting in considerable losses in life and property.

1.2(a) Causes of Watershed Degradation

The environmental factors contributing to watershed degradation in Jamaica have been intensified by the following types of human activity:

- Unsuitable hillside agricultural practices such as over cultivation of steep slopes, indiscriminate slashing and burning, and cultivating without soil conservation or engineering works;
- Deforestation due to illegal removal of trees for fuelwood and charcoal production, yam sticks and lumber;
- Illegal settlements on hillside lands;
- Improper construction and lack of maintenance of roads;
- Forest fires caused by individuals;
- Unapproved quarrying and sand mining.

1.2(b) Effects of Watershed Degradation

While the impact of human activities on watershed are many and varied, some of the main ones may be summarized below:

- Reduced tree and vegetative cover;
- Reduced water availability and quality;
- Reduced productivity of land, increased siltation of rivers and reservoirs due to soil erosion;

- Increased marine and coastal contamination and degradation adversely affecting the tourism industry;
- Increased flooding resulting in loss to human life, property, roads and agricultural crops;
- Loss of habitat for important flora and fauna.

1.3 History of Watershed Management

Jamaica's awareness of the need for soil conservation and watershed protection dates back to the 1930s. Croucher and Swabey (1937), Wakefield (1941), and the first annual report of the Soil Conservation Division (1944) all stressed these needs. With reference to watershed degradation, an Economic Policy Committee Report in 1945 stated:

“Steps must be taken to meet this grave and widespread menace before it is too late.”

In the early 1950s, two land authorities were established, i.e. Yallahs Valley and Christiana Area were created by the Land Authority Act (1951). The Authorities' main tasks were to rehabilitate land, check soil erosion and improve farming, however, success was limited due to inappropriate land use and poor maintenance (Division of Economics and Statistics 1961).

The 1960s saw several important developments in watershed protection. The first was the promulgation of "The Watershed Protection Act, 1963" which created the Watershed Protection Commission and empowered the Minister to declare Watershed Areas. With the conservation of water resources as its primary focus, the Commission was empowered to make regulations, prohibit and regulate land use and supervise and undertake improvement schemes. Under the Commission, Watershed Areas were declared, demonstrations setup, improvement schemes initiated, and small farmers assisted in carrying out conservation work with support from the World Food Programme. During the 1970's, however, the Commission was dissolved, and its functions transferred to the newly created Natural Resources Conservation Department, of the Ministry of Mining and Natural Resources.

During the late 1960s to mid-1980s, a series of watershed management and soil conservation projects funded by the Food and Agriculture Organization of the United Nations (FAO) were implemented. Under these projects a training centre and several demonstrations were established, research activities and a national programme in soil conservation were developed. Watershed investment proposals resulting in multi-million dollar investments from USAID, IFAD and UNEP were also produced. During that period, approximately 380 extension officers and twenty young professionals were trained with a view to these officers forming the core of the new Forestry and Soil Conservation Department. Unfortunately, GOJ was unable to create permanent positions for these persons and, as a consequence, they sought alternative employment.

With the promulgation of the Natural Resources Conservation Act in 1991, the NRCA was created with several divisions including a Watershed Protection and Management Branch (WPMB). However, due to staffing and funding limitations, the Branch has over the years focused primarily on regulatory and public education activities.

In the 1990s, several agricultural and forestry development projects have been implemented in the watersheds. These projects include the Trees for Tomorrow Project funded by CIDA, the Morant-Yallahs Agricultural Development Project funded by the European Union; the Hillside Agriculture Project, funded by USAID; Environmental Management of Watersheds Development of Institutional Capabilities, the Forestry Capacity Project and the Hydrological Support Unit Project all of which were funded by the UNDP and government of Jamaica. One of the outputs of the Hydrological Support Unit Project was the delineation of 26 Watershed Management Units which have come to replace the 33 Watershed Areas originally identified. A National Parks and Protected Areas System Plan has been prepared under the USAID- funded project which provided the blueprint for the development of national parks and protected Areas. Many of the areas designated for protection are upland watershed areas. Under a second Phase of the project Management Plans for priority protected areas were developed, for implementation by NGOs and community groups.

In 1995, the Watershed Management and Fuel Wood Production Committees were formed to promote action aimed at managing the nation's watersheds and to develop strategies to address deforestation. Chaired by the Senior Advisor to the Prime Minister on Land Policy and Physical Development, the Committee consisted of representatives of various organizations and agencies. In 1996 the "Report on the Work of the Ad Hoc Watershed Management Committee and the Fuel Wood Production Committee" was produced, containing the Committee's findings, conclusions and recommendations.

In response to growing concerns about the continued deterioration of the nation's watersheds, the Prime Minister appointed a Watershed Task Force in 1998 which was chaired by the Senior Advisor to the Prime Minister on Land Policy and Physical Development. As part of this initiative, various Sub-Committees were formed to make recommendations on a number of areas

pertinent to the development of the Integrated Watershed Programme, including: policy and institutional arrangements, planning, public education and training, eco-tourism, incentives, commercial forestry and fuel wood plantations.

Indeed, the interventions mentioned above met with varying degrees of success. Their overall impact on the state of the environment seems to have been minimized for a number of reasons. The lack of a sound and steady policy to guide the design of watershed interventions resulted in the implementation of activities which, in some cases, have been inconsistent with watershed management principles. Moreover, a project-based rather than programme-based approach has meant that the gains from previous interventions have been short lived and have seldom been sustained by investments in

long-term programmes. Institutional instability, the loss of trained staff and data/information has also minimized the gains from interventions.

1.4 International Trends

Early watershed programmes and projects in developing countries concentrated on soil conservation and erosion control work. However, since 1980s, greater emphasis has been placed on utilizing an integrated approach, which combines soil conservation and rural development elements with strategies to improve both land and people.

The United Nations Conference on Environment and Development held in Brazil, 1992 put forward a set of principles which has resulted in a greater emphasis being placed on alleviating poverty and improving living standards, protecting tropical forests and other natural resources and promoting people's participation. Given these principles, interventions have tended to address simultaneously, issues of development, sustainable resource management and poverty eradication. One of the main strategies employed to facilitate participation of communities in the sustainable management and protection of natural resources has been the empowerment of local and community groups through the delegation of authority and accountability.

1.5 Legislative Framework

The Watersheds Protection Act (1963) is the law governing watersheds in Jamaica and is administered by the Natural Resources Conservation Authority. The primary focus of the Act is the conservation of water resources by protecting land in or adjoining the watersheds. The Act is intended to: ensure proper land use in vital watershed areas; reduce soil erosion; maintain optimum levels of groundwater and promote regular flows in waterways.

The Act has not benefited from any substantial revision since its promulgation and may be considered outdated in respect of the participatory approach currently being utilized in watershed management; institutional arrangements; and fines, to name a few. The Act relies heavily on prohibiting and regulating to protect the declared watersheds, and lacks provisions for incentives, public education and the involvement of local communities.

In addition to the Watershed Protection Act 1963, several other pieces of legislation are pertinent to watershed management work: The major ones are listed below:

- Natural Resources Conservation Authority Act (1991)

- Forest Act (1996)
- Rural Agricultural Development Act (1990)
- Water Resources Act (1995)
- Town and Country Planning Act (1988)
- Land Development and Utilization Act (1966)
- Country Fires Act (1988)
- The Mining Act (1947)
- Wildlife Protection Act (1945)

The Watersheds Protection Act and many related acts have a number of gaps and overlaps in terms of areas and responsibilities. For instance, both the Forest Act and Natural Resources Conservation Authority Act have stipulations for managing "Protected Areas" but the clear distinctions between them and the jurisdictions of each are to be defined and agreed upon. The same is true of the lands in the declared watersheds and the rural areas under RADA's jurisdiction, with respect to the responsibility for soil conservation work in watersheds. In view of these legislative gaps and jurisdictions with parallel or contending powers, objective requirements for protection of watersheds and NRCA's role in this process need to be clearly defined. The best way to address this appears to be through the updating of the existing Watersheds Protection Act and by instituting appropriate Regulations under the Act.

1.6 Institutional Framework

The management of watershed protection is vested principally in the NRCA. However, several other agencies are also involved by virtue of powers held or activities conducted with respect to watersheds. Accordingly, the institutional framework for watershed management may be seen as having six (6) categories of agencies, namely: (1) regulatory; (2) custodial - land holders or other custodians, and executors of protective works on watershed lands; (3) technical information, advisory, extension and research bodies; (4) ad hoc coordinating committees; (5) non-governmental organizations; and (6) external funding agencies. NRCA and FD are the primary government agencies involved in watershed protection, the NRCA administers the Watersheds Protection Act, 1963 and the NRCA Act, 1991. The NRCA Act sought to establish NRCA as the principal planning, monitoring and enforcement agency in the field of environmental protection.

Under section nine of the NRCA Act, the NRCA may require an environmental permit to be issued to undertake any new enterprise, construction or development of a prescribed nature, anywhere in Jamaica. Persons wishing to undertake projects which fall within the certain prescribed categories including: irrigation or water management projects; watershed development; felling of trees and land clearing of 10 hectares or more for agriculture are required to apply for an environmental permit.

As a matter of policy NRCA does not do physical works, but rather monitoring, enforcement, oversight and co-ordination. The Watershed Protection & Management Branch monitors the state of watersheds, investigates particular problems or questions, fosters co-operation between various related agencies, promoting remedial action. However, due to budgetary and human resource management constraints the Branch has only been able to undertake these functions to a limited extent.

The FD of the MOA operates under the Forest Act, which confers powers in respect of the declaration of and regulation of the use of Forest Reserves. The FD, inter alia, manages Crown Lands in the watershed areas on behalf of the COL, and is responsible for soil conservation on these lands. It also leases some lands for agro-forestry - mainly to FIDCO and CIB/CIDCO. FD provides technical assistance in forestation and soil conservation to farmers and other landholders, as well as undertake major reforestation projects, outside the Reserves. However, due to budgetary constraints, it has had difficulty fulfilling its mandate especially in areas related to watershed protection.

There is considerable overlap between agencies in authority over the handling of watershed areas. The question of responsibility for public watershed protection works requires clarification. Under the Flood Water Control Act, the Ministry of Transportation and Works may be regarded as having responsibility for such matters as land and stream bank integrity, river training, in addition to road and drainage (under other applicable law). The MOA (which at one time had a watershed engineering division - later transferred to NRCD) and FD might also be construed as having some legal role. RADA, although not specifically mandated by law, plays an important de facto role by virtue of its involvement in problems affecting farmers.

In addition to the need for the rationalization of the functions of the various institutions involved in watershed management, a recent report highlighted the need for these institutions to receive adequate levels of resources noting that " all the institutions with the de facto roles in watershed protection – including the NRCA itself- are short of the human and financial resources needed to prosecute their desired interventions" (Report on the Work of the Ad Hoc Watershed Management Committee, 1996).

II. CHALLENGES

The Government of Jamaica recognizes the need to respond to the problem of watershed degradation and its effects. In responding to this problem, a number of challenges will have to be addressed, these include the need for:

- National Action Plan and Co-ordinating Mechanisms

A national watershed action plan is needed for systematically and strategically implementing the protection and management of the nation's watersheds. In preparing the national action plan, it will be necessary to: (i) conduct a national watershed

classification and priority ranking; (ii) conduct surveys and develop plans for individual watersheds selected for intensive management; and (iii) develop an overall implementation plan.

- Effective Extension and Incentive schemes

Extension agents in watershed management and soil conservation are limited by the unavailability of critical resources and many are inexperienced in watershed conservation work. At the same time, land users and people's awareness of the importance of watershed protection is very low. Incentive schemes to assist and induce farmers and other land users to undertake conservation and improvement must be put in place.

- Professional Staff and Training

As mentioned before, the number of professional staff currently working in watershed management is less than adequate. At present, there is no permanent training center operated for conducting watershed and conservation training. In view of the technological progress in watershed management in recent decades, such as Geographic Information Systems, monitoring & evaluation, lack of continuous training constrains the extent to which the technology can be applied.

- Research

Very limited research has been done in soil erosion, erosion control methods, forest hydrology, and the socio-economic aspects of watershed management. Data on the cost and effectiveness of various watershed treatments are not available.

- Database and Monitoring

The country lacks basic data required for planning on a watershed basis. Much of the limited data the country had has been scattered or lost. A watershed database is crucial for planning, designing and monitoring watershed interventions.

- Stakeholder Awareness and Participation

There is a great need to transfer the knowledge and skills required to improve the understanding and management of watersheds. Additionally, it is also necessary to promote changes in values, attitudes and behaviours in order to bring about healthier watersheds and greater public participation in the process of watershed management. In building greater awareness for greater public involvement, the exercise must be oriented towards empowering and promoting opportunities for participation at all levels of the process.

- Appropriate Land Use

Appropriate land use is the basis of watershed management, however, land is often not used in accordance with its capability. Indeed, in protecting the watersheds, some adjustments to land use will have to be made taking into account land capability, carrying capacities and fragile ecosystems.

III. POLICY

In order to manage and protect the island's watershed fully and effectively, a clear policy is required which will emphasize inter alia a coordinated and integrated approach, local participation, manpower and resource building, land use planning, among others.

3.1 Objectives

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.

3.2 Guiding Principles

1. Watershed management is a long-term and permanent process requiring continuous investment and consistent effort in order to obtain desirable results.
2. The design, planning and implementation of watershed management interventions are for the benefit of the communities concerned, upstream and downstream, and for all sectors.
3. The people in the watershed areas and their environment need special attention and support, especially the less privileged ones.
4. Both the protection and production functions of the land and water resources in a watershed are considered integral and a balanced approach should be taken. For areas populated with subsistence farmers, on-site short-term returns and benefits need to be much emphasized.
5. Watershed management does not necessarily mean total preservation. Land use impacts must, however, be closely assessed and monitored and damages rehabilitated.

6. Compromise rather than confrontation and complimentary rather than contradictory approaches are to be taken in resolving conflicts of interest that may arise in resource uses.
7. Proper land use is the basis for managing any watershed. Adjustments to existing land-use are needed based on practical criteria, which must be established and applied to all watersheds.
8. No single agency can undertake watershed management effectively. Close co-ordination among government agencies and between public and private entities is essential for success.
9. Local participation and community involvement in watershed management is very essential. NGOs, youth and women must be included in the planning and implementing interventions.
10. Encouragement, mutual understanding, demonstration and incentives are more effective than regulatory measures in the attainment of watershed management objectives.
11. Intensive technical support and monitoring are essential to the success of watershed management programmes and to the realization of lasting benefits from these efforts.
12. Any watershed or conservation work carried out in the watershed needs proper maintenance and should be considered to be an integral part of the programme.

3.3.a. Strategies for Implementation of the Watershed Policy at the National Level

(1) Develop a National Watershed Programme

A National Watershed Programme will be prepared which will specify the activities that are to be undertaken to protect and manage the nations watersheds and the roles of the agencies involved. Each agency involved will implement the programme according to their own jurisdiction. For instance, forest protection and development is the mandate of the Forestry Department; soil conservation, land husbandry, and agricultural development is the duty of RADA; and road slope stabilization and small erosion control structures are the responsibility of Ministry of Transportation and Works, local Parish Councils and Forestry Department. A clear understanding of the coordinating mechanism and responsibilities among participating agencies is essential. Overlapping and over-stepping of duties must be avoided. Monitoring will be carried out by NRCA.

(2) Establish an inter-Ministerial Watershed Management Committee

Chaired by the Minister of Environment and advised by a Technical Sub-Committee, the Committee will meet quarterly to ensure policy implementation, agency co-ordination, and will discuss budgetary matters. The Committee will also evaluate and report to the Cabinet.

(3) Strengthen human and financial resources required to co-ordinate, implement and monitor work in the watersheds

Training to upgrade the skill of persons involved in watershed management at all levels will be undertaken. Efforts will be made to obtain adequate budgetary resources and support from the donor community to protect and manage the country's watersheds.

(4) Rank each watershed and establish priorities for interventions.

A reconnaissance survey, using remote sensing Geographic Information system (GIS) techniques, will be conducted to determine watershed conditions, problems, and management needs in order to prioritize each watershed and identify critical areas for interventions. Problems and management needs will be assessed in order to prioritize the watersheds and to plan activities, a survey of environmental and socio-economic conditions, major watershed problems and management interventions will be conducted to provide the relevant information.

(5) Secure budgetary support for implementation of the Policy

NRCA, as the lead agency, will seek the budgetary support required to implement the programme. Once the funds are identified, they may be pooled together, or allocated to respective agencies to finance watershed activities specified in the Watershed Programme.

3.3.b. Strategies for Implementation at the Local Level

(1) Encourage/facilitate the work of existing NGOs and CBOs and the formation of Local Watershed Committees to spearhead work at the community level

NGOs and CBOs with activities focussing on watershed protection and management will be supported and encouraged through the provision of technical and financial assistance where possible. These organizations will play a major role facilitating the involvement of communities in the management of watersheds, in mobilizing local support for watershed protection and management and in the dissemination of information. They will also be

expected to collaborate and supervise watershed management activities where possible and to forge strategic linkages with schools, churches and other organizations.

(2) Establish linkages with the Local Government System

Linkages will be established with local government to ensure that there is adequate levels of support for and co-ordination of watershed protection and management activities taking place within each parish.

3.4 Supporting Strategies

(1) Proper Land Use:

Proper land use is the foundation of watershed conservation work. Technical criteria for land capability classification will be established and used. Criteria for watershed zoning will be worked out jointly with the Town Planning Department and Rural Physical Planning Unit.

(2) Cost effective Work:

A quick study will be undertaken to determine the cost effectiveness of several major conservation treatments. Jamaica has used an array of conservation treatments over the last 40 years, a collection of existing data supplemented with current field research results will give a useful picture.

(3) Incentives:

Incentives will be provided to assist land users in carrying out conservation work and to compensate them for extra labour, land and/or capital invested in conservation. The most appropriate incentive to be offered will be determined taking into consideration the availability of funds and the actual needs of persons carrying out the conservation work.

(4) Technical Assistance:

Farmers and other land users will receive technical assistance in carrying out conservation work. Training activities will be organized by NRCA in collaboration with RADA, Forestry Department, NGOs and Local Watershed Management Committees.

(5) Training of Watershed Management Professionals:

Training in watershed management is needed at the professional level. Intensive courses in Watershed Management will be developed and offered at the vocational schools, Agricultural College, and other tertiary institutions. Training will be viewed as a

continuous undertaking and the attendance of all professionals in watershed management will be facilitated and encouraged.

(6) Public Education:

Public education is of utmost importance to any watershed programme. The public will be provided with information on the importance of watersheds and on ways to protect it. Farmers and other land users will be exposed to information on the importance of soil and water resources, their protection and conservation needs, and the environmental impact of activities taking place upstream and downstream in the community. Volunteers will be recruited and field days conducted to enforce the ideas of resource conservation and watershed management. The involvement of grassroots extension organizations and schools will be actively encouraged to play a leading role in this process. In order to facilitate the building of greater public awareness about watershed management issues, videos and signs carrying environmental protection messages will be produced for wide spread distribution and utilization within the island.

(7) People's Participation:

Efforts will be made to involve stakeholders, NGOs, decision-makers and concerned individuals in the process of managing the watersheds and to ensure a broad-based representation at the community level. Where community based, organizations are absent, Local Watershed Committees will be established to facilitate effective and sustainable intervention in the management of watersheds at the community level. These Committees will ensure sustainable community action and will facilitate the inclusion of indigenous technical knowledge in identifying and solving problems within watersheds. They will also strengthen the link and assist in promoting the required behavioural and attitudinal changes among watershed users.

(8) Monitoring:

A Watershed Monitoring Programme is to be developed for use primarily by the NRCA. This programme will provide information which will enable the NRCA to: develop a national watershed programme; identify issues and problems in the watersheds; make sound decisions; carry out appropriate actions and track progress.

(9) Research:

The Government recognizes the importance of research in the management of watersheds. Given the resource constraints, research activities will focus on applied research. This will include determining erosion rates; identifying the most appropriate erosion control measures; studying farmers' and other land users' acceptance of conservation treatments; identifying incentive needs and effectiveness, etc. Joint research initiatives will be undertaken with other organizations and institutions to the greatest extent possible.

3.5 Financing

The Government recognizes that substantial investment is needed to protect the country's vast watershed areas. This investment, though substantial, is justifiable when compared with the future losses and the substantially higher level of investment, which would be required to address the consequences associated with the non-adoption of protective measures. The floods occurring in the parish of Portland alone in 1996 and 1998 illustrate this point. The rehabilitation cost associated with the flood damage was estimated at JA\$261.5 million and JA\$832.3 million for 1996 and 1998 respectively.

In order to obtain the level of budgetary support which would facilitate investment in watershed protection, a number of arrangements have been utilized in other countries which may provide examples of options worth exploring. These include the following:

- allocation of a small percentage of the cost of major construction projects taking place in watersheds such as highways, reservoirs, dams and housing for slope stabilization and watershed protection purposes;
- collection of a small cess from export crops which are grown on the slopes of watersheds for soil conservation/land husbandry purposes;
- collection of a small percentage of water utility bills to protect watersheds.

In order to ensure that NGOs and CBOs have adequate resources to play a meaningful role in watershed protection and management, assistance will be provided to these organizations which will enable them to access local and international donor funding.

In addition to the options mentioned above, a number of other channels for funding can be explored, namely:

- establishment of a fund for watershed management to receive contributions from hotels, and other benefactors;
- allocation of a percentage of the fees collected for permit applications for projects within watersheds;
- allocation of a percentage of the fees collected for bird shooting to be used towards watershed protection;
- provision of incentives to the private sector by way of tax breaks to encourage conservation and the restoration of degraded watersheds; and the

- collection of user fees.

3.6 Legislation

A new act is needed which: incorporates new thinking and approaches to watershed management; addresses critical institutional and legal issues; and which provides a solid legal basis for the conservation and development of Jamaica's watershed resources into the next century.

IV. PROPOSED INSTITUTIONS AND MANDATES

While maintaining its overall co-ordinating function, NRCA will seek to facilitate the management of the watersheds by establishing linkages and partnerships with the Parish Councils, NGOs and the private sector.

The following sections indicate the proposed functions and responsibilities of main agencies in watershed management with a central theme of co-ordination and collaboration.

Law enforcement and other agencies will also be involved in special events and in watershed protection work in general. The assistance of the NGO's, Parish Councils, and Environmental Wardens, and volunteers are very much needed in the overall watershed programme.

4.1 Natural Resources Conservation Authority (NRCA): Lead Policy and Monitoring Agency

NRCA has an overall responsibility of conservation, protection and proper use of land, water and other resources in the nation's watersheds. NRCA is a lead agency among others in national policy formulation, national planning and inter-agency coordination but it is not a field-implementing agency. Based on its mandate, the responsibilities of the NRCA are to:

- (1) Formulate national policy and strategies for watershed management.
- (2) Study national issues in watershed management and to formulate options and solutions about major watershed problems.

- (3) Classify and rank nation's watersheds and produce national plans and programmes for watershed management.
- (4) Seek resources and budgetary support for watershed management programmes.
- (5) Coordinate and collaborate various activities performed by different agencies.
- (6) Maintain databases and information systems for monitoring the nation's watersheds.
- (7) Develop criteria for land capability, critical area identification and zoning for improved land management.
- (8) Promote national awareness of watershed conservation.

4.2 Forestry Department (FD): Implementing Agency

The FD has the overall responsibility for the implementation of watershed protection and conservation. The department not only directly manages government owned forest lands but also assists private landowners with the management of their private forest lands. In addition to its normal mandate in protecting forest resources, its duties as they relate to watershed management are to:

- (1) Conduct joint survey and coordinated planning for the targeted watersheds identified by a national priority classification.
- (2) Develop mutual and integrated plans for protecting, rehabilitating or developing the targeted watersheds.
- (3) Administer watershed programmes in the targeted watersheds, co-ordinating with government agencies and NGOs in the implementation of these programmes.
- (4) Provide extension services to key land users and rural women in particular, so as to increase the number of trees grown on farms for production and protection functions.
- (5) Implement gully and stream erosion control work and landslide and road slope stabilization with the support of public agencies or land owners.
- (6) Conduct personnel training in watershed management and awareness and education campaigns in watersheds.

(7) Conduct applied research and experiment in watershed management and forest hydrology.

4.3 Rural Agriculture Development Authority (RADA): Collaborating Agency

RADA is an extension and rural development agency. It promotes rural development and farming practices which are environmentally friendly. RADA implements its work in targeted watersheds in close coordination with FD. Its responsibilities are to :

- (1) Provide technical assistance and incentives to encourage land users to adopt soil conservation, land husbandry, and agro-forestry practices on their farms.
- (2) Promote farming practices and cropping systems that will increase production and reduce soil erosion and pollution.
- (3) Assist in maintaining a vegetative cover on slopes by monitoring and discouraging the incidence of "burning".
- (4) Provide extension education to land users regarding land husbandry and agro-forestry jointly with the FD.
- (5) Promote public awareness with respect to conservation of natural resources jointly with the FD and the NRCA.
- (6) Promote agro-industry/cottage industry development.
- (7) Design and implement rural development work for the benefit of the residents of the watersheds.

4.4 Water Resources Authority: Collaborating Agencies

The Water Resources Authority has responsibility for monitoring and regulating the use of surface and ground water resources of the country. Its responsibilities are to:

- (1) Monitor stream-flow, sediments, surface and ground water quality.
- (2) Interpret stream-flow and water quality data and use the information to inform the public regarding necessary policy and action interventions required.
- (3) Provide information on flood plains, stream boundaries, and wetlands for planning land use.

(4) Identify Water Quality Control Areas and stream buffer strips for protection purposes.

(5) Conduct public education from a water resources management perspective.

4.5 Lands Department/ Land Development and Utilization Commission(To be merged with the proposed Environment and Planning Agency) : Collaborating Agencies

The Commissioner of Lands nominally owns the land of Jamaica in trust of the people. It has an important role to play in the implementation of watershed work especially on crown lands. The Lands Development and Utilization Commission has the power to regulate land use particularly for idle lands in watersheds. These two land management administrations should be equipped with the necessary resources and be mandated to:

(1) Coordinate with FD and NRCA in leasing of forest lands.

(2) Minimize illegal cultivation on Crown Lands.

(3) Conduct land use adjustment and intensify land use on idle lands.

(4) Advise on land administration, title, and other legal matters.

(5) Exercise land settlement in accordance with land capabilities and soil conservation principles.

4.6 National Water Commission

The National Water Commission is responsible for the island's potable water supply. As such, it has jurisdiction over much of the land in watersheds, which supply water to municipalities. Its responsibility is to collaborate with the NRCA, FD and other agencies to ensure that watershed management and protection interventions harmonize with and facilitate plans to supply potable water.

4.7 Local Government, Youth and Community Development: Coordinating agency

Ministry of Local Government Youth and Community Development has the responsibility for the maintenance and management of the roads at the parish level. In the upper watersheds, its responsibilities are to:

(1) Plan, design, construct and maintain public roads in watersheds and provide effective drainage systems along the roads.

- (2) Coordinate with FD in pursuing road slope stabilization work.
- (3) Undertake river training work along major streams.
- (4) Assist in rural development work.

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