

THE MATURA WATERSHED

A CASE STUDY TOWARDS ADAPTIVE AND INTEGRATED WATER RESOURCES MANAGEMENT

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1. INTRODUCTION

The Matura watershed is located in the eastern region of Trinidad. The drainage area of this watershed is approximately 5.2 km² (Water Resources Agency), the watershed area encompasses the Matura community. This watershed represents an area where the balance between human and ecological capacity has been aptly maintained. Unfortunately, there are many emerging threats such as natural resource exploitation and unregulated development which has the potential to alter this equilibrium within the watershed.

The aim of this study is to assess the Matura watershed from an integrated and adaptive water resources management perspective concentrating on the interplay among multiple stakeholders as a possible model for adaptation in other watersheds of Trinidad and Tobago. The project will investigate the challenges within the Matura watershed, the interventions by various agencies to mitigate threats and evaluate the effectiveness of these strategies to prevent and abate watershed degradation.

The following methodology was applied to assess the watershed and make recommendations for its improvement:

- Desktop study of the Matura area to obtain historical and current information relevant to the project objectives.
- Stakeholder interviews to gain insight into the work undertaken and challenges in the Matura watershed.
- Field investigation for ground-truthing of various physical, ecological and socio-economic characteristics of the Matura watershed.

2. CURRENT STATE OF THE WATERSHED

Physical

The Matura watershed is bordered by the Salybia watershed to the east, Toco watershed to the north and the North Oropouche and Rest North Oropouche watersheds to the west (Figure 2-1). The Matura watershed is located within the North Oropouche Hydrometric Area which consists of 9 drainage basins encompassing a total area of 606 km² (Water Resources Agency, 2005).

The channels draining this watershed are the Matura, Rio Negro, Macaque and Quebrada Grande Rivers, where the Matura River is the predominant watercourse. The Rio Negro tributary enters the Matura River approximately 5 km before the outfall of the catchment while the Quebrada Grande River forms the headwaters of the Matura River. The Macaque River enters the Matura River within the upper reaches of the watershed. These watercourses drain in a south easterly direction from the higher elevations of the Northern Range to the Matura Bay.

The topography of the Matura watershed creates ideal conditions for higher rainfall than some other areas in Trinidad, this illustrated in the red box of Figure 2-2. Consequently, flow in the rivers of this watershed is fairly constant throughout both the dry and wet seasons; average annual runoff for Matura is estimated at 1,590 mm (Water Resources Agency, 2005).



Figure 2-1: Matura Watershed

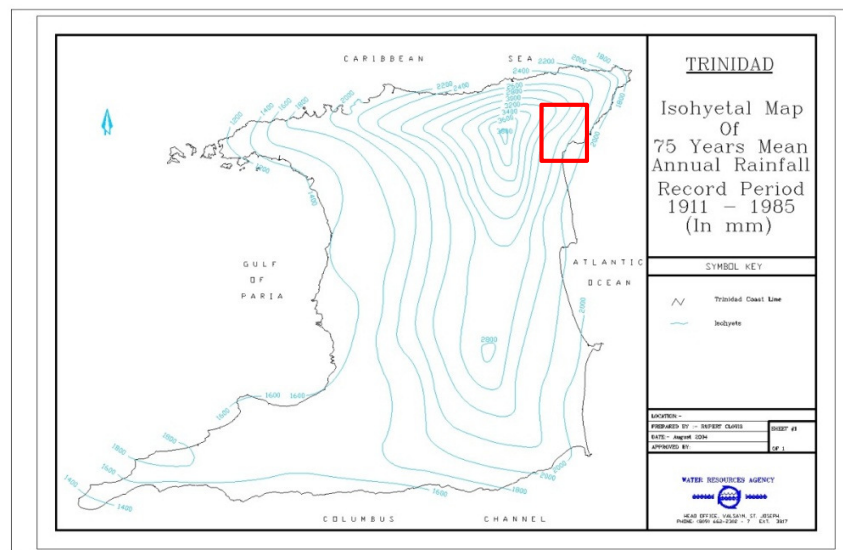


Figure 2-2: Isohyetal Map of Trinidad (Water Resources Agency, 2004)

The Matura River has multiple uses including a surface water treatment plant owned and operated by the Water and Sewerage Authority (WASA). This plant supplies water to the village of Matura, additionally villagers use rainwater harvesting to augment supply to their households. The Matura watershed is therefore of great significance to the operation of the Matura Water Treatment Plant and the WASA.

There are a number of hydrological features along the Matura River which function as eco-attractions to the Matura community and other persons that visit the area. Some of the popular sites are:

1. Mermaid Pool
2. Matura Waterfall
3. Manulot Rapid

Ecological

The Matura Forest Reserve located in the Matura watershed is a designation which was historically intended for timber production, specifically pine. The Forestry Division of the Ministry of Environment and Water Resources manages the forest reserve since it is predominantly state owned lands. This watershed is located adjacent to the Matura Environmentally Sensitive Area (ESA) which was declared in 2004 and contains the largest acreage of intact *Mora* primary forest in Trinidad and Tobago (Department of Life Sciences, 2006). The Matura ESA also forms the habitat of the endangered and endemic Pawi and Ocelot (Environmental Management Authority, n.d).

Presently, sections of the Matura Forest Reserve which falls in the upper watershed have been allocated for watershed conservation, as such pine harvesting has ceased in these areas. A major percentage of the land use in the Matura watershed is primary undisturbed forest. A smaller portion of the watershed is used for residential purposes mainly in the lower regions of the watershed. Additionally, small pockets of agriculture including both animal husbandry and crop farming are undertaken.

A significant feature of the Matura watershed is the presence of a nesting ground for marine sea turtles, namely the leatherback turtle. This nesting ground is located along the Matura Beach adjacent to the outfall of the Matura River. Conservation efforts have been geared towards the protection of this nesting ground through the designation of the Matura Beach as a prohibited area under the Forests Act.

Socio-Economic

The Matura community can be considered a small rural village based on field investigations. The village has an estimated population of 1,600 (McIntosh & Renard, 2010). The major forms of economic activity are fishing, eco-tourism, extractive industry, small retailing and in the most recent past, hunting. Within the watershed a few quarry operations exists, this includes extraction of sand and gravel and processing of this material. As of January 2013, the Minerals Division of the Ministry of Energy and Energy Affairs reported 8 legal quarries in the Matura watershed (Minerals Division, 2013).

The nesting ground at Matura Beach also provides income in the form of guided tours along the beach for visitors to observe turtle nesting and egg-hatching. Nature Seekers, a community based organisation founded in 1990 has been one of the key players in the protection of the nesting ground and providing conservation tours to the Matura area. Additionally, eco-tourism activities include lodging facilities and associated services as well as hiking tours to various recreation sites in the watershed. Figure 2-3 depicts the location of some of the recreational sites and two of the quarries in the Matura watershed.

Watershed Challenges

The major threats to watershed degradation originate from anthropogenic activities that are unsustainably executed. These activities include:

- Illegal quarry operations

- Illegal timber harvesting
- Improper agricultural practices
- Alternative (illegal) agriculture
- Uncontrolled recreational activities

There are numerous reports of illegal quarrying in the Matura watershed (Guardian Media Limited, 2013) resulting in the destructive removal of natural resources and land degradation. Illegal quarry operations are those which are not licensed by the Ministry of Energy and Energy Affairs (MEEA) as such there is no regulation or control of the activities that take place in these quarries. In some instances, material is excavated in an unsafe and unsustainable manner with no land rehabilitation by the operators.



Figure 2-3: Map of Quarries and Recreational Sites in the Matura Watershed

The presence of processing plants near to the Matura River is also a challenge since these wash plants do not have proper sediment controls. Consequently, the runoff from these areas are high in sediment, without trapping of this runoff to allow settling of entrained sediments this water enters the river resulting in sedimentation of the channel and at the outfall point (Matura Bay).

The fact that these quarries are illegal also means that the regulatory agency, Minerals Division of the MEEA is not able to guide operators on proper mechanisms for protection of the natural resources surrounding the quarry. Additionally, monitoring of the environment is not proactively undertaken but rather reactive after reports from the community of the negative effect of quarrying and processing operations on the surrounding environment.

Quarrying is also a significant threat to citizen security due to claims of additional unlawful factors which contribute to the industry. Most recently, there have been claims of a quarry war after the destruction of equipment at one quarry site from an arson attack (Trinidad Express, 2014). These illegal quarries occupy a portion of state lands which is a major percentage of the watershed.

Another prominent issue within the Matura watershed is improper agricultural practices. During the field visit, small pockets of farming were observed along the bank of the river. The unsustainable use of chemicals such as pesticides and fertilisers result in poor water quality in the Matura River which can have serious consequences on aquatic life, the downstream water treatment plant and the general health of the watershed.

Illegal land clearing is also a major challenge in the Matura watershed where forest is removed for a range of activities, namely housing, agriculture, alternative agriculture or planting of marijuana, illegal pine harvesting and quarrying. In addition, vegetation removal due to forest fires is another concern in the Matura watershed. These fires are intentionally set to clear land for both alternative agriculture and subsistence farming.

Changes in the character of the Matura River, specifically, the physical characteristics of the river (sediment and colour) signify that erosion on the banks of the channel is occurring. This erosion is due to a lack of soil protection due to the removal of vegetation. The riparian vegetation especially creates bank/land stability and allows for the filtering of sediments from runoff before it enters the channel. Interviews with field personnel that have historically worked in the area reveal the physical changes to the watercourse which suggests a significant amount of soil erosion is occurring in the Matura watershed.

Littering is another serious challenge in the Matura area due to unrestricted access throughout the watershed. The pristine nature of the Matura River has generated popularity among locals and tourist for river recreational activities. As a result, many persons visit the river on both guided and unguided tours. There is no access restrictions within the watershed as most of the lands are state owned; therefore persons can opt to explore the area without a tour guide. Groups that visit the various attractions along the Matura River report the heavy presence of litter along the nature trails and at the recreational sites.

Generally, there is more control in guided tours as the tour guide is able to encourage and ensure that garbage is not left along the trail or at the destination. In many cases however, persons access these trails unrestricted and the unwanted remnants of these visits are left behind. The litter moves throughout the Matura River and eventually enters the ocean at the Matura Bay. The consequences of garbage in the marine environment are numerous and obvious. Additionally, the riverine fauna face similar effects from the littering habits of visitors to the Matura community.

Indiscriminate dumping in the upper parts of the watershed is also a major concern. During the field investigation, dumping of large appliances and furniture was observed within the Matura Forest Reserve. This is due to the fact that the access to the pine forest is not restricted therefore persons dump garbage in these areas. The absence of proper facilities to dispose of these large items may be one reason for the indiscriminate dumping in the remote areas of the watershed.

3. CURRENT ACTIONS

Actions taken to mitigate against the effects of the emerging threats to the watershed were initiated by the regulatory agencies that constantly monitor the watershed as well as the community-based organisation, Nature Seekers. These mitigation actions range from micro-scaled projects for specific areas of the Matura watershed to broader, holistic programmes geared towards watershed rehabilitation and effective natural resource management in Trinidad and Tobago.

Matura Watershed Rehabilitation

Nature Seekers, was established with the aim of protecting the nesting ground of sea turtles along the Matura Beach. This was the first co-management model developed in Trinidad between the community members and the Forestry Division for sea turtle conservation (Caribbean Natural Resources Institute, 2010). According to (James & Fournillier, 1993) this model establishes that communities can actively contribute towards the protection and sustainable management of natural resources while simultaneously gaining improvements in its socio-economic status and livelihood.

Nature Seekers formed out of a need for protection of nesting turtles after a long history in the community of hunting these turtles for eggs, shells and meat. The Wildlife Section of the Forestry Division recognised the importance of community involvement in the conservation of the Matura Beach nesting ground after it was declared a Prohibited Area in 1990. Consequently, Nature Seekers was formed by a group of villagers that have been able to reduce the rates of turtle slaughtering from 30% to zero (McIntosh & Renard, 2010). Unfortunately, in March 2014 one event of turtle poaching in Matura was reported by Nature Seekers, assumed to be as a result of the turtles becoming entangled in fishing nets (Guardian Media Limited, 2014).

The activities of Nature Seekers have evolved to include conservation of the flora and fauna in the Matura community due to the changing needs of the watershed. Currently, the organisation is undertaking a reforestation programme in the lower watershed in collaboration with the National Reforestation and Watershed Rehabilitation Programme (Sammy, 2014). The reforestation programme will provide multiple benefits to the watershed both through improvement of water quality at the lower reach of the Matura River but also by attracting wildlife. Additionally, Nature Seekers has expanded their operations to include provision of tour guide services, part-ownership of a guesthouse, fire prevention and fighting services, community education and consultancy (McIntosh & Renard, 2010).

The community, through Nature Seekers is able to obtain gainful employment from the various environmentally sustainable projects the organisation has undertaken. According to (Sammy, 2014), approximately 1.2 km² of land has undergone reforestation in the Matura watershed. In addition to reforestation, Nature Seekers assists in extinguishing forest fires using equipment owned by the group. Fire guardians consist of community members and employees who are trained by Nature Seekers.

Land has also been leased to Nature Seekers for organic farming which provides further income for the group. In addition, community members have been able to benefit from increased knowledge and technical capacity from the various programmes Nature Seekers has embarked upon. This encompasses inter alia, training in forestry, fire prevention and eco-tourism (McIntosh & Renard, 2010).

Another significant achievement of Nature Seekers is the educational programmes that are carried out in the schools of the communities along the north-east coast of Trinidad. The programme attempts to bring awareness to the relationship between turtles and fishing as well as the importance of watershed rehabilitation to water supply in the community. These educational programmes are also extended to interested persons within various communities along the north-east coast of Trinidad.

The Forestry Division of the Ministry of Environment and Water Resources has also been active in the Matura watershed both in terms of wildlife and forest conservation. The aspects of wildlife conservation have been highlighted in the case study of Nature Seekers through collaborative management of the sea turtle nesting ground. A significant action taken by Forestry Division is the assignment of specific regions of the pine forest in the upper watershed for watershed conservation, therefore pine harvesting in these areas have ceased.

The Forestry Division also monitors forest fires within the Matura Forest Reserve from a fire tower located in the upper watershed (Figure 2-3). Foresters patrol the Matura Forest Reserve monitoring the activities that occur in the watershed, the intention is for these reports to feed into protection and rehabilitation programmes.

The National Reforestation and Watershed Rehabilitation Programme of the Ministry of Environment and Water Resources play a role in watershed protection and rehabilitation in Matura. The core purpose of this programme is to reforest degraded state lands throughout Trinidad and Tobago (Ministry of Housing and the Environment, 2011). Watershed rehabilitation is undertaken through the forest rehabilitation programme executed by Nature Seekers in the Matura area.

Country-Wide Rehabilitation Initiatives

The policy context of water resources management is imperative to the formation, implementation and administration of watershed rehabilitation initiatives in Trinidad and Tobago. In 2005, the National Integrated Water Resources Management Policy (NIWRMP) was enacted in Trinidad and Tobago. The NIWRMP makes reference to satisfying and managing the demands of all water users through a sustainable approach. It also sets the framework for water allocation priorities, issues facing the water sector, instruments for policy implementation and monitoring/review of the policy. (Water Resources Management Unit, 2005).

The Water and Sewerage Authority of Trinidad and Tobago (WASA) through the Water and Sewerage Act is mandated to provide water and sewerage services to the population. The Waterworks and Water Conservation Act also provides legal context to the management of water resources in Trinidad and Tobago.

Attributed to the NIWRMP, the Water Resources Agency (WRA) of the WASA initiated an Integrated Water Resources Management (IWRM) Stakeholder Forum. The aim of this forum is to bring stakeholders together to forge strategies to cope with challenges facing the sector in an integrated manner while simultaneously promoting the coordinated development and management of water, land and related resources (Water Resources Agency, 2012). The IWRM Stakeholder Forum initiated in 2009 was able to bring to the fore the major water issues facing civil society, corporate entities and government agencies. Stakeholders focused on five thematic areas, namely:

1. Watershed Protection
2. On Farm Water Management
3. Public Education
4. Wastewater Standards
5. National Information Database

Due to financial and other constraints some of the projects have not materialised to date. Continuation of the IWRM Stakeholder Forum and implementation of projects is expected in the near future.

The WASA through the WRA has also initiated the Adopt a River Programme (AARP) which is an initiative that attempts to involve corporate and community based organisations in the improvement of watersheds (Water Resources Agency, 2013). The AARP focuses on educating the population of Trinidad and Tobago on water and the critical nature of the resource. The programme intends to build an appreciation for natural resources and promote a sense of guardianship for water and its management by empowering community groups through training and awareness. A group can “adopt” or undertake a project in a chosen watershed that will attempt to achieve the main objectives of the AARP.

Priority watersheds have been identified throughout Trinidad and Tobago based on the quality of the watershed and its importance to water supply. The Matura watershed has not been designated as a priority watershed since it is still able to maintain the balance between human development and its ecological capacity. However, this does not limit a group from adopting the Matura watershed to conduct a rehabilitation project. The WASA still has a vested interest in the Matura watershed due to the presence of a water treatment plant in the area. The presence of a water treatment plant gives the Authority a vested interest in the Matura watershed.

The Minerals Division of the MEEA is another government agency that has been actively engaged in an exercise to regulate all quarry operations throughout Trinidad and Tobago. This has led to the formation of the Minerals Advisory Committee which comprises of representatives from a number of government agencies involved in the regulation of the quarry sector in some regard. As such, the Minerals Division has attempted to shut down all illegal quarry operations throughout the country. In September 2014, this was enforced in the Matura area (Daily News Limited, 2014) where equipment from some of these illegal quarries were seized due to numerous reports of degradation to the watershed.

In addition to the exercise to stop illegal quarrying the Minerals Division and the Minerals Advisory Committee have begun an effort to streamline quarry operations. This has been carried out through the development of guidelines for design and rehabilitation of quarries. The regulatory process for quarrying has also become more stringent where operations over 0.61 km² are required to obtain a Certificate of Environmental Clearance from the Environmental Management Authority.

4. OUTCOMES OF CURRENT ACTIONS

Measuring the success of the current actions can be a difficult task with the absence of baseline data for the Matura watershed. The WRA has the fiduciary responsibility for monitoring of the hydrological systems in Trinidad and Tobago and the quality and quantity of water resources in the Matura watershed have been frequently monitored. Consequently, the impacts of the emerging threats to the watershed have been recognised by the WRA, Forestry Division, Ministry of Environment and Water Resources and Nature Seekers, this is the impetus for the previously mentioned initiatives.

In the past, the strategies that have been initiated by government agencies to protect watersheds in Trinidad were more reactive than proactive. The benefit to the Matura watershed is that an early response was initiated to the emerging challenges within the area based on experiences in other watersheds. This has led to a series of interventions which originated out of a need to protect the natural capacity of the Matura watershed.

The recognition of the significance of community involvement by regulatory agencies is critical to the effectiveness and sustainability of the initiatives which are currently being undertaken in the Matura watershed. The partnership between Nature Seekers and the Forestry Division as well as the Ministry of Environment and Water Resources is one example of collaborative adaptive management. The extent to which all phases of integrated and adaptive water resources management (I/AWRM) are carried out is difficult to ascertain due to data limitations. To some extent this can be considered a case of evolutionary adaptive management as the stimulus was the prominence of sea turtle poaching. The Matura community was able to identify a situation which required adaptation in order to maintain the balance between the human and ecological capacity of the watershed while the relevant government bodies were able recognise the necessity of stakeholder engagement and participation in the process of natural resource management.

Nature Seekers has also increased the adaptive capacity of the community through its training and education programmes in schools and with residents. The effect of this type of strategy is one which will not materialise for generations to come but will have a powerful influence on the way a community is able to actively participate in the management of its natural resources. Building awareness among youth will have a substantial and long-term effect on the culture of the Matura community to one of environmental sustainability and natural resource protection. The impact of the work of Nature Seekers has been successful as the members of this group have evolved from families of poachers (Sammy, 2014) who now understand the importance of sustaining this natural resource.

The driver for halting pine harvesting in one area of the Matura Forest Reserve was watershed rehabilitation. This action may be considered a form of passive adaptive water resources management since the Forestry Division has acknowledged the impact of forest removal in adjacent watersheds, specifically other areas of the Northern Range and the detrimental consequences of land degradation to the health of the watershed. However, more environmental education is required to ensure the desired outcome of watershed conservation is achieved and the protection of the primary forest remains a sustainable initiative.

The AARP is another example of collaborative I/AWRM. While presently there are no projects within the Matura Watershed this programme has great potential in the Matura area to deal with some of the existing challenges to the water resources of the area. The AARP through the WRA also encompasses community-based training in water resources management. The curriculum of this training course highlights the scientific aspects of water resources and the hydrological cycle in addition to the importance of human activity to the health and quality of watersheds (Water Resources Agency, 2012). At the end of this training session, community residents are expected to understand their role in watershed protection and management with the aim of empowering the community to play an active role in the IWRM decision-making process.

The main problems that remain in the watershed are specific to the quarry sector and its operations in the Matura area. Traditionally, quarrying has been an unregulated industry with minimal controls on the environmental consequence during and after the operation. While the MEEA has attempted to streamline the industry a culture shift to one of environmental sustainability is necessary to ensure the Matura watershed stays in balance. A lack of resources to enforce and monitor the quarry sector is the main hindrance to achieving the objectives of this reform initiative.

The problems of regulation, monitoring and enforcement are not limited to the quarry sector. These challenges are also experienced by the Forestry Division with the responsibility of monitoring the Matura Forest Reserve. The presence of illegal activities, namely marijuana plantations in the remote areas of the watershed impedes the functions of various agencies responsible for natural resource management. In the case of the WRA and the WASA, the rehabilitation of more degraded watersheds critical to the water supply of the country, specifically within the Caroni basin has become priority. The Caroni basin is a significant source of raw water that is treated to provide potable water for north, central and parts of south Trinidad. These areas house the major urban centres of the country.

The actions that have been taken to protect natural resources within the Matura watershed have been sustainable primarily because of community participation in its planning, implementation and monitoring. Community engagement is critical to the sustainability of natural resource management strategies as community members are actively involved in the decision-making and execution process which brings a sense of ownership.

The Nature Seekers model is one that has been applied to adjacent similar watersheds where the community are included in both conservation and business initiatives. Eco-tourism is one of the main industries in the

Matura watershed and from the example of Nature Seekers, if the community is allowed to sustainably benefit from the natural resources the need for conservation of the resource becomes intrinsic.

5. CONTACT

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6. BIBLIOGRAPHY

- Caribbean Natural Resources Institute. (2010). *Conserving the Grande Rivierie Watershed: A case study of collaborative forest management in north-east Trinidad*. Laventille: Canari.
- Daily News Limited. (2014, September 22). *24 vehicles seized in Matura forest*. Retrieved from Trinidad and Tobago Newsday: <http://www.newsday.co.tt/news/0,200705.html>
- Department of Life Sciences. (2006). *Matura National Park ESA: Participatory Biological Baseline Survey*. St. Augustine: University of the West Indies.
- Environmental Management Authority. (n.d). *Environmentally Sensitive Area: Matura National Park*. Port-of-Spain: Environmental Management Authority.
- Guardian Media Limited. (2013, January 19). *Illegal quarrying in Matura likened to drug smuggling*. Retrieved from Trinidad and Tobago Guardian: <http://www.guardian.co.tt/news/2013-01-19/Illegal-quarrying-matura-likened-drug-smuggling>
- Guardian Media Limited. (2014, March 29). *Poachers, nets kill turtles at Matura*. Retrieved from Guardian : <http://www.guardian.co.tt/news/2014-03-29/poachers-nets-kill-turtles-matura>
- Iverson, T. (2011). *Minimax Regret Discounting*. unknown: unknown.
- James, C., & Fournillier, K. (1993). *Marine Turtle Management in NE Trinidad: A successful community based approach towards endangered species conservation*. Port-of-Spain: Forestry Division.
- McIntosh, S., & Renard, Y. (2010). Placing the commons at the heart of community development: Three case studies of community enterprise in Caribbean Islands. *International Journal of the Commons*, 4(1).
- Minerals Division. (2013). Quarry Listing (January 23, 2013). Ministry of Energy and Energy Affairs.
- Ministry of Housing and the Environment. (2011). National Reforestation and Watershed Rehabilitation Programme. Port-of-Spain.

- Sammy, D. (2014, November 26). Matura Watershed Challenges and Interventions. (S.-J. Govia, Interviewer)
- Trinidad Express. (2014, August 14). *Million dollar arson attack on Matura quarry*. Retrieved from Trinidad Express Newspapers: <http://www.trinidadexpress.com/news/Million-dollar-arson-attack-on-Matura-quarry-271280581.html>
- Water and Sewerage Authority. (2014, January 24). *Water Resources Agency Overview*. Retrieved from Water and Sewerage Authority: http://www.wasa.gov.tt/WASA_WRA.html
- Water Resources Agency. (2004). Isohyetal Map of Trinidad. Water and Sewerage Authority.
- Water Resources Agency. (2005). *State of the Water Resources*. St. Joseph: Water and Sewerage Authority.
- Water Resources Agency. (2012). *Community Based Training Manual*.
- Water Resources Agency. (2012). *IWRM Position Paper*.
- Water Resources Agency. (2013). *Adopt a River Programm Information Holder*. Barataria: Water Resources Agency.
- Water Resources Agency. (n.d.). Water Resources Information. Water and Sewerage Authority.
- Water Resources Management Unit. (2005). *National Integrated Water Resources Management Policy*. Port-of-Spain: Government of Trinidad and Tobago.