

GENERAL CONFERENCE TOPIC:

WATER RESOURCES AND COASTAL ZONE MANAGEMENT

TITLE OF PAPER:

DOUBTS ABOUT DROUGHTS?
ELEMENTS OF A SUITABLE NATIONAL DROUGHT POLICY
FOR
TRINIDAD AND TOBAGO

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ABSTRACT

A historical review of the occurrences of droughts in the Caribbean Region would yield country examples such as Haiti, Cuba and Jamaica (EM-DAT Database). However, for the period ending the last quarter of 2009 to the first quarter of 2010, Trinidad and Tobago and many other islands of the Caribbean Basin (including Barbados, St. Lucia and Grenada) have been characterised with what appears to be a newfound era of serious drought-like conditions.

Albeit Trinidad and Tobago has never had a drought of the magnitude to be considered a natural disaster, the above conditions now mandate the need for a National Drought Policy that forms part of the country's overall disaster risk reduction strategy.

This paper provides a historical overview of drought conditions in the Caribbean and examines the incidence of these and other natural disasters as they relate to Trinidad and Tobago. Additionally, a review of (1) the literature on the socio-economic impacts of droughts; (2) selected drought-prone country case studies; and (3) suitable elements of the national drought policies of a few countries is undertaken herein. The main objective of the paper is to use the aforementioned as a framework to inform the establishment of an appropriate National Drought Policy for the twin-island of Trinidad and Tobago.

¹ The author would like to acknowledge the research assistance provided by Mr. Vishram Rooplal of the Academic Affairs Department at the Cipriani College of Labour and Co-operative Studies.

1.0 INTRODUCTION

On March 14th, 2010 the Former Minister of Public Utilities, Honourable Mustapha Abdul-Hamid reported that the Trinidad and Tobago Meteorological Service had officially declared that the country was experiencing a meteorological drought (Abdul-Hamid 2010b). For the first time in its immediate history, the populace of Trinidad and Tobago were faced with a meteorological drought² of the magnitude comparable to that of a natural disaster. Using the EM-DAT's definition of natural disasters, the year 2010 was therefore the first recorded year that a drought was added to the EM-DAT's Database for this twin-island republic since 1900.

Pre-2010 historical records on the occurrence and incidence of natural disasters in this Caribbean Small Island Developing State (SIDS) reveal that it was impacted by nine (9) natural disasters during the period 1900 to 2010. More specifically, Table 1 reveals that the associated and measureable impacts of these included forty-five (45) deaths, injury, homelessness, the absence of basic needs for approximately fifty three thousand (53,000) people and an estimated damage cost of sixty-four million (US\$64m) dollars.

TABLE 1: NATURAL DISASTER PROFILE OF TRINIDAD AND TOBAGO FOR THE PERIOD 1900 TO 2009

DISASTER DATE	DISASTER TYPE/ NAME	TOTAL NUMBER OF DEATHS	TOTAL NUMBER OF PEOPLE AFFECTED	TOTAL DAMAGE (US\$)
September 9th, 2004	Storm (Hurricane Ivan)	1	560	1,000,000
April 22nd, 1997	Earthquake	-	17	25,000,000
October 17th, 1996	Flood	-	200	-
October 5th, 1993	Flood	5	10	70,000
July 7th, 1993	Storm (Hurricane Bret)	-	-	57,000
July 25th, 1990	Storm (Hurricane Arthur)	-	1,000	-
August 14th, 1974	Storm (Hurricane Alma)	2	50,000	5,000,000
September 30th, 1963	Storm (Hurricane Flora)	24	-	30,000,000
June 27th, 1933	Storm (Unknown Name)	13	1,000	3,000,000
	TOTAL	48	52,787	64,127,000

Sources: EM-DAT: The OFDA/CRED International Disaster Database www.em-dat.net – Université Catholique de Louvain - Brussels – Belgium, Mitchell (1933) & Alexander (2010)

²**Meteorological Droughts** are usually defined on the basis of the degree of dryness and the duration of the dry spell. Oftentimes, past data on “degree of normal or average dryness” or “water availability” is used to compare deviations from these whereby conditions of “abnormal or increased dryness” or “severe water scarcity” occurs in a particular area and over a period of time. One can also distinguish between Agricultural and Hydrological Droughts. In the case of former, **Agricultural Droughts** link meteorological characteristics to agricultural impacts as the source for drought conditions. Conversely, **Hydrological Droughts** are defined in terms of the associated effect of precipitation shortfalls on the amount of surface and subsurface water supply in an area (adapted from the PDC Website).

Whilst a few other Caribbean Countries such as Haiti, Cuba and Jamaica have been affected by droughts in the past (see Table 2), others such as Barbados, Grenada and St. Lucia were for the very first time in a similar predicament to Trinidad and Tobago in experiencing drought conditions this year.

TABLE 2: INCIDENCE AND OCCURRENCE OF DROUGHTS IN CARIBBEAN COUNTRIES FOR THE PERIOD 1900 TO 2009

CARIBBEAN COUNTRIES	YEAR OF DROUGHTS	TOTAL NUMBER OF DROUGHTS	TOTAL NUMBER OF PEOPLE AFFECTED	TOTAL DAMAGE (US\$)
(1) Anguilla	1919	1	0	-
(2) Antigua and Barbuda	1983	1	75,000	-
(3) Cuba	1981, 1986, 1993, 1998, 2000, 2004	6	820,000	183,139,000
(4) Dominican Republic	1968	1	240,000	5,000,000
(5) Guyana	1988, 1997	2	607,200	29,000,000
(6) Haiti	1968, 1974, 1977, 1980, 1992, 1993, 2003	7	2,305,217	1,000,000
(7) Jamaica	1968, 1981, 2000	3	1,000,000	6,500,000
(8) Puerto Rico	1994	1	0	2,000,000
	TOTAL	22	4,147,417	226,639,000

Source: EM-DAT: The OFDA/CRED International Disaster Database www.em-dat.net – Université Catholique de Louvain - Brussels – Belgium

In an attempt, to address the undeniable drought conditions that existed in Trinidad and Tobago and possible future ones, the author begins with a preliminary framework that draws on the contents outlined in sections two, three and four of this paper. These sections tersely present (1) the socio-economic impacts of droughts; (2) selected drought-prone country case studies; and (3) suitable elements of the national drought-related policies of a few countries, respectively. This paper is therefore a preamble for the rigorous formulation of an actual and suitable National Drought Policy for Trinidad and Tobago that draws on the prescriptive experiences of other countries and elements that are congruent with the realities of this island.

2.0 A REVIEW OF THE SOCIO-ECONOMIC IMPACTS OF DROUGHTS

Fortunately, unlike other natural disasters³, the droughts experienced in Caribbean countries and previously outlined in Table 2 have not resulted in the death, injury and homelessness of any individuals. However, the proportional damage costs identified in Table 1 (64,127,000) far outweigh those in Table 2 (226,639,000) even though the former table depicts half the number of disasters than the latter and includes only one country (EM-DAT: The OFDA/CRED

³ Such as wind storms, earthquakes and floods only.

International Disaster Database). This suggests therefore that the financial losses from a given drought are one of the most crucial impacts of this type of natural disaster.

Tables 3 outlines some of the economic impacts of droughts on countries and disaggregates these impacts by the general and specific characteristics outlined in the literature and from other credible sources. In particular, and for Trinidad and Tobago, the impacts of drought on agricultural producers and livestock producers are noteworthy. In Johnson (2010) for example, Mr. Norris Deonarine, Education and Research Officer of the National Food Crop Farmers Association indicated that farmers in Trinidad did not have enough water for their crops and for their animals. This has implications for their incomes if yields from both are lower than average.

TABLE 3: ECONOMIC IMPACTS OF DROUGHTS ON COUNTRIES

ECONOMIC IMPACTS	
GENERAL IMPACTS	SPECIFIC IMPACTS
(1) Cost and Losses to Agricultural Producers	<ul style="list-style-type: none"> • Reduced Incomes for Agricultural producers • Poorer quality crops • Lower yields of crops (quantity or stock) • Loss of crops (due to lower yields, light-weight produce) • Reduced productivity of the crop land • Increased irrigation costs • Cost of new or supplemental water sources (wells, dams, pipelines)
(2) Cost and Losses to Livestock Producers	<ul style="list-style-type: none"> • Reduced Incomes for Livestock producers • Decreased stock weights • High Livestock mortality rates • Disruption of reproduction cycles (due to delayed breeding, more miscarriages) • Closure of grazing lands • Unavailability of water for livestock • Reduced milk production • High costs of water for livestock • Cost of new or supplemental water sources (wells, dams, pipelines)
(3) Loss from Timber Production	<ul style="list-style-type: none"> • Loss of trees • Fires • Tree diseases
(4) Loss from Fishery Production	<ul style="list-style-type: none"> • Damage to fish habitats • Loss of fish and other aquatic organisms (due to decreased flows)
(5) Decline in Food Production and Disruption in Food Supply	<ul style="list-style-type: none"> • Increased prices of local food • Increased importation of food • Loss of revenue from water-dependent goods and services that are exported
(6) Loss to Tourism Industry	<ul style="list-style-type: none"> • Loss to manufacturers and sellers of recreational equipment • Loss to tourism-related activities such as hunting, fishing, bird watching, etc.
(7) Energy related impacts	<ul style="list-style-type: none"> • Increased demand for energy • Reduced supply because of increased drought-related power activities
(8) Loss to Water Suppliers	<ul style="list-style-type: none"> • Decline in Revenue (if metred) • Cost of water transport or water transfer • Cost of new or supplemental sources of water to meet demand
(9) General Economic Effects	<ul style="list-style-type: none"> • Loss to industries directly dependent on agricultural production • Unemployment in drought-impacted industries • Reduction in overall economic development

Sources: NDMC Website & IDRC (2005)

Tables 4 outlines some of the social impacts of droughts on countries based on both general and specific characteristics outlined in the literature and from other credible sources.

TABLE 4: SOCIAL IMPACTS OF DROUGHTS ON COUNTRIES

SOCIAL IMPACTS	
GENERAL IMPACTS	SPECIFIC IMPACTS
(1) Health Impacts	<ul style="list-style-type: none"> • Mental Stress (anxiety, depression) • Physical Stress (domestic violence) • Health-related low-flow problems e.g. Reduced Sewage flows • Poor nutrition (due to stress related dietary deficiencies, high cost of food) • Increased respiratory ailments • Public Safety from fires
(2) Conflicts	<ul style="list-style-type: none"> • Water user conflicts
(3) Quality of Life	<ul style="list-style-type: none"> • Increased poverty • Population Migration • Loss of aesthetic values • Reduction or modification of recreational activities
(4) Other Social Impacts	<ul style="list-style-type: none"> • Dissatisfaction with Government Drought Response • Perceptions of Inequity (related to gender, age, socioeconomic status, ethnicity)

Sources: NDMC Website & IDRC (2005)

3.0 DROUGHT-PRONE COUNTRY CASE STUDIES

This section briefly reviews the measures utilized by four countries to manage drought conditions.

Case Study 1: Bolivia

Overview and Contributing Factors to Droughts: Bolivia is a country that is marred with water problems. These include areas where water is outrightly scarce and areas where when available that access to water is a problem. This country exemplifies how water scarcity results in water wars. In 2000, after much resentment over the two-year privatization of water by a private, foreign company named Aguas del Tunari, social groups paralyzed the country by blockades. This resulted in the loss of lives, riots and a measure of anarchy. The Government of Bolivia discontinued its contract with Aguas del Tunari. Paradoxically, this company was allowed to sell water in the Cochabamba City of Bolivia without themselves paying for it.

Solutions: The solution to water wars that were linked to drought woes in the Bolivia was resolved when a local Council was formed based on suggestions from representatives of civil society and social organisations. This council was called Consejo Interinstitucional del Agua (CONIAG) and developed in order to devise a water management law that had public consultation. The Law was eventually passed in 2004 and quarantined water rights to water for indigenous and farming communities. Additionally, in 2005, the Government of Bolivia created a Water Ministry to deal with water issues in this Andean country.

Another approach included the use Geographical Information System (GIS) Technology coupled with the establishment of database of registered individuals with legal water rights via field work conducted by local farmers and irrigators' groups. In tandem, both approaches made it easier to identify and guarantee that indigenous people, peasants and small farmers have access to water (IDRC 2005).

Case Study 2: China

Overview: The interior province in China called Guizhou has a district called Changshun County that is located in the south west region of the country. This area is prone to drought conditions which have resulted in lower yields from crops, little crop diversification, degraded forests and overgrazed land. Women in these parts face the heavy burden of collecting water for their families daily during the dry winter season.

Contributing Factors to Droughts: In this region of China, people reside on hilly and dry terrain that is marked by acute water shortages. Groundwater is difficult to access because the subsurface of the hills are made of porous limestone and dolomite. As a result, it is difficult for groundwater to be trapped on this type of terrain. These natural conditions predispose this area to having a restricted water supply.

Solutions: In the above scenario, relief from drought was derived from a Community-based Natural Resource Management (CBNRM) approach that was based on shared learning. In stark contrast to the conventional approaches used in this centralized society, a bottom-up approach that involved the direct involvement of local villagers in a new water system proved more successful and practical. Villagers in this region policed this vital resource (water) by agreeing to regulate, maintain, manage and even pay for the quantity of water used - a practice that had set a new precedent in China. As a result of an improved water supply, these women were now able to use the time saved from collecting water to grow other types of fruit trees, mushrooms and strawberries (IDRC 2006a).

Case Study 3: Middle East and North Africa (MENA) Region

Overview: According to IDRC (2006b), the MENA Region⁴ is the most water-scarce location in the world. In fact, countries located therein are either below or close to below the *water barrier* or critical line below which it becomes very difficult to survive. This barrier also refers to the quantifiable condition whereby a country has less than 500m³ of water per person annually.

Contributing Factors to Droughts: In this region the increased demand for water caused by Low annual rainfall, Low per capita volume of renewable water resources, Population growth;

⁴ The MENA Region members include countries such as Algeria, Morocco, Tunisia, Egypt, Jordan, Lebanon, West Bank and Gaza, Syria and Yemen.

Development Trends; Increased Urban Migration, High Proportion of Youth in Countries, Industrial Actors, the Tourism Sector and the Irrigation-dependent Agriculture Sector coupled with a limited and fixed water supply.

Solutions: The solution to drought woes in this region revolved around saving water in order to ensure that a supply exists for the future. Specifically, it includes the use of drip irrigation, low-flow faucets, low flow toilet, treated “grey water” (lower quality water from sinks and bathtubs) to water plants and irrigate crops, reclaimed water from natural plants and mechanical plants, the use of mixed water or reclaimed water and freshwater and the establishment of Water User Associations (WUA) to allocate water more equitably among different actors.

Case Study 4: Trinidad and Tobago

In both a statement to the House of Representatives in Parliament and a subsequent address to the nation the then Minister of Public Utilities, Honourable Mustapha Abdul-Hamid outlined some specific measures utilised by Government of Trinidad and Tobago and its State-owned Water and Sewerage Authority (WASA) to deal with the meteorological drought experienced at the onset of 2010. These measures included both physical and non-physical strategies for drought management (Abdul Hamid 2010a and 2010b).

TABLE 3: PHYSICAL AND NON PHYSICAL STRATEGIES UESD FOR DROUGHT MANAGEMENT IN TRINIDAD AND TOBAGO IN 2010

PHYSICAL STRATEGIES	NON PHYSICAL STRATEGIES
(1) WASA undertook a Leak Repair Programme and the Public School Leak Repair Programme.	(1) Implementation of Water Schedules.
(2) WASA has assisted it Large Commercial customer to identify and repair leaks from their premises.	(2) Monitoring of consumption patterns (demand for water) of the top 200 large-scale customers.
(3) Creation of 10 wells in communities to increase the water supply therein and to avoid wastage of waters via distant sources instead of local sources.	(3) Public Awareness about water restriction for rivers and watercourses that should not be accessed for water and other practical water conservation methods that could be utilised in the homes of citizens. This was achieved via the National Water Conservation Public Education Programme which was launched on December 1st, 2009.
(4) Installation of new pipelines to (1) ensure that there was an increase in the transmission capacity; and (2) to complete the transmission grid in certain areas.	(4) Stiffer penalties for violation of restrictions abstraction.
(5) In March, WASA reduced the water production from its main reservoirs (Arena, Navet, Hollis and Hillsborough).	(5) Water restrictions and enforcement of bans on the use of water hoses, power washing equipment (pressure washers), fountains and sprinklers for plants, lawns and cleaning buildings.
(6) Barging water from three rivers in the North Coast where there is a surplus to ports in the South West of the county where there is a water supply shortage.	(6) WASA purchased more water from Desalination Company of Trinidad and Tobago (DESALCOTT) to increase the combined daily production of water in the country.
	(7) Purchase of Small Package Desalination Plants
	(8) Purchase and Installation of Portable Water Treatment plants for five communities severely affected by water including Point Fortin, Penal, Fyzabad, Matura and Talparo.

Sources: Abdul-Hamid (2010a) & Abdul-Hamid (2010b)

4.0 NATIONAL DROUGHT POLICIES: COUNTRY CASE STUDIES

Having reviewed some drought management strategies used by countries above, this section now examines specific elements of actual drought policies for two different countries: Australia and St. Lucia. The intent herein is to postulate suitable elements for a National Drought Policy for Trinidad and Tobago.

Lessons Learned from the Government of Australia

For decades prior to the formulation of its National Drought Policy in 1992, the Government of Australia provided a variety of ex post relief measures for drought-affected farmers. Some of these measures included, among other things, the provision of subsidies for livestock producers, cash grants and low-interest loans. These relief measures were facilitated under the country's National Disaster Relief Arrangement (Quiggin and Chambers, 2004; Marangos and Williams, 2005).

Quiggin and Chambers (2004) revealed that the sole use of ex post⁵ relief measures, identified in the preceding paragraph, was criticized by some economists in the pre-1992 period because they:

- Discouraged the use of ex ante⁶ measures;
- Encouraged overstocking; and
- Resulted in disparities with the distribution of relief funds among agricultural producers.

Consequently, the National Drought Policy devised in 1992 contained considerable changes for drought management that both altered the pre-existing status quo and factored in comments from various critics. Some of the changes that were made and that could be beneficial for the formulation of a Trinidad and Tobago National Drought Policy include:

- Active involvement of agricultural producers in the reduction of the moral hazard problem by ensuring that specific measures are undertaken in the pre-disaster period to reduce the subsequent impacts of droughts. This contrasts with the relief-dependence measures that discourage activities for self-protection in the pre-disaster period; and
- Reclassification of Droughts as part of a farmer's normal environment that must be managed efficiently as any other risks as opposed to being viewed as paralysing natural disasters (Quiggin and Chambers, 2004; Marangos and Williams, 2005).

⁵ These include measures undertaken *after a* natural disaster has occurred, in order to reduce the impacts in the aftermath of the event.

⁶ These include measures undertaken *prior to* a natural disaster, in order to reduce the impacts in the aftermath of the event.

Even though the above changes (as outlined in the Nation Drought Policy for 1992) were adopted by the Government of Australia, this paradigm shift was still accompanied by the provision of drought relief for producers in the event of “extreme droughts” and “exceptional circumstances” (Marangos and Williams, 2005).

Lessons Learned from the Government of St. Lucia

In 2009 the Government of St. Lucia approved a “Water Management Plan for Drought Conditions” or Drought-like Policy in Cabinet (GOSL 2009). Some useful elements of this plan that could be used for the formulation of a Trinidad and Tobago National Drought Policy include:

- A comprehensive overview of previous and existing drought conditions in the country;
- The status of water sources and existing infrastructural capacity;
- The status of existing sewerage systems;
- Identification of the lead responder to general drought conditions;
- Identification of the lead responder when drought conditions have reached the magnitude of a natural disaster;
- Specific sources of personnel in the event that a major drought is experienced;
- Specific Legislation that are linked to water, drought and natural disasters;
- Details about the distribution of the “Plan for Drought Conditions” among different individuals and institutions;
- Specific date for the renewal and revision of the Plan on an annual basis;
- A list of other water-related documents that supplement the Plan;
- Specific list of ongoing training and professional development that would be used to provide staff with the knowledge to manage drought conditions (including training in Initial Damage Assessment);
- Details about the establishment of a Drought Task Force and its Chairman and membership;
- Identification of the entities that would be involved in monitoring drought conditions; and
- Details outlining the formal process for the declaration of a National Drought Emergency.

5.0 CONCLUSION

Clearly, Trinidad and Tobago’s history was significantly altered with the advent of the prolonged changes in precipitation in 2010. A National Drought Policy for Trinidad and Tobago is therefore the embryonic stage of beginning to deal with this type of disaster. As such, the following are suggestions that can be used for drought management in Trinidad and Tobago.

1. Firstly, a distinct National Drought Policy should be formulated to supplement the existing National Integrated Water Resources Management Policy of 2005. This

separation is warranted because the latter does not explicitly address a comprehensive approach to deal with this crisis that faced Trinidad and Tobago this year.

2. Secondly, new drought-specific legislation, necessary expertise and collaboration amongst governmental organizations⁷ linked to water resources are imperative for the formulation of a National Drought Policy.
3. Thirdly, active consultations between diverse, local actors⁸ (including Agricultural Producers, Livestock Producers, individuals that were severely affected in 2010) and the governmental organizations outlined above can chart the way forward for a suitable policy that manages this country's precious natural resource (water).

Of course the disparate nature of policy formulation and policy implementation presents yet another challenge. However, since there are no doubts about droughts in the future of Trinidad and Tobago it is imperative that a National Drought Policy be formulated for this country.

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⁷ Some of these governmental organizations include Water and Sewerage Authority (WASA), Water Resources Agency (WRA), Ministry of Public Utilities, Ministry of Agriculture, Land and Marine Resources, Ministry of works and Transport, National Agricultural Marketing and Development Corporation, Agricultural Development Bank, Office of Disaster Preparedness and Management (ODPM), Trinidad and Tobago Meteorological Service and Ministry of Planning, Housing and the Environment.

⁸ Local actors include National Food Crop Farmers Association, Agricultural Society of Trinidad and Tobago, The Cattle Farmers Association, Beekeepers Association, Cocoa Farmers Association, Rice Growers Association, Land Use Planners, Geographic Information System Specialists, Economists, Sociologists, Legal Professionals, Disaster Specialists and others.

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