

Charley George Granvorka

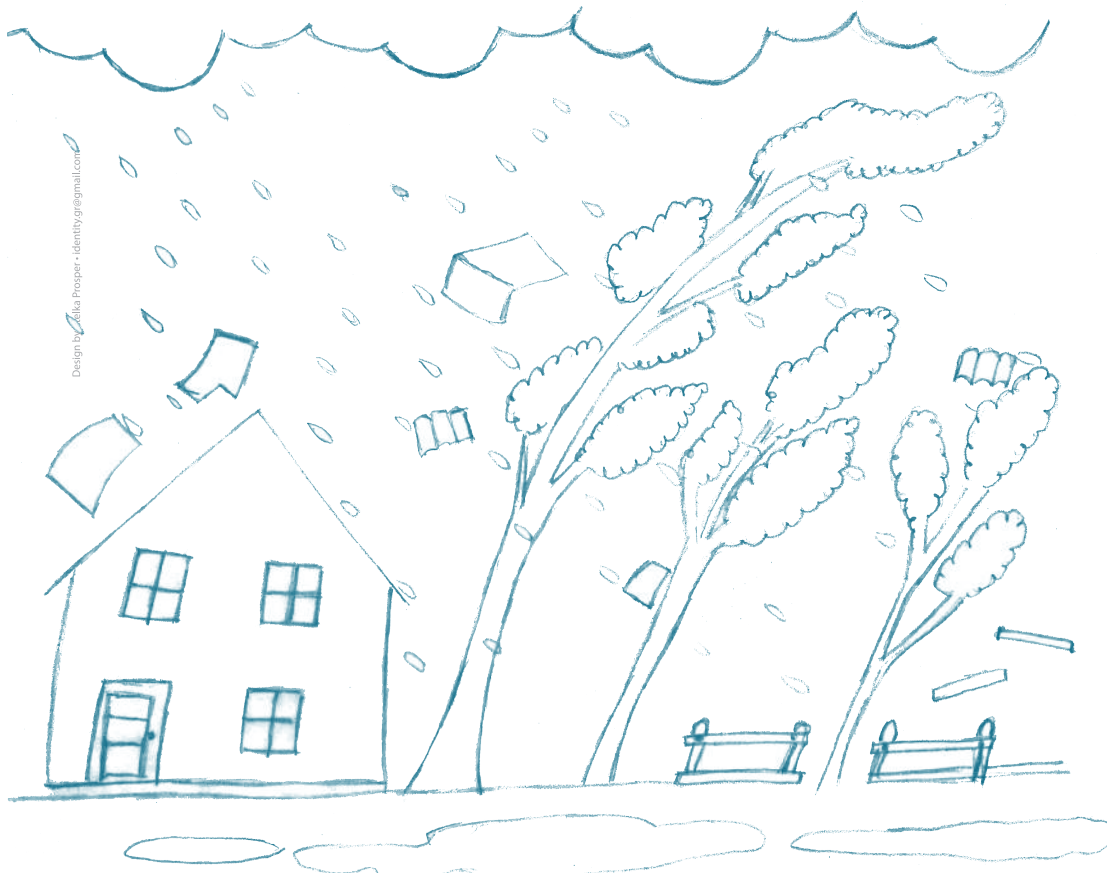
Consultant

Marie Josée Louismé

Coordinator of the Research and Systemic
Investigations Unit (URES)
Office of Citizen Protection

Benefit-Cost Analysis

Integrated Management of Risks and Disasters in Haiti



Integrated risk and disaster management in Haiti

Haiti Priorise

Charley George Granvorka
Consultant

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info@copenhagenconsensus.com

www.copenhagenconsensus.com

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Academic Summary

Due to its geographical location in the Caribbean, the Republic of Haiti is naturally exposed to a series of natural hazards, the most frequent of which are cyclones, hurricanes and heavy rains with dramatic consequences that seriously handicap its economic development. Indeed, Haiti is considered by the International Organizations as a "fragile¹" country with poverty affecting nearly 59% of its population². In this context, the key issue is how to reduce environmental vulnerability as a path to harmonized economic development. It is in this spirit that this program is presented. It proposes an Integrated Risk and Disaster Management (GIRD) strategy, which is based on two complementary axes, including the setting up of an Early Warning System for Flood Risk (SAPI), and Provision of temporary shelters Multifunction for people and livestock.

The expected results of this strategy have been estimated from the Cost-Benefit Analysis (CBA) as a decision-making tool and highlight the monetary estimate of the direct effects. Indirect effects as well as side effects were not estimated in financial terms.

a) Direct effects

The first direct effects of GIRD are the preservation of human lives and livestock, which is the most important economic capital of the rural population. According to the World Bank, EWS is the safest and most cost-effective means of saving lives and protecting the livelihoods of households and reducing the impact of disasters.

b) Indirect effects

The risk and disaster prevention strategy allows the State to integrate risk into planning and financial protection by the government. By having a global view of the risks to which the territory is subject, it will be better able to assess the impact of disasters on investment decisions both by itself and by the FDI. The risk prevention strategy encompasses different and complementary

¹ See World Bank definition www.worldbank.org

² Rapport conjoint Gouvernement de la République d'Haïti, The World Bank, the Inter-American Development Bank, the United Nations, the European Union January 2017, p. 12

activities (perception, evaluation, prevention, reduction and financing), allowing for trade-offs between resource allocations and investment protection, as well as synergies between different actors.

c) Side effects

From a social and psychological point of view, these programs have the advantage of securing the more fragile people and allowing them to overcome the traumatic shock linked to the disaster and develop their resilience. Finally, there is the establishment of public confidence towards the institutions, the development of participatory democracy and social inclusion.

Policy summary

Overview and Context

Problems

"What strategy can we implement to reduce the environmental vulnerability of Haiti? »

"Vulnerability is the degree to which a system is susceptible or unable to cope with the adverse effects of climate change, including variability and climatic extremes"³. The three components of vulnerability are exposure, sensitivity and adaptive capacity.

The whole Haitian territory is generally affected by hurricanes, cyclones or other phenomena of the same type, however, analysis of secondary sources shows that it is generally the poorest regions that are most affected (Nippes, Sud, Grande-Anse, Ouest). 2.1 million people were affected by Matthew on October 3-4, 2016 throughout the entire Haitian territory⁴.

Program

The program is conceived as a model of Integrated Risk and Disaster Management (IRDM) around two complementary and necessary components in order to produce the estimated results. The two components are as follows;

1) An Early Warning System for Flood Risk (SAPI), based on flood risk mapping in the 65 municipalities identified at risk, the definition of Communal Emergency Plans, the "as usual" cooperation with the North American Weather Services and cooperation with neighboring nations in the Caribbean through the Caribbean Hycos program. At the same time, training Weather Service staff is strengthened and the Government carries out an extensive national information and communication campaign on risks, prevention and education, including regular evacuation exercises.

2) The provision of temporary Multifunction Shelters for people and livestock, all categories combined.

Factors relating to the implementation

³ Definition www.weadapt.org

⁴ Joint Report Haitian Government International Community, January 2017.

- Costs
- Direct costs including budgetary implications: 5,961,217,294 HTG
- Private Costs: **None**
- Potential sources of income integrated into the program allowing its implementation
- (Eg. user fees): Sources not estimated, although existing.

Success indicators and monitoring and inspection costs

Success indicators for the two components of the model are:

A) SAPI

Indicators

- number of people who have received the information,
- number of people who have understood the information,
- number of participants in information meetings and evacuation exercises,
- quality of the information collected post exercises,
- reactivity, perception of messages, change in behavior of people during evacuation alerts.

Monitoring and control costs

Monitoring and control are an integral part of the mission assigned to the staff in charge of the implementation of the IRDM at the various state levels (from the central to the decentralized level). These costs therefore correspond to the normal remuneration paid to these personnel.

Annual incremental costs may include:

- the cost of the annual training day for volunteers.

As it stands, it was estimated at 15,331,752 HTG for 13,234 volunteers used over 10 years at 50% of their time. However, it can be considered that it is a variable cost that could increase in relation to the intensification of hurricanes in occurrence and severity under the Climate Change if nothing were done to mitigate the impacts,

- the cost of the communication evaluation process in its formal, qualitative and quantitative aspects in terms of expected effects.

Precedence (Has the program already been implemented? If so, what was the effect? If not, what constraints prevented its implementation?)

Unless mistaken, such a program has never been carried out in Haiti.

Risks:

The first risk is the "political" risk for a dual reason.

- The governing team may not consider the implementation of an GIRD strategy to be a priority,
- A change of leadership could lead to the abandonment of the GIRD strategy already initiated purely for a politician's political reasons.

Other risks may result from the scarcity of funding and the disinterestedness of local actors.

Justification for the program

Benefits

Description of direct social and private benefits and how the program addresses the issues listed above

The first social benefit directly related to the program is the reduction of loss of life, production, and subsistence economic capital for the rural populations. Thanks to one of the implicit components of **SAPI**, the preparation, information, communication, risk education and effectiveness of community volunteers is much more responsive and the irrational is no longer as decisive in the behavior of the people involved. Another social benefit not estimated in the intervention is the reduction of health care costs. We can also mention the strengthening of the social bond resulting from community collaboration.

With regards to the private benefits that result from risk education, economic actors know better how to prevent risk if not eliminate it. In fact, they know better how to preserve their productive capital. Finally, the **SAPI** makes it possible to develop interinstitutional collaboration, in particular in the mapping of risks and the elaboration of the Communal Emergency Plans, the alert to the populations during an emergency to get sheltered soon enough. All these different but complementary elements make the proposed GIRD model responsive to the listed problems.

Finally, a commitment to environmental management is a strong signal to local and external partners. From a social point of view, it is another way to establish and strengthen dialogue with local communities, economic agents and restore the confidence in institutions by showing them that their concerns are taken into account. The private partners are the households who are thus assured that everything is done to enable them to preserve their means of subsistence, maintain their incomes and not to experience an excessive break in their daily lives.

For private business partners, the State's commitment to environmental management helps demonstrate that their demands are being considered. The demand for environmental management was clearly expressed in the aftermath of the January 2010 earthquake through the reconstruction and spatial planning plans for harmonized development, as reflected in the document entitled "Vision and Roadmap for Haiti" Economic Forum of the Private Sector in March 2010. Indirectly, it is also the means of expanding the base of insured persons in connection with local insurance companies and other organizations involved in microinsurance (Fonkoze). Other equally important private partners include the media, telecommunication companies and business associations, thus strengthening their collaboration with the institutions.

Multifunction Shelters reduce the loss of life, the number of people injured and they provide a safeguard for the small working capital of rural households consisting of small tools and livestock. From a psychological point of view, shelters represent security for the affected people and reduce the trauma associated with the loss of property and the prospects for economic survival. Moreover, outside of times of emergency, Multifunction Shelters can be used as schools, associative meeting places, country medical centers, places of shelter for women who are the victims of domestic violence.

Other social, economic and environmental benefits (effects on employment, effects of foreign exchange, income distribution and external effects)

The advantages or benefits of the GIRD can be assimilated to the costs avoided during a natural disaster. At the macroeconomic level, these are the direct social, economic and environmental costs such as loss of life, property and housing. In addition to these costs it is necessary to add

indirect costs such as disruptions in the economic life (business) the increase of the diseases and the negative impacts on the biodiversity.

From a social and economic point of view, the avoided costs or benefits relate to the destruction of public buildings, housing, infrastructure, loss of turnover due to destruction or damage to company production equipment. An environment preserved at the heart of government concerns is a sign for foreign direct investors to be less reluctant. By 2015, the rate of FDI in Haiti was 1.1% (ECLAC, 2015). In addition to direct employment, FDI encourages indirect employment, especially in the service sector, and makes the country more attractive and reassuring, for example, in the tourism sector. The increase in revenues thus generated enhances domestic spending, investment and demand. In the long term, a real risk and disaster management policy can help reduce the brain drain and improve human capital and reduce poverty.

Description of beneficiaries

The first direct beneficiaries of the program are:

- the families located in areas at risk of flooding,
- the families that are not subject to the direct flood risk but cannot find shelter because they are too far from relatives or friends to accommodate them,
- animals that constitute the economic capital of most rural families and their small production equipment (small tools, seeds...).

Indirect beneficiaries include:

- Local companies belonging to the sectors of construction, sale of building materials, transporters.
- The labor market due to the hiring of workers needed to build the Multifunction
- Shelters,
- the families of workers who see their incomes improved,
- the internal market due to the increase in domestic demand for goods and services,
- the internal financial market through the increase of saving of economic agents via the improvement of savings derived from the improvement of incomes.

Unmeasured benefits

Undeniable unmeasured benefits exist from this program. Including:

- trust and dialogue between the population and the institutions through participation and inclusion through the various information and communication campaigns and risk education,

- faster identification of priority areas for relief or for infrastructure to be restored,
- a shorter period of schooling,
- the possibility of using temporary shelters for other income-generating activities. For example, renting to associations fighting against violence against women, associations or training centers for young people...

From a financial point of view, the increase in the State's indirect income has not been estimated, however they exist via taxes levied on goods and services consumed which are generated by internal demand in a secure environment.

Table of costs and benefits

Summary table

Programs	Benefit	Cost	Benefit-Cost Ratio	Data Quality
SAPI	13,090,742,460	1,763,907,612	7.4	Average
Multifunction Shelters	17,825,634,578	4,197,309,682	4.2	Average

Notes: All figures are based on a discount rate of 5%

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1. Introduction

Over the last 21 years Haiti has been hit by forty cyclones, thunderstorms and heavy rains, with an annual average of 2 events⁵ which have caused flooding and accompanying landslides with serious human and material consequences. As a result of climate change, these phenomena will increase in occurrence and severity, and Haiti, which has a high overall vulnerability index, will be increasingly exposed to catastrophe risks. In addition to Matthew in October 2016, six similar phenomena affected the country. Property damage and losses are still significant and seriously undermine the economic development of the island, whose environmental susceptibility is among the highest.

The environmental problem in Haiti is the first obstacle to its economic and social development. According to the 2016 World Risk Report, Haiti is ranked 6th for environmental susceptibility, 13th for adaptive disability, the 3rd for reactivity, 5th for vulnerability, and was awarded a grade of 12.9/13 for its vulnerability to cyclones. This natural vulnerability, due to its geographical location and environmental vulnerability, is compounded by social vulnerability, which maintains 58.6% of the population (10.7 million in 2015), ie 6.3 million people below the poverty level or extreme poverty⁶, and economic vulnerability due to very low performance indicators⁷. Recall that "vulnerability is the degree to which a system is susceptible or unable to cope with the adverse effects of climate change, including variability and climatic extremes". The three components of vulnerability, as defined by the Intergovernmental Panel on Climate Change (IPCC), are "exposure, sensitivity and adaptability"⁸. According to the Joint Report of the Republic of Haiti and the international community (January 2017) the available historical data generally lead to the conclusion that weather-related disasters would have resulted in estimated annual damage and losses of approximately 2% of the GDP from 1975 to 2012. In addition to recorded deaths, losses and damages observed during the course of hurricane Matthew, 2.1 million people were affected.

⁵ EM-DAT

⁶ World Bank, 2016

⁷ Rapport conjoint Gouvernement de la République d'Haïti, The World Bank, the Inter-American Development Bank, the United Nations, the European Union January p. 12

⁸ www.weadapt.org.

These elements highlight the scale of the economic, environmental and social stakes as well as the urgency to identify measures to reduce the vulnerability of the country.

The proposed program is conceived as an integrated strategy with two components. **1)** the implementation of an Early Flood Warning System (SAPI) which aims to anticipate the negative impacts of flood risk **2)** the provision of Multifunction Shelters (people + livestock) coupled with the SAPI. This strategy applies to the entire territory. However, if 65 municipalities were identified as flood-prone, the program calls for the construction of 117 shelters to take account of the number of people evacuated during the course of hurricane Matthew, ie 175,500 people. The shelters are multifunction because they can accommodate both people and animals. Their average capacity is 1,150 people and 450 animals of all breeds. Coupled with the SAPI, Multifunction Shelters aim to reduce losses in human and economic capital in order to maintain the livelihood of economic agents.

Hurricane Matthew, which struck Haiti on October 3 & 4, 2016, generated floods of more than 600mm within 24 hours. The losses and damages were significant, 180,104.24 billion Gourdes or 20% of the GDP⁹, and the financial requirements for recovery and reconstruction were estimated at 2.7 billion USD, or 32% of the GDP¹⁰. The loss of human life is also significant, as 546 deaths have been officially recorded. Added to the loss of life over the last two decades, this represents a total of 8,271 deaths, an annual average of 375 deaths.

Over the long term, these programs will enable Haiti to have a global approach to the risks threatening its territory. In fact, the Government will be able to better anticipate the effects of Climate Change and integrate them into the definition of its development policies. Thanks to these programs, human capital and technical capital will be better preserved and will thus reduce the breaks in economic life. The resulting GDP growth is likely to contribute to a reduction in poverty. After the literature review (2) and a brief presentation of the BCA methodology (3), the paper presents the costs and benefits of the programs before concluding.

⁹ Rapport conjoint Gouvernement de la République d'Haïti, The World Bank, the Inter-American Development Bank, the United Nations, the European Union p. 9

¹⁰ Ibid.

2. Literature review

The secondary literature was the source of basic information for this program.

These are the most recent and relevant official reports that have the environmental, economic, social and political vulnerability of the country in common, while stressing the need for more effective decentralization for the success of different policies, including environmental policies. Matthew being a recent event, in addition to the joint report of the Haitian government and the international community (January 2017) there is no other global estimate of its effects.

In the post-Matthew context, the joint report of the Republic of Haiti with the international community of January 2017 estimates losses and damage at 180,104.24 billion Gourdes or 20% of the GDP¹¹, and the financial requirements for recovery and reconstruction were estimated at 2.7 billion USD, or 32% of the GDP¹². Linked to the analysis of the Post-Sandy Balance Sheet of May 2013 and the 2015 indicators, it is notable that Haiti's economic performance remains very low, but that it is due in general to their environmental vulnerability since over almost a decade the regular loss of GDP was estimated at 2% a year due to the cyclonic phenomena that hit Haiti.

In the area of risk and disaster management, several National Strategy documents for the reduction of risks mention the need to establish measures to prevent and educate against natural disasters. The most recent document based on the information available is the National Emergency Response Plan (NERP), National Risk Management System, Discussion Paper. December 2001, updated 2009. Still related to risk management, the World Meteorological Organization and the CGES produced two reports in 2010 and 2015, each of which reported the need for a fully autonomous Meteorological Forecasting Service, it also envisions the restructuring of the forecasting services of SRNE and the CNM and the establishment of a network of hydrological stations covering the whole country as well as the need to cooperate with the Caribbean Hycos network. The CGES, itself, reports on the realization of a network of hydrological stations of which it also foresees in the evaluation. However, it was not possible to find any

¹¹ Rapport conjoint Gouvernement de la République d'Haïti, The World Bank, the Inter-American Development Bank, the United Nations, the European Union p. 9

¹² Ibid.

document suggesting the effective establishment of this network of hydrological stations. It is this gap which has led to the estimation, at a minimum, of station maintenance; 711,100 HTG over ten years.

It was also the analysis of the WMO report and the reports on decentralization and local and regional authorities¹³, which highlighted the need for institutional reform, a restructuring of the Weather services and effective decentralization, particularly for risk and disaster management.

From a sociological point of view, the reading of an empirical article¹⁴ highlighted the lack of public confidence in institutions but also the irrational behavior of people in situations of uncertainty. This leads to advocating the establishment of the SAPI.

Other reports were used to support the estimation of livestock in quantity and value. These include the Post Matthew Report of January 2017 and the "General Agricultural Census, Agricultural Atlas of Haiti, October 2012". The following documents were informative but not necessary for executing programs, "Rapid Assessment Report of Agricultural Loss and Damage Caused by Hurricane Matthew, MARNDR, and October 2016". "Post-Hurricane Matthew Needs Assessment in the Agricultural Sector, MARNDR, November 2016.

2.1 Theory

The Cost-Benefit Analysis (CBA) is a good decision-making tool in comparing the levels of expenditure required. Thus, within the scope of public decisions, the BCA can thus reduce the possibilities of technocratic, political and demagogic capture. From the axiomatic point of view, the BCA approaches the theory of utility. Individuals seek to maximize their utility and the results represent their expected value.

¹³ Les Collectivités Territoriales dans l'Etat Unitaire Décentralisé d'Haïti Document de travail n° 1. March 2002

¹⁴ Marcelin, L.H., Cela, T., Schultz M, J.:(2016) "Haiti and The Politics of Governance and Community Response to Hurricane Matthew".

3. Cost-Benefit Calculations

Since the interventions are already described in the introduction, we present only the costs and benefits.

3.1 SAPI

3.1.1 Costs

The costs of this program were calculated on the basis of data collected in the secondary literature, the salary scale by categories disseminated in 2015 by the Ministry of Economy and Finance (MEF) and their correlation with the cost of volunteers in Bangladesh¹⁵ which has implemented a similar system of multifunctional shelters coupled with an EWS. The total cost of this intervention is **1,763,907,612 HTG**.

Table 1. Summary of the costs (HTG)

Components	Qty	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Engineer	1	597,600	597,600	597,600	597,600	597,600	597,600	597,600	597,600	597,600	597,600
Technicians	2	115,920	115,920	115,920	115,920	115,920	115,920	115,920	115,920	115,920	115,920
Secretaries	2	115,920	115,920	115,920	115,920	115,920	115,920	115,920	115,920	115,920	115,920
Emergency plans for 65 municipalities	65	219,866,664	219,866,664	219,866,664							
Mapping Analysis	1	5,083,285	5,083,285								
Cost of cooperation with the Caribbean		6,825,006	6,825,006	6,825,006	6,825,006	6,825,006	6,825,006				
Cost of cooperation with Canada and Miami		0	0	0	0	0	0	0	0	0	0
Staff training		1,337,055	1,337,055	1,337,055							
Maintenance of hydrological stations		71,170	71,170	71,170	71,170	71,170	71,170	71,170	71,170	71,170	71,170
Volunteers (50% of the time)	13,234	1,475,848	1,486,257	1,497,612	1,509,982	1,523,269	1,537,330	1,552,030	1,567,241	1,582,947	1,599,235
Total cost 3%: 1,946,338,677 Total cost 5%: 1,763,907,612 Total cost 12%: 1,295,635,494											

¹⁵ Evacuation volunteers fan out in Bangladesh, Mai 2013, Reliefweb

The list of components of the SAPI shows a relatively high cost applied to the Communal Emergency Plans, ie 659,599,992 HTG. The cost is justified by the number of Plans to be drawn up, 65, requiring mapping from the Geographical Information System (GIS), training and assistance from an external consultant at least during the first year. The Communal Emergency Plans represent a planning tool for municipal actors in charge of risk management, with the objective, among others, of preventive information and population protection (Tierney, 2008)¹⁶

3.1.2 Benefits

3.1.2.1 Human lives

According to the EMDAT database, from 1996 to 2016, 7,224 hurricane and flood-related deaths were recorded in Haiti, an annual average of 364 deaths. Rogers and Tsurkinov (2010) argue that EWS demonstrates 80% efficacy over 5 years in the preservation of human lives in their paper entitled "Costs and benefits of early warning systems". This hypothesis was used to determine the average number of lives saved, ie 291 lives. In order to take into account the expected growth of the Haitian GDP, ie 2% per annum, reduced the GDP per capita, and at its maximum efficiency peak, an EWS provides an average annual GDP per head of 142,000 HTG; An evolution between 134,301 HTG and 151,263 HTG over the 10 years of the implementation of the GIRD model.

Table 2. GDP growth / Overhead and estimated value of life (base 291

Benefits	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
GDP / Head (HTG)	134,301	135,946	137,652	139,418	141,142	143,122	145,063	147,067	149,134	151,263
Value of lives saved 3%	338,993,082	457,528,883	579,087,968	703,820,443	831,857,151	963,354,105	976,421,743	989,911,079	1,003,822,817	1,018,156,272
Value of lives saved 5 %	251,649,100	339,643,308	429,881,829	522,476,093	617,523,232	715,139,059	724,839,734	734,853,439	745,180,719	755,821,057
Value of lives saved 12%	120,900,317	163,175,563	206,529,050	251,014,311	296,678,011	343,575,793	348,236,309	353,047,215	358,008,772	363,120,732

3.1.2.2. Livestock saved

Benefits related to the quantity of rescued cattle are also estimated from the number of animals rescued by category: cows, goats, pigs, poultry. Their price was determined on the basis of the current average market price between males and females and the quantitative data for total

¹⁶ Tierner, K. (2008) Hurricane Katrina : Catastrophic impacts and alarming lessons.

livestock production and the losses are provided by the appendices in the attached Report between the Haitian Government and the International Community in the Post Matthew context in January, 2017 and the Post-Sandy 2013 report which are the most recent source of data. Table 3 summarizes these benefits without going into the details of the spreadsheets.

Table 3. Benefits associated with the annual average number of rescued livestock

Categories	Number	Average value HTG	Total Value HTG
Cows	132	30,000	3,972,280
Goats	2,477	3,000	7,430,349
Pigs	39	3,500	135,880
Poultry	7,096	425	3,015,847
TOTAL	9,744		145,543,560

4. Multifunction Shelters

4.1 Cost

The unit cost of multifunction shelters has been provided by the World Bank and was applied in Bangladesh, being 18 million Gourdes per shelter. The cost of maintenance was estimated at 3% of its value, ie an annual cost of 63,180,000 HTG. The total cost of the program is **4,197,309,682 HTG** for the construction and maintenance of 117 shelters over 10 years. The number of shelters needed is obtained by the number of evacuees, 175,500, by the maximum capacity of the shelters, 1,500 persons.

4.2 Benefits

This program cannot be conceived without the SAPI, which it is closely complements. The benefits derive from the installation of the SAPI in terms of lives and livestock saved. The benefits are **17,825,634,578 HTG** at a 5% discounted rate.

5. Conclusion

Haiti is a country that is extremely vulnerable to natural and environmental hazards. The country is one of those with a very high environmental susceptibility. Economic vulnerability is added to the natural and environmental vulnerability that in turn generates social vulnerability since 59% of the population are locked in a poverty trap. Under the effects of global warming within the scope of climate change, cyclonic phenomena will be become more numerous and more severe.

There is therefore an urgent need to identify a strategy to reduce environmental vulnerability. This strategy is the subject of the programs of this proposal and aims to anticipate the impacts of the flood risk, which is most recurrent due to the frequent passage of hurricanes and other cyclonic phenomena on the country. This involves setting up a SAPI and coupling this network to a set of Multifunction Shelters capable of accommodating evacuees and their animals. The financial arbitrage of the intervention was carried out by a Cost-Benefit Analysis whose results demonstrate the level of effectiveness of the proposal in terms of direct effects measured through the preservation of the number of human lives. The number of lives preserved with the intervention is 291 lives on average per year, thus maintaining an average GDP per head of 142, 000 HTG in rural areas. The economic capital of the population is also preserved and contributes, through reproduction, to the improvement of household incomes. There are many indirect and secondary effects. They allow the government to better understand the impacts of natural disasters on domestic public and private investment, but also on the FDI and the attractiveness of the territory. From a sociological perspective, the advocated programs contribute to building the resilience of society by allowing it to better anticipate the negative impacts of disasters. Finally, the implementation of a risk and disaster reduction strategy is also a way to restore confidence a country's institutions that are known for its institutional instability.

Finally, in terms of recommendation, the analysis of the secondary literature systematically revealed the need for effective decentralization in Haiti. The decentralized territorial entities are relays of the State. As part of the implementation of the proposed programs, they should play a key role in the success of the programs.

Summary table

Programs	Discount rate	Benefit	Cost	CBR	Data Quality
SAPI	3%	19,772,884,460	1,946,338,677	10.2	Average
	5%	13,163,437,542	1,763,907,612	7.4	
	12%	4,743,138,627	1,295,635,494	3.4	
Multifunction Shelters	3%	26,580,044,860	4,468,597,280	5.9	Average
	5%	17,825,634,578	4,197,309,682	4.2	
	12%	6,240,065,539	3,476,563,014	1.8	

Notes: Calculation sheets

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Disaster Risk Management

Haiti Priorise

Marie Josee Louisme

Coordinator of the Research and Systemic Investigations Unit (URES), Office of Citizen Protection

FIELD	ENVIRONMENT
SUBJECT	DISASTER RISK MANAGEMENT
QUESTION	WHAT LAND USE PLANNING STRATEGY SHOULD BE ADOPTED IN ORDER TO REDUCE ENVIRONMENTAL VULNERABILITY IN HAITI ?

Acknowledgments:

Jean Alain BERNADEL, *economist-statistician*; **Técheler CHÉRISCLER**, *computer engineer, software analyst and developer*; **Alfred VALCIN**, *social worker, specialist in DRM*; work colleagues for their support and advice.

List of Acronyms Used:

1. AFD: French Development Agency (*Agence Française de Développement*) in Haiti
2. DRM: Disaster Risk Management

Introduction

It has been concluded that natural disasters and the quality of the environment are strictly related. Many studies show that the impacts of natural disasters tend to be worse in the poorest and most affected countries, partly because of the increase in population size, but also because of unique characteristics such as: rapid urbanization, inequality, degradation of the environment, and lack of planning and governance¹. According to a study published by the Germanwatch Global Climate Risk Index, Haiti is in third place amongst countries most affected by extreme weather events between 1995 and 2014². The latest meteorological events in Haiti demonstrate the country's level of environmental vulnerability to natural hazards, to which it is regularly subjected to do its geographic position. These climate events cause considerable damage to both human beings and their means of subsistence, to infrastructure and the environment. They

¹ Herrera, J, Lamaute-Brisson, N., Milbin, D. Roubaud, F, Saint-Macary, C., Torelli, C, Zanuso, C.. L'Evolution des conditions de vie en Haïti entre 2007 et 2012. La réplique sociale du séisme. IHSI, DIAL, Paris, Port-au-Prince, 2014, p 21.

² Kreft S., et al., global climate risk index 2016 who suffers most from extreme weather events? weather-related loss events in 2014 and 1995 to 2014, Allemagne, 2016, disponible en ligne à l'adresse: <https://germanwatch.org/fr/download/13503.pdf>, consulté le 12 octobre 2016.

worsen a state of vulnerability already exacerbated by extreme poverty that touches close to 60% of the population.

According to Thomas Lalime, a Haitian economist, “natural disasters caused losses for the Haitian economy of more than 10 billion U.S dollars in 12 years, which translates to 122% of the nominal GDP in 2014-2015, estimated at 425.6 billion Haitian gourdes (HTG)³.” As an example, in addition to up to 3000 deaths recorded, the damage caused by hurricane Jeanne in 2004 costs up to 10 billion HTG (256 billion USD). This translated to 7% of the GDP, 18% of domestic investment and 6% of foreign debt⁴. In 2008, hurricanes Fay, Gustav, Hanna and Ike, which all hit Haiti within a month, impacted more than 165,000 families, with a human toll of 793 deaths, 548 injured, and 310 missing. Damages and loss were evaluated at 897,39 millions USD, or 14.6% of the country’s GDP in 2007⁵.

More recently, on October 4th, Hurricane Matthew hit Haiti and caused close to 2 billion dollars worth of damage, according to Haitian authorities.⁶ More than 175,000 people lost their homes, with economists evaluating damages at close to 600 million dollars.⁷ This data suggests that the problem of land-use planning in Haiti constitutes an aggravating factor to the risks when a meteorological or environmental event occurs.

Haiti faces the challenge of building new proper homes to meet the needs of families currently in search of housing and those in inadequate housing. That challenge is compounded by the needs linked to population growth and rapid urbanization. In light of this, the remarks by former Prime Minister Laurent Salvador Lamothe, made in the preface of the National Housing and Habitat Plan (PNLH) are quite telling: “the January 12th, 2010 earthquake exposed our vulnerability as well as our weak response capacity to disasters. It also brought to light Haitian families’ pressing need to have access to adequate and safe housing.” The question then is: what land-use planning strategy should be adopted for the population in order to reduce Haiti’s environmental vulnerability?

³ Lalime, T, Haiti-Désastres Naturels Plus de 10 milliards de dollars américains de pertes en 12 ans, in Le Nouvelliste, disponible à l’adresse : <http://lenouvelliste.com/lenouvelliste/article/164167/Plus-de-10-milliards-de-dollars-americains-de-pertes-en-12-ans>, consulté le 12 octobre 2016.

⁴ CEPALC, Le cyclone Jeanne en Haïti: dégâts et effets sur les départements du Nord-ouest et de l’Artibonite : de la vulnérabilité, 2005

⁵ Gouvernement de la République d’Haïti, Rapport d’évaluation besoins après désastres des cyclones Fay, Gustav, Hanna, Ike, novembre 2008.

⁶ See more at: <http://lenouvelliste.com/lenouvelliste/article/164859/Haiti-pres-de-2-milliards-de-dollars-de-degats-causes-par-Matthew#sthash.RDWa5033.dpuf>

⁷ Ibid.

After clarifying what we mean by integrated disaster risk management, we will propose a few suggestions for the reduction of Haiti's environmental vulnerability. These include a new land-use planning strategy, reforestation, and a funding policy for construction projects, both for potential homeowners and for renters. To that end, we researched the topic, mostly online. As some of the data was difficult to access, we settled for information found in the press, particularly in Le Nouvelliste, or on the websites of certain cooperation agencies.

1. What do we mean by integrated disaster risk management?

Integrated disaster risk management involves upstream integration of preventative measures in addition to the construction of protection structures or the implementation of an early warning system. The aims are to: reduce the vulnerability of people and property (prevention and preparedness); limit the scale of the damage through adequate commitment as well as post-disaster rehabilitation and reconstruction efforts to return to either the previous situation, or to a better situation (recovery). Integrated risk management creates a systemic link between prevention, control and reconstruction.

While it's recognized that it is impossible to completely eliminate the risks of extreme weather events, adopting certain measures or changing certain behaviors can reduce the impacts. One of these measures relates to proper land use to reduce the dangers. This is where the State can intervene to introduce a land-use planning strategy that would allow for the relocation of the most vulnerable people. The plan's success will be contingent on an interdisciplinary and inter-institutional collaboration and the involvement of all concerned parties (local authorities, populations) in the decision making process.

2. A new land-use planning strategy as a first step to reducing environmental vulnerability

Within the framework of a new land-use policy, the State needs to acquire some decision-making tools that certain institutions can provide. These include, for example, Haiti's National Center for Geospatial Information (hazard maps, natural disaster risks maps, event registries...) or the Planning and Local Development Authority of the Ministry of Planning and External Cooperation.⁸ Some countries, like Switzerland, are able to determine the level of security wanted for various land uses. The State needs to set its disaster protection objectives.⁹ Certain

⁸ Voir la mission et les attributions de cette structure à l'adresse : <http://www.mpce.gouv.ht/fr/direction-de-lamenagement-du-territoire-et-du-developpement-local-et-regional>

⁹ Voir le modèle suisse à l'adresse : <http://www.vd.ch/themes/territoire/dangers-naturels/gestion-integree-des-risques/amenagement-du-territoire/>

construction restrictions should be in place in accordance with the level of risk in each zone (different colors could be used to warn about the level of risk).

3. The creation of forest areas through reforestation as another component to reducing vulnerability

It's been proven that forest areas help to protect the environment. Forests help to reduce surface water flow and protect against landslides, amongst other things. And so a second component to the reduction of environmental vulnerability in Haiti could be reforestation. This reforestation plan will need to take consider many factors such as the utility of trees (food, construction, etc.), the climate in which they will grow, and their economic value. In Switzerland, with pretty low annual maintenance costs, forests allow the government to save millions of Francs that would otherwise need to be spent on protective measures. The responsibilities will need to be defined between the central and local governments.

4. A third component: a policy of loans facilitating the acquisition, construction, or rental of houses to those who want them

According to information gathered, it seems that on an institutional level certain initiatives have been undertaken by the Haitian government in the past to deal with the housing issues faced by the population. For example, the creation in 1973 of a land use planning unit allowed for the development of tools such as the national land use graphic, as well laws on regionalization, communal organization, allotments, and even on the urban community in Port-au-Prince. Unfortunately, in 1986, the planning was put on the backburner; the impacts of this can still be seen today in urban as well as rural zones. And so, within the framework of disaster risk management, it's important for the State and other players not to repeat the errors of the past. This means that the goal in terms of the housing problem should not be to return to pre-earthquake "normality". They should instead focus on adequate and safe planning.

As soon the State decides on a new land-use plan, it will need to begin assisting those who will be relocated, ensuring that they are able to have access to decent housing, no matter their means. They will need to develop a set of plans and measures. The first of these will aim to provide credit grants at preferential rates for the purchase of a house to those who have a stable job or an adequate income generating activity. The second will entail providing a subsidy to those who want to simply rent a house or an apartment, without running the risk of being evicted with no recourse and for unknown reasons. Finally, the third measure will need to allow those who want to become homeowners but cannot because of their salary, to achieve this goal by way of housing cooperatives co-financed through a community construction model. It's understood that these three plans can be applied to many zones, even those considered to be in

precarious situation, based on preliminary studies on the capacities and expectations of those concerned.

Conclusion

We know that in the past, Haiti has suffered through many natural disasters and many lives were lost or destroyed. Hurricane Matthew exposed a new level of vulnerability for buildings in case of flooding. In cases like these, people's houses as well as important documents (birth certificate, marriage certificate, title deeds, etc.) and even plantations are part of the recorded losses. Any strategy for the reduction of environmental vulnerability in Haiti through an integrated disaster risk management approach, must consider, amongst other things: the tendency of the population to occupy space in a disorderly and lawless fashion; their inclination towards rapidly down trees; and the weak financial means they have to find decent housing.

To ensure better results, the State must acquire better decision-making tools that will provide information on actual vulnerability of risk areas, and allow it to ensure that people are relocated /do not build in risk zones with no supervision. The government should take the necessary measures to promote community involvement in the decision making process, and create a good framework to ensure decent housing financing for the population.

In terms of preventing disaster risk, and as part of the greater land use planning strategy, a social housing program is essential to protecting the lives and possessions of the people. However, developing a relocation and social housing program for residents of precarious areas will incur a relatively high cost (in order to insure high quality housing structures and to be able to effectively prevent damages caused by natural disasters.)

Following past disasters, the central government was forced to disburse a considerable amount of funds to repair damages and help affected families. A cost-benefit analysis of this new proposed policy should be based, at best, on experiences of the last ten years in Haiti. This will allow us to better determine the validity of the program and to predict negative impacts.

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Haiti faces some of the most acute social and economic development challenges in the world. Despite an influx of aid in the aftermath of the 2010 earthquake, growth and progress continue to be minimal, at best. With so many actors and the wide breadth of challenges from food security and clean water access to health, education, environmental degradation, and infrastructure, what should the top priorities be for policy makers, international donors, NGOs and businesses? With limited resources and time, it is crucial that focus is informed by what will do the most good for each gourde spent. The *Haiti Priorise* project will work with stakeholders across the country to find, analyze, rank and disseminate the best solutions for the country. We engage Haitians from all parts of society, through readers of newspapers, along with NGOs, decision makers, sector experts and businesses to propose the best solutions. We have commissioned some of the best economists from Haiti and the world to calculate the social, environmental and economic costs and benefits of these proposals. This research will help set priorities for the country through a nationwide conversation about what the smart - and not-so-smart - solutions are for Haiti's future.



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