Climate change adaptation to protect human health

BARBADOS

This summary gives an overview of the aims, activities, challenges and results of the project "Climate change adaptation to protect human health" for Barbados.

Project background

The "Climate change adaptation to protect human health" project is a global initiative funded by the Global Environment Facility (GEF) Special Climate Change Fund (SCCF) and jointly implemented by the World Health Organization (WHO) and the United Nations Development Programme (UNDP). The seven pilot countries were Barbados, Bhutan, China, Fiji, Jordan, Kenya and Uzbekistan.

Overall project goal

The series of pilot projects aimed to "increase adaptive capacity of national health system institutions, including field practitioners, to respond to climate-sensitive health risks".

Barbados at a glance

Barbados is a Caribbean island in the North Atlantic Ocean, north east of Venezuela. The climate is tropical oceanic, dry sub-humid with an average temperature of 26.8°C and a rainy season from June to October. The terrain is mostly flat, rising gently to the central highland region. The island lies on the edge of the Atlantic storm zone, and has been affected by tropical storms in recent years.

Climate change and health in Barbados

Climate change is projected to increase temperatures and to affect water quality and quantity. As Barbados is already a water-stressed country, further decrease in the availability of fresh water is likely to lead to adverse health impacts. Saline intrusion into fresh water aquifers, and salination of water sources due to sea-level rise, and changing weather and precipitation patterns will put additional pressure on water availability. Thus, water availability and related health issues are expected to become key problems.

Water scarcity carries a range of health risks. These are related to the following:

- Reduced amounts of water available for basic hygiene (e.g. water-washed diseases);
- Chemical and microbial contamination as a result of increased drought;
- Gastrointestinal diseases.

In addition, water scarcity may result in water-storage and vector-borne diseases.

- Barbados has the highest incidence of dengue in the world.
- Rainwater storage as a response measure to lack of freshwater provides breeding sites for the disease vector of dengue, the *Aedes aegypti* mosquito.

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Objectives of the Barbados project

The specific objective of the project in Barbados was to strengthen national adaptive capacity to address health issues related to climate change-attributable water scarcity. In order to attain this goal, the project considered national priorities in the area of climate change and health, and focused on the following:

- Implementation of policies and programmes to ensure that health risks do not increase as a result of using treated wastewater to recharge aquifers and for irrigation;
- Strengthening public acceptance of the use of treated wastewater for non-potable use;
- Safe storage of water by the public to prevent the breeding of *Aedes aegypti* mosquitoes.

The Ministry of Health was the lead organization and the project was implemented in close coordination with the Ministry of Environment, Barbados Water Authority, Ministry of Agriculture, Meteorological Office and University of the West Indies. Other ministries supported the implementation of this project. The National Climate Change Committee played a key supervisory role. The United Nations Development Programme (UNDP) and the World Health Organization (WHO) Pan American Health Organization jointly provided technical guidance and supervised the project.

The key stakeholders participating in implementation are listed below:

- Environmental Health Department (EHD), Ministry of Health
- Barbados Meteorological Office
- Ministry of Environment Drainage, and Water Resources
- Barbados Water Authority

Barriers/challenges to implementation of the various strategies, policies and procedures

The following barriers were faced at the beginning and during implementation of the project:

- Lack of sufficient national capacity in terms of human and financial resources for translating climate change risks into strengthened health sector response;
- Lack of guidelines and legislation for water storage. This means that any new storage facility that was developed did not take into consideration climate change and the related health impacts;
- Limited capacity with regard to issues of wastewater reuse. Barbados had little experience in utilizing wastewater for non-potable purposes or for recharging aquifers;
- Limited information and communication in the health sector as well as among the general public on climate change and its impacts in Barbados;
- High staff turnover in the health sector, which required considerable time and energy to rebuild the project team;
- Inadequate technical and administrative resources and day-to-day support throughout the period of implementation of the project;
- Data unavailability and/or inadequacy: inadequate datasets to set up an early warning system (EWS) as there were too few dengue cases;
- Lack of appropriate collaboration between stakeholders;
- Lack of buy-in (interest) by middle-level managers of the EHD affected participation of lower-level staff.

Solutions

- Education and training on climate change and health was provided on a constant basis as part of project implementation, which targeted project staff, the health sector and different stakeholders involved in implementing the project.
- Training of Environmental Health Officers (EHOs) in the use of geographical information systems (GIS) to target areas with a high density of mosquitoes improved human and technological capacity.
- Computers and other equipment were acquired for the collection and analysis of mosquito- and weather-related data. These equipment were deployed to the six pilot polyclinics for the use of the EHOs and community health nurses.
- The project developed guidelines on the storage of water as it relates to climate change and health.
- Two persons participated in a training course focusing on wastewater reuse in Jordan (2014). As a result of their participation, guidelines were developed for non-potable water use.
- The project conducted training courses for senior administrative health managers from the central and district levels. Middle-level managers were also sensitized to the impacts of climate change on health and how it will impact the day-to-day operations of the EHD.
- Collaboration within the Ministry of Health and among external stakeholders was improved with the re-engagement of a committee comprising the Ministry of Health, Ministry of Environment (Environmental Protection Department) and Ministry of Agriculture (Barbados Water Authority).

Main outcomes and outputs: climate change adaptation in Barbados

The three outcomes defined for the global project on "Piloting Climate Change Adaptation to Protect Human Health" were adjusted slightly to the specific context of Barbados and the health risks associated with climate change.

In Barbados, all project outcomes dealt with wastewater reuse, and the project developed and implemented country-specific outputs in relation to these defined outcomes.

Outcome 1

Policies and programmes are implemented to ensure health risks do not increase as a result of using treated wastewater to recharge aquifers and for irrigation

Before formulating policies and programmes for the safe use of treated wastewater, a series of studies and analyses were conducted:

- The relationship between meteorological variables and the incidence of dengue in Barbados was analysed.

An analysis of dengue cases in Barbados (2004–2013) was conducted. Due to the small number of dengue cases, prospective predictions of dengue outbreaks are thought to remain difficult. Therefore, instead of designing and developing an EWS based primarily on meteorological data, it was recommended to strengthen the integrated surveillance of vectors, which integrates weather and climate variables and other environmental variables into the monitoring.

- A knowledge–attitude–practices (KAP) study of Barbadians in relation to climate change and health was carried out.
- GIS was used to determine the spatial distribution of the vulnerability of aquifers in Barbados to nitrate, fecal coliforms and fecal streptococci.
- A management solution linking the Vector Control Unit and the EHD with the Central Ministry was developed (interconnectivity and appropriate devices).

Outcome 2

Capacity strengthening on climate change and health, and increase in public acceptance of the use of treated wastewater for non-potable use

A series of awareness-raising activities and campaigns were conducted on the general issues of climate change and health in Barbados in preparation for promoting the use of treated wastewater for non-potable use among the public. The direct effects of climate change on the risk of diseases (i.e. insufficient supplies of freshwater and increased transmission of waterborne diseases such as salmonella, giardiasis and amoebic dysentery) are expected in Barbados.

Project activities under outcome 2 targeted health professionals, teachers and students, as well as the general public. They included information on the topics of water scarcity and associated health risks, the additional risks posed by climate variability and change, and the need for adaptation measures. The use of treated wastewater in agriculture contributes to safeguarding the scarce water resources of the country.

- In Barbados, 84 EHOs were trained on the use of climate data together with health data as a way to provide early warnings on vector-borne diseases in conjunction with GIS-targeted vector control.
- An agreement was entered into with the Ministry of Education for sensitizing teachers and students of all primary schools and students of secondary schools on the impacts of climate change on health.
- A poster and essay competition was held for primary and secondary schoolchildren.
- A students' workbook on climate change and health for primary and secondary schools was developed in conjunction with the Ministry of Education.
- Lectures on climate change and health were held across the island for members of churches, social groups, schools, government institutions and a health nongovernmental organization (NGO). These increased the awareness of potential risks in the population.
- Electronic media were also utilized for sensitizing the general public on the impacts of climate change and health.
- The project sponsored T-shirts for the first dengue awareness week run by the Ministry of Health, Barbados. The week was part of an islandwide programme seeking to raise awareness of the impacts of dengue and its association with climate change among the public. The project manager and the focal point, along with an entomologist from the Ministry of Health were interviewed on national television about dengue, climate change and the fight against the *Aedes aegypti* mosquito vector.

Outcome 3

Public safely stores water to prevent the breeding of *Aedes aegypti* mosquitoes

Apart from the direct health effects from climate change in relation to water scarcity and waterborne diseases, the secondary health effects of policies used to address water stress were considered. Use of rainwater catchments and storage facilities to reduce climate change-associated water stress were expected in particular to increase the number of potential breeding sites for the dengue-transmitting mosquito *Aedes aegypti*. The use of treated wastewater as an adaptation measure to combat water scarcity, particularly for agriculture, bears health risks if it is not managed properly. It could increase the transmission of waterborne diseases and the water may be contaminated with hazardous chemicals. Therefore, policies and guidelines for the correct management and use of treated wastewater are needed.

Outputs combined research, training and raising awareness, as well as implementation of policies and measures to ensure safe storage of water to prevent the breeding of *Aedes aegypti* mosquitoes.

- Targeted source reduction programmes were continued in high-density mosquito areas to destroy mosquito-breeding sites, in conjunction with space spraying (fogging) by the Vector Control Unit of the Ministry in areas of heightened risk.
- A methodology was developed to identify the types of containers in which *Aedes aegypti* mosquitoes breed most productively.
- A facility was established to rear larvae-eating fish for biological control of mosquitoes, for distribution to the public.
- The *Global guidelines for the safe use of wastewater and response to warnings of elevated risks* were adopted.
- The *Rainwater storage guidelines* were adapted by the project in Barbados.
- An early communication and alert system for water quality was implemented.
- Lectures, town hall meetings and demonstrations on both preventing and reducing mosquito-breeding sites were conducted in schools, community centres and churches by EHOs.

Lessons learned

» Development of water quality standards for the use of treated wastewater improved water quality and safety. Improved practices for the storage of rainwater prevented the breeding of *Aedes aegypti*, thus decreasing the incidence of dengue fever.

» Adequate support is needed, both technical and administrative, in order to scale up the project.

» The technical support provided by WHO has proven to be beneficial for implementation of the project.

» Health can be a powerful driver of change in relation to climate change issues.

» Climate change issues are broader than just environmental issues.

» The public is aware of climate change, but not of its implications on health, so awareness-raising and education is critical for building resilient communities.

» The poster competition implemented in schools attracted a lot of interest and participation from students. Dialogue with policy-makers should be constant and it is important to communicate the results of the project in a relevant way so as inform policy-making. The lessons learned and guidance developed through implementation of the project will be relevant to other countries starting to implement similar projects in the future.

» More technical guidance should be provided at the initial stages of project implementation.

Efforts to ensure sustainability of the structures and measures

Iterative risk management or similar approaches can help ensure that interventions are successful under future climate and development pathways. To ensure that project outputs and activities remained beyond the project phase, Barbados took a series of steps:

- Climate change was integrated into the EHD workplan of the Ministry of Health. It was also embedded in the 2014–2015 planning cycle and is expected to be a permanent feature of the EHD at the level of environment and health specialists. The EHD has a monitoring tool and climate change was integrated into it.
- Ten thousand workbooks were printed for school-age children (11–13-year-olds) and were to be used in the schools even after the end of the project (Photo 1).
- Eight hundred notebooks were printed for teachers and students of schools that participated in the poster and essay competition.

Photo 1: Climate change and health workbook

Prepared by the Climate Change and Health Office, Environmental Health Department, Ministry of Health, Barbados

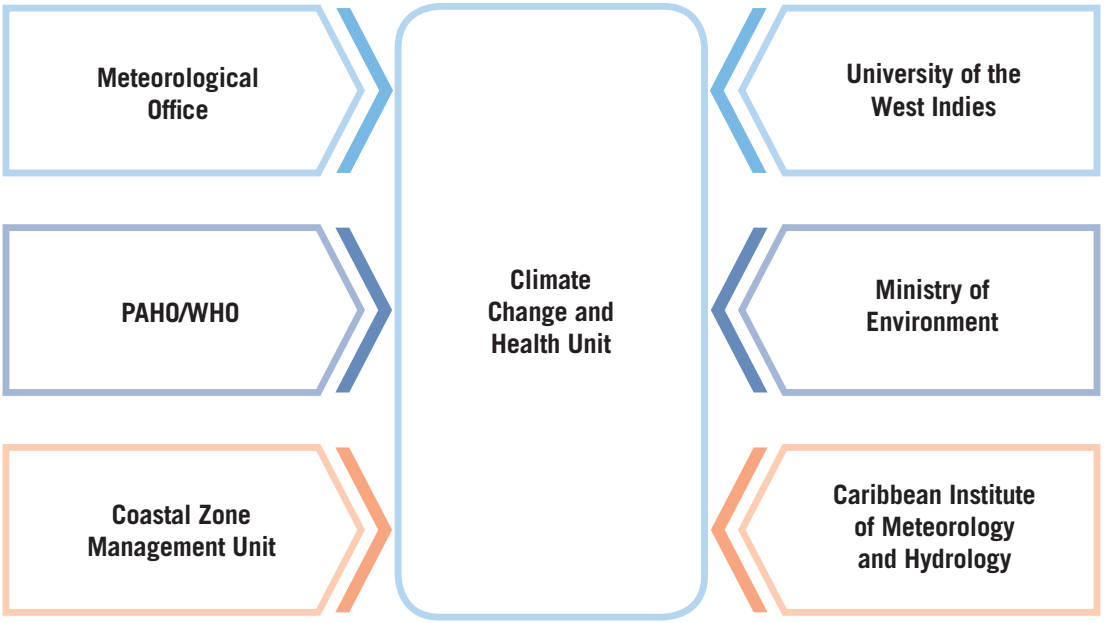

Fig. 1: External collaboration of suggested Climate Change and Health Unit

The set-up of a new Climate Change and Health Unit has been proposed, with strong intrasectoral and intersectoral linkages. The suggested external collaboration is illustrated in Fig. 1.

Opportunities for scaling up

A draft paper on upscaling of the project was presented to and accepted by the Minister of Health and the Permanent Secretary. A workplan was developed using the project as the basis for upscaling. Both documents are in draft form.

Key products

Key products that may be of interest to other regions or countries include the following:

- Young citizens: students' workbook and notebook printed on Piloting Climate Change Adaptation to Protect Human Health, by the Ministry of Health, Barbados, 2015 (Fig. 2); lectures and information, education and communication materials;
- Rainwater storage has been adapted from the WHO *guidelines for the safe use of wastewater, excreta and greywater (WHO 2006), Rainwater storage practices: guidelines for public health safety and protection, Barbados' adaption to climate driven health risks, Climate change adaption to protect human health,* Ministry of Health, Barbados, 2015;
- The early communication and alert system for water quality was also adapted from the WHO *Guidelines for the safe use of wastewater, excreta and greywater, Early communication and alert system for water quality, Barbados' adaption to climate driven health risks, Climate Change adaption to protect human health, Ministry of Health,* Barbados, 2015;
- Adaption of the *Global guidelines for the safe use of wastewater and response to warnings of elevated risks, Climate change and health,* Ministry of Health, Barbados.

Fig. 2: Cover of the students' notebook (MoH, Barbados)

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