

Applied Research Partnerships with Developing and Transition Countries

Swiss Universities of Applied Sciences and Universities of Teacher Education

Project title

Caribbean Water Monitor: Small island states, water resources and climate change

Thematic focus

Water monitor climate change

Year

2009

Project location

Barbados and Trinidad, Caribbeans

Swiss Institution

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Description

The objectives of the project were the preparation of drought-relevant base documentation, the development of operative web-based tools and drought information material for Barbados and Trinidad & Tobago, as well as the conduction of training activities and two capacity building workshops on both islands. In a first working step, the available data of the both island states have been collected, elaborated and validated. On this data stock, trend analyses were conducted to identify possible data trends which are due to climate change, referring them to a standard reference period (e.g. 20 or 30 year averages). This elaboration is done using mainly the free and open-source statistics package R.

The two of the most suitable parameter to measure drought trends in general are the Standard Precipitation Index (SPI) and the Deviation from Normal (DfN). Their purpose is to assign a single numeric value to the recent precipitation relative to the historical measured quantity and to indicate deviations from long term conditions. The developed WEB-based tool manages the available data using the open source PostgreSQL database, calculates both parameters and displays them for all measuring stations separately. Finally a built-in GRASS interface has been developed with the scope to produce interactively a set of contour maps of Barbados, interpolating the SPI's extracted for a defined time period.

Development relevance

In the Caribbean the water availability is connected to a general climate set-up of dry and wet seasons. Water shortages can occur historically rather in the dry season, which lasts roughly from January to May. Climate change can potentially alter these patterns. According to the current fourth assessment report by the Intergovernmental Panel on Climate Change (IPCC),

the rather small islands of the Caribbean are particularly vulnerable to extreme weather events and the consequences of predicted climate change (IPCC 2007a). Both workshops addressed a technical-scientific audience and an end-user/decision maker audience for the use of the developed WEB-application.



Workshop held at CIMH in Husbands, S. James Barbados on the 10th of may 2010.



Participants of the Workshop at the 12th of may 2010 at the Ministry of Agriculture, Land and Marine Resources, Centeno, Trinidad

KFH

Rektorenkonferenz der Fachhochschulen der Schweiz
Conférence des Recteurs des Hautes Ecoles Spécialisées Suisses
Conferenza dei Rettori delle Scuole Universitarie Professionali Svizzere
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Swiss Agency for Development
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Main features of the project

Drought is an extended period of time in which a deficiency in water supply occurs. Even though the triggering condition is the lack of precipitation, the impacts may be aggravated by a non-sustainable usage of water resources. Drought has a substantial impact on the ecosystem, the population and its economic activities, such as agriculture and tourism. Drought has many consequences: environmental, social and economic, since water is vital for environment, agriculture and social-economic communities. Due to the nature of drought it is not easy to quantify or even estimate the losses and costs.

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The preparation of a drought relevant base documentation was realized through the development of interactive drought maps, reflecting the recent precipitation situation in comparison with the past.

This dynamic tool, the so called Caribbean Water Monitor is an essential tool in water resources management and offers help for decision support in planning and managing water resources. It reflects automatically the current situation of Barbados and Trinidad & Tobago regarding drought by calculating two indices (SPI and DfN) on a monthly basis that help to identify the possible onset of a drought situation. Later on the integration of decile values is planned (decile values are used to give an indication of the spread of the observations over the period of record). A part of the drought monitor can be consulted later on a special drought web-page. The products that were prepared during the project are available on an internal web-portal, which serves also as a national entry point regarding drought. It explains the issues about drought, hosts the drought monitor, presents the project outcomes and connects the interested audience with the competent governmental authorities. The web-page is hosted at Barbados.

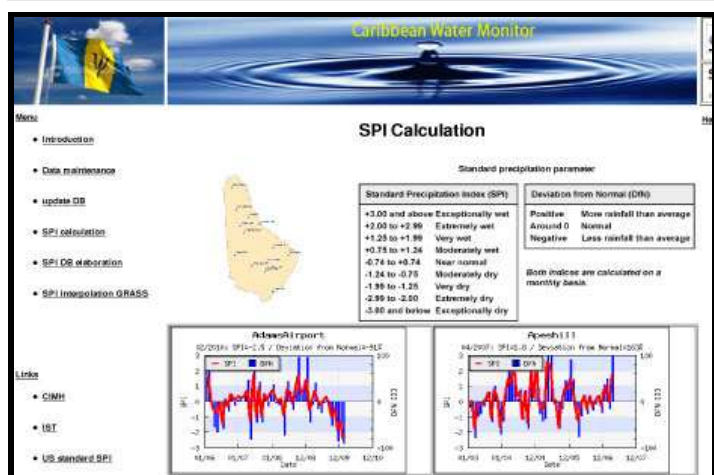
The project contains the following specific features

- providing efficient, effective and objective consultancy services in the study and preparation of drought hazard maps for both islands.
- providing support services related to drought mapping.
- providing training, that is transfer of skills.

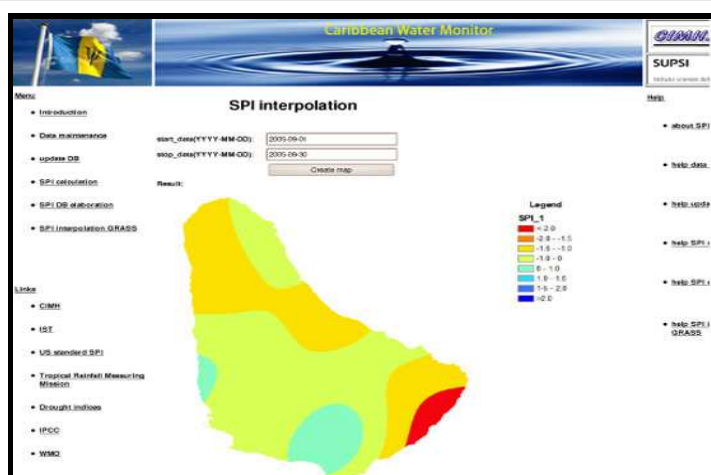
The objectives were achieved through a series of products and activities that were developed during the conduction of the project:

- The project was accompanied by a one-week training and two workshops at the end of the projects.
- A detailed analysis of the acquired data using the open source package R (<http://www.r-project.org>) for statistics.
- The technical products include a geospatial database (PostgreSQL/PostGIS), a WEB interface for the data management, a graphical representation of the two relevant indices (SPI and DfN) and an interactive continuous map for a geographical representation of SPI spline-interpolation.

The project was concluded with two final capacity-building workshops, on both islands involved, discussing the technical-scientific contents of the project together with an end-user/decision-maker audience (for the application and possible uses of the water resources monitor). Stakeholder interaction was an important part of the process. It provided essential information and helped in the transfer of ownership of the project. The following two images show the developed Caribbean Water Monitor application.



Calculation and graphical representation of the Standard Precipitation Index (SPI) and the Deviation from Normal (DfN) for the relevant measuring stations in Barbados and Trinidad & Tobago.



Interactive SPLINE-interpolation of the calculated SPI indices of 14 measuring stations on Barbados.