The Caribbean Dewetra Platform

"…a tool for near real-time monitoring and impact-based forecasting"

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Introduction

The Caribbean Dewetra Platform (CDP) is a spatio-temporal, data fusion platform capable of seamlessly integrating evolving hazard data, socio-economic and vulnerability information in support of improved decision making within the disaster management community. Ground- and space-based near real-time hydro-meteorological observations in addition to numerical weather prediction outputs are presented in an online geospatial environment accessible by multiple users. Country specific information such as digital elevation models, slope models, watershed extents, hazard maps, population demographics and critical infrastructure can be merged with hazard data to rapidly identify potentially exposed assets and support impact-based forecasting. The ability to crowd-source reported impacts in part through the use of Twitter and other smart device applications provides a useful workflow within the platform for impact verification, managing response actions and damage assessments. This poster showcases some of the various tools and products available within the platform.

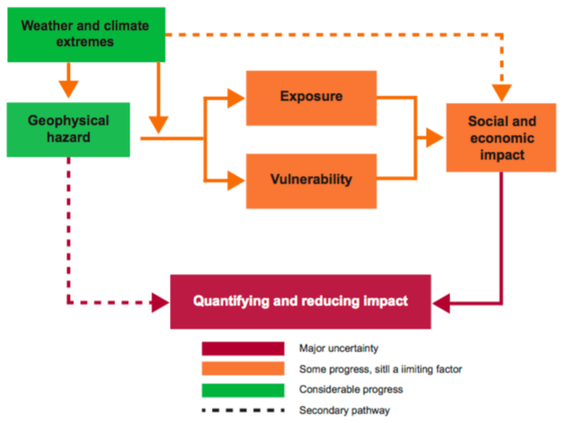

Fig. 1: Relationship among key elements of an impacts forecasting system .
(Source: WMO-1150)

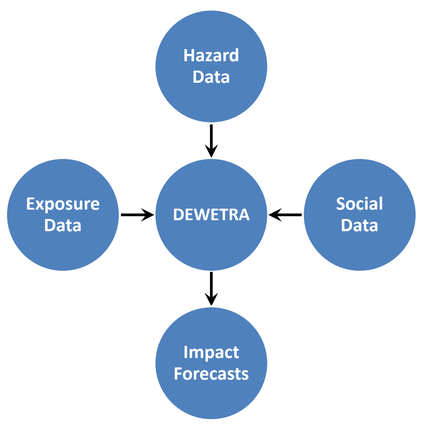

Fig. 2: The Caribbean Dewetra Platform. Data fusion and multi-hazard impact forecasting decision making tool.

Hazard Forecasting and Monitoring

The CDP provides meteorological and disaster officials with an online, disaster management, collaborative tool that supports impact-based forecasting, multi-hazard early warning and improved decision making.

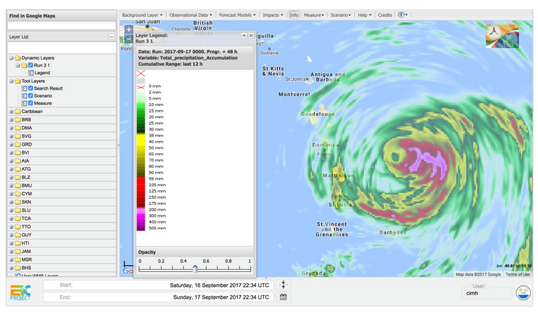

Fig. 3: CIMH 4km WRF rainfall accumulation prediction output. (Hurricane Maria)

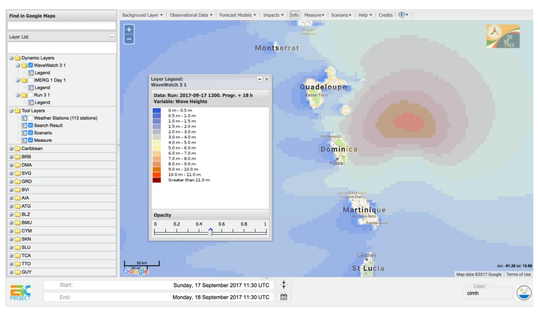

Fig. 4: CIMH WW III wave height prediction output. (Hurricane Maria)

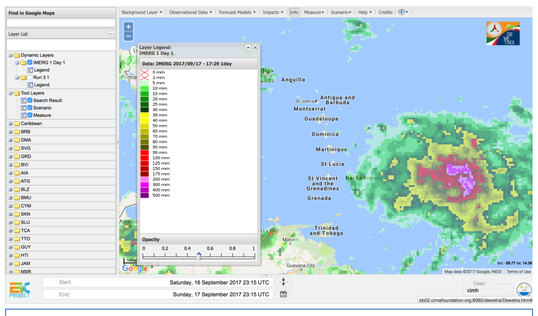

Fig. 5: GPM IMERG satellite-derived rainfall accumulation. (Hurricane Maria)

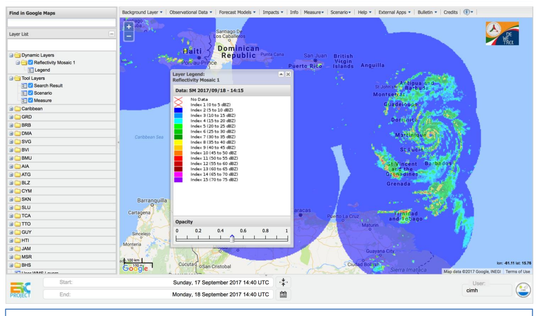

Fig. 6: Caribbean Weather Radar reflectivity mosaic. (Hurricane Maria)

Exposure and Vulnerability

Country specific information such as topography, watershed extents, flood and landslide hazard maps, population demographics and geo-located critical infrastructure can be presented as overlays within the geo-spatial environment to identify exposed assets, physical and social vulnerabilities and support the quantification of impacts. The fusion of evolving hazard data supports the rapid identification of exposed assets and provides a useful forecasting chain for social and environmental hazards.

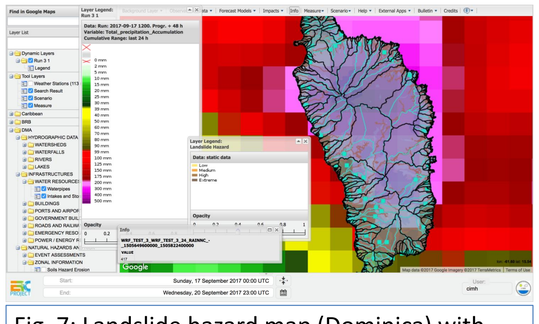

Fig. 7: Landslide hazard map (Dominica) with rainfall accumulation prediction as an overlay.

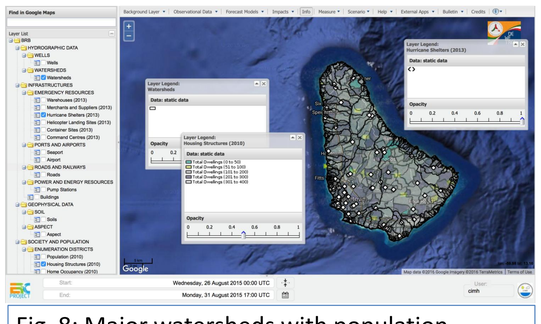

Fig. 8: Major watersheds with population demographic map and shelters as an overlay.

Early Warning and Alerting Systems

The CIMH has been steadily expanding hydro-meteorological monitoring networks across the Caribbean. Stations within these networks are capable of issuing threshold based alerts via SMS with the data streamed in near real-time to the CDP for visualization and interpretation. In addition, the platform is equipped with a Common Alert Protocol (CAP) broker and document producer for integration with regional CAP compliant systems. The CIMH network comprises of both commercial and open source stations. Comparatively cheap open source stations significantly reduce losses during extreme events and the cost of network rehabilitation.

Fig. 9: a) Rainfall monitoring in headwaters and landslide prone areas. b) Stage monitoring upstream of vulnerable areas. c) Tide monitoring along coast. d) CAP document production and dissemination.

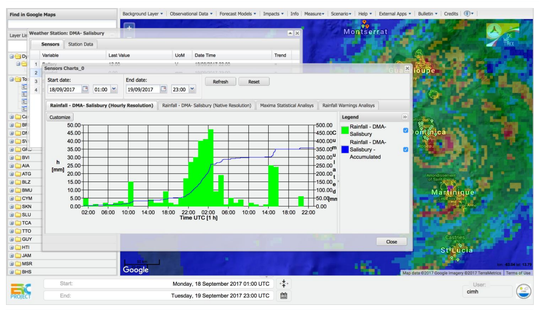

Fig. 10: Near real-time rainfall during the onset of event (Hurricane Maria)

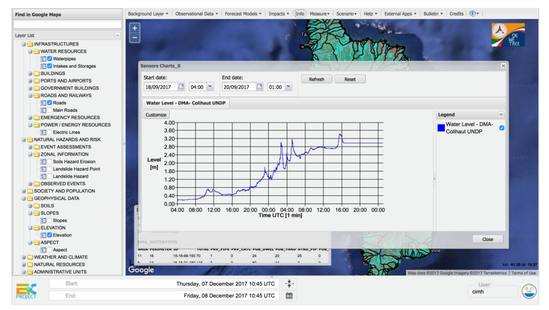

Fig. 11: Near real-time water levels during onset of event (Hurricane Maria)

Climate Variability

Climate data provide another layer of valuable information when trying to characterize probable impacts of hydro-meteorological events. Products such as sea surface temperatures and standardized precipitation indices are made available to support the decision making process.

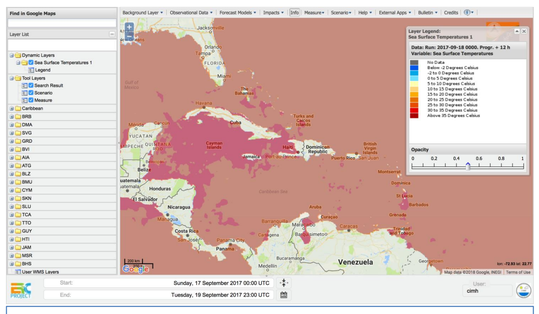

Fig. 14: SSTs prior to the passage of Hurricane Maria across the Caribbean

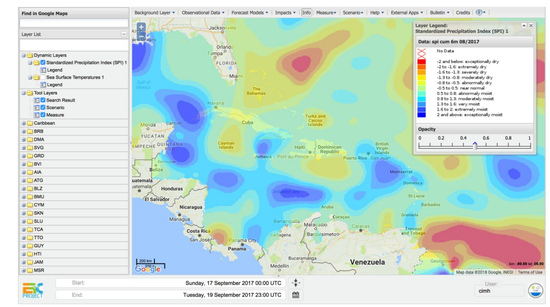

Fig. 15: 6-month SPI illustrating precipitation deficits/surpluses over the Caribbean

Impact Reporting

The CDP provides workflows for observed impacts to be reported both in the field via crowd sourcing in addition to managing reported impacts within an emergency operations centre setup. These impacts are geo-located and made available to users through the platform interface and support the rapid mobilization of first responders and assessment teams post event. All data are archived within the platform. The collation of impact data also supports (i) the verification of impact forecasts; (ii) post-impact analyses and (iii) research and development activities.

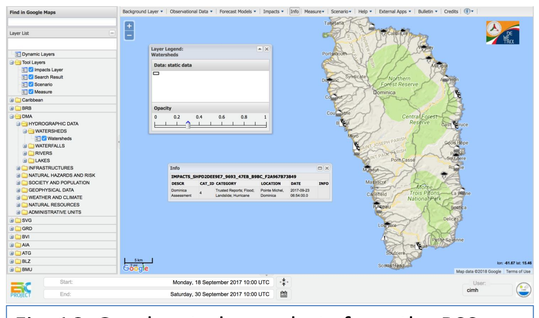

Fig. 16: Geo-located snapshots from the RSS reconnaissance flight (Hurricane Maria)

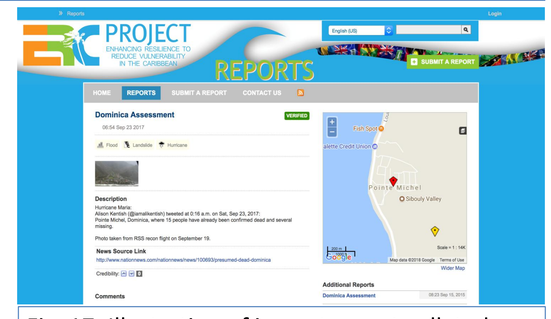

Fig. 17: Illustration of impact report collated from Twitter and RSS images (Hurricane Maria)

Summary

In order to significantly reduce losses, regional economies need to become more weather and climate resilient through actions that increase adaptation including improved targeted impact-based forecasting, early dissemination of accurate and easily understandable information and the delivery of data services that can be easily integrated into the decision making process.

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