Hydro-Climate Tools Developed by UNESCO's International Hydrological Programme and its "Water Family" to Address Water-Related Sustainable Development Goals (SDGs) and Related Commitments (H51S-1568)

United Nations Educational, Scientific and Cultural Organization · International Hydrological Programme

G-WADI

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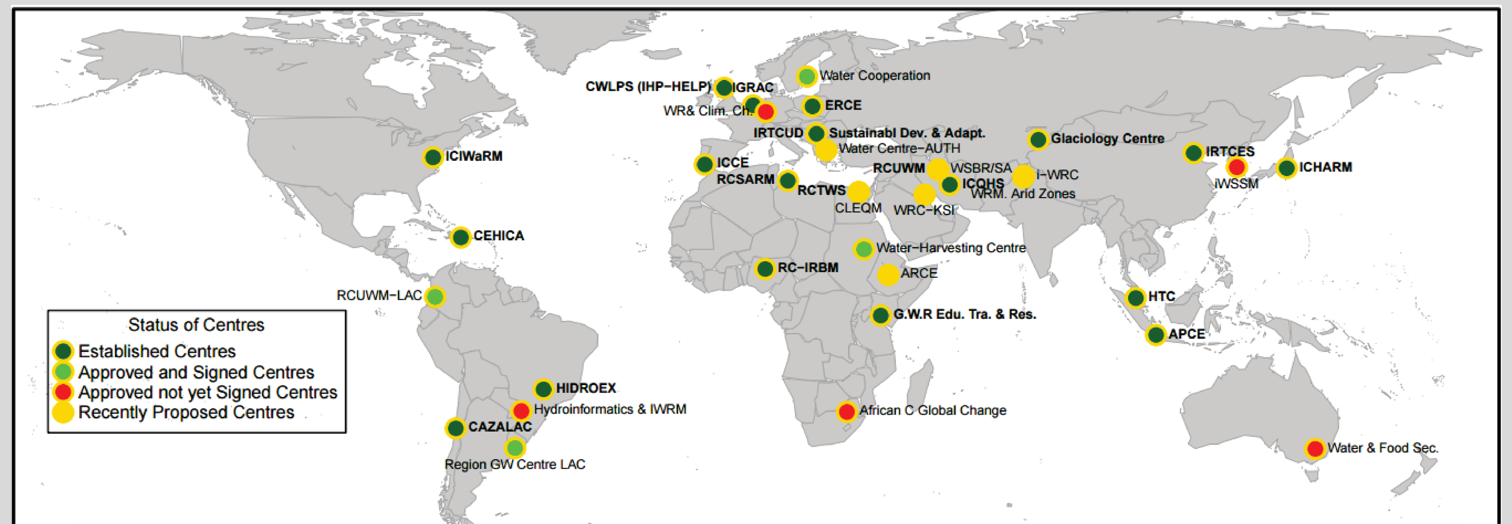
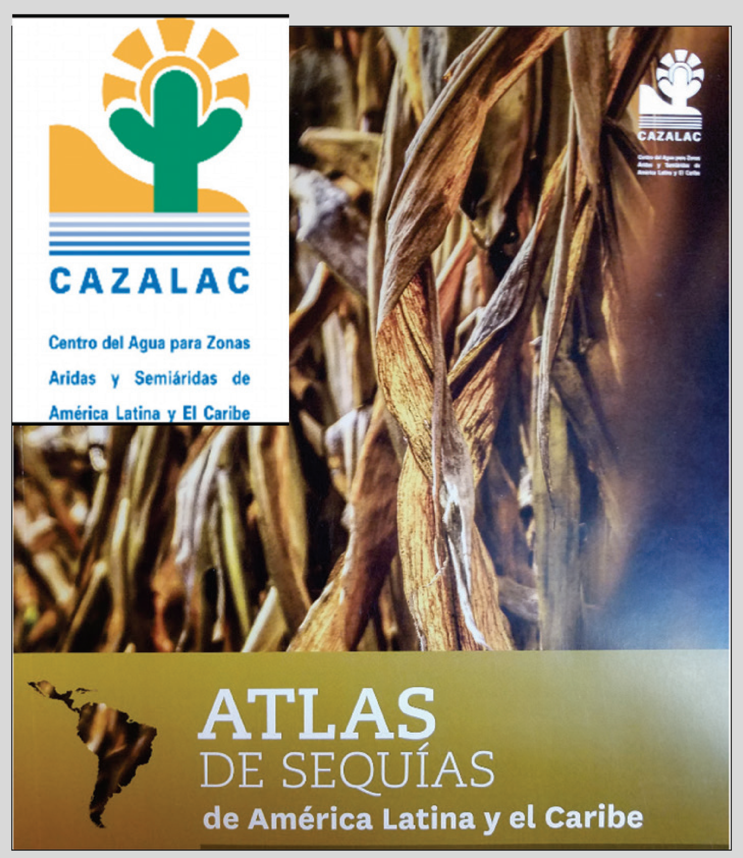
Summary: The International Hydrological Programme (IHP) is the only intergovernmental programme of the UN system devoted to water research, water resources management, and education and capacity building. Along with other elements of UNESCO's "water family"—the World Water Assessment Programme and a global network of affiliated water centers and chairs—it is uniquely qualified to make a broad contribution to attaining the Sustainable Development Goals (SDGs).

This presentation summarizes some of the hydro-climate models, tools, frameworks and approaches developed by the water family to address SDGs related to floods, droughts, water supply and sanitation, food and agriculture, energy and others. They include A) the Latin American and Caribbean Drought Atlas, B) the African and Latin American Flood and Drought Monitors, C) the ICHARM Platforms on Water Resilience and Disasters, D) the PERSIANN family of real-time and historical precipitation estimation tools, and E) the Climate Risk Informed Decision Analysis approach to water resources management.

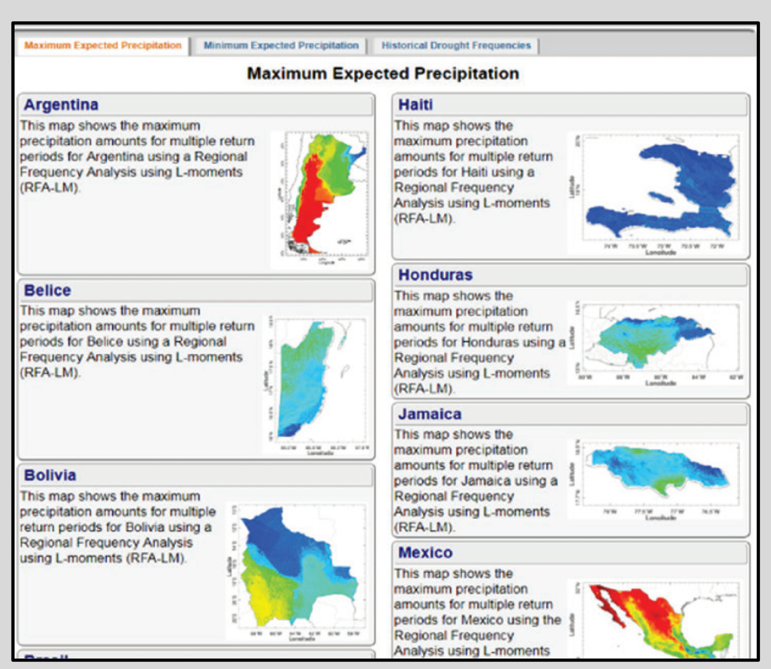


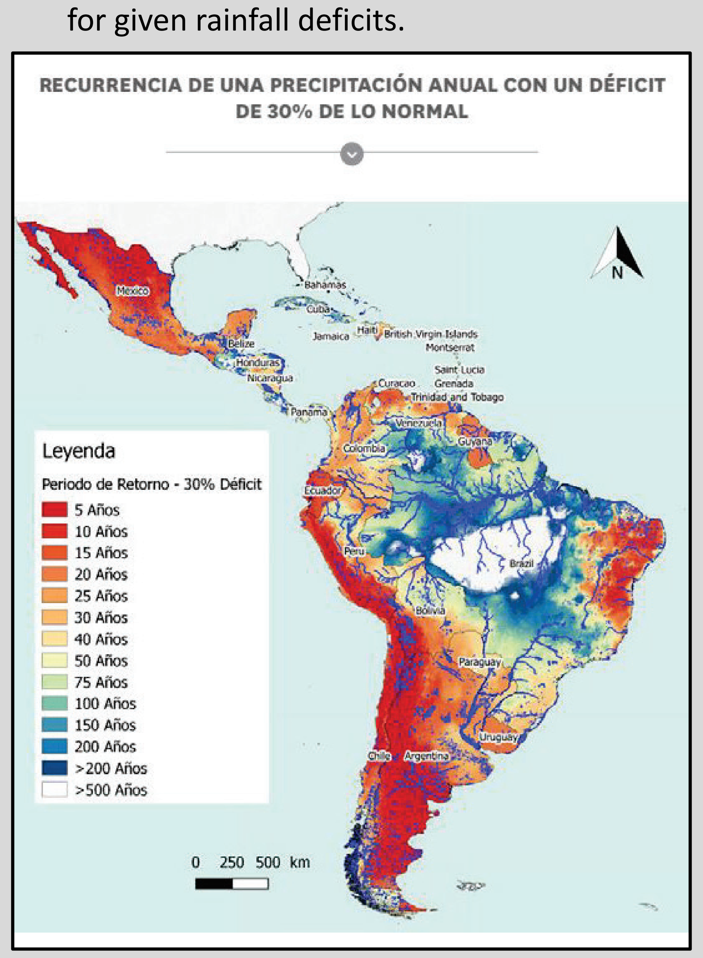
. UNESCO Water Related "Category 2" (affiliated) Centers – part of the IHP "Water Family".

A) Drought Atlas for Latin America and the Caribbean

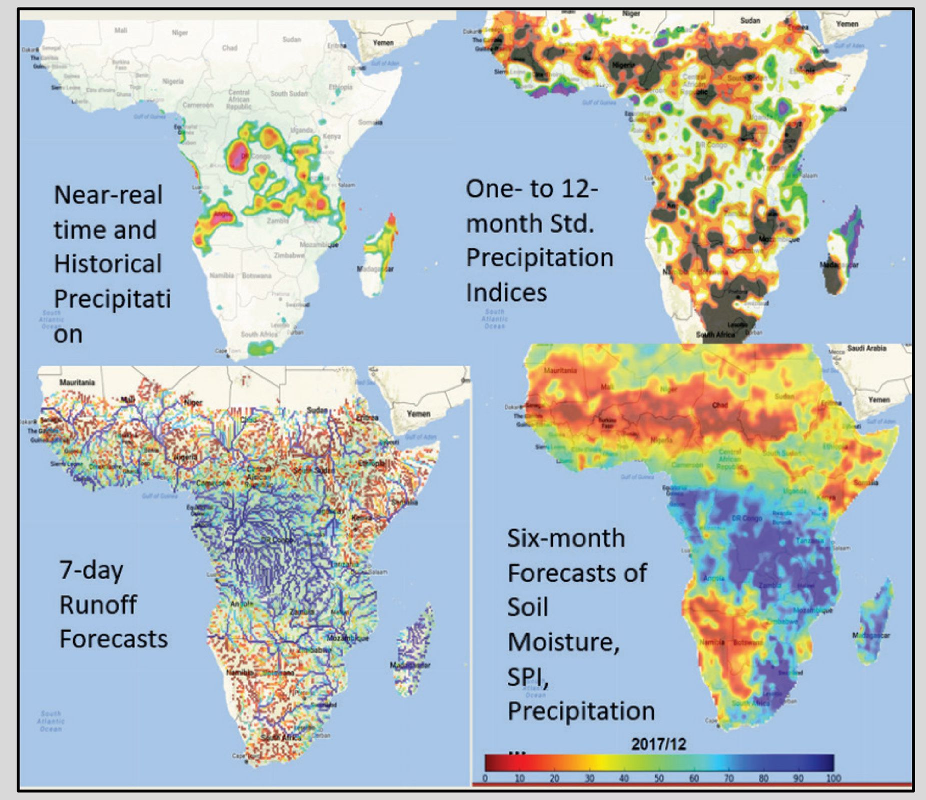


The Drought Atlas, published in 2018 by UNESCO and the Water Center for Arid and Semiarid Zones of Latin America and the Caribbean (CAZALAC), is a tool for historical drought frequency analysis. Using the statistical framework of L-moments to aggregate data from multiple precipitation gauges, maps of minimum and maximum expected precipitation for different return periods for each country in the region were produced. In addition, the Atlas contains 10 country-level case studies, primarily from South America, a summary of the methodology, and maps of return intervals for given rainfall deficits.

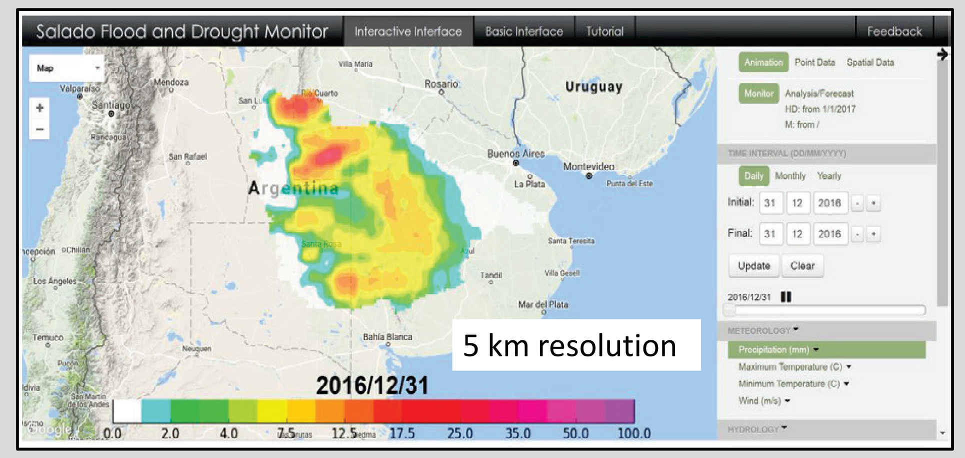




B) Latin American and African Flood and Drought Monitors



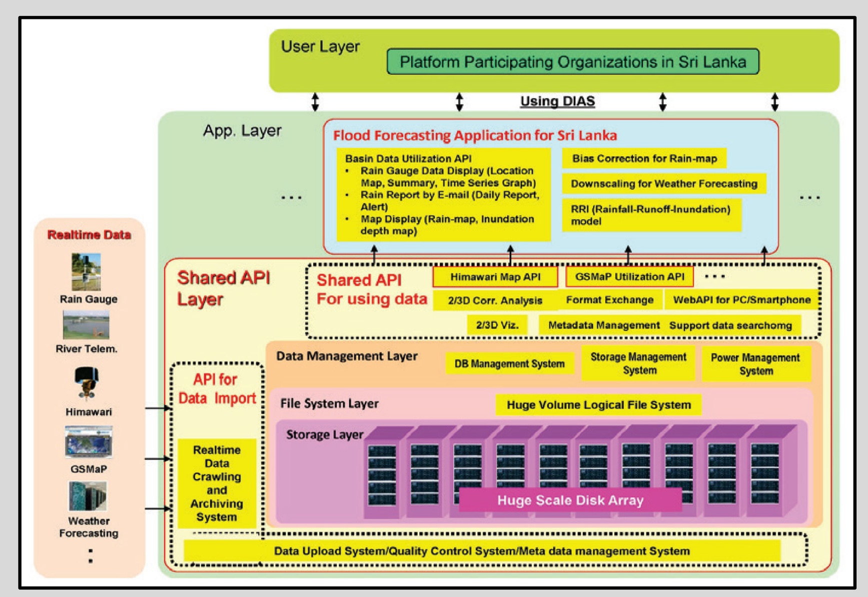
Princeton University & Princeton Climate Analytics, with UNESCO and ICIWaRM collaboration, have developed flood and drought monitors and forecasting systems for Africa and Latin America/ Caribbean. Driven by climate forcing data and downscaling methods, the Google Maps-based system uses land surface and other models to produce 25 km resolution historic reconstructions, near-real time monitoring and 7-day and seasonal forecasts. Five-km products have been developed for Lake Chad & the Salado River Basin, Argentina.

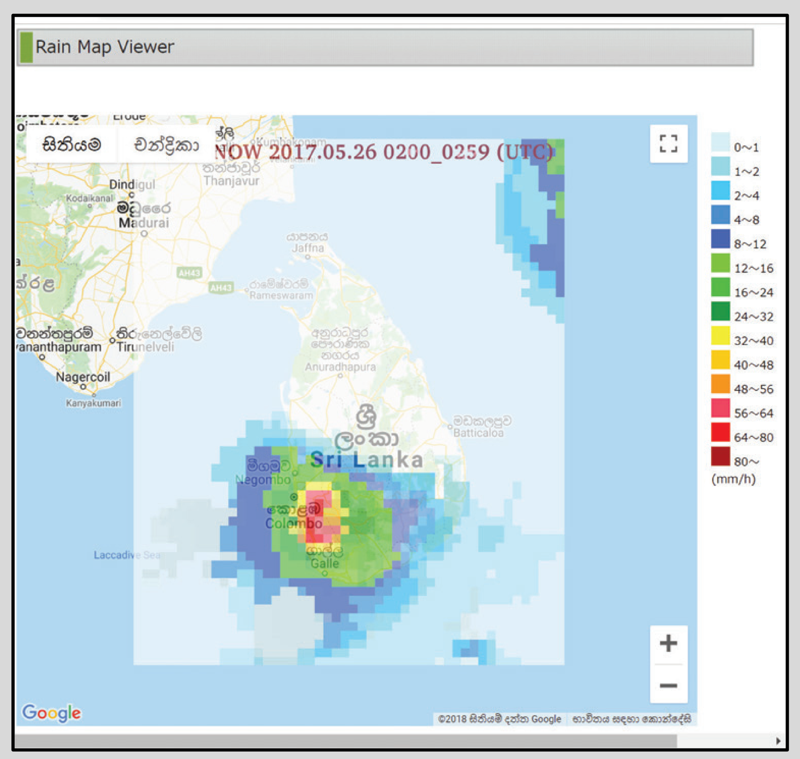


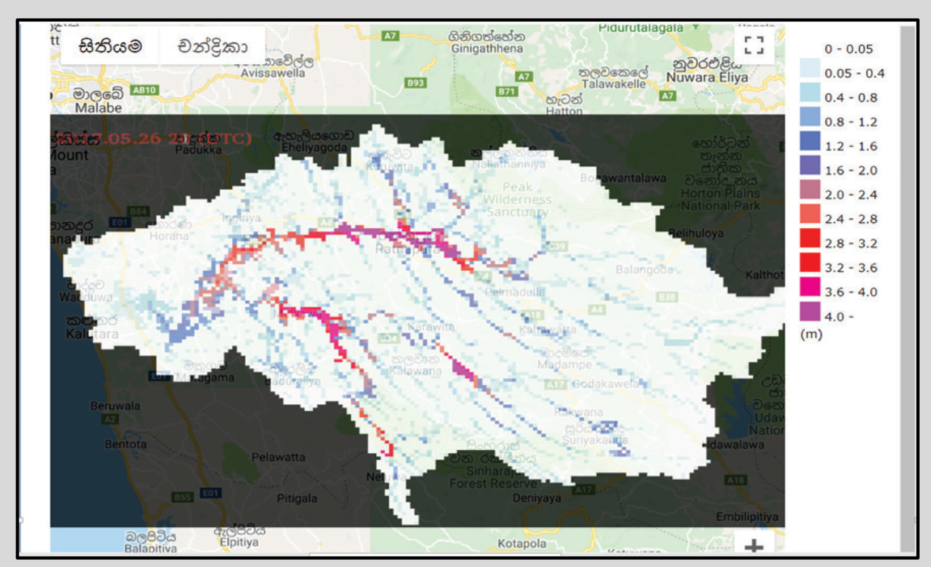
C) Data Integration and Analysis Platforms for Water Resilience and Disasters

Hundreds of lives were lost in 2017 flooding in Sri Lanka. In response, ICHARM and the University of Tokyo developed a data sharing application of flood forecasting on their Data Integration and Analysis System (DIAS). Real-time data from DIAS are used to generate flood forecasts, also in real time. These forecasts are then visualized and provided to local stakeholders.

In Pakistan (not shown), ICHARM also provided a flood forecasting system covering a large part of the Indus River basin, using their Integrated Flood Analysis System (IFAS). This provided floodplain and hazard maps of the lower Indus.







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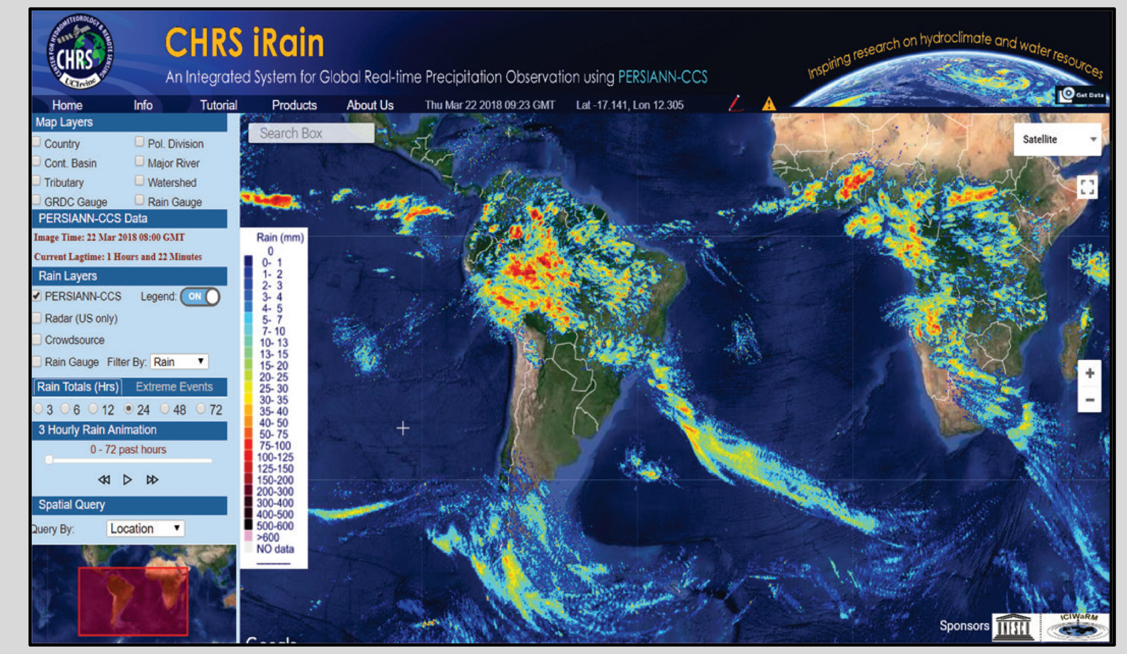
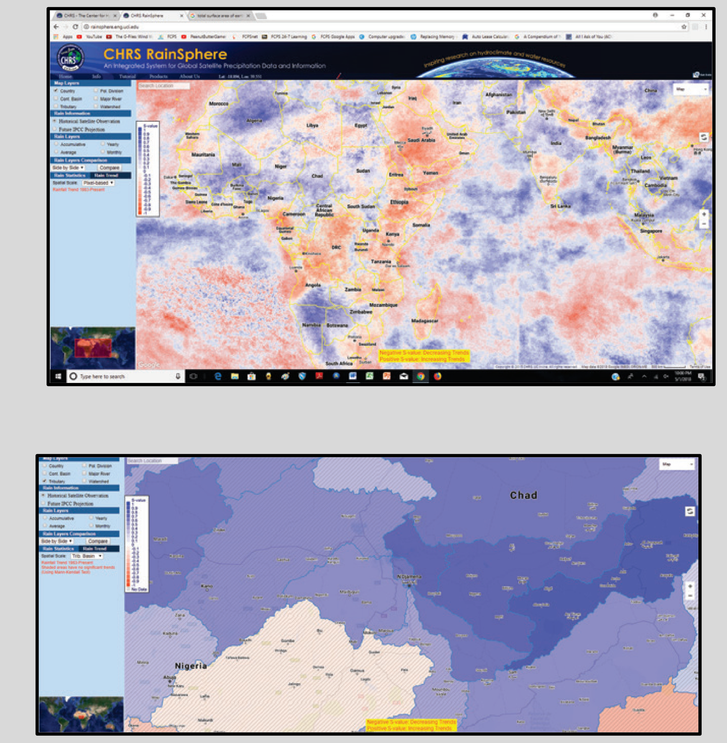
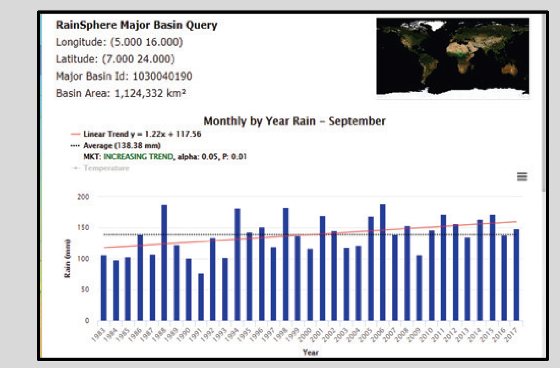
D) Real-Time and Historical Precipitation Products



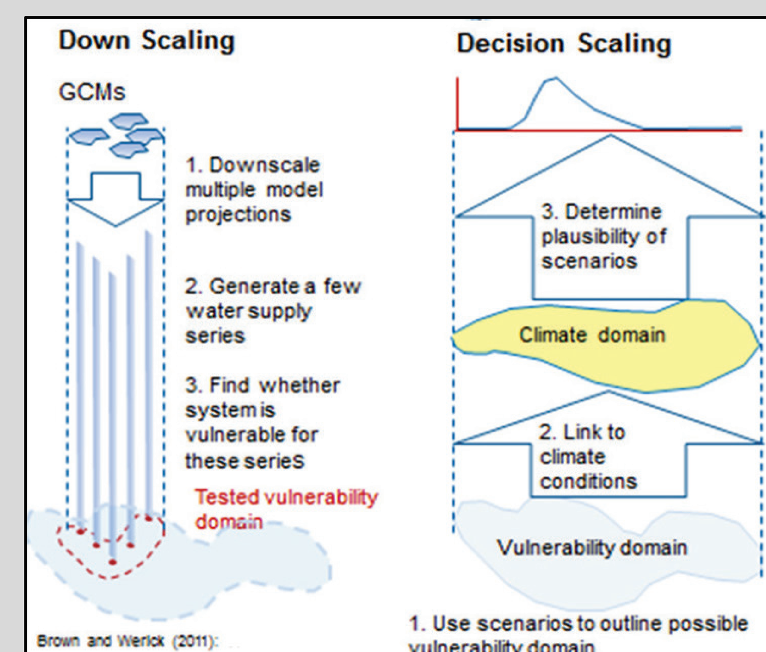


CHRS Center for Hydrometeorology & Remote Sensing UCIrvine

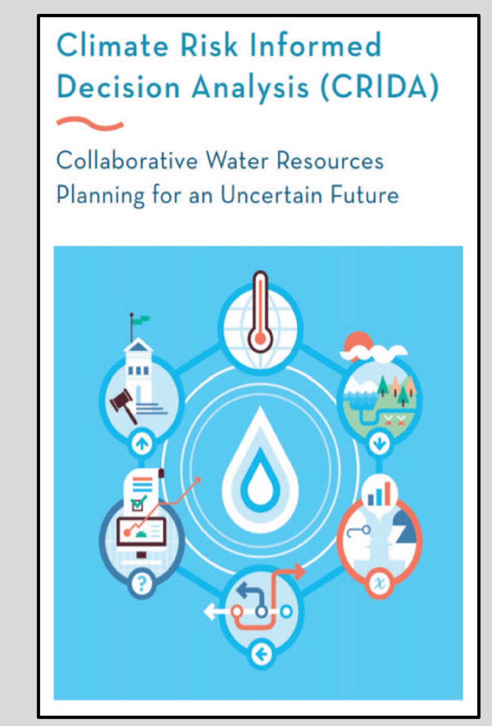
A major component of UNESCO G-WADI's ongoing programs and services is the PERSIANN (Precipitation Estimation from Remotely Sensed Information using Artificial Neural Networks) family of products. These include near real-time precipitation products and platforms (e.g., iRain, based on PERSIANN CCS) and a climate data record (PERSIANN-CDR and derived products such as RainSphere), and others. RainSphere helps visualize precipitation trends over time, including whether those trends are statistically significant or not. For example, much of the Sahel, including the Lake Chad region, seems to be getting wetter since 1983.



E) Bottom-up, Collaborative, Climate Risk-Informed Decision Analysis for Water Resources Planning and Management



Water resources engineers, planners and decision-makers cope with a broad range of risks and uncertainties that may negatively impact users. In addition to climate change (e.g., temperature; precipitation amount, timing and phase; floods and droughts…), changing demographics and land use and natural climate variability, may need to be accounted for. This report presents a planning approach that incorporates climate risk into the well-worn, bottom-up planning pathway most familiar to water resources professionals involved in designing resilient, robust systems.



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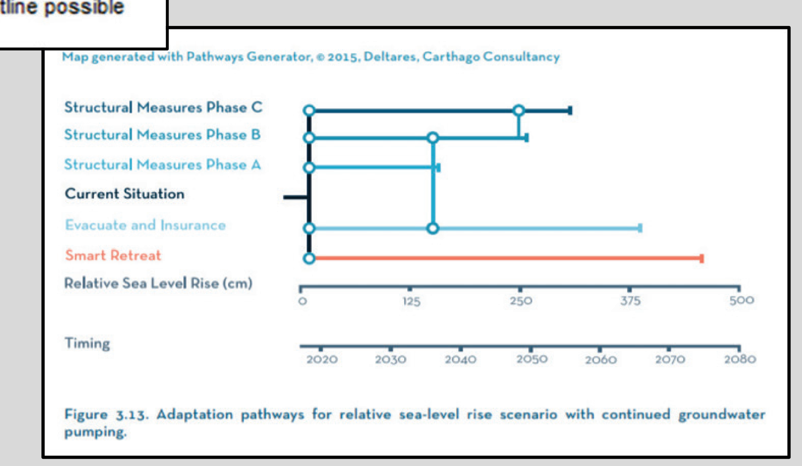

AGWA Alliance for Global Water Adaptation

Many of IHP's Hydro Climate tools were developed through its Global Network on Water and Development for Arid Lands (gwadi.org). Through its partners, G-WADI is developing and testing a variety of tools related to satellite-based precipitation estimates, flood and drought monitoring and forecasting, regional frequency analysis, and other topics.