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DEVELOPMENT & DEPLOYMENT OF A CLIMATE CHANGE-DECISION SUPPORT SYSTEM (CC-DSS) IN SAS DAM, MADHYA PRADESH

Climate change adaptation (CCA) has recently emerged as a new fundamental dimension to be considered in the planning and management of water resources. Because of the need to consider the already perceived changes in climate trends, variability and extremes, and their interactions with evolving social and ecological systems, water management is now facing new challenges. The challenge for decision-makers and stakeholders in the water sector is to understand these climate change anomalies, to determine where and how regions and sectors are vulnerable and to implement appropriate adaptation measures.

Water resources are complex systems that encompass different interlinked components, including technical, economic, social, cultural, environmental and legal aspects. A river basin system, for example, can include several ecosystems with different hydrological sub-systems, various kinds of water uses supporting different social and economic activities, different types of actors with different interests related to water and numerous types of 'institutions' – sets of rules, regulations and policies – regarding water allocations.

Decision making must be based on a solid knowledge base of the impact and consequences of climate change, including the physical, socio-economic and environmental impacts and on the appropriate measures to reduce or minimize these impacts.

OBJECTIVES:

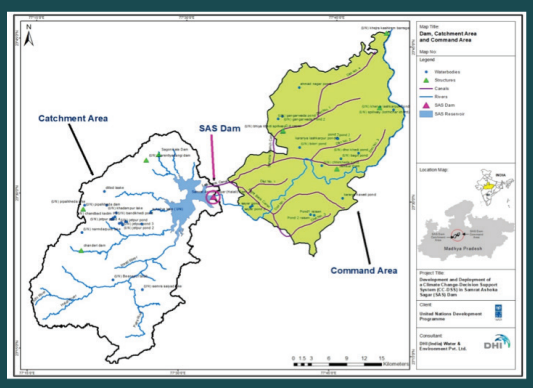
- To mainstream climate change concerns in Water Resource planning through informed decision-making processes
- To provide the Water Management Authorities with a structured, user friendly, practical water resources management - climate change based DSS
- Allow users to analyses Climate - hydrological data, run hydrological simulation models in conjunction with Climate change models, run water allocation models and study the effect of potential decisions
- To meet future demand based on optimal use of water storage and allow decision makers to assess the impact of potential adaptation options under various scenarios
- The DSS will enable WRD to compare and evaluate various Climate change adaptation options against Business-as-usual activities
- To support the WRD in scaling up this pilot to other sub basin/basins and showcase climate change mainstreaming into Integrated Water Resource Management (IWRM)

PILOT AREA:

The Climate Change Decision Support System has been proposed to be deployed and tested at Samrat Ashok Sagar reservoir (Halali), which is an Irrigation and water storage reservoir situated on Betwa river, a tributary of the Ganga river. The reservoir is situated in Raisen district of Madhya Pradesh and has a culturable command area (CCA) of 32,292 ha. [1]

Erratic precipitation patterns and growing water demand for the agriculture have complicated the irrigation planning process at the reservoir operations. So, at the reservoir level, different weather conditions need to be simulated by combining the probability levels of rainfall, evapotranspiration and inflow.

[1] *http://indiawris.nrsc.gov.in/wrpinfo/index.php?title=Sarat_Ashok_Sagar (Halali)_Major_Irrigation_Project_JI00981*



IMPLEMENTATION ACTIVITIES

Task 1 - Stakeholder Engagement, User Requirement Analysis

Task 2 - Development of a Modelling Framework for the DSS

Task 3 - Data Collection & Management

Task 4 - Simulation, Adaptation Scenario building exercise and operationalization of DSS

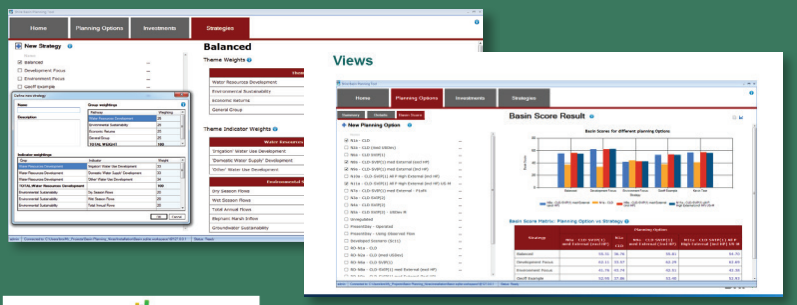
Task 5 - Web-based User Interface/ Dashboard of the DSS

Task 6 - On Line Portal Hosting and Deployment of the DSS

Task 7 - Training & Capacity Building, Operational plan for ensuring sustainability

CCDSS FRAMEWORK

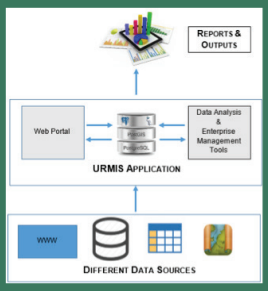
- Data base and processing environment
- Scenario Manager
- GIS Manager
- Spreadsheet Manager
- Job Manager
- Dashboard Manager
- Script Manager

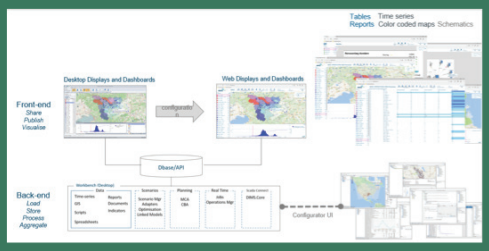


CCDSS ARCHITECTURE

CC-DSS will have three layers

- Database Layer
- Data Analysis and Enterprise Management Layer
- Web Based Interface





EXPECTED OUTCOMES

Reservoir Performance for Crop water planning: The Crop water planning tool is one of the key components of the optimization process which integrates reservoir operations with hydro-economic models. It will determine allocations for the full irrigation and deficit irrigation modelled under each weather condition. The exercise will ensure optimum water availability for all weather conditions to maintain highest possible total farm income even under deficit irrigation.

Adaptation to Flood/Drought Situation: Through simulation of Climate and Hydrology of the Reservoir, DSS will help the department to plan much in advance for maintaining the Water balance of the reservoir in water deficit and water surplus periods in the future.

Adaptation Strategies in the Reservoir Basin: Based on the inferences of the water balance components under CC scenarios from the DSS, departments can implement relevant Climate change adaptation strategies (Water use efficiency such as Drip/Sprinkler Irrigation, PGWM, Artificial Groundwater recharge etc.) in the command area with the help of Water User Associations

State Knowledge Management Centre on Climate Change (SKMCCC, EPCO)
Department of Environment, Government of Madhya Pradesh
Ekant Park, Arera Colony, Bhopal, Madhya Pradesh – 462016, India
Website: www.climatechange.mp.gov.in
Tel: +91 755-2460255, 755-2970499

United Nations Development Programme (UNDP)
55, Lodhi Estate,
New Delhi – 110003, India
UNDP website: www.in.undp.org
Tel: +91-11-42836125