

WELCOME TO HYDRAULICS AND WATER RESOURCE ENGINEERING (HWRE)



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INDIAN INSTITUTE OF TECHNOLOGY MADRAS
Department of Civil Engineering

HWRE

May 26 , 2023 at IITM

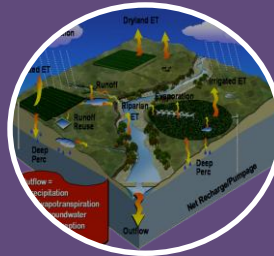
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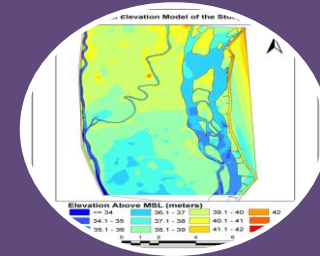
- ❖ Remote Sensing and GIS
- ❖ Hydrological Modeling
- ❖ Irrigation water management



Crop Evapotranspiration,
Inter-basin water transfer,
Irrigation efficiency



Impact of climate and land use
changes on the water
resources



Floods & droughts extent,
magnitude, duration and
frequency

Hydrologic Modelling for effective management of land and water resources

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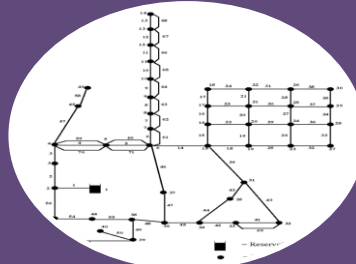
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- ❖ Open-Channel Flow Modeling
- ❖ Closed Conduit Flows
- ❖ Groundwater Resources Management



Modeling of flow and transport of pollutants in open channels for quantity and quality management



Analysis of steady and transient flows in pipe systems, optimal design, condition assessment



Simulation and management models for groundwater resources utilization and aquifer remediation

Computational Hydraulics for Management of Water Resources



Dr. Subbarao Pichuka

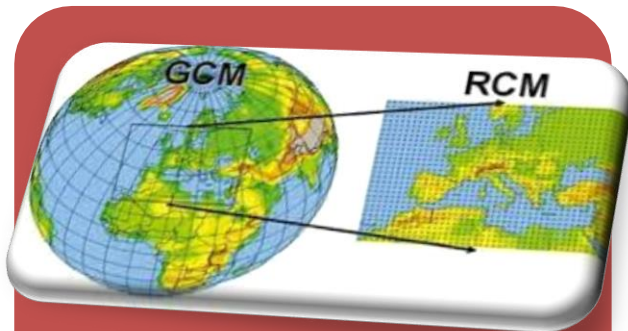
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Major Areas of Research

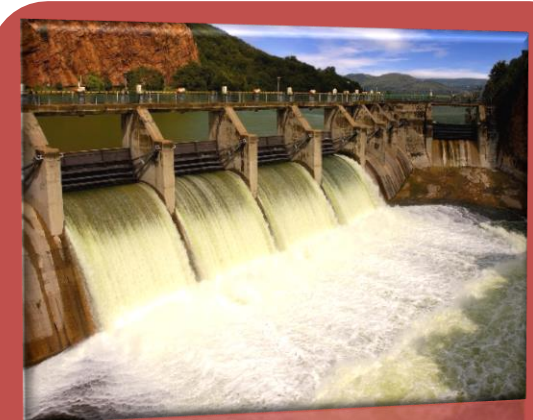
- Climate Change impact on Hydrological Extremes
- Urban Hydrology
- Integrated Watershed Management, Dam Engineering



Downscaling techniques to bring the large scale information to local scale



Utilizing the downscaled data for watershed management and urban flooding studies



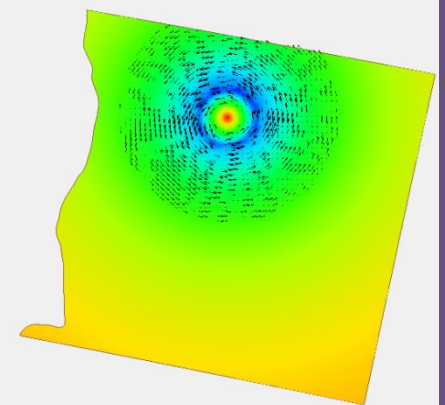
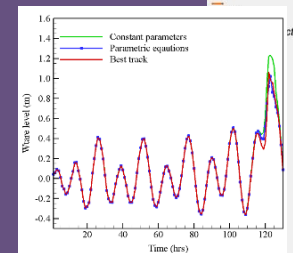
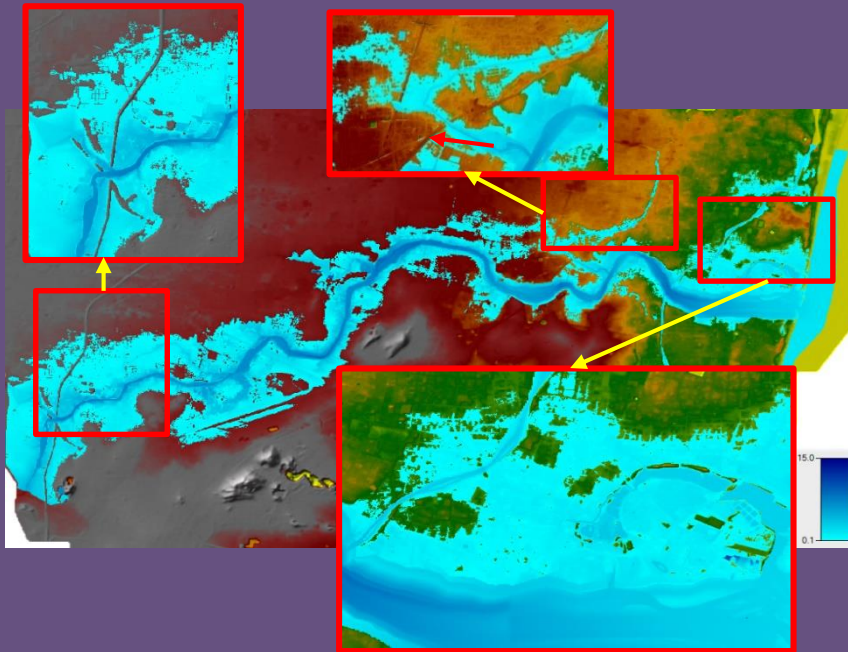
Assessing the climate change impacts on Dam Safety

Assessing the variation of Hydrological parameters under different climate change Scenarios

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- ❖ Computational Hydraulics – river, coastal and dam-break flow, urban flood, flash flood
- ❖ Experimental Hydraulics – flow and sediment transport in river-networks
- ❖ Ocean Dynamics - storm surge and tsunami wave propagation, interaction of river and ocean



Dr. K. P. Sudheer

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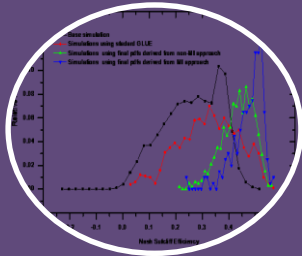
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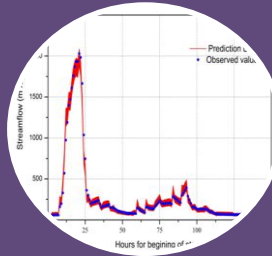
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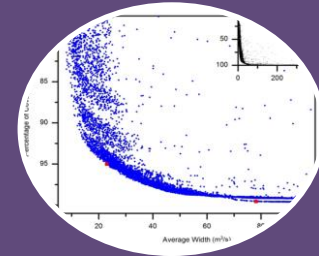
- ❖ Hydrologic Modeling
- ❖ Predictions in Ungauged Basins (PUB)
- ❖ Uncertainty and Sensitivity Analysis



Distributed Hydrological Models for PUB



Hydrologic Prediction Band



Construction of Prediction band

Employing Distributed Hydrological Models for Water Resources Assessment



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Major Areas of Research

- Process based eco-hydrological models of vegetated land surfaces
- Climate change impact on food and water security
- Experimental manipulation of crop micro climate environment



Develop an experimental greenhouse facility to study plant behavior under various microclimatic conditions



Develop a high resolution 3D explicit architecture plant canopy and root system ecohydrological model



Predict impact of climate change on future food and water security and suggest mitigation measures

Predict the response of vegetation under abiotic stresses and climate change

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- ❖ Experimental Hydraulics
- ❖ Sediment Transport
- ❖ Cohesive Sediment Dynamics
- ❖ River Training and Scour Protection Works



Step pool hydrodynamics
in mountain streams



Annular flume
(Cohesive sediment studies)



Field application

Laboratory to field to prevent sedimentation at hydraulic structures

Typical Courses & Electives

Hydraulic & Water Resources Engineering

Applied Hydraulic Engineering
Groundwater Engineering
Surface water hydrology
Water Resources Planning & Management
Rive Engineering

Simulation Modeling in Water Resources
Contaminant transport Modeling
Pipeline Engineering
Geographic Information System
Remote Sensing of the Environment
Urban Hydrology and Storm Drainage design

Hydraulic Engineering Laboratory
Hydroinformatics Laboratory

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Hydraulic & Water Resources Engineering Lab

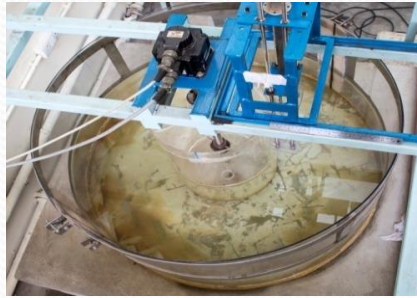


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August 23, 2022 at IITM

Experimental Research Facilities at the Hydraulic Laboratory



Annular flume



Experimental flume with steep slope



River confluence model with mobile bed



New hydraulics laboratory with experimental flumes

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