

# Integrated Framework for Effective Adaptation the Water Sector



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# Water resource development

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- Shall always remain one of the preferred options to cater to vagaries on account of
  - Inherent Spatial variability and
  - Temporal variability of this resource

# Possible development options



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- Surface water Interventions – different scales
  - Big projects – Reservoir or runoff the river scheme
  - Medium & Minor schemes
  - Watershed level – check dams
- Ground water exploitation
  - Shallow wells
  - Deep tubewells



# Implications of interventions

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- Every intervention big or small has associated impact
- Integrated Watershed philosophy was the scientific option suggested to judiciously tackle possible implications



# Extent of interventions

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- It is true that the enhanced water requirement shall warrant enhanced level of interventions
- But in our country, of late there seems to be a competition of sorts between various ministries and departments for unabated, at times unwarranted development without any concern for carrying capacity of the system

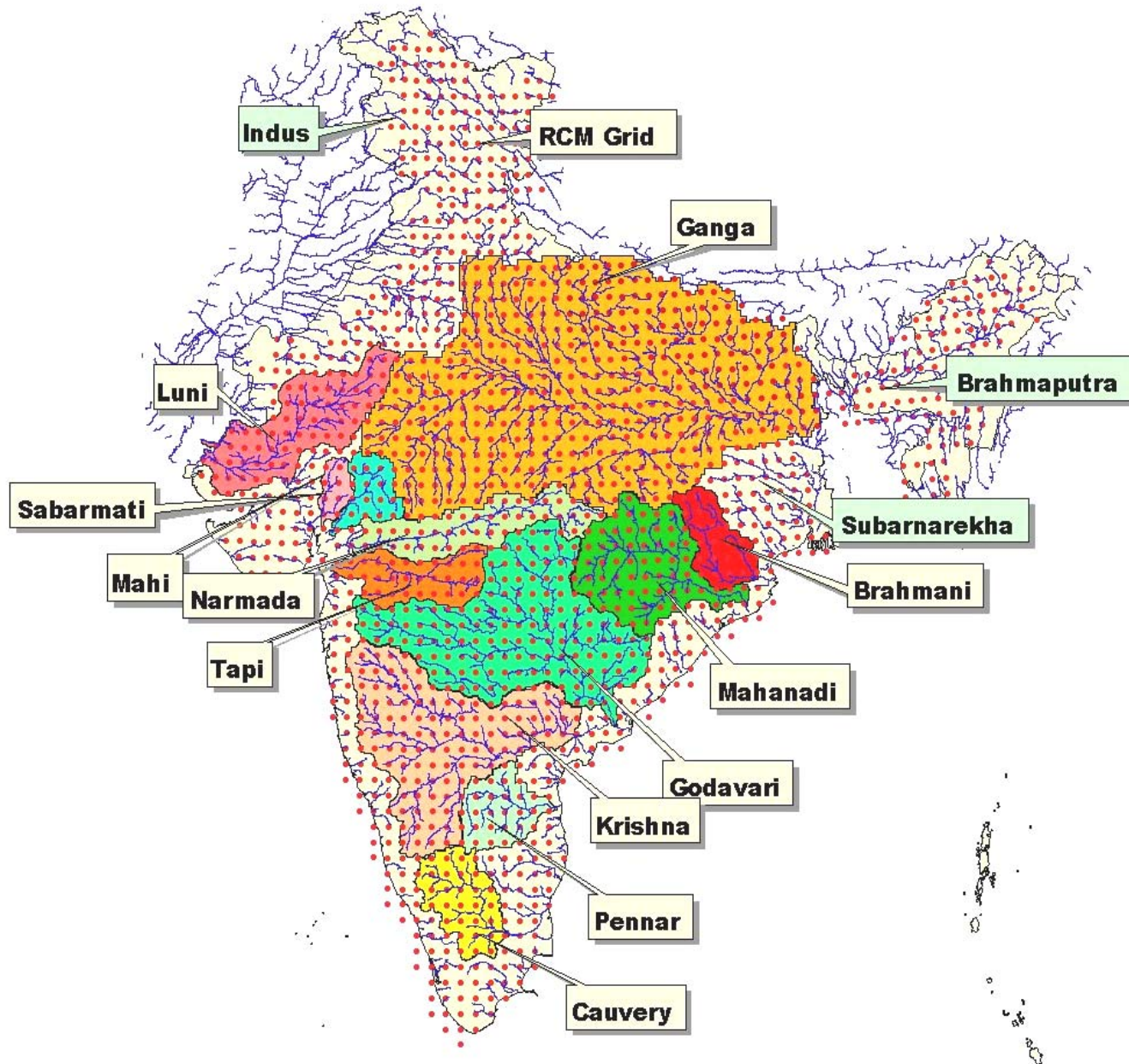
# Conventional departments and ministries implementing interventions



Irrigation/ water resources (Major, medium, minor)

- Hydropower (Mega to small)
- Rural development -Watershed programme
- Forestry - Watershed programme
- Agriculture & horticulture - Watershed programme
- Municipalities - Water supply and sanitation

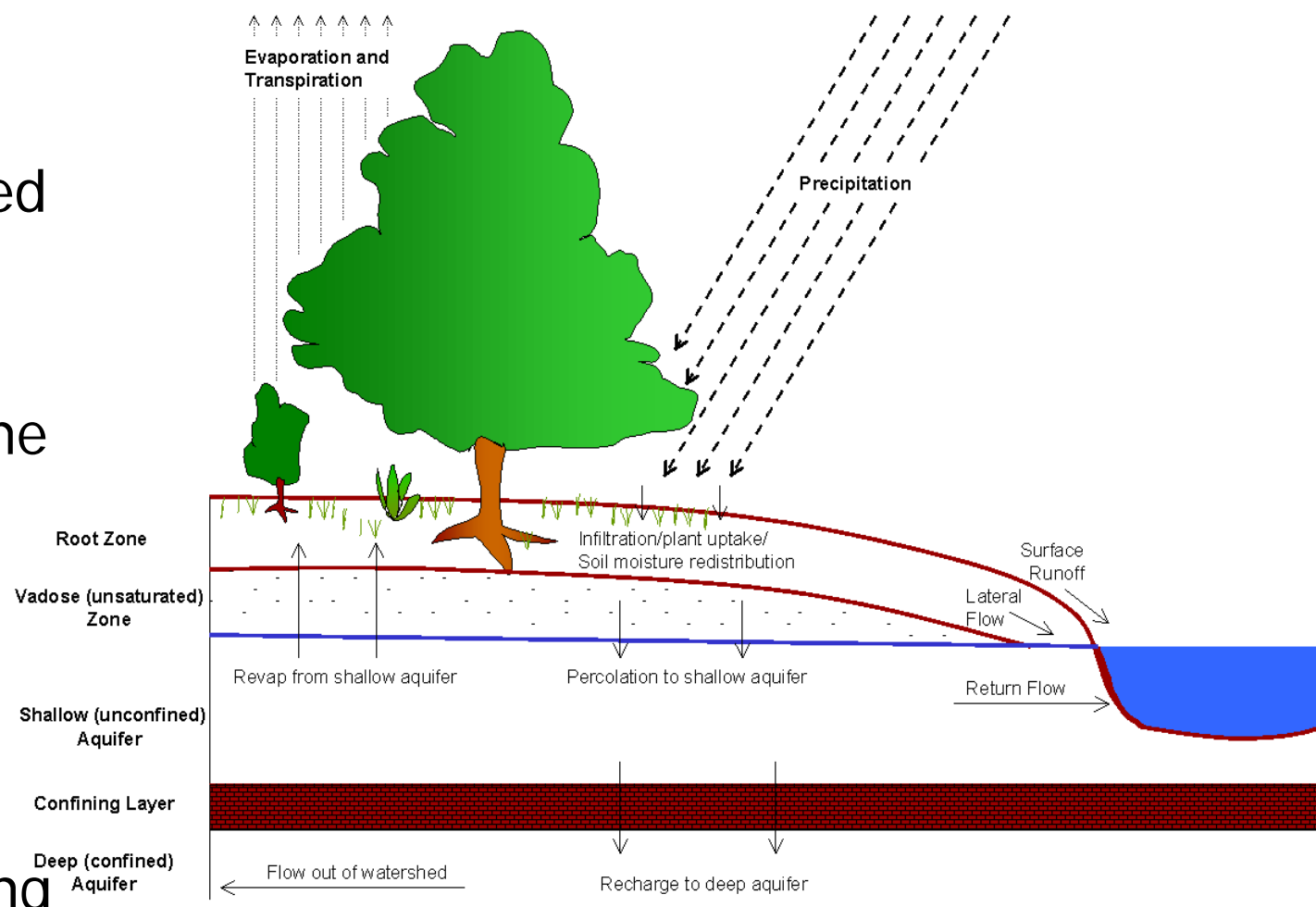
# River Basins Modeled for NATCOM



# SWAT Model Components

## Features

- Physically based
- Distributed model
- Continuous time model (long term yield model)
- Uses readily available data
- Suitable for long term impact studies





# Model Outputs Analaysed

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- Detailed outputs include all the water balance component at spatial and temporal scales which are analysed for
  - Changes in magnitude and frequency of flood peaks
  - Severity of droughts
  - Changes in flow patterns
  - Changes in groundwater recharge



# The major concern

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- Future development & Adaptation shall require enhanced level of interventions that shall require
  - A common framework to provide an integrated information base to address externalities, convergence of scales, sustainability
  - Procedures for scenario generation and evaluation

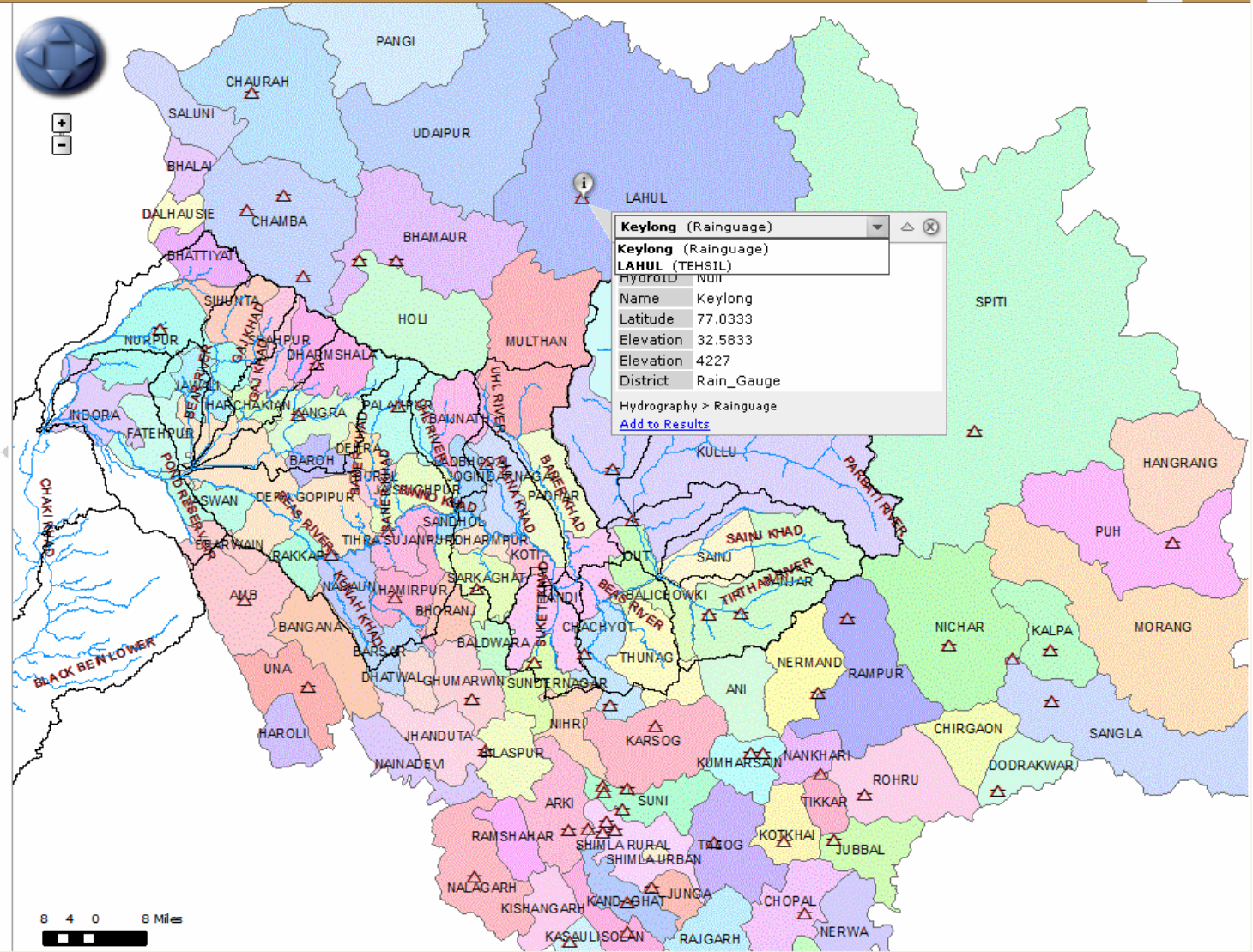
# Hydrological Information System

SubBasinwise Model Results | Help

Print Map | Find Tehsil | Search



- Results**
- Map Contents**
- Landuse
    - LANDUSE
    - SOIL
  - Hydrography
    - WaterBody
    - BOREWELL
    - HYDRO\_PROJECTS
    - IrrigationScheme
    - WateSupplyScheme
    - SewageTreatmentPlant
    - Rainguage
  - Drainage
    - SUTLUJ\_DRAINAGE\_LINE
    - RAVI\_DRAINAGE\_LINE
    - CHENAB\_DRAINAGE\_LINE
    - BEAS\_DRAINAGE\_LINE
    - SUTLUJ\_SUBBASIN
    - RAVI\_SUBBASIN
    - CHENAB\_SUBBASIN
    - BEAS\_SUBBASIN
    - INDUS\_BASIN
  - Administrative
    - VILLAGE
    - TEHSIL
    - DISTRICT
    - STATE



# SubBasinwise Model Results

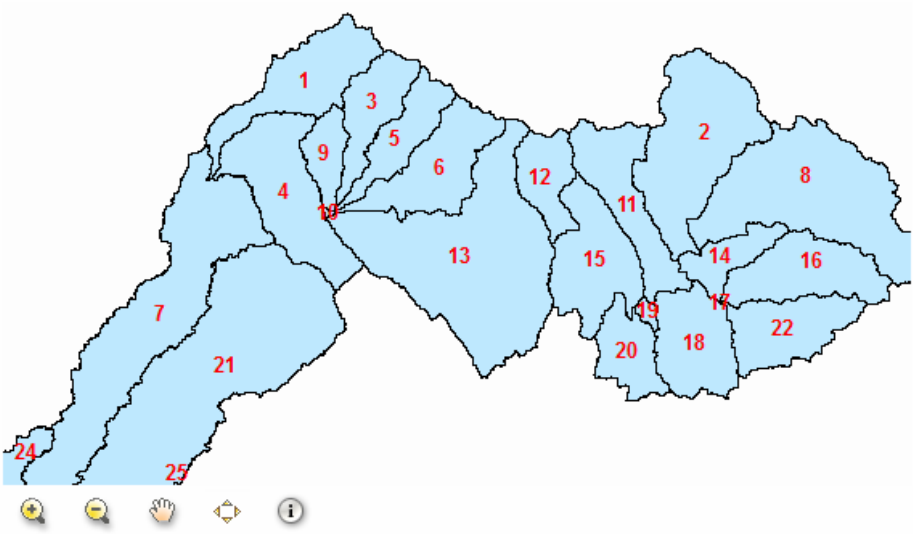
Select ID:  
0002  
0003  
0004  
0005

Select Parameter:  
Water Balance

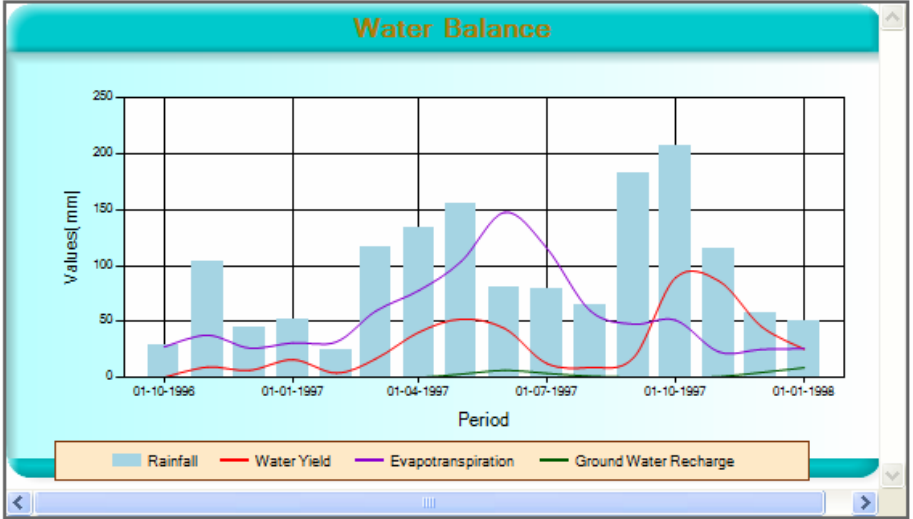
Select Time Range  
From: 1996/01/1  
To: 1998/01/1

Show Table

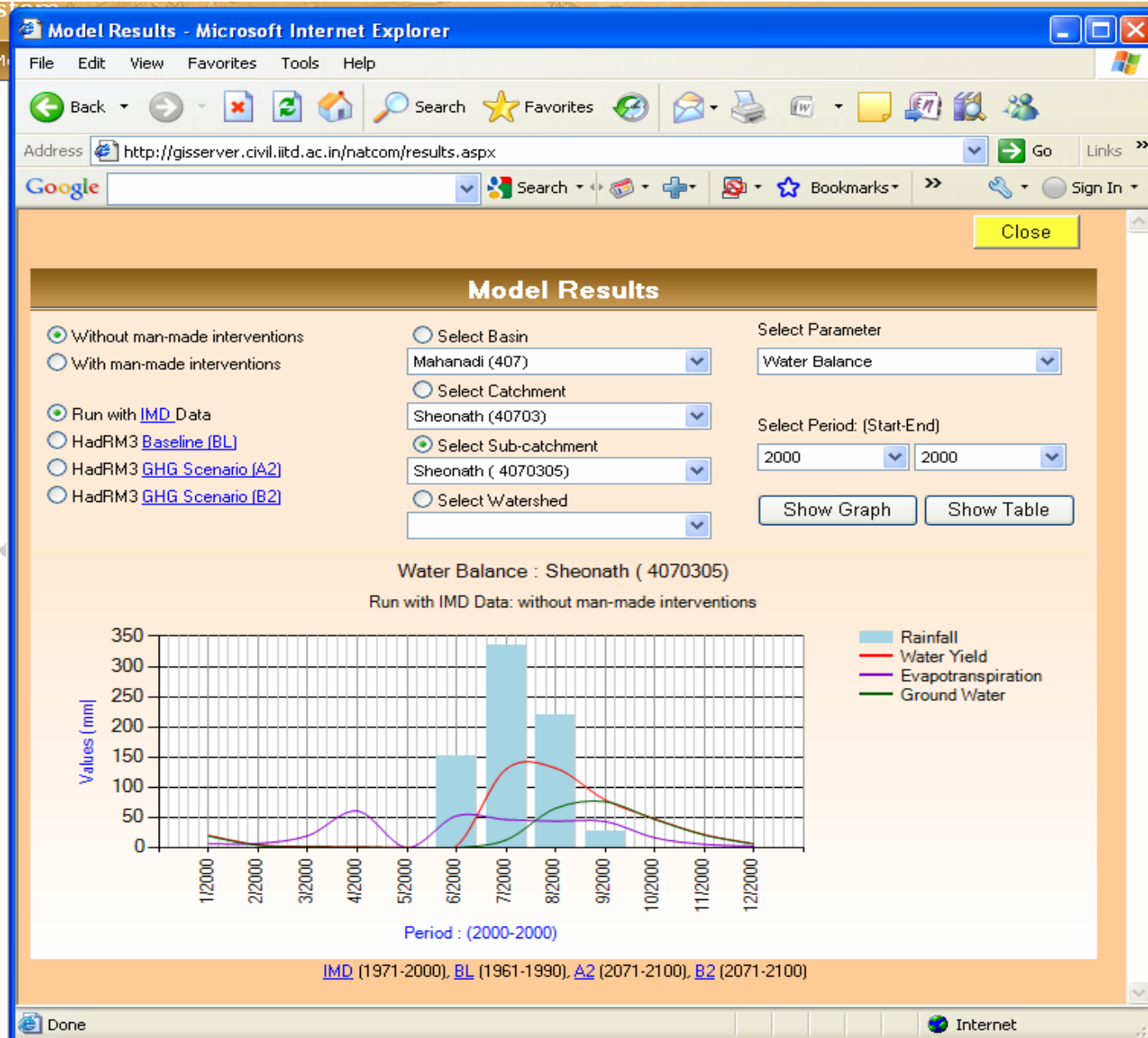
Show Graph



SubBasin Beas



# Web Based interface for Analysing the model results( with climate change scenarios )



# Web-Based Interface for Basinwise Analysis

## Basinwise Analysis

Average Water Balance Components for IMD, Control and GHG

Select Basin

Select Catchment

Select Sub Catchment

Select Watershed

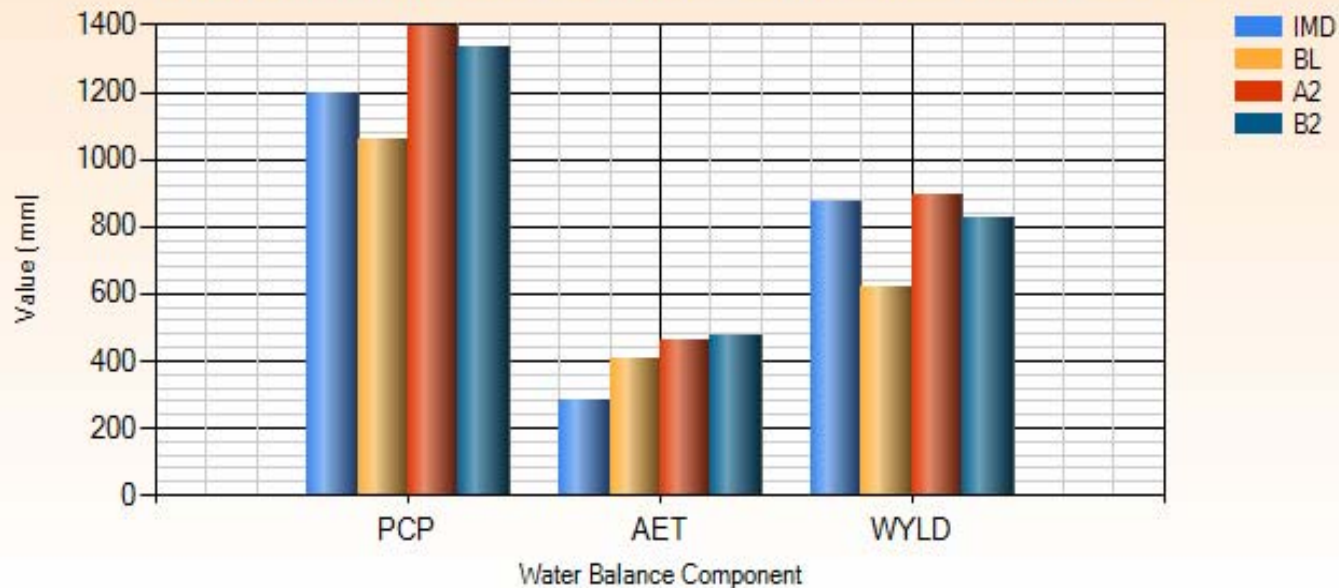
Mahanadi (407)

Sheonath (40703)

Sheonath (40703C)

Show Graph

Average Water Balance Components for IMD, Control and GHG Climate Scenario



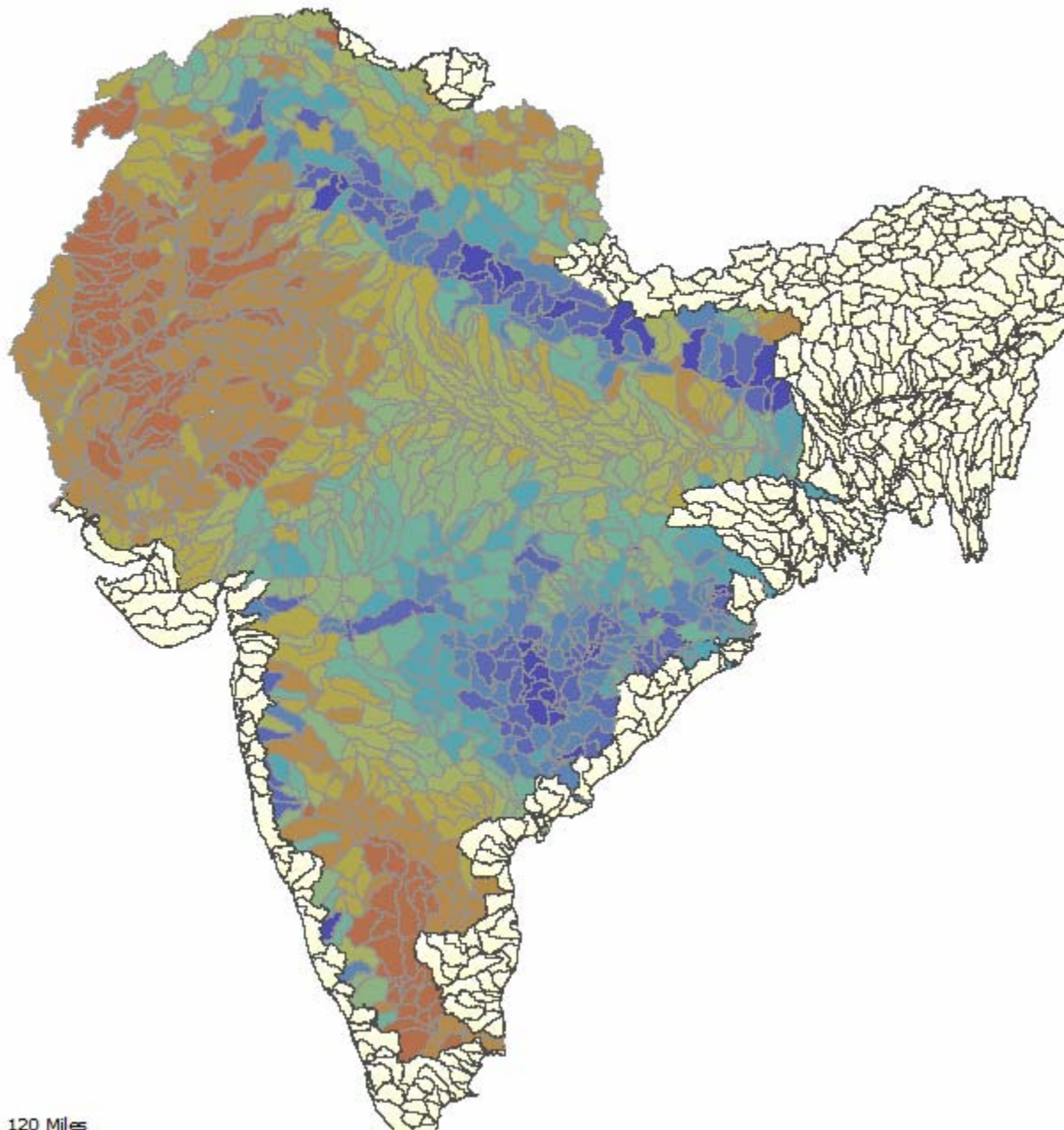
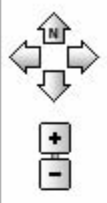
[IMD](#) (1971-2000), [BL](#) (1961-1990), [A2](#) (2071-2100), [B2](#) (2071-2100)



Results

Map Contents

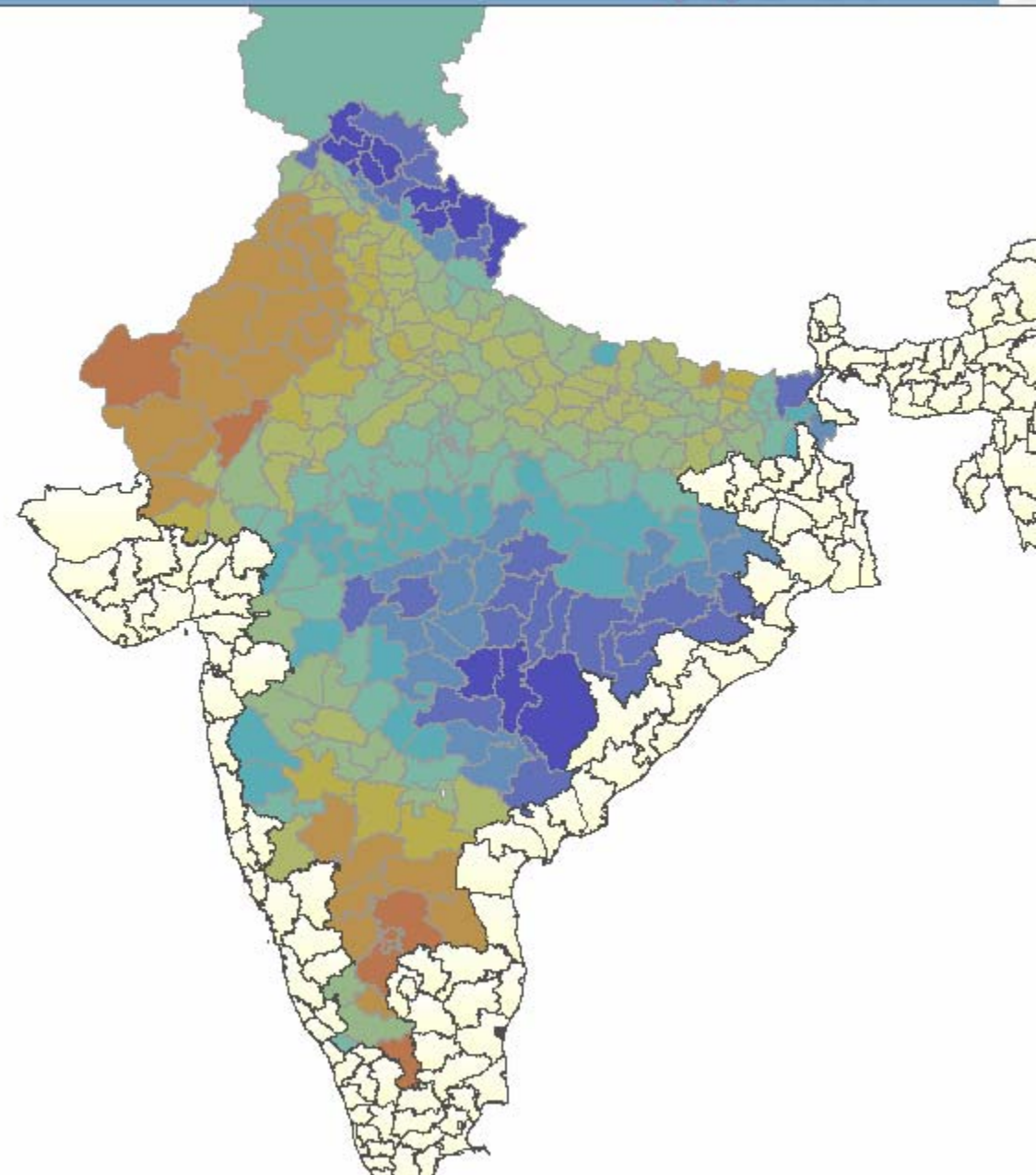
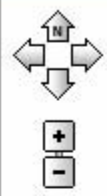
- WaterYield
  - SubCatchmentwiseAnnualWat
    - 0.00
    - 0.01 - 54.59
    - 54.60 - 170.95
    - 170.96 - 308.24
    - 308.25 - 473.42
    - 473.43 - 671.88
    - 671.89 - 883.15
    - 883.16 - 1161.03
    - 1161.04 - 1544.80
    - 1544.81 - 2127.37
    - 2127.38 - 4225.08
  - DistrictwiseAnnualWaterYield
- DrainageNetwork
  - Drainage@50 Thousand Thres
  - Drainage@ 2 Lakh Threshold
  - Drainage@ 10 Lakh Threshold
  - Drainage@ 1 Crore Threshold
- DrainageArea
  - SubCatchment
  - Catchment
  - Basin
  - Region



Results

Map Contents

- WaterYield
  - SubCatchmentwiseAnnualWat
  - DistrictwiseAnnualWaterYield
    - 0.00
    - 0.01 - 49.18
    - 49.19 - 172.68
    - 172.69 - 281.45
    - 281.46 - 371.96
    - 371.97 - 496.60
    - 496.61 - 660.05
    - 660.06 - 864.00
    - 864.01 - 1134.88
    - 1134.89 - 1516.54
    - 1516.55 - 2311.20
- DrainageNetwork
  - Drainage@50 Thousand Thres
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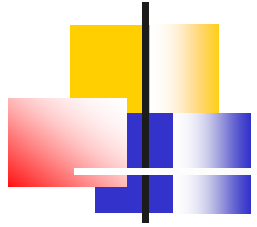




# Conclusions

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- Integrated water resource development and management requires a common framework
- Creation of NDSI complaint spatial databases is essential for sustainable use of water resources and associated development and adaptation for climate change impacts
- <http://gisserver.civil.iitd.ac.in/natcom/>



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Thank you