DSS-H: Decision Support System—Hydrology

Neeranchal National Watershed Project under PMKSY of GoI

A World Bank & GoI funded project at Department of Land Resources, GoI

भूमि संसाधन विभाग
DEPARTMENT OF
LAND RESOURCES

राष्ट्रीय जल विज्ञान संस्थान
National Institute of
Hydrology

THE WORLD BANK

DSS-H is a planning and monitoring tool to make the watershed development in India a science-based activity, leading to effective problem solving with improved efficiency

The Government of India has been implementing various watershed development programmes over the last 50 years. It has launched the **"Pradhan Mantri Krishi Sinchayee Yojana" (PMKSY)** with an objective of providing access to irrigation to every farm **'Har Khet ko Pani'** and efficient use of water **'Per Drop More Crop'**. One component of PMKSY is the Integrated Watershed Management Programme (IWMP), which is implemented by the Department of Land Resources (DoLR), Ministry of Rural Development (MoRD), and has now become the Watershed Development Component (WDC) of PMKSY.

Neeranchal National Watershed Project (NNWP)

The World Bank assisted NNWP was conceptualized to address through proof of concept, some of these emerging challenges that the existing IWMP framework was grappling with. The Project Development Objective of NNWP is *"to support the Watershed Development Component of the PMKSY (WDC-PMKSY) to improve incremental conservation outcomes and agricultural yields for communities in selected sites, and adoption of new processes and technologies into the broader programme in participating States".* Neeranchal is expected to positively influence the outcomes of the ongoing WDC-PMKSY through technical and financial support for better delivery and impacts through improved planning approaches, capacity building, coordination and convergence, and supportive R&D.

NNWP also supports institutional strengthening for improved service delivery through capacity building of implementing organisations, adoption of effective project management practices including processes and technologies at the National, State and District levels. As an important deliverable, NNWP will assist in scientific hydrological assessment and planning of watershed projects, through identification of water surplus and deficient areas, catchment prioritization, improved identification of water harvesting potential, planning for optimal water availability and use in rainfed areas and application of innovative tools for community water budgeting

NNWP is being implemented in nine participating states i.e. Andhra Pradesh, Telangana, Chhattisgarh, Madhya Pradesh, Gujarat, Jharkhand, Maharashtra, Odisha and Rajasthan, and cover approximately 60 percent of the rainfed area of the country. The project will contribute to improved watershed management activities in identified watersheds in two districts in each participating State, with each watershed of about 5,000 ha.
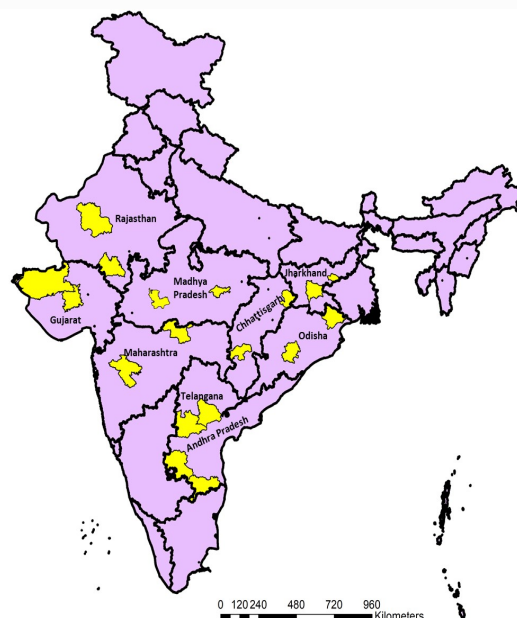
About DSS-H

DSS is a tool that helps decision makers by compiling useful information from a combination of raw data, documents and models to solve problems and make decisions. It presents data in such a way that users can make decisions more easily.

The DSS-H is intended to be a useful tool for planning of appropriate soil, land, crop and water-related interventions at the watershed scale. Once developed, DSS-H will be used by the SLNAs in "Neeranchal States" to derive hydrology-related information for use in preparation of the DPRs for their projects. DSS-H will also provide results and information regarding impact assessment of the watershed interventions, such as check dams, ponds, groundwater recharge structures, improvement in water use efficiency through appropriate crop and land management.
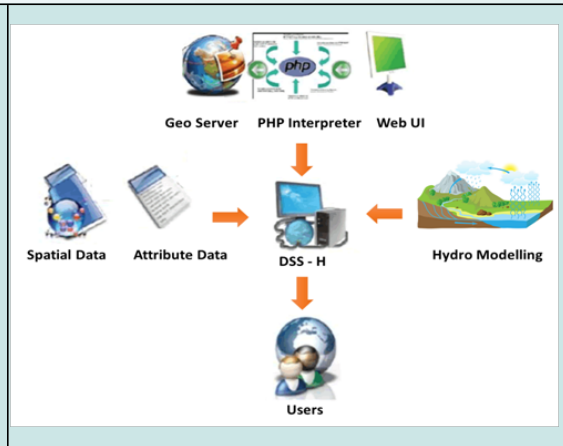
DSS-H will provide:

- Suitable sites for water harvesting structures
- Selection of appropriate design
- Estimation of number of structures feasible
- Water availability from different sources
- Water demand for different uses
- Water balance
- Measures for addressing gap in water demand
- Impact assessment through various indices
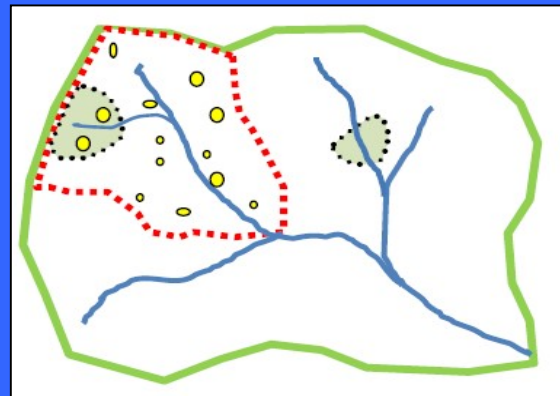
DSS-H utilizes relevant data on meteorology, hydrology (surface water, groundwater, water quality), geomorphology, soil, irrigation, land use and land capability, crops and cropping practices, water demand, demographic, socio-economic, etc.

Thematic output from DSS-H is available in the form of maps, graphs, tables, reports. Hydrology modeling tools are used to derive the results under different modules of DSS-H, which are useful in preparation of DPRs, DIPs, etc.

Themes & maps: Thematic layers; maps of location, drainage, geomorphology, soil, soil health, landuse, land capability, DEM, crops, structures, sampling sites,..

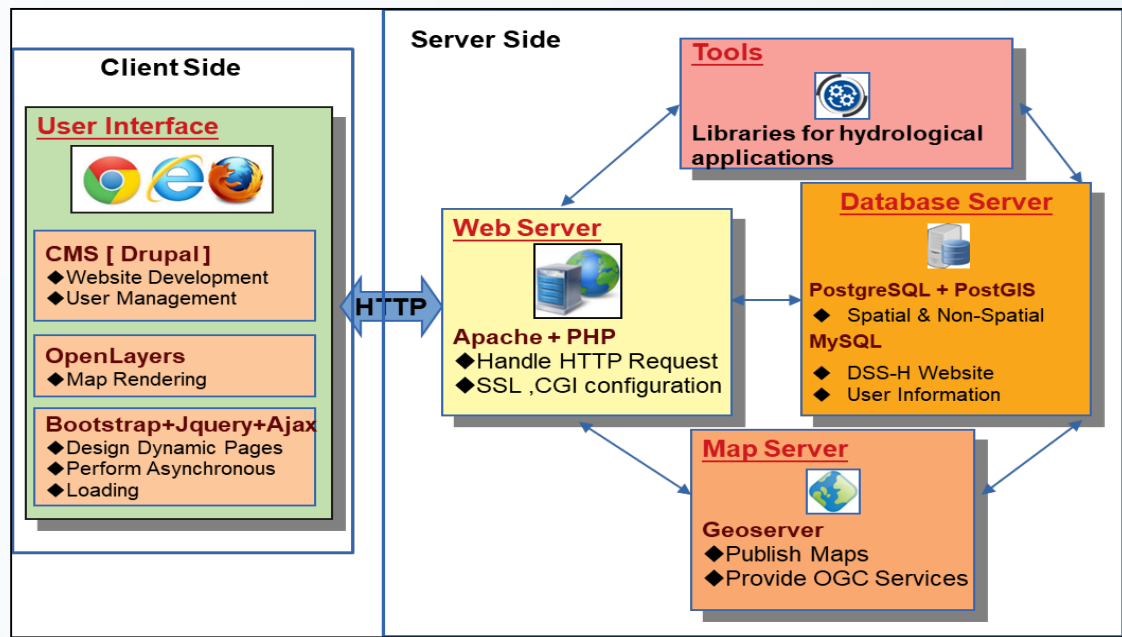**Tables:** Spatial, non-spatial data tables, time series, probability distribution tables

Graphs: Graphs for tables (input data and results)

Geotagged Structures: Soil and water conservation and groundwater recharge structures.

DSS Queries: Watershed specific queries/ answers on water availability, water demand, environment and livelihood, impact assessment

Metadata: Information regarding data

DSS-H Architecture

Client Side

User Interface

CMS [Drupal]
◆ Website Development
◆ User Management

OpenLayers
◆ Map Rendering

Bootstrap+Jquery+Ajax
◆ Design Dynamic Pages
◆ Perform Asynchronous
◆ Loading

HTTP

Server Side

Tools
Libraries for hydrological applications

Web Server
Apache + PHP
◆ Handle HTTP Request
◆ SSL ,CGI configuration

Database Server
PostgreSQL + PostGIS
◆ Spatial & Non-Spatial
MySQL
◆ DSS-H Website
◆ User Information

Map Server
Geoserver
◆ Publish Maps
◆ Provide OGC Services

Modules of DSS-H

## DSS-Hydrology for Neeranchal National Watershed Project

Home

Objective of DSS-Hydrology

The overall objective is to support DoLR and States to develop and pilot decision-support systems (DSS-H) to facilitate improved returns from watershed management through assessment of investment options, site selection and prioritization. Prioritization relates to soil and water conservation measures including landuse practices at sub-watershed level that can then be downscaled to guide micro-watershed level planning.

View Detail
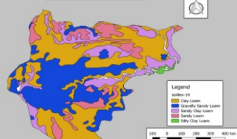
PLANNING

Planning for drinking water, livestock, industry and crops, Database generation, Design storage estimation, Water Demand estimation, water balance estimation, pre project Water use efficiency, crop productivity/production and soil health condition

View More

SITES AND STRUCTURES

Identification of suitable site for water harvesting structures, selecting appropriate structures for water conservation, soil conservation, Ground water recharge, catchment and command area of structures, estimation of number of structures feasible in the watershed.

View More

IMPACT ASSESSMENT

Estimation of runoff with change in Land Use, computation of water quality Index, NDVI and NDWI, estimation of change in ground water table, soil moisture and soil erosion, post project crop production and water use efficiency, social vulnerability analysis

View More

DPR INPUTS
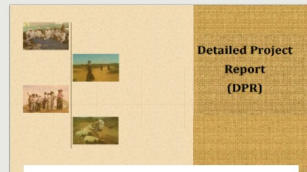
The DSS-H will provide the basic project information, geography and geohydrology of watershed, socio-economic profile of watershed, drinking water requirement, detail of crop area and yield, ground water table information in the watershed area

View More

SELECT STUDY AREA

Chhattisgarh >> Kanker >> IWMP-14 Change

- Kanker
- Administrative
- ☑ District Boundary
- ☑ Block Boundary
- ☐ Tehsil Boundary
- ☐ Village Boundary
- Hydrological
- ☑ IWMP-14
- ☑ IWMP-15
- ☑ IWMP-16
- ☑ IWMP-17
- Other Data
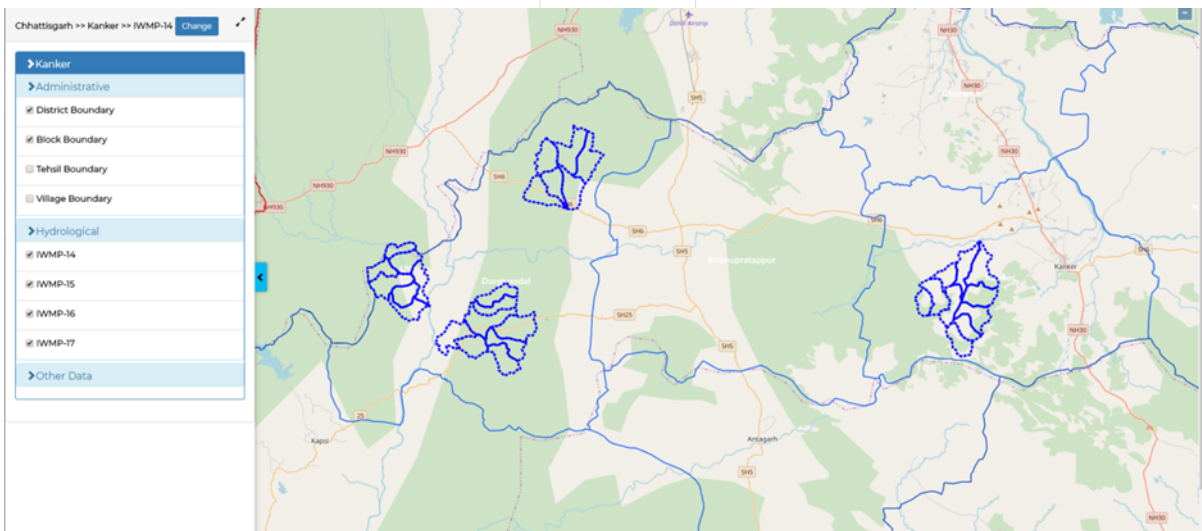
DSS-H Tools

Many tools are included in DSS-H for computation of hydrological parameters and various indices required for impact assessment. These tools are for computation of Runoff, ET, Ground Water Recharge, Soil Loss, Crop Water Requirement, Water Quality Index, Soil Moisture Index, Water Poverty Index, Watershed Sustainability Index, Watershed Performance Index, Livelihood Vulnerability Index.

Showing ground water level variation for Village: Devri in Block: Kanker in Chhattisgarh, for year 1996 to 2000

Ground Water Level Data Table

Block	Village	Year	Post monsoon rabi	Pre monsoon	Monsoon	Post Monsoon kharif
			[m bgl]	[m bgl]	[m bgl]	[m bgl]
Kanker	Devri	1996	5.49	0	3.04	0
Kanker	Devri	1997	5.82	0	3.23	0
Kanker	Devri	1998	4.51	0	3.58	0
Kanker	Devri	1999	5.36	0	1.9	0
Kanker	Devri	2000	4.76	0	2.91	0

Evapotranspiraion Plot

DSS - Hydrology under Neeranchal National Watershed Project

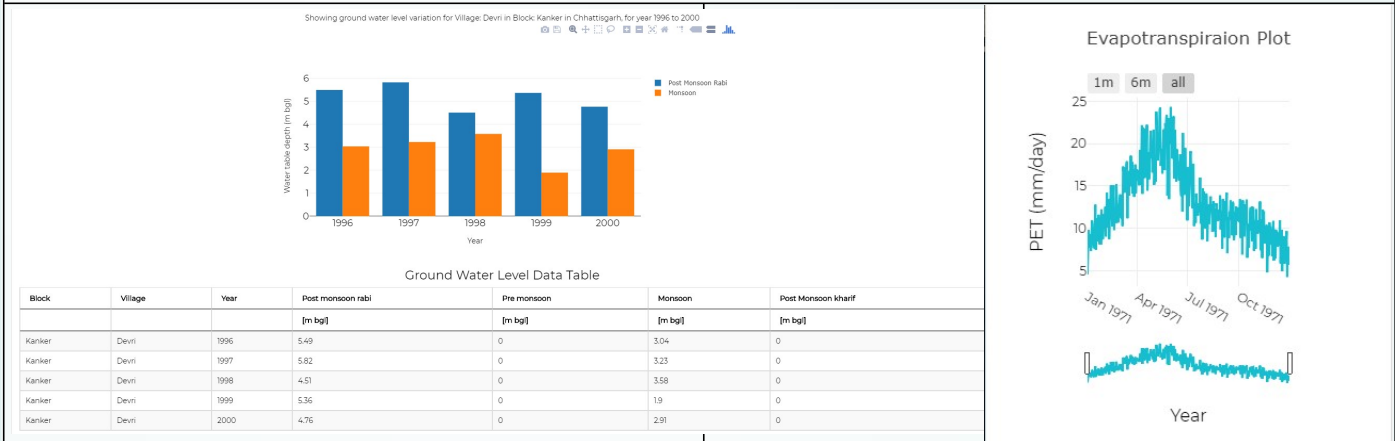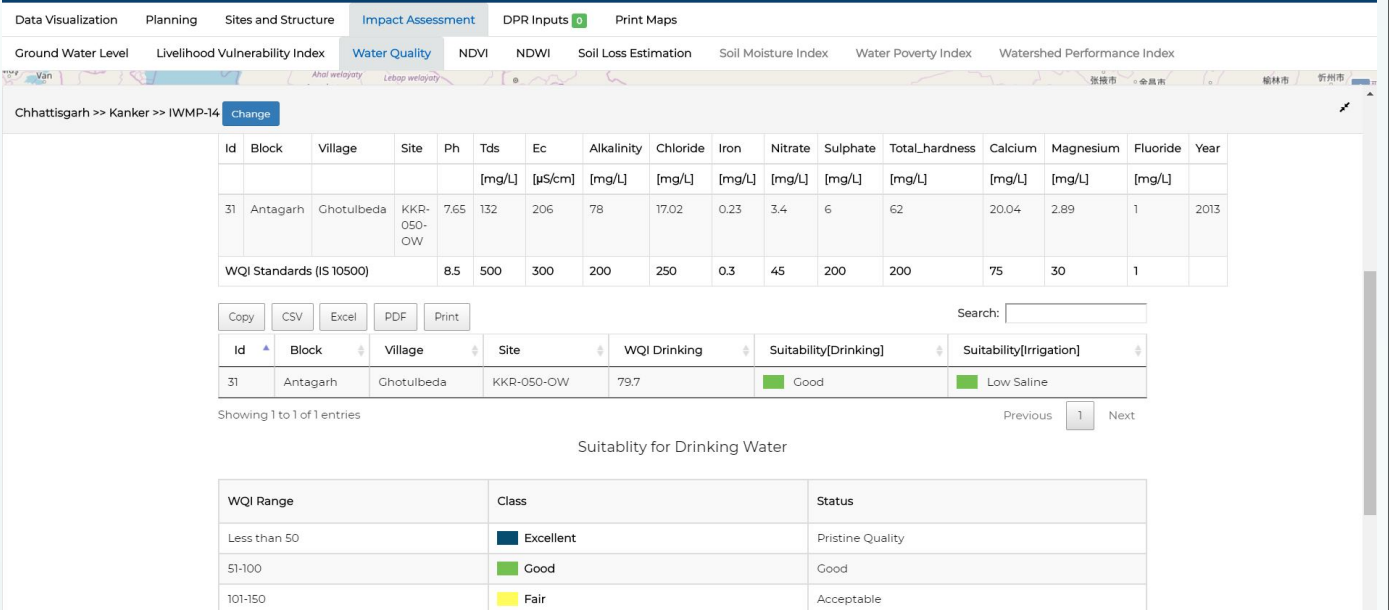Data Visualization Planning Sites and Structure Impact Assessment DPR Inputs 0 Print Maps

Ground Water Level Livelihood Vulnerability Index Water Quality NDVI NDWI Soil Loss Estimation Soil Moisture Index Water Poverty Index Watershed Performance Index

Chhattisgarh >> Kanker >> IWMP-14 Change

Id	Block	Village	Site	Ph	Tds	Ec	Alkalinity	Chloride	Iron	Nitrate	Sulphate	Total_hardness	Calcium	Magnesium	Fluoride	Year
					[mg/L]	[µS/cm]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	[mg/L]	
31	Antagarh	Ghotulbeda	KKR-050-OW	7.65	132	206	78	17.02	0.23	3.4	6	62	20.04	2.89	1	2013
WQI Standards (IS 10500)				8.5	500	300	200	250	0.3	45	200	200	75	30	1	

Copy CSV Excel PDF Print   Search:

Id ▲	Block	Village	Site	WQI Drinking	Suitability[Drinking]	Suitability[Irrigation]
31	Antagarh	Ghotulbeda	KKR-050-OW	79.7	■ Good	■ Low Saline

Showing 1 to 1 of 1 entries   Previous 1 Next

Suitablity for Drinking Water

WQI Range	Class	Status
Less than 50	■ Excellent	Pristine Quality
51-100	■ Good	Good
101-150	■ Fair	Acceptable

Features of DSS-H

Interactive	Web based
Flexible	Thin Client based
Modular	Geo-visualization
User friendly interface	Built with free and open source technologies

DSS-H developed by:

National Institute of Hydrology (NIH) is a premier Research and Development organization under the MoWR, RD & GR, (Government of India). The main objective of NIH is to undertake, aid, promote and coordinate systematic and scientific work on all aspects of hydrology and water resources.

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