MONITORING NETWORK

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Importance

- Understanding the Occurrence, Movement and availability of water
- To know about Hydro-chemical characteristics
- Identification of Recharge and Discharge areas
- Measure the Impacts of climatic factors
- To estimate the water budget


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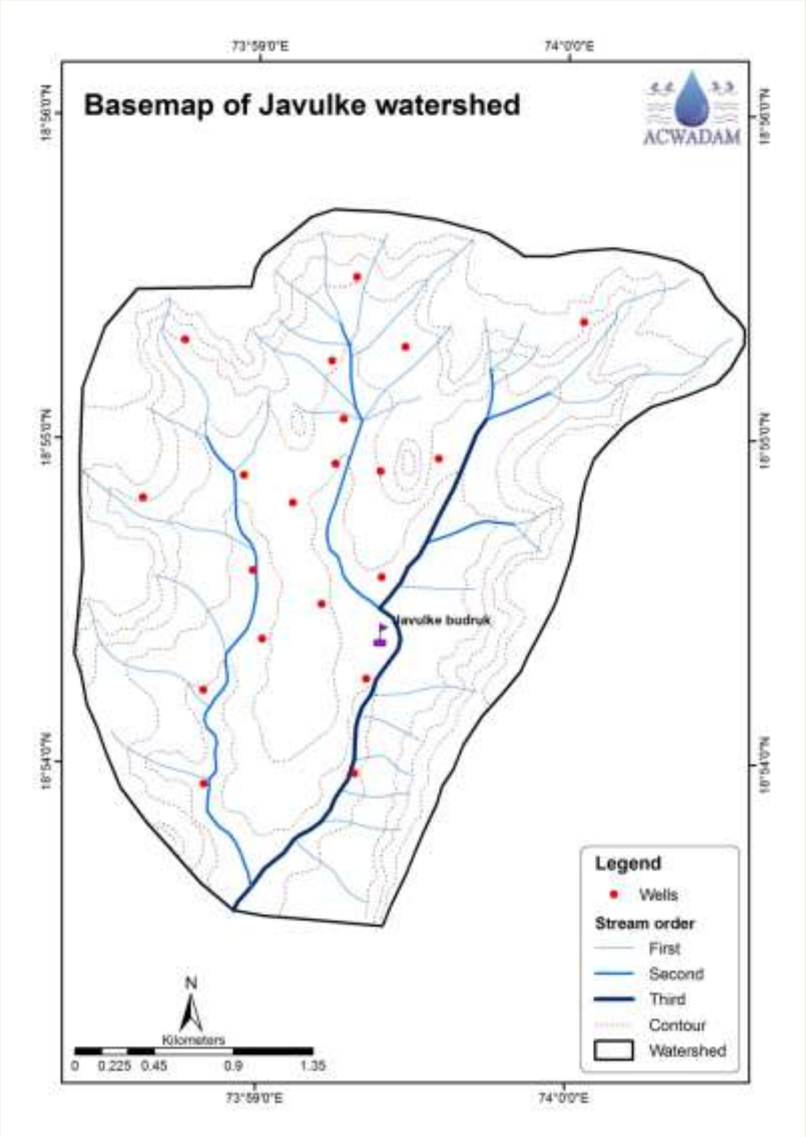
Processes of Setting Up of Monitoring Network

- Monitoring structures should be selected such that it covers all the study area



Processes of Setting Up of Monitoring Network

Should cover all type of water harvesting structures such as:

- Agricultural wells (Irrigation wells)
- Drinking Water Wells
- Community Wells
- Wells that are abandoned

Processes of Setting Up of Monitoring Network

Network of local people and staff

- It is essential to have a good rapport with the local people as they are the one who make a difference to the project
- Monitoring of welfare of local staff based at the site is necessary, as they are the one who do the hard work in the field
- It is the responsibility of the project leader to motivate the field staff and keep his/her goodwill

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WELL INVENTORY DATA SHEET

Date: **Name of Village:**

Well code		Name of Owner	
Latitude		Longitude	Elevation
Depth of Well (m)		Diameter of Well (m)	
Pre monsoon water level		Post monsoon water level	
Pump capacity and Discharge		Casing	
Static Water level			
Depth and Direction of inflows			

Water Quality:

Temp: *pH:* *Salinity:* *TDS:* *E.C.:*

Season	Crop	Total area under cultivation	How many times water is given?	Duration of Pumping	Drip/Sprinkler/Flood

When was the well dug?			
Has re-deepening happened?			
When?	How?		
Horizontal bore? How many?			
Depth and length of horiz. bores			
Well ownership?	Private	Shared	Common
Main use of well	Agriculture	Drinking	Other
Total land irrigated by the well			

Well Coding

- Simplistic coding
- Codes should usually start with Initials of village where the well is located

Code Marking – Guidelines

- Good Quality Paint
- Code should be preferably away from direct exposure to Sunlight – more placed on North / South direction
- Location preferably on Well Wall, Pump Station, Tree Trunk or any unmovable object

Well Dimension Monitoring

- Fix a *measuring* point at any given place at the top of the well from where all the dimensions of the well will be measured
- Measure the Depth of the well from the same point
- Measure the vertical distance of the water level in the well from the measuring point – this is called the *Static water level*
- Reduced water level = (Ground elevation– Static water level)
- ***Static water level is the vertical distance of the water level in the well from top***
- ***Reduced water level is the groundwater levels given with respect to height above sea-level***

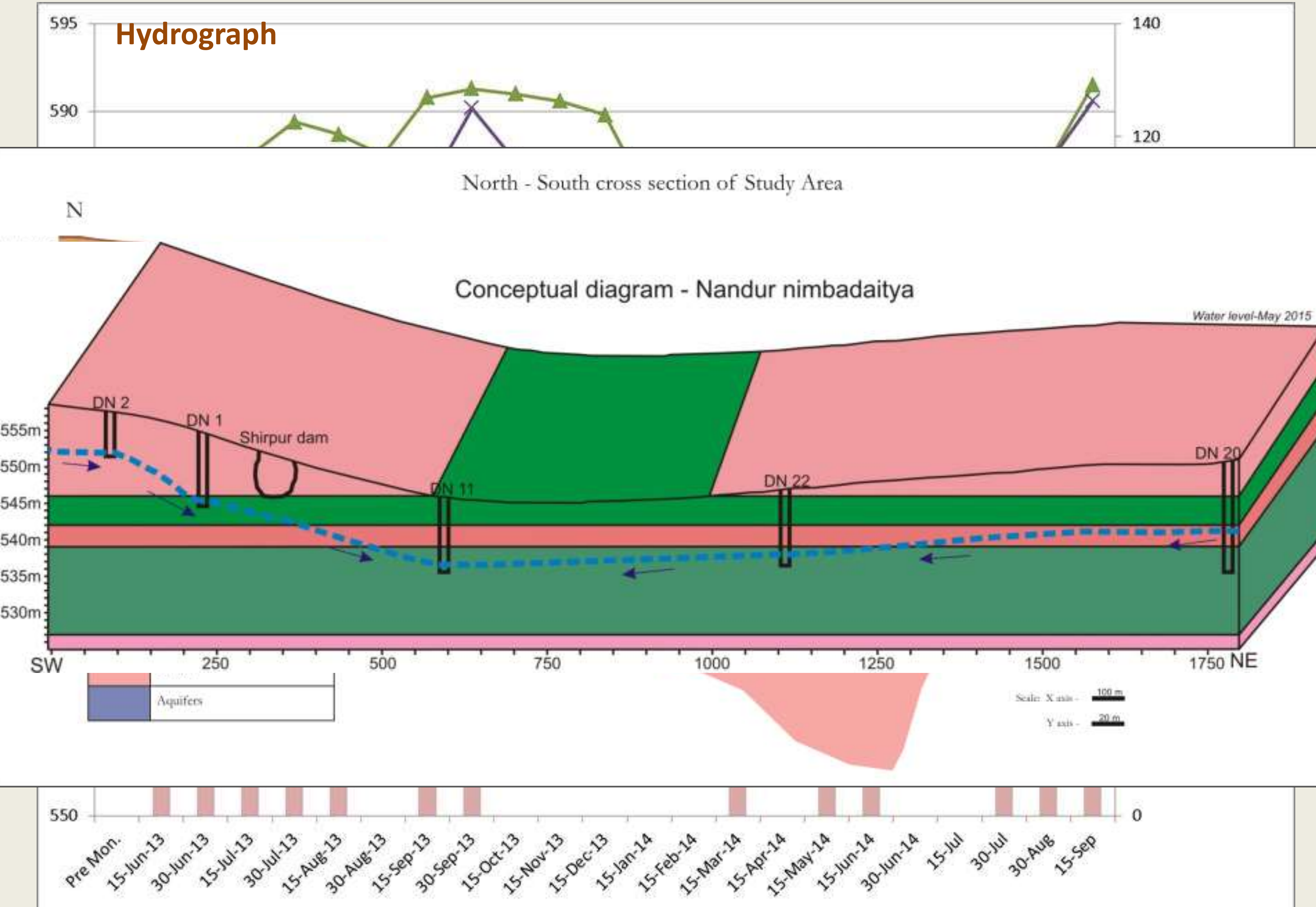
Pumping details

Pump capacity/ Pump discharge:

Season	Pumping days	Pumping hours	Irrigated crop	Crop area
Summer				
Winter				
Monsoon				



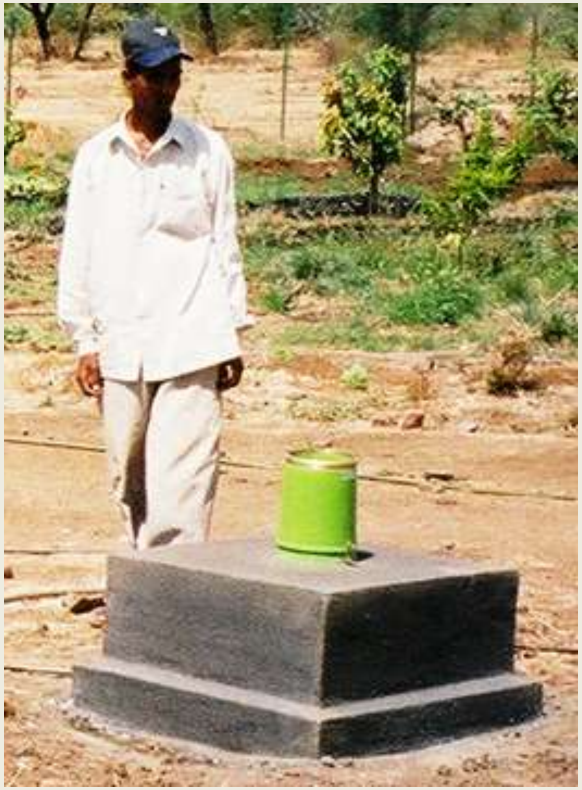
Application of data



Surface water sources

Rainfall

- Rainfall measurement is essential for both the general measurement of water resources and for a specialized hydrological study.



MONITORING

…..in 'V' notch

On the spill way

in the check dam

Discharge from ‘V’ Notch weir

‘V’ Notch weir	
Head (H) in cm	**Flow in lit/min**
1	0.8388
1.5	2.3114
2	4.7449
2.5	8.2891
3	13.0755
4	26.8416
5	46.8903
10	265.2518

Discharge can be measured using Thompson's equation:

For 90° notch the equation is **$Q=0.8388H^{5/2}$**

Where;

Q= Discharge in lit./min.

H= Head in cm.

Discharge from Rectangular weir

- The discharge in the adjacent table is measured in gallons per min.
- Table is based on Francis equation:

$Q=3.33(L-0.2H)H^{1.5}$

Where.

Q= Flow of water in ft^3/sec

L= Length of weir in ft

H= Head of weir in ft

Head (H) in inches	Length (L) of the weir in feet 1	3	5	Additional gpm for each ft. over 5 ft.
1	35.4	107.5	179.8	36.05
1.25	49.5	150.4	250.4	50.4
1.5	64.9	197	329.5	66.2
1.75	81	248	415	83.5
2	98.5	302	506	102
5	370	1175	1985	405
10	--	3216	5490	1136
15	--	5740	9920	2090

$1 ft^3 = 0.02832\ m^3$ or $1\ m^3 = 35.31 ft^3$

Simple method of measuring Velocity of stream on the field is by using a hollow rod and stop watch

Measurement of surface flow

Another common method of measuring the discharge in larger streams consists in **measuring flow velocities** at a number of points in the flow cross-section and then the product of the **avg. flow velocity** and the **flow area** gives desired discharge

Surface runoff can be measured using flow measurements

Watershed inputs and outputs

- **INPUT**
  - The main input to a watershed is rainfall.
  - In very rare cases, water may also be brought to a watershed from outside its boundaries (lifting water from sources outside the watershed).

- **OUTPUT**
  - Surface runoff
  - Infiltration
  - Evaporation and transpiration

- Existing storages in soil moisture and other water bodies change with the input of water

Precipitation= Surface runoff + Evapotranspiration + Infiltration + change in soil moisture + change in existing storages of water

Water Quality Monitoring

- Water quality reveals a lot about the hydrochemical characteristics of groundwater.
- All Parameters Water Quality Monitoring.

Water quality: Indicators for anthropogenic contamination

Weather Parameters

Time line for Monitoring

- Detailed Monitoring System Necessary
  - Ideally - Monthly Monitoring

- Minimum – Seasonal data required
  - Pre-Monsoon
  - Post Monsoon
  - Winter season
  - Summer season

THANK YOU FOR YOUR ATTENTION