Rainwater Harvesting & Artificial Recharge

19.06.2020

Lay out

- What is required?
- Mantra
- Rural Areas
- Urban Areas
- General Observations
- Traditional Water Harvesting in India
- Benefits - A Case Study

What is required?

- Artificial Recharge / RWH
- Effective Implementation to get the maximum benefit
  - What structures to recommend?
  - Where to recommend?
  - Design aspects
    - Size - Yield from Catchment
- Recharging the zones
  - Penetration of impermeable strata

Mantra

- Catch rain where it falls
  - Small structures
  - Decentralized
  - Using the terrain condition to the advantage
  - People participation
  - Using Existing schemes to the advantage

Area specific RWH & AR Structures

- **Hilly and Inter-mountainous area**- Himachal Pradesh, Jammu & Kashmir, Uttarakhand, Sikkim & North Eastern States
  - Percolation Tanks, Modification of Village tanks as recharge structure, Gabion Structure, Contour Bunds, contour trench

- **Alluvial Area**- Rajasthan, Punjab , Haryana, Uttar Pradesh, Bihar, West Bengal
  - Percolation Tanks, Recharge Pits

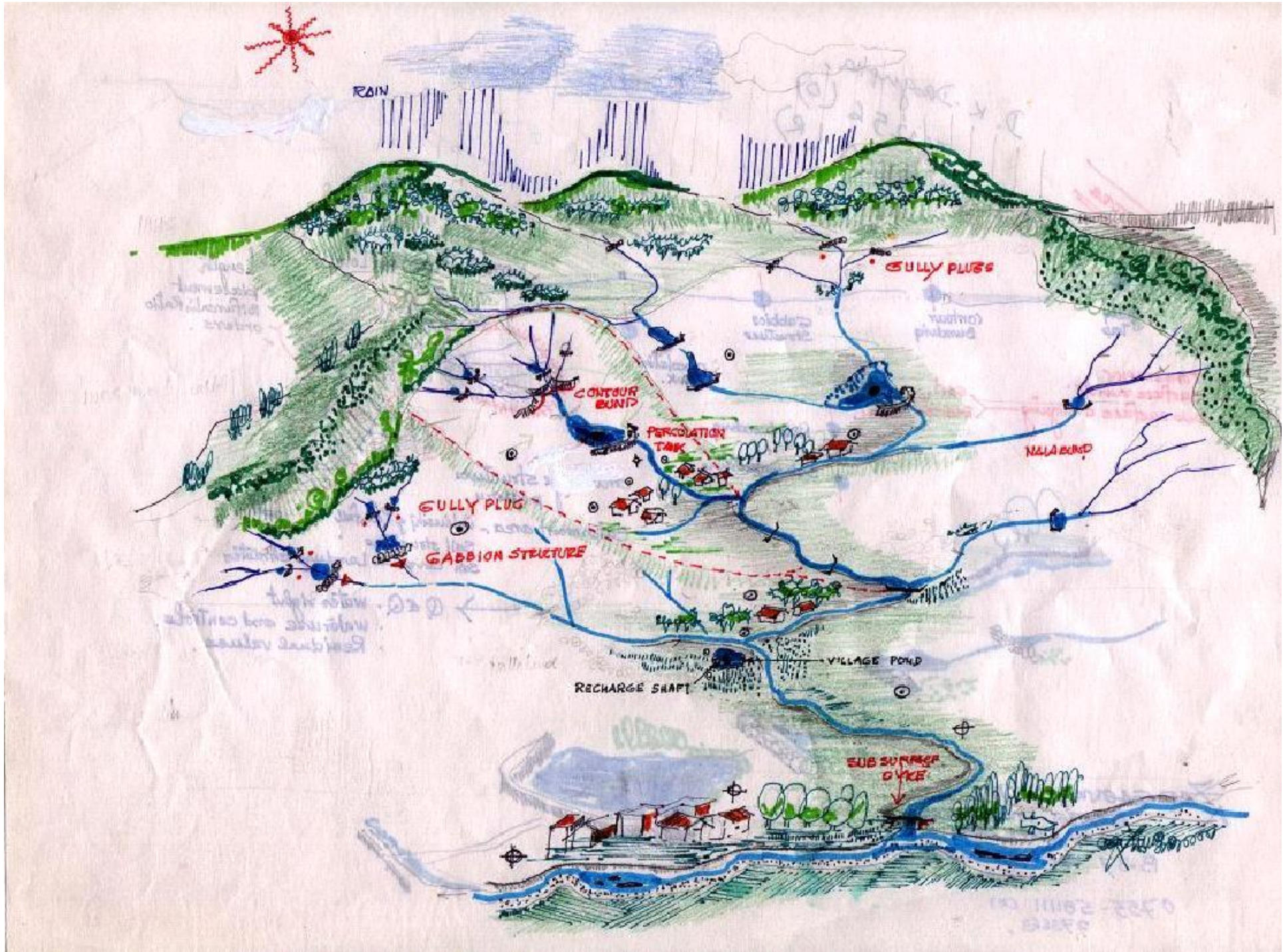
- **Hard Rock Area**- (Madhya Pradesh, Maharashtra, Odisha, Jharkhand, Karnataka, Tamil Nadu, Andhra Pradesh, Kerala)
  - Recharge through Abandoned Dug Wells/ Bore Wells/ Tube Wells, Modification of Village tanks as recharge structure, Gabion Structure, Percolation Tanks

Atmanirbhar Bharat Abhiyan

States	No of Districts
Bihar	32
Jharkhand	3
Madhya Pradesh	24
Odisha	4
Rajasthan	22
Uttar Pradesh	31
Grand Total	116

Rural Areas

- First order Streams
  - CD / Nala Bund / Gully Plug / Gabion
- Second Order Streams
  - CD / Percolation Ponds
    - With or with out recharge wells
- Third order Streams
  - Percolation Ponds
- Hill Slopes
  - Contour Bund / Contour trench
- Broad U shaped Valley with narrow mouth
  - SSD
    - Shallow Bed rock
    - Impermeable sides


RAIN
GULLY PLUGS
CONTOUR BUND
PERCOLATION TANK
NALA BUND
GULLY PLUG
GABBION STRUCTURE
VILLAGE POND
RECHARGE SHAFT
SUB SURFACE DYKE

CHECK DAM/CEMENT PLUG/ NALA BUND

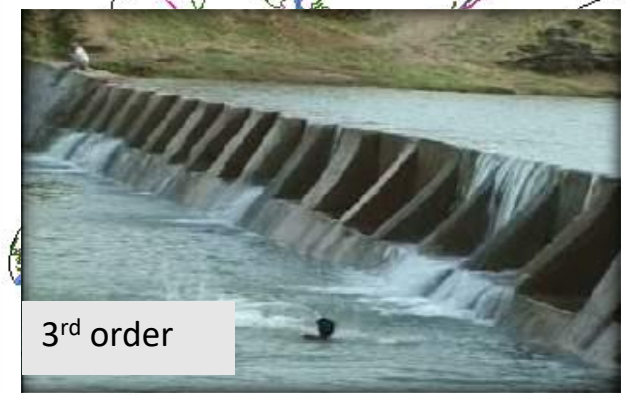
- Across small streams; gentle slope
- Feasible both in hard rock as well as alluvial formation.
- Sufficient thickness of permeable bed or weathered formation.
- Water confined to stream course; height less than 2 m but depends on the terrain
- Designed based on stream width; excess water allowed to flow over the wall.
- Series of such check dams to harness more water on a regional scale.

WATER HARVESTING THROUGH CONSERVATION

- Contour Trench/ Bund
- Check Dams
- Gabion Structures
- Percolation Tanks
- Cement Plug
- Farm ponds

1st order

2nd order



3rd order

Direct Recharge into Aquifers

- Recharge Shaft
  - > 10” and depth less than 10m
  - Recharge shallow aquifer, penetrating surficial clays
- Recharge wells
  - 6-8” Dia
  - Depth equal to the depth of aquifer
- Injection wells
  - 6-8” Dia
  - Depth equal to the depth of aquifer
  - Injected with pressure more than the pz pressure in aquifer

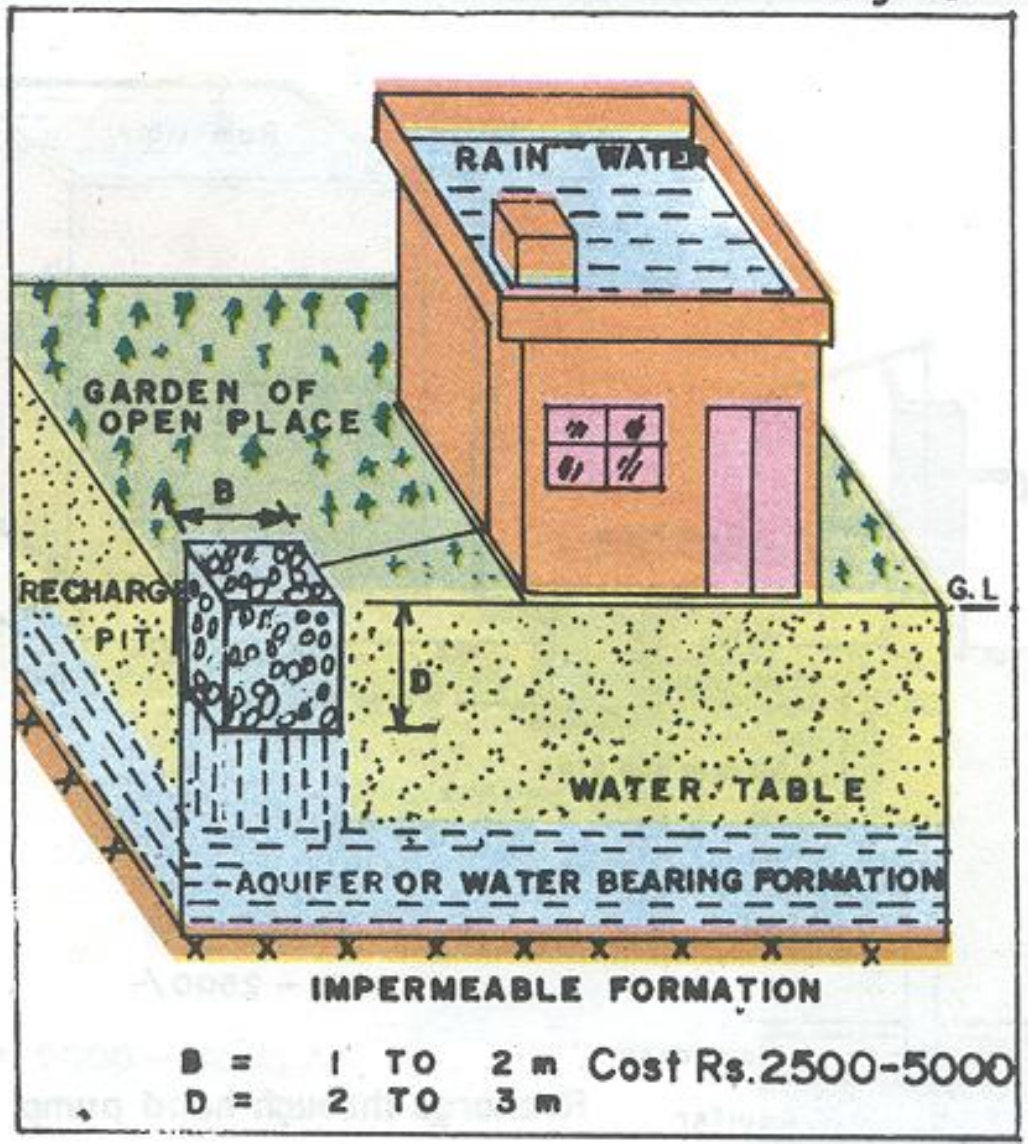
D-Recharge

Urban Areas

- RTRWH
  - Storage
  - Recharge
  - Combination of both
- Compute quantum based on intensity
  - Design intake based on the aquifer parameters
  - Provide for Storage if required

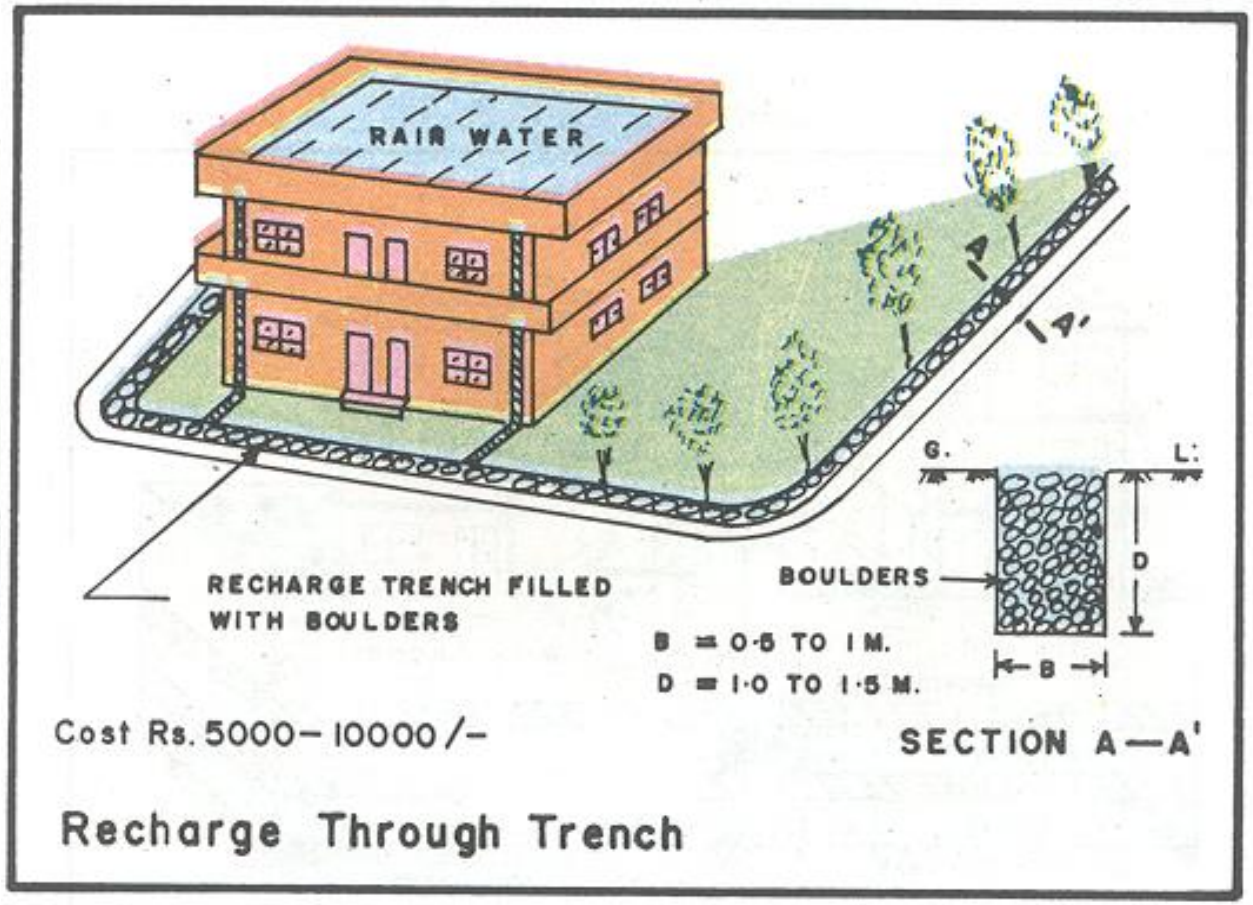
RWH through Pits/ Trenches

Fig..3



B = 1 TO 2 m Cost Rs.2500-5000
D = 2 TO 3 m

Fig..4



Cost Rs. 5000– 10000/–

Recharge Through Trench

General Observations

- Correct Siting of different Structures is essential 

- Filter Media is a prerequisite for direct recharge into aquifer
    - Removes Suspended solids & physical impurities
- Structure type depends on
    - Terrain
    - Aquifer zone to be recharged
- Structure Design depends on
    - Quantum of harvested water
    - Ability of aquifer to accept

Traditional Water Harvesting Structures

- Rainwater Harvesting is age old practice
- Different structures used as per need
  - Tanka, Beri – Rajasthan
  - Oorani –TN
- Traditional Structures are easily accepted

http://www.rainwaterharvesting.org/Rural/Traditional.htm

Ekalpar Beri, Jaisalmer district, Rajasthan


Tanka

Thanks