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/ Tubewells, Modification of Village tanks as recharge structure, Gabion Structure, Percolation Tanks

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**Atmanirbhar Bharat Abhiyan**

<table>
<thead>
<tr>
<th>States</th>
<th>No of Districts</th>
</tr>
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<tbody>
<tr>
<td>Bihar</td>
<td>32</td>
</tr>
<tr>
<td>Jharkhand</td>
<td>3</td>
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<tr>
<td>Madhya Pradesh</td>
<td>24</td>
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<td>Odisha</td>
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<td>Rajasthan</td>
<td>22</td>
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<tr>
<td>Uttar Pradesh</td>
<td>31</td>
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<tr>
<td><strong>Grand Total</strong></td>
<td><strong>116</strong></td>
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Rural Areas

- First order Streams
  - CD / Nala Bund / Gully Plug / Gabion
- Second Order Streams
  - CD / Percolation Ponds
    - With or without 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
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
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
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
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
Thanks