Water Conservation and Ponds

1.Defining Ponds

- A technical definition of ponds have yet not been standardized. Many rely on size for defining a pond.
- Pond is any thing with surface area from one hectare to as little as few square meters.
- Pond is a standing body of water made manually or occurring naturally but smaller than lake
- Ramser has set upper limit of pond as 8 hectares(20 acres)
- Ancient British defined pond as natural or man made water body which is between 1 m^2 to 20,000 m^2 in area
- In North America even large water bodies are called ponds. Walden pond in Massachusetts measures 25 hectare, Spot pond measures 140 ha while Crystal lake measure 13 ha.

2a. Types of ponds: These are

- Farm House Ponds or On-farm Storages.
- Pond formed below a dam
- Causeway pond
- Temple ponds

2b. Planning the pond

- A rectangle pond is commonly build on flat terrain.
- It can be edge-shaped later.
- Dimension depend on required capacity
- Livestock ponds are provided with ramp with flat slope

3.Characterstics

- Standing water body which provides habitat for wetland plants and animals.
- Margins of ponds are fringed by wetlands
- Open water allow algae to grow that support food web.
- Fish in ponds have significant impact on other form of organisms. It reduces quantity of plants in ponds.
- Serve as places of food and wild-life.
- Serve also as places for human sewage and garbage dumps

4. On- farm storages

- The most commonly used structures are gully dam, farm dam, Ring tanks and excavated tanks or ponds.
- A gully dam is a structure built across a gully or depression to provide storage which impound runoff originating from catchment above it. The dam wall is usually constructed of earth and clay obtained from within the storage basin.

5.Preliminary Investigation before Design and Construction of Ponds

i. General considerations

- Selection of pond site based on landscape structure.
- Selection based on associated ecological functions and values.
- Evaluating on-site and off site effects of constructing a pond.
- Locating a pond where largest volume can be obtained with least amount of earth fill.
- Avoiding large area of shallow water because of excessive evaporation and growth of noxious aquatic plants.
- Livestock ponds to be made near to pastures and grazing grounds.
- Avoiding pollution of pond water by selecting location where drainage from farmsteads, feedlots, sewage lines, mine dumps areas does not reach pond.

ii. Contributing drainage area of Ponds:

- Contributing drainage area must be large to maintain water in pond during drought.
- Paying attention to physical factors that directly affect the yield of water : or relief, soil infiltration, plant cover, and surface storage.
- Conveying water is expensive and hence locate a pond as close to the major water use as practicable.

iii. Minimum pond depth

- Water must be deep enough to meet the intended use requirements.
- Deeper ponds are required where permanent and year round water supply is essential or where seepage losses exceed 3-inches/ month

iv. Protection of drainage area

- The inflow of water from drainage catchment (watershed) must be free from silt to maintaining the required depth and capacity of pond.
- Protection through erosion control practices.(silt-draps, gabbions)
- Land under cover of trees, grass etc. is desirable catchment area.
- Conservation practices like fence, conservation tillage, strip-cropping are best watershed situations

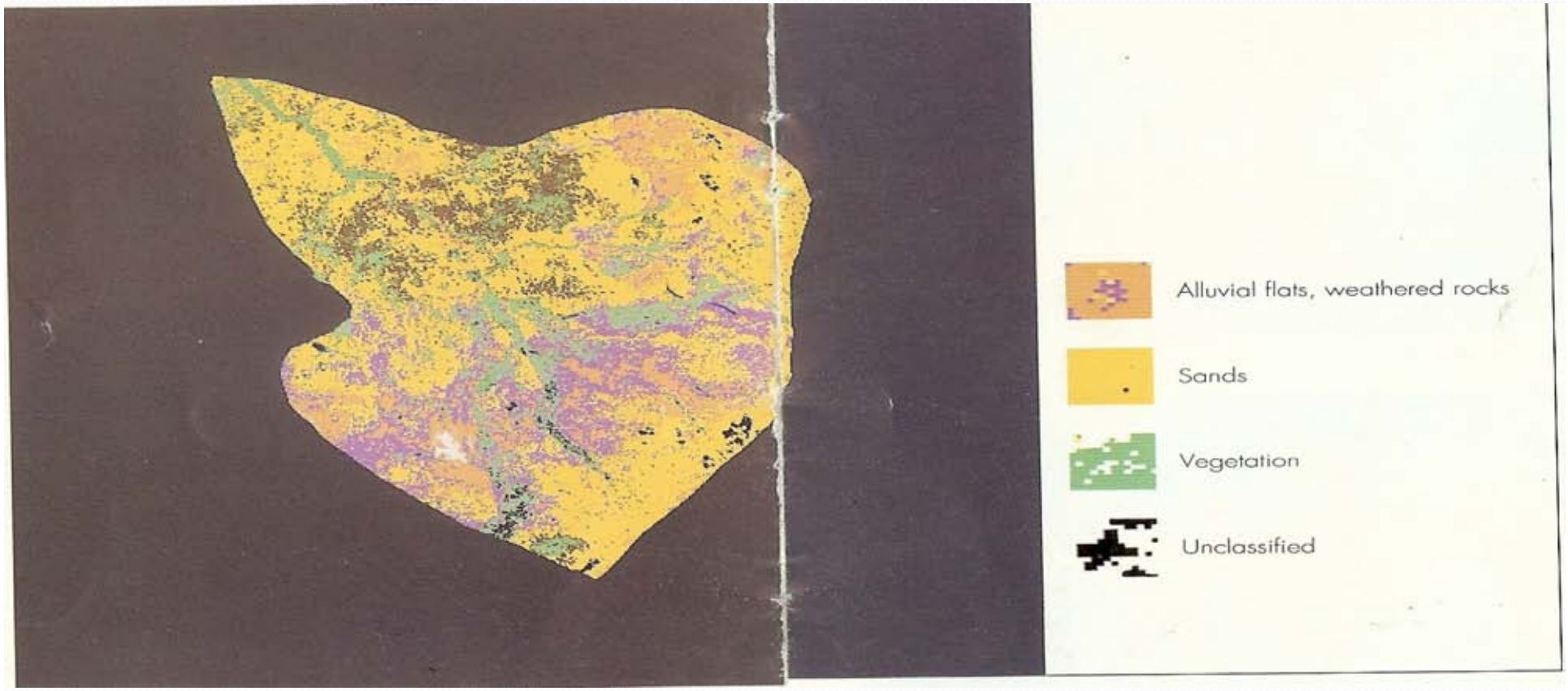
v. Inlet and spillway requirement of pond

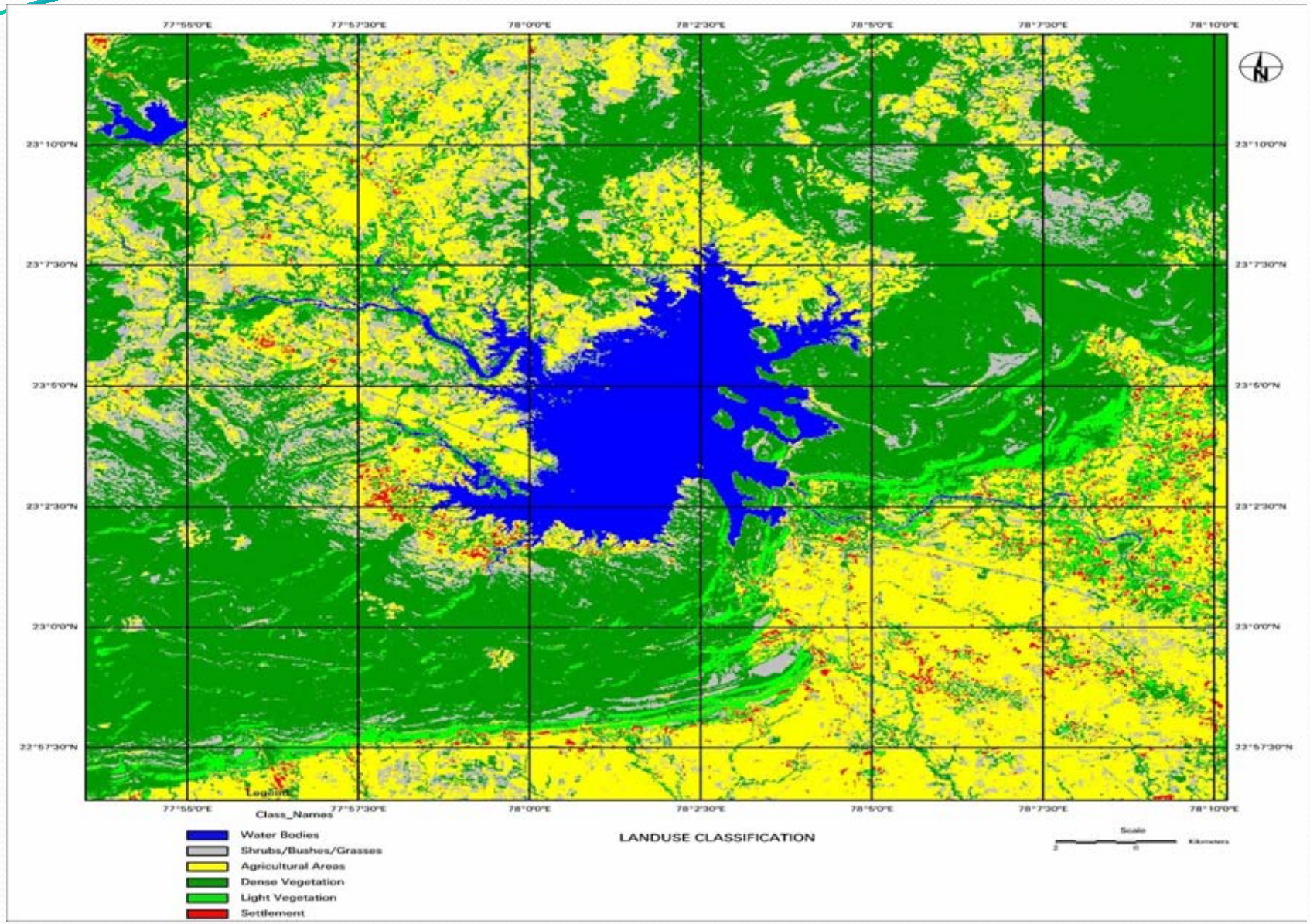
- Ponds require inlet with silt ward-off system(filter-strip)
- Run-off to enter a pond in flat terrain through a channel
- Avoid scouring on side slope of a pond.

vi. Estimating storm runoff

- Using hydrologic soil groups and runoff curve numbers for agricultural lands/ urban area/ arid range lands

vii. Land Use – Land Cover Map Derived From Satellite Imagery

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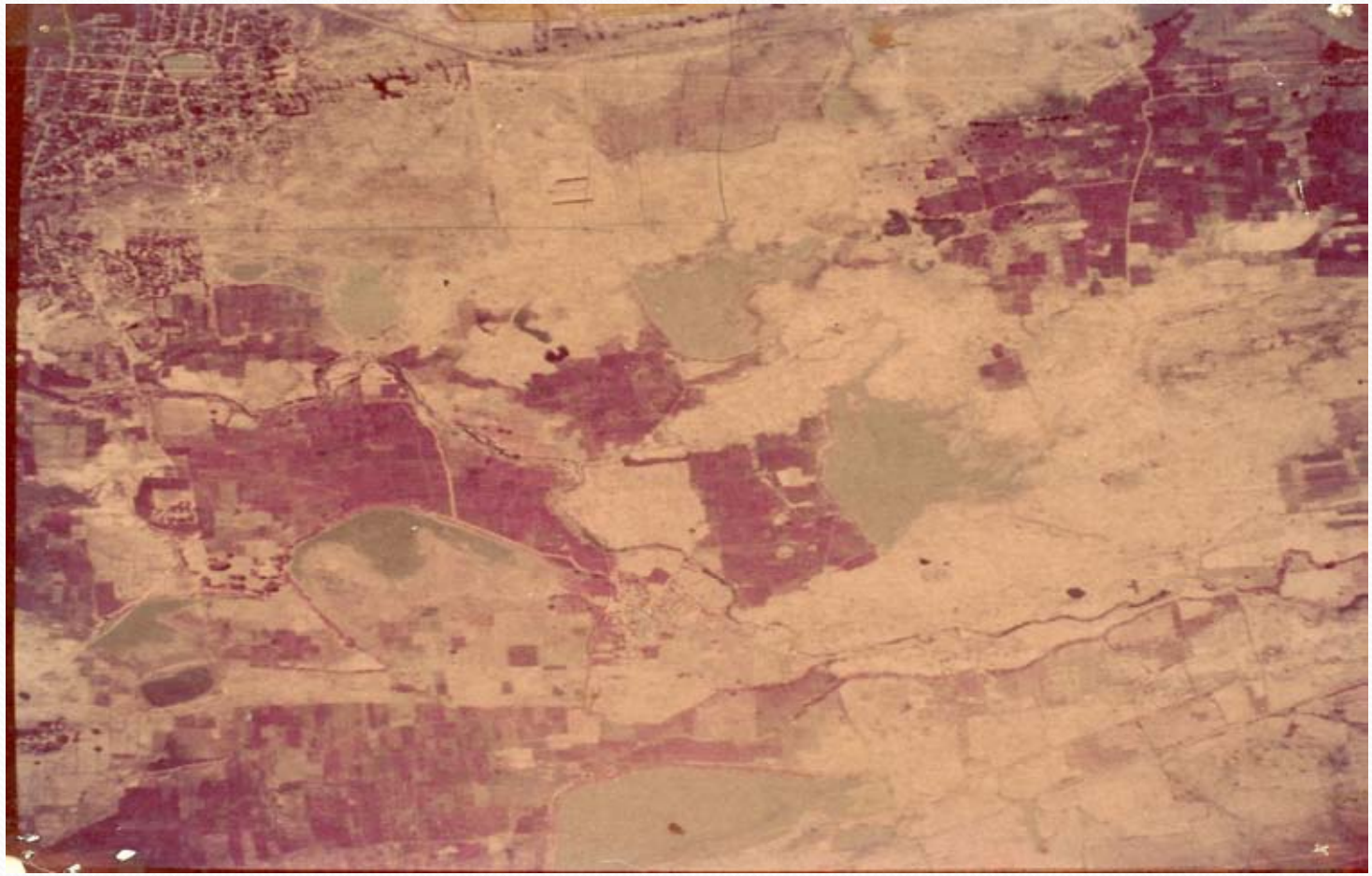
23°0'0"N
22°57'30"N
N
Layers
Class_Names
Water Bodies
Shrubs/Bushes/Grasses
Agricultural Areas
Dense Vegetation
Light Vegetation
Settlement
LANDUSE CLASSIFICATION
Scale
Kilometers

viii.CIR Image



ix. Very High Resolution Image Of Water Body

x. Efficiency of percolation ponds

Period of observation	Impounding of water (Days)	Gross storage	Evaporation	Net Percolation	Percolation efficiency
(1)	(2)	(3)	(4)	(5)	(6)
Monsoon period (June-Oct)	60 Days	Thousand m^3	Tm^3	Tm^3	%
				(3-4)	5/3

6.IMPACT OF GROUND WATER RECHARGING INTERVENTION

Rajasthan

Sr.No.	Location		Structure/ Scheme	Findings
	Village	Block		
I. District – Jaipur				
1	GudaKumantan	Dudu	Poly House (NHM)	Recycling & Reuse of water for vegetable growing
2	Chandpura	Amer	Check Dam (IWMP)	Area benefitted by irrigation of 6337 ha. Ground water level rise of 2 m. observed to occurred.
II. District – Kota				
3	Daulatpur	Ladpura	Check Dam (IWMP)	i. Ground water level rise of 3.50 m. observed. ii. Crop yield 12 qu./ha. causingRs. 24000/- increase in income/year of farmers.
4	Mukandpura	Ladpura	Farm Pond (RKVY)	i. Ground water rise of about 4 m. observed, ii. Crop yield 30 q/ha increase in income from farming Rs. 60,000/-per year.

III. District – Sikar				
5	Paniharwas	Khandela	Village Ponds (MNREGS)	i. Ground water level rise of 2.5 m. observed between Pre & Post project period.
6	MehrukiDhani	Khandela	Village Ponds (MNREGS)	Crop yield increase of 25 % occurred
7	KhandelaGramin	Khandela	Village Ponds (MNREGS)	Ground water level rise of 2.5 m. reported to have occurred.
8	Mankeda	Piprali	Anicut (MNREGS)	Crop yield & water yield improved.
9	Shakamberi	Piprali	Earthan Bund (MNREGS)	Water availability improved and rise of 2 m reported.
10	Nani Bund	Piprali	Checkdam	Ground water rise of 2.5 m. occurred.
11	Devgarh	Piprali	Checkdam	Ground water level rise of 1.5-2m occurred.
IV. District – Bhilwara				
12	Karnos	Asind	Ponds(RKVY)	i. Agriculture productivity increased by 8 q/ha. ii. Farm income increased to Rs. 70,000/year`
13	MorkaNimbahera	Asind	Ponds(RKVY)	I. Guwar crop production doubled from 6 q/ha to 12 q./ha & Maize from 12 q/ha to 24 q/ha. Income of farmers increased to Rs. 36,000/ yr. due to availability of water.
14	Jerda Mala	Asind	Loose Bolder Check dam (MNREGS)	Water used for growing plantation.

Rajasthan

State		District	Recharge structures
Rajasthan	1	Alwar	2 Roof Top -RWH and Recharge shafts 1 Check dam
	2	Banswara	3 Roof Top -RWH and soak pits
	3	Bharatpur	5 pits, 1 trench, 1 dug well recharge, 3 check dams , 6 hydro-fracturing and borehole blasting systems
	4	Jaipur	3 Roof Top -RWH with Recharge pits

District	General Performance Indicator score	Critical Factors Indicator Score				Co-relation with system functionality/ field test-score	Overall ranking at scale of 10
		A. Tech-nical	B. Social & Environ-mental	C. Finan-cial	D. Institu-tional		
RAJASTHAN							
Alwar	8	5	5	7.5	3.5	6	6
Bharatpur	7.5	3.5	4.5	7.5	3.5	6	5.6
Banswara	7.5	4.5	5	7.5	3.5	6	5.8
Jaipur	8	4.5	4.5	7.5	3.5	6	5.9
Average Ranking							**5.8**

State		Scheme district	Scheme Score (%)	Sustainability status
Rajasthan	1	Alwar	60	Partially Sustainable
	2	Bharatpur	56	Partially Sustainable
	3	Banswara	58	Partially Sustainable
	4	Jaipur	59	Partially Sustainable

Uttar Pradesh

State		District	Recharge structures
Uttar Pradesh	1	Jhansi	3 Check dam
	2	Allahabad	3 Check dam
	3	Agra	3 Check dam
	4	Sonebhadra	3 Check dam

District	General Performance Indicator score	Critical Factors Indicator Score				Co-relation with system functionality/ field test- score	Overall ranking at scale of 10
		A. Technical	B. Social & Environ-mental	C. Finan-cial	D. Institutio-nal		
UTTAR PRADESH							
Jhansi	9	6	3.5	7.5	3.5	7	6.6
Allahabad	9	6	3.5	7.5	3.5	6	6.4
Agra	9	5	3.5	7.5	3.5	6	6.2
Sonebhadra	8.5	5	3.5	7.5	3.5	5.5	6
						Average Ranking	**6.3**

State		Scheme district	Scheme Score (%)	Sustainability status
Uttar Pradesh	1	Jhansi	66	Partially Sustainable
	2	Allahabad	64	Partially Sustainable
	3	Agra	62	Partially Sustainable
	4	Sonebhadra	60	Partially Sustainable

7.Assessing Groundwater Recharge through Check Dam Ponding

Recharge structures	Height (m)	Effective Height (m)	Length (m)	Backwater Spread (m)	Storage (CUB M)	Number of filling	Evaporation loss (in %)	Total Recharge (tub.m)
Check dam (Alluvium)	3	2.25	15	250	4218.75	2	0.18	6918.75
Check dam (Hard Rock)	3	2.25	15	250	4218.75	2	0.25	6328.125

8.Convergence Strategy

Various Central Ministers have number of Centrally sponsored programme/schemes. As many as nine Centrally sponsored schemes have been launched by GoI (NRAA) which have affinity with Water Resources, Agriculture, Rural Development and Environment. Such schemes/programme include.

- Dug well Recharge Scheme
- Mahatma Gandhi National Rural Employment Guarantee Scheme **(MNREGS)**
- Integrated Watershed Management Programme **(IWMP)**
- Rashtriya Krishi Vigyan Yojna **(RKVY)**
- National Watershed Development Programme **(NWDP)**
- National Afforestation Programme (NAP)
- National HorticultureMission (NHM)
- National Food Security Mission (NFSM)
- Bharat Nirman Yojna (BNY)
- **Sustainability of Rural Drinking Water Supply etc. Central and State Departments**

9.1 A multi-faceted strategy

- A multi-faceted strategy is needed to be adopted towards achieving convergence among various programme/schemes having common goals. (i.e recharging of ground water)
- First step in this direction would be identifying potential areas/schemes for convergence which have similar and common goals.
- Convergence should commence at grass roots with process of grass-roots planning.
- MNREGA is model national programme for convergence in Agricultural level programmes.
- Common goals of improving & augmenting existing Rural drinking and allied water supplies should be set up.

9.2 Common Recharge Fund

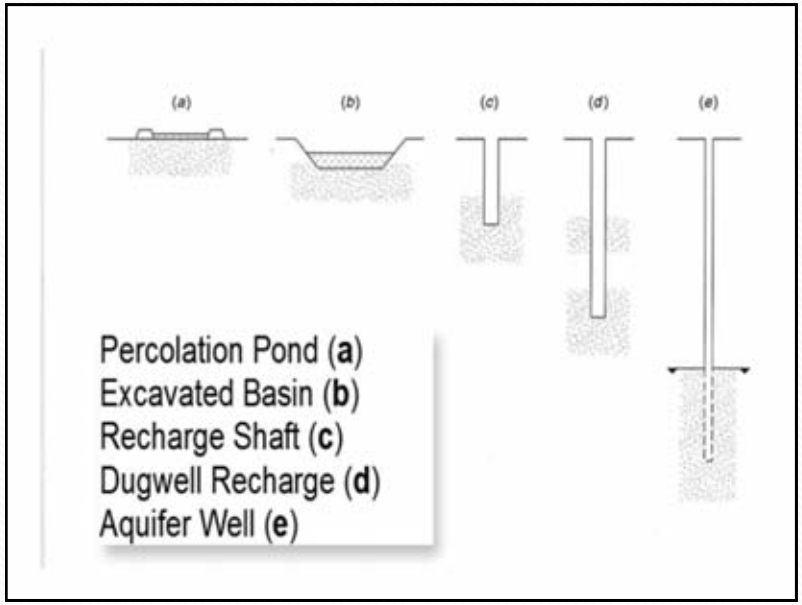
In view of common objective under various centrally sponsored schemes, a common 'Recharge Fund", should be build to promote augmentation of rural drinking water supplies.

10.STANDARD RWH MODEL FOR RURAL AREA

The effective methods shall use variations / combinations of direct-surface, direct-subsurface or indirect recharge techniques.

10.1 CHOICE OF RECHARGING METHODS

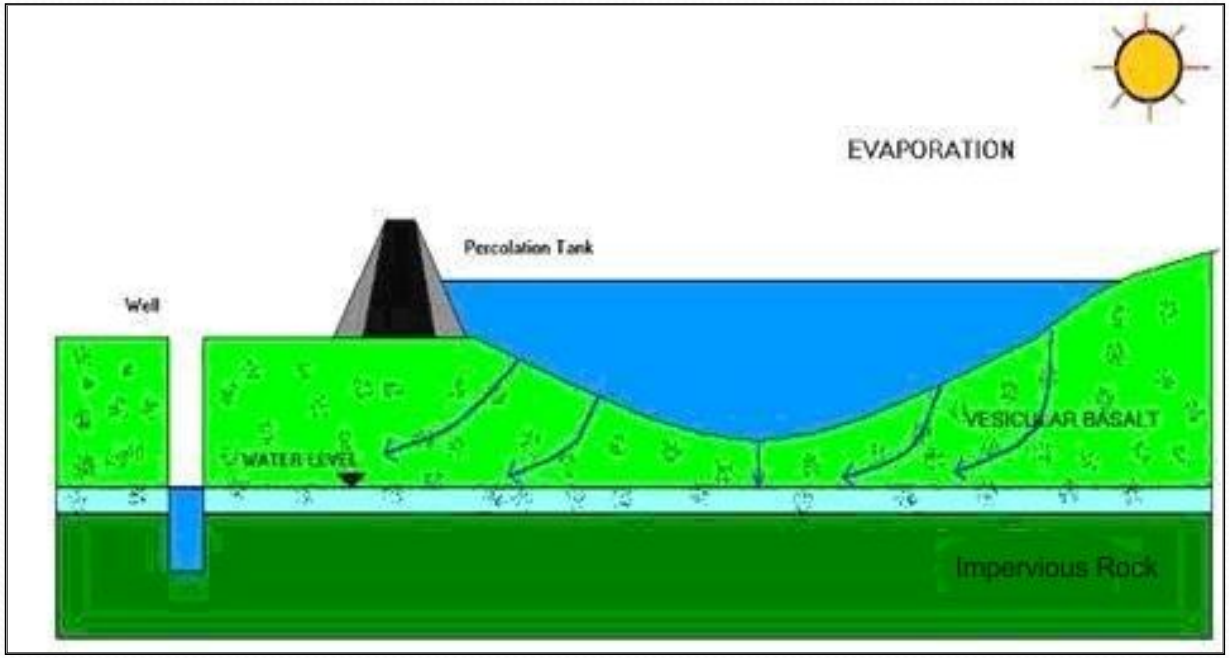
The depth to water table, soil permeability, Hydraulic conductivity &Transmissivity of unconfined aquifer play a large role in choosing appropriate methods of recharging ground water sources. The following ground water recharge techniques commensurate with depth are



10.2 STANDARD RWH MODEL

Percolation Pond

The Percolation Pond is an artificially constructed body of surface water. It should be constructed over a highly permeable land so that the stored water from surface runoff is easily percolated to recharge the groundwater. The recharge area downstream should have wells and cultivable land in order to benefit from the natural flow of augmented groundwater.



Percolation Pond

THANK YOU