



Groundwater recharge: technical aspect

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IN THE AREA under study and in Madhya Pradesh State too, the rural population greatly depend on tube wells fitted with hand pumps or power pumps to cater to their need of safe drinking water, since surface sources are either not available or too polluted. Indiscriminate exploitation of ground water particularly for irrigation purposes has resulted in nation wide excessive recession of ground water table adversely effecting the yield of drinking water sources and some times leading to total drying of tube wells, more so in summer season. The balance between allowable draft and natural recharge seem to have been disturbed beyond redemption by natural processes. Hence there is pressing need to address this problem immediately.

Strategy

Keeping in view of increasing the available ground water storage following strategy is applied.

- Conservation of available ground water storage.
- Optimise the use of the quantity of water abstracted from ground water storage.
- Increase ground water storage by applying recharging techniques.

The above methodology was discussed at greater length during a training course conducted by the the ODA of U.K. on "Ground Water Development" in Nov'92. This unifide approach was successfully implemented on a micro-watershed level in the semi arid districts of Madhya Pradesh State (India) called Rajgarh, where water scarcity is perennial and acute.

Location geography and drainage

Rajgarh District is mostly semiarid. It is located between 23°-28' and 24°-18' north latitudes and 76°-11' and 77°-20' east longitudes and situated at an average altitude of 447m amsl. The general topography of the district is undulating with valley side slopes varying between 1:35 to 1:70, mostly due to differential weathering of trappean rocks overlain by lateritic-soils in S-E and N-W parts of the district.

Due to sharp and steep slopes maximum surface runoff finds its passage to rivers and flows away and thus all streams and rivers dry out after January except few pools.

Geology and hydrogeology

Massive, Jointed, fractured deccan traps alongwith vesicular and weathered ones occupy 93 per cent of the total district area. Joints and fractures are more dense along

narrow linear valleys. Major lineaments (though small in number) are concentrated in the north-central and south-western parts of the district.

Groundwater occurrence

It is often found under unconfined conditions in all the lithological units of the area. At deeper levels usually good yield is obtained at top and bottom contacts in intertrappeans. Primary porosity in the rock formations is practically absent but the groundwater occurs in the secondary porosity e.g. joints, fractures and lineaments etc.

Identified major problems associated with water/land resources and their prominent areas of infestation (given in brackets):

- Poor groundwater potential due to compact black basalt formation. (*Jhadmau, Bhiyapura*)
- Steep and sharp slopes draining away all surface runoff instantaneously allowing very little time for natural recharge. (*Jhadmau, Nihal-Chodliya, Bhiyapura*)
- Soil erosion and poor land management. (*Nihal-Chodliya, Jhadmau, Bhiyapura*)
- Unsustainable cattle load destroying vegetative cover beyond regeneration. (*Jhadmau, Bhiyapura*)
- Indiscriminate deforestation. (*Jhadmau, Bhiyapura*)
- Poor water conservation facilities. (*Rugnathpura, Nihal-Chodliya, Jhadmau*)
- Poor irrigation practices. (*Whole area*)

Implementation area

Based on severity of the problems four microwatershed were selected for taking up water recharging and water/soil conservation works during the period 1995-96. These areas are spread all over the district and are dissimilar in nature.

Pre/post construction appraisal

Post construction studies are carried out only in Jhadmau watershed area since three years have elapsed after implementation. Other works are rather recent. Following sectors show the effect of recharging work :-

- **Water Supply** :- Water had to be transported every year from February upto June end but the village now has a piped water supply scheme using a collector well of 12m dia and 12m depth. Thus the water problem is effectively controlled.

General details of area chosen

Watershedwise details of works undertaken

Based on above selection criteria, following works have been undertaken in each of the selected watersheds

- **Water Quantity** :- the earlier 15 lpcd water supply in summer season is now 45 lpcd showing a 200 per cent increase.
- **Handpumps** :- Out of 10 handpumps installed in the village, 8 are operative throughout summer. The figure earlier was only 2, hence 400 per cent improvement is achieved.
- **Dugwells** used to work on full efficiency only upto December and thereafter only partial yield was available upto March beyond which they used to go dry. Postconstruction appraisal shows full efficiency upto Feb and lesser yield upto June. There is no drying of dugwells now.
- **Ground water table improvement** is observed in all 22 dugwells under monitoring. No well shows recession in water table. 5 wells show no change. In 3 wells water level rose by 22 per cent and upto 25 per cent in 6 wells. 3 wells show a 50 per cent rise in water level and 5 wells show a 100 per cent rise. The studies were conducted on same dates in different years.
- **Irrigation wells** used to operate 6 hr. a day during irrigation season which now sustain for 12 hrs. a day. This shows a remarkable 100 per cent increase in their dependability. The sustainability is also extended from December to April which again shows a 50 per cent improvement.
- **Agriculture** :- The farmers in the area used to sow gram which needs less water but does not pay well. Now mostly wheat is being sown for which though greater amount of water is needed but a better return is ensured.
- **Grass** :- Barren hill slopes are now covered with dense lush green grass which is being auctioned by the village panchayat for which it is another source of income.
- **People's Awareness** :- Apart from all physical benefits obtained from implementation of this recharging project, the greatest benefit is the improvement in people's awareness i.e. water consciousness. People of the project area are convinced that recharging is solution for their problems which is clearly shown by their enthusiastic participation in all project activities; viz. setting up to watershed committee etc. People have unanimously agreed for not grazing their cattle in open area unchecked near plantation and not pumping water from percolation tank. They even allowed the construction works on their private lands.

Above study shows clearly the efficiency of integrated approach towards water recharging and soil/water conservation works and multipronged benefits to the people at large and in particular.

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