INTEGRATED GEOLOGICAL INVESTIGATIONS FOR GROUNDWATER POTENTIAL AND WATER RESOURCE MANAGEMENT OF PANCHDHARA WATERSHED OF SELOO TALUKA, WARDHA DISTRICT, MAHARASHTRA USING REMOTE SENSING AND GIS TECHNIQUES

AN

EXECUTIVE SUMMARY

OF

MINOR RESEARCH PROJECT

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BY

Dr. S. P. Joshi
(Associate professor)
Principal Investigator

DEPARTMENT OF GEOLOGY
SHRI MATHURADAS MOHOTA COLLEGE OF SCIENCE,
UMRER ROAD, NAGPUR -440 009
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SUMMARY OF THE FINDINGS

1. The Panchdhara watershed represents part of Wardha river basin. It is located in the northeastern part of the Wardha District of Maharashtra. The watershed is characterized by hot climate with alternating dry and wet seasons with the average annual rainfall grading to 1069 mm.

2. Deccan Trap basalt flows are thick, tabular having large areal extent and occupy 141.82 sq km whereas alluvial deposits cover 11.91 sq km area. The thick horizon of muroom up to 3 m is exposed in the northern part of watershed whereas in some parts, flows are extensively traversed by intersecting sets of horizontal and vertical joints. The local alluvium deposits composed of sand and gravelly-sand beds are located in three distinct isolated patches. The maximum thickness of local alluvium is noted near north of Takli village (16.7 m).

3. Agriculture is the major activity of the people in this area. About 56 % area of the watershed is under agriculture. Only 3 % area of the watershed is under Kharip crop. About 43 % area of the watershed is under double crops (both Kharip and Rabbi), where as 10 % area of the watershed is under perennial crops.

4. In the watershed the new areas have been brought under cultivation with the rising tendency of bi-annual cropping pattern. In addition, sugarcane is the predominant perennial crop of the watershed, which requires maximum quantity of water throughout the year. These agricultural practices in the study area put escalating demand for huge quantity of water. This has eventually resulted in exploitation of groundwater from deeper depths, subsequently causing the lowering of water table and scarcity of water in the watershed area. It alarms for ever-increasing need for the water conservation and recharge in the study area. Thus, in Panchdhara watershed, artificial recharge measures can cope with scarcity of water and raise the groundwater level.

5. The higher runoff from plateaus needs to be arrested and utilized for recharging by applying suitable artificial recharge structures. The lowering of groundwater table is extensive in pediment, pedeplain and flood plains, where intense agriculture practice is being exercised.

6. In the study area the pre-monsoon and post-monsoon water levels vary from 8.1 m to more

than19 mbgl and 2.1 m to 7.9 mbgl respectively.

7. Moderately steep ground as well as very steep slopping ground occupies 41 % of the total area of watershed, which provides higher runoff, which needs to be arrested. On the contrary a very few conservation structures exist in the study area.

8. The Panchdhara and Dongargaon rivers create dendritic drainage pattern in the study area, which point out the homogenous geological set up of watershed area. The bifurcation ratio values for various ordered streams suggest minimum structural disturbance in the watershed area with higher percentage of sediment yield. The drainage density (2.16) as well as higher value of length of overland flow (1.08) is also indicative of high relief with aggressive run-off and erosion in some parts of watershed. The low value of constant of channel maintenance (0.46) for the watershed indicates the low permeability, steep slope and highest surface runoff in some parts. The basin relief of 250 m is indicative of high gravity of water flow, low infiltration and high run off conditions.

9. The interrelationship of lithology, geomorphology, landuse, slope, depth to hard rock and the yields of dugwells bring out four groundwater potential zones in the study area. The excellent groundwater potential zone, where average yield of the wells is more than 3500 lph, corresponds to the flood plains and deep pediplains located on the southern tip of the watershed. This zone is mostly dominated by the thick weathered rock zones as well as local alluvial sediments. In this zone, generally the static water level (SWL) value ranges between 2.5 - 9 mbgl with good recharge conditions. Kamthi, Rehaki kalan and Surgaon villages comes under this zone.

10. Good groundwater potential zone is mainly covered by deep pediplain as well as shallow pediplain, where average yield of the wells is between 2500 - 3500 lph. This zone is mostly influenced by weathered rock mantle of thickness 4 to 8 m as well as very thick local alluvial tracts. Such favourable hydrogeological conditions in the zone are suitable for groundwater exploitation. Ridhora. Takli, Antargaon, Hivra, Vadgaon kalan and Vadgaon kh villages come under this zone.

11. Moderate groundwater potential zone is dominated by pediment unit. At places, shallow pediplain also covers this zone. In moderate groundwater potential zone the average yield of the

wells is between 1500 - 2500 lph. The zone is mostly confined to weathered and fractured rocks located at 2 to 4 mbgl. In majority of cases, the static water level (SWL) value ranges between 2-8 mbgl during post monsoon. The recharge conditions are moderate to good. Amgaon, Salai kalan, Sond, Heti, Borkhedi kalan, Bothali, Borkhedi and northern part of Juvadi, villages are the parts of this zone.

12. Poor groundwater potential zone is mainly a rocky terrain dominated by rocky plateau/ hills. The depth of weathering is also very shallow and not uniform. Generally, the static water level (SWL) value ranges between 3-9 mbgl during post monsoon and wells go dry during summer seasons. The poor groundwater potential zone has average yield of the wells less than 1500 lph. Adiwasi ashram, Raipur and adjoining areas where basalts are exposed on surface come under this zone.

13. The present investigation brings out the action plan for arresting erosion and to facilitate artificial recharge. As per action plan the strip plantation is suggested along the river channels to control the river flow and to minimize the siltation in river bed. Filter strips thus created along the river and at the places of diversion of drains will redirect the overflow of the seasonal river channels and thereby check the soil erosion. The suggested sites of contour trenches will be effective in checking the erosion intensity and increasing green belt to develop soil profile. Gully plugs will check the velocity of running water in the upper riches of hilly tracts. Anicut/ Gabbion bandhara will help in checking the soil erosion in the waste land area. This will also help to conserve the soil moisture which results in the growth of vegetation.

15. CONTRIBUTION TO THE SOCIETY:

As per the action plan proposed sites of percolation tanks will recharge the groundwater reservoir both in alluvial as well as hard rock formations. Check dams are suggested across small streams having gentle slope. Such structures will trap the silt and stored water can be utilized for agricultural purposes. Nala bunds ensues sufficient water percolation by checking the velocity of runoff, and improve soil moisture regime. Recharge pits will help to penetrate impervious strata so as to pour water it to the aquifer.

Underground bandharas are proposed to arrest base flow in the stream. In the Adiwasi Ashram, Antargaon, Surgaon, Rehaki kalan and Vadgaon village, water from roof top rain water harvesting can be collected for domestic utilization as well as to recharge the groundwater

reservoir through conserving storm runoff during monsoon.