# Catchment Areas & Their Preservation

**This article presents the Expert Committee's research that identified catchment areas that had been used for construction and mining; and their suggestions for restoring these catchment areas to their original condition.**

By Y C Agrawal

It had been observed that reservoirs, village ponds and other water storage works are not receiving water, which they were receiving in the past. Rajasthan is a water deficit state. During the hearing of the Public Interest Litigation the Rajasthan High Court issued an order to the Government of Rajasthan to constitute an Expert Committee to advise the court and the Government of Rajasthan for (i) identifying catchment areas that have been used for construction, mining and other purposes; and (ii) suggesting measures for restoring these catchment areas to their original condition. This article presents this study and its outcome.

## Introduction

A Civil Writ 'Public Interest Litigation' D.B. 1536/2003, Abdul Rahaman v/s State of Rajasthan was filed in the Rajasthan High Court raising the issue and emphasizing the need to protect tanks and ponds for maintaining a proper and healthy environment to enable people to enjoy a qualitative life, which is the right of a citizen under Article 21 of the Constitution of India. The Rajasthan High Court during hearing of the PIL observed that it appears there has been indiscriminate utilization of catchment areas for construction and mining purposes that have prevented lakes, reservoirs, rivers, ponds, etc. from receiving water even during the rainy season.

The Rajasthan High Court on 18th July, 2003 directed the Rajasthan Government:

- To undertake a general survey to identify the catchment areas which have been used for construction and mining purposes.
- It was further directed that survey shall also be undertaken for the purpose of studying the effect of utilization of catchment areas for construction and mining purposes or for other purposes.
- Further suggestion was sought for restoring the catchment areas to their original shape and use.

Pursuant to the directions of the Rajasthan High Court dated 18th July 2003, an Expert Committee with the following composition was constituted by the Rajasthan Government vide Secretary to the Government, Irrigation Department, Rajasthan, Jaipur order dated 19th September 2003.

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| Mr Y C Agrawa | Director (Minor Irrigation schemes),<br>Investigation, Design & Research Unit Irrigation Department, | Jaipur | Convener |
| Mr S B L Mathur | Joint Director, Jodhpur Range,<br>Watershed Development & Soil-Conservation Department | Jodhpur | Member |
| Mr S S Dhindsa | Chief Chemist,<br>Public Health Engineering Department | Jaipur | Member |
| Mr Rakesh Hirat | Superintending Mining Engineer | Udaipur | Member |

The committee was assigned the following duties:

- Undertake a general survey to identify catchment areas that were being used for construction and mining.
- Study the effect of the utilization of catchment areas for construction and mining or other purposes.
- Suggest measures for restoring catchment areas to their original condition and purpose.

## General Survey

The Committee framed a tour program to visit Jodhpur, Balia village of Didwana Tehsil district Nagaur, Udaipur, Rajsamand lake, mining areas in district Rajsamand and the tanks, ponds, embankments, drainage channels enroute, Ana Sagar Lake at Ajmer.

The Committee members and SDM Didwana along with other related officials and Sarpanch of Balia village visited the '*Nadi*' in question. The *Sajra* and *Khasra* of Balia village were also studied. The school building in question, the small hill nearby, the existing *nallah* of the Balia village and nearby areas were also visited. It was seen that *Khasra* Number 253, on which the school had been constructed, is depicted in the village Khasra as the *Gair Mumkin Nadi*. Other than the school building, many other single story buildings were also present on *Khasra* No. 253; these were to be constructed earlier than the school building in question.

The small hill nearby was also inspected. It was observed that pits had been excavated for *murum* and other building material. The small nalla starting from the small hill was also inspected up to the railway line, where a bridge has been provided over the nalla to pass rainwater. This nalla has not been obstructed, so whenever it rains the rainwater flows within the nallah in a normal manner. The land on which the school is constructed is higher than the nalla bed. Presently no Nadi exists at Khasra No. 253.

Later, during the discussion, officers were of the view that the inflow in lakes, reservoirs, etc. has reduced in comparison to earlier years. Before the arrival of the water from the Indira Gandhi Nahar Project (through lift canal) in Jodhpur, there was water scarcity in the city and villages in Jodhpur district. The overall opinion was that it was difficult to manually study the obstructions in catchment areas in a comprehensive and correct manner. Hence, *Remote Sensing Data* was sought from the '*State Remote Sensing Application Centre Jodhpur*' under the Science and Technology Department, Government of Rajasthan. It was concluded that catchment characterization for all types of water bodies in the state would take a long time and would be costlier. Therefore, the catchment characterization work of all major and medium projects (numbering 100) would be carried out with the aid of Remote Sensing Technology. The multipurpose resolution 23.5 meter data from the 'Indian Remote Sensing Satellite LISS – III Sensor' was used for this purpose. The officials of the Revenue, Irrigation and other departments of the Government of Rajasthan would be tasked with identifying obstructions in catchment areas of the Minor Irrigation Projects and other small reservoirs.

It was further decided that:

- Satellite data of LISS – III of the Indian Remote Sensing Agency (NRSA) Department of Space, Government of India, Hyderabad, would be used for latest post monsoon period i.e. September-October 2003.

- Base maps in digital mode would be prepared, from the site maps of the Irrigation Department used as reference.
- Nature of the obstruction in catchment/submergence area would be identified and delineated. If its occupance is of sizable area, it would also be delineated and the area of the same calculated.
- All details as mentioned in objective would be depicted.
- Outputs in hard copy (computer generated) would be generated on the scale of 1:50,000 for water bodies having catchment area of up to 800 $km^2$ and beyond that the maps would be on the scale of 1:2,50,000. 'Details of obstruction prints' were to be separately plotted as inset.

The project Director of the State Remote Sensing Application Centre Jodhpur, indicated that the cost of the work would be around Rs 22.70 lacs.

During the visit to the Fateh Sagar Lake at Udaipur, it was observed that a hotel has been constructed on the lake bed. It was also brought to the notice of the Committee that '*Katedari*' rights for the land on lake bed, had also been given to individuals. This situation might be prevalent in the other lakes of the state also.

It was concluded that such *Khatedari* rights must be withdrawn. The Committee observed that some inlets of the Fateh Sagar Lake had been fully or partially blocked causing reduction in water inflow of the lake. It was also brought to the notice of the Committee that untreated domestic waste, industrial waste and other waste were entering the lakes/reservoirs deteriorating the water quality.

The Committee was of the opinion that a drain should be constructed on the periphery of the lake, etc. to prevent entry of such waste materials into the lakes, etc. This polluted water should be treated and released in the river/*nallah* streams. The Committee observed that the width of the inlet channels of the lakes had reduced and was variable. It was necessary to remove obstructions on the width of the inlet channels and to define their width by providing suitable arrangements such as masonry walls, pillars, etc. Wherever required, deepening of such inlet channels must be ensured.

Next, the Committee visited Rajsamand Lake and leased mining areas of the Kelwa block. The Committee also visited the processing units enroute and the Gomti River crossing on Chhaparkhedi–Tasol road. The slurry and discarded marble stone block/*khanda* were seen on the river bed near the banks and on the adjoining causeway. On Udaipur-Ajmer road near the river/*nallah* crossings, it was observed that marble slurry and waste from the processing units had been dumped on the river bed along both banks. Discussions were held with the Mining Engineers, head of processing units association and several mine owners.

Further, it was observed that along the contours of the hills, dry stone masonry walls had been constructed in most of the cases to check soil erosion along steep hill slopes. These check walls caused hindrance in the free flow of rainwater to the bottom of the hills. The Committee recommended that the 'Watershed

*Figure 1: Empty Ramgrh Dam*

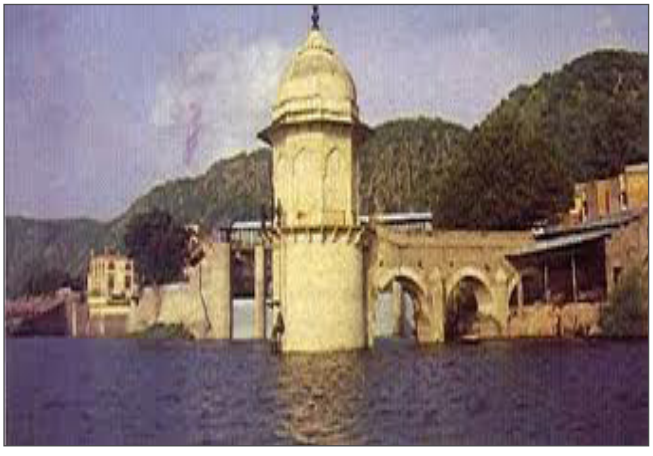

*Figure 2: Full Ramgrh Dam*

and Soil Conservation Department' Government of Rajasthan, should prepare guidelines for construction of such contour guide walls to have the minimum possible effect on the free flow of rainwater. Similarly, it was observed that the Forest Department/local villagers have constructed masonry/dry stone masonry boundary walls on their lands, which obstruct the free flow of rainwater. The Forest Department should prepare guidelines for such boundary walls to have minimum effect on the free flow of rainwater. Private land-owners must provide free passage for rainwater across boundary walls constructed along the periphery of their land.

The Committee then visited the Raj Samand Dam. The Committee observed that there was no water in Raj Samand Lake that year. The Committee visited the Road Causeway (about 10 km upstream of Raj Samand Dam) across the Gomati River (which carries water into the Raj Samand Lake) on Chhaparkhedi–Tasol road. The marble processing units had dumped rejected marble stone blocks and marble slurry, on both sides of the Causeway up to the road level, making the Causeway ineffective. Thus the water from the Gomati River could not enter the Raj Samand Lake until the water level of the river was above the road level. This was the main reason that there was no water in the Raj Samand Lake during the Committee's visit on September 26, 2003.

Construction of anicuts of great heights was another major reason for lack of water in the lake. The Committee recommended that the height of anicuts should be restricted to 2 meters above the deepest *nallah* bed level as per Government orders; thus, the Government must dismantle the additional height of the anicuts.

From Udaipur to Raj Samand, the Committee noticed that waste material had been dumped on the bed along both banks of the drainage channels, this needed to be removed.

In most parts of the Rajasthan, mining operations for building stones, metallic and non-metallic minerals were in progress. In the Kelwa cluster, the Committee observed that mining operations do not influence the nearby *nallah* of the catchment area. Due to interference of the hills and the plain ground, the runoff (rainwater) from the mining leases may be somewhat less than in area where there were no mining leases.

Where mines/quarries had been excavated below ground level, the rainwater flows into these mines/quarries and only when these are full does the water flow in the drainage channels downstream of such mines/quarries. This reduces the volume and speed of water reaching the ponds, lakes, reservoirs, etc. Therefore, the Committee recommended that the Government should construct ring bunds along the periphery of such mines/quarries and also excavate link drainage channels along the periphery of the mines/quarries to by-pass them. If this was not possible, then such mines/quarries must be sealed and refilled with waste material/other material to ensure unobstructed flow of rainwater in the drainage channels.

Where ever mines/quarries were excavated below the ground level, after the rains, they need to be dewatered. This lowered the water table in nearby wells, which had to be deepened and required more power to lift water from such wells. The worst affected district in Rajasthan is Baran.

It has been indicated by the Mining & Geology Department, Government of Rajasthan that the mining lease out area is below 1 percent of the geographical area of Rajasthan.

After visiting the Kelwa cluster of mines, we proceeded to Ajmer by road. During the journey from Udaipur to Ajmer, the Committee observed that the culverts constructed across the drainage channels had been made ineffective by filling earth in the *nallah* on both sides of the road. A similar position was likely at other places in Rajasthan. The *nallah* on both sides of the road culvert was being filled with earth brought via tractors by a private party for business activity (for building a showroom) on the National Highway No. 8 (Udaipur–Ajmer portion).

At Ajmer, the Committee visited the Ana Sagar Lake. It was brought to the notice of the Committee that the *Khatedari* rights on the bed of the Ana Sagar Lake had been given to individuals. Also there were obstructions in the inflow and

outflow channels of the Lake, which were causing the problem. It was also brought to notice that inflow from part catchment area of the Ana Sagar Lake had been diverted to some other depression.

The Ana Sagar Lake had been overflowing nearly every year, until recently. When the Ana Sagar Lake overflowed in the past, the surplus water caused problems to the inhabitants with property on either banks of the outflow channel. Also the water entered residential colonies due to high water levels in Ana Sagar Lake.

It is essential that obstructions in the inflow and outflow channels be removed and their capacity increased. Protection works need to be put in place for residential colonies being flooded due to increased submergence area of the Ana Sagar Lake caused by high water levels of the lake.

The Committee submitted its first report to the Government on the 29th of September 2003. A factual report was submitted to the Rajasthan High Court and was considered by the court. The Court found the report to be satisfactory.

Total obstructions were identified as 4674 in an area of 203.94 $Km^{2.}$ Out of this the Committee suggested that 816 obstructions be left as is, as they had a negligible effect. 1803 obstructions could not be removed. It was suggested that 2055 obstructions, comprising an area of 103.46 $Km^2$ be removed.

## The Effects of Catchment Area Utilization

### Construction

Many development activities have been taken since independence. It is felt that at some places, proper drainage crossing in embankments, residential colonies and other construction activities have not been provided to allow free and uninterrupted water flow in drainage channels. This has resulted in the reduction of catchment areas of lakes, reservoirs, rivers, ponds, etc. Due to soil conservation works, watershed works and water harvesting structures, the runoff from the catchment areas has been reduced.

Untreated domestic waste, industrial waste and other wastes entering water bodies cause deterioration to the quality of water. This causes biological growth of various types.

### Mining & Other Purposes

Wherever excavation in mining leases moves below the natural ground level, water from the adjoining area enters the mine and fills it, thus reducing the quantity of water reaching water bodies likes lakes, reservoirs, etc. Wherever there are deep mines they are dewatered for mining operations. This lowers down the ground water table and creates scarcity of water for drinking and agriculture. The dumping of marble slurry and other waste into drainage channels causes reduction in their water carrying capacity and thus reduces the quantity of water reaching the water bodies.

## Suggestions for Restoring Catchment Areas

Looking to the site visit by the State Level Expert Committee in September 2003 and the General Survey Reports received from the District Collectors and Chairmen District Expert Committee, following measures should be taken to restore catchment areas to their original condition and use:

1. All land shown as drainage channels like *nallah*, rivers, tributaries, etc. as on 15.8.1947 should be declared to be Government land. Any conversions made after 15.8.1947 should be declared illegal. Relevant act and rules must be amended accordingly.

2. Catchment areas should be demarcated by constructing pillars at suitable spacing, depending upon the size of the catchment area with the help of GT sheet to the scale of 1:25,000 or 1:50,000 and/or a 'Water Shed Atlas of Rajasthan' prepared with the aid of the State Remote Sensing Application Centre, Jodhpur.

3. Drainage channels should be demarcated: (i) in unoccupied areas, this can be done by installing pillars at suitable distances or by constructing side walls, depending upon the size of drainage channel and its importance; (ii) in urban and rural areas, the demarcation of drainage channels must essentially be done by constructing side walls of appropriate height and thickness.

4. *Khatedari* rights of individuals on the submergence area of Government owned lakes and other water bodies should be brought under the ownership of the Government.

5. Engineering professionals and *Patwaries* should inspect drainage channels in catchment areas. Wherever there are obstructions in the nallahs, they should be suitably removed by constructing culverts, deepening and widening nallahs, etc.

6. A no objection certificate must be obtained from the Irrigation Department for any constructions activities that may interfere with the flow of water in drainage channels.

7. Anicuts more than 2 m in height, above the deepest nallah bed should be identified. More than 2 m of height should be dismantled.

8. Wherever residential colonies have been constructed obstructing the flow in drainage channels, the obstruction must be removed and *nallahs* may be deepened/ constructed.

9. On the periphery of lakes, ponds and water bodies in urban and rural areas, a pucca drain should be constructed to prevent entry of domestic, industrial and other waste.

10. For soil conservation work, suitable guidelines must be issued by the 'Watershed & Soil Conservation Department' so that their interference in the flow of water is minimized.

11. The district administration should specify places for dumping various types of waste material. If any body dumps waste material in other places, particularly in drainage channels, then suitable punishment should be meted out.

12. The government should use television, radio and newspapers to create awareness about this matter.

13. The possibility of using marble slurry as construction material, for filling depressions, etc. should be explored, as has been done for disposal of fly ash from Thermal Power Stations.

14. Water quality of water bodies should be monitored regularly.

15. Wherever waste materials generated from mines and processing units has been dumped, obstructing flow of water in drainage channels diversion drains and check walls must be constructed. For this purpose a special condition should be incorporated in the lease/license agreement.

## Result

The Rajasthan High Court issued an order on 2nd August 2004 Following is an extract of the order:

- We are happy to note that the State Government spared Rs 22.70 lac for the purpose of the survey

- Having given thoughtful consideration to the issue involved and the suggestions made by the Committee, we direct the State Government to consider the recommendations of the Committee referred to above and chalk out a plan to take the effective steps for restoring catchment areas to their original shape.

- It is made clear that the order will not prevent the State Authorities from drawing up or taking further steps more effectively to fulfill the objects of the directions issued by this court.

- Three months time is granted for giving positive shape to the suggestions.

The Rajasthan Government has started implementing the orders of the Rajasthan High Court. Under the direction of the State Government, all the concerning departments like Irrigation, Local Self-Government, Revenue Department, etc. have issued orders for taking action as suggested in the report.

**About the Author**

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