

## Are We Conserving our Water Resources ?

### *Monsoon rainfall*

'Familiarity breeds contempt'. So says a well-known and oft-repeated adage. It is a fact of life that we take many of the great simple and common natural events for granted and often give no serious thought to an understanding of such phenomena. The miraculous onset of the monsoon, which is due to set in a few days from now, bringing with it welcome showers to a thirsty and parched nation, is one such event which is so common but, one which is least understood. It is a recurring climatic episode which merits closer study.

Separately in this issue we have reproduced the gist of a talk by one of our revered and respected senior meteorologists - Dr. Pisharoty. The talk was about certain aspects of Indian rainfall and water conservation. We would like to draw the attention of our readers to some of the points made by Dr. Pisharoty (*see* pages 608-612).

### *Climate of Past Ages*

As geologists, we are concerned with the study of palaeo-climate, i.e., the climate of past ages. We know that the Himalayan mountains in the north and the Western Ghats in the south exercise great orographic control on the distribution pattern of rainfall over the Indian subcontinent. But, the Himalayas were not in existence 50 million years ago. Perhaps the same was true of the Western Ghats. It would be interesting to speculate what the pattern of rainfall was like before the present-day physiographic character was imposed. Can a study of the palaeosols of past ages or the pattern of distribution of fauna and flora, as preserved in the strata, tell us something of the climate of the past? Understanding the past may help us in getting a better knowledge of the changing pattern of climate and such perception is sure to help us to plan for a better future.

India is not badly off, in respect of the benefits received through rainfall, compared to many other parts of the world. The average annual rainfall received over the plains of India is 117 cm. The global average, it should be remembered is only 70 cm. As emphasized by Dr. Pisharoty, this annual replenishment of rain water amounts to as much as 370 million hectare metres! We are therefore not badly off. But, are we really managing this resource to our best advantage?

### *Retention of rain where it falls*

The first and foremost character of this rainfall, we must realise, is that it is seasonal, confined to just about 60 rainy days in a year. Human ingenuity has to devise ways and means of storing this water and making

it serve our needs not only for the rest of the year but also make provision for one or two years of deficient rainfall. The most obvious concentration of effort should, therefore, be directed towards retaining the rainfall where it fell. In this direction, there has been hardly any worthwhile attempt.

Deforestation of land, absence of contour bunding, increased urbanisation, creating pockets of enormous water consumption, total disregard to groundwater recharge—have all had the net effect of making the bountiful supply of water vanish in no time. The construction of large dams and impounding large volumes of water have not served the country well. They have caused environmental damage and their utility is greatly reduced because of rapid siltation. Firstly, the benefits are too much localized, confined to certain favoured sections of the valley. The vast extent of land away from the valley region is not protected. The root causes for preventing flash run-off too have not been tackled. It is here that Earth Scientists probably can play an important role in the coming decade. They must make an effort aimed at sustainable development, that is, one which 'meets the need of the present without compromising the ability of the future generations to meet their own needs'.

#### *Need to identify regions of rapid run-off*

Generalised maps are available showing the pattern of distribution of rainfall. These are not of much value in carrying out detailed hydrogeological studies of specific areas. More important information would be the run-off component for the different topographic and climatic regions and for the different basins and sub-basins. This information has to be represented on maps showing specifically areas of concentrated run-off.

#### *Significance of Rain Nakshatras*

It is also not enough to have just the annual and monthly rates of rainfall. Such data to be of value has to be provided for shorter periods—weekly or pentad (five-day) periods. Our ancients had recognized the importance of classifying rains into 13 or 14 day periods (*Rain Nakshatras*). Observation extended over hundreds of years had established different degrees of reliability and characteristics for each of these rain periods. What is needed today is a scientific analysis of this ancient practice of reckoning reliability of rainy periods. Knowledge has to be fed to the farmer in a language which he understands.

#### *Utility of Tanks*

Our ancients again had greater appreciation of the pattern of distribution of rainfall and had created numerous tanks and ponds throughout the land to catch and conserve rain water where it fell. Through criminal neglect we have allowed most of the tanks to get silted up. Their storage capacity has been greatly reduced. The thick accumulation of impervious clay has effectively prevented stored water from percolating and contributing

to groundwater storage. The net result has been the drying up of tanks and the progressively dwindling supplies of groundwater.

Individual effort at local level has almost disappeared giving place to too much dependence on governments to cater to the primary needs. Self-reliance as a worthy way of life has given place to one of increased dependence on doles from government.

#### *Make water stay on land*

What is urgently needed is a reversal of this trend and the implementation of land-use practices aimed at making the water to stay on the ground and not allow it to run-off. We have to concentrate on run-off farming – i.e., a practice aimed at conveying precipitated water from the same catchment to growing areas without interim storage. Individual effort at local level is called for. Erection of contour bunds and stone lines to check the flow of water, growing of rows of trees to serve not only as wind breaks, but as agents to catch rain water,—such practices, aimed at allowing water to percolate and recharge the groundwater body, are of greater value than construction of large dams at enormous cost through borrowed money. Greed has been the object of the giant projects rather than satisfying our immediate needs. Practices as those outlined above will encourage participation of the local people, a procedure which has been consistently ignored by our planners. The participation of local people in all industrial and developmental activities is essential both on moral and practical grounds.

#### *Gain Knowledge of Nature at first-hand*

High sounding research proposals aimed at carrying out lithofacies analysis, sedimentary basin analysis, etc., are being planned and liberally funded. Greater and more useful contributions to our knowledge will be possible if these researchers turn their attention to the study of aspects of erosion and sedimentation in their own back-yards. A tank with a catchment area of a few hundred square kilometres could function as an ideal set up for such a study. If a self-recording rain gauge were to be installed to measure the pattern of rainfall, a stream gauge to measure the quantum of flow in the channel for different intensities of rainfall, an observation well to measure the fluctuation in shallow and deep groundwater levels, a laboratory equipped with simple instruments to measure the sediment load, the grain-size and mineralogy of particles carried by the stream, —these will furnish far more valuable information of inestimable value than the type of research work that is presently in fashion. A start has to be made to gain knowledge of Nature at first hand. Such knowledge has greater value than all the knowledge gathered at second hand by reading accounts of what others have done elsewhere in an environment totally different from that existing in our neighbourhood.

Such studies are sure to focus attention on the rates of sedimentation and 'the rape of the soil' that is going on before our very eyes through bad

watershed management. Tank beds should be our fields of study. They are sure to prove to be the best monitoring mechanisms to gauge and assess the beneficiary effect of the measures taken to prevent soil erosion and surface-flow of rainwater.

Some of our tanks are hundred to two hundred years old. The history of some of the larger tanks like those built during the Mughal and Vijayanagar periods may extend beyond 200 years. These tanks have an accumulated silt thickness of 200 to 300 cm. Just as the study of tree rings can throw light on the changing pattern of climate from year to year, a close study of the layers of silt accumulated in the bed of an old tank or lake, can tell us about the frequency of draughts and their duration. It is also possible that the layer of fine silt deposited in the tank might register the record of an earthquake too. We, therefore, wish to make a strong plea for initiating studies of recent sediments with the primary object of deciphering the changing pattern of rainfall and its effects. This is a piece of relevant research which has great potential for good. Voluntary organisations, associations of farmers, cooperatives, university departments, schools and colleges and even private individuals can become sources of vital information which will prove useful to the planning process.

'The availability of clean, abundant supplies of water is an assumption that underlies virtually every product we use and every activity that we undertake'. Groundwater is the water of last resort when every other source fails. Indiscriminate sinking of bore-wells and pumping them beyond their capacity will spell ruin. Urgent attention has to be directed towards optimal utilization of this valuable resource.

We once again wish to enter a strong plea to our Earth Scientists to focus a part of their attention to solving the problems of our countryside.

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