

TRADITIONAL INDIAN METHODS FOR WATER MANAGEMENT.

India occupies the South-Central Peninsula of the Asian continent. Besides the main land there are two important groups of islands, namely Lakshdweep in the Arabian Sea and Adaman & Nicobar Island in the Bay of Bengal. India has a large coast line, extending to about 7500 km., which permits numerous ocean routes to the rest of world. The country is endowed with almost all important topographical features, such as high mountains, extensive plateaus and wide plains traversed by mightly rivers like Ganga, Brahmputra, Indus , Narmada, Tapi, Mahi, Maha Godavari, Krishna, Kaveri, etc. The country is bounded by Himalayas in the North and has a large peninsular region tapering towards the Indian Ocean.

Due to wide variation in topographical and climatic conditions, whole country can be broadly classified in five physiographic divisions.

1. The Himalayas.
2. The Northern Plains.
3. The Peninsular Region.
4. The Coastal Plains.
5. The Island (Andaman - Nicobar & Lakshadweep)

Each Geographical division has devised different and innovative methods for water conservation, Trans Himalayas region of India consists of cold deserts of Ladakh and Kargil in Jammu and Kashmir and Lahaul & Spiti valleys of Himachal Pradesh. Ladakh gets an annual rainfall of only 140 mm.

Even though, Ladakhis have developed an excellent irrigation system known as Zing in which glacier water is diverted from streams with the guided channels to a small tank. This stored water is utilised the following day in the field. Similarly, in Spiti valley of H.P., irrigation system known as Kul has been developed. In Western Himalayas, farmers have devised a major tradition of building canals aligned roughly with contours which is known as " khul " to draw water from the hill streams or springs. A typical community khul services six to 50 farmers, irrigating an area of about 20 Ha, In Uttaranchal "Naula" are traditionally utilised for drinking water purpose. These are small wells or ponds in which water is collected by making a stone wall across a stream.

Water resources potential of Eastern Himalayas and North-East hills, is the largest in the entire country. However available water resources have hardly been tapped because of rugged nature of terrain. In this region, farmers have developed a concept of terrace and bund. Farmers grow wet rice , fish culture in terraces and finger millets on the risers / terrace bunds. The " Zabo " system is practiced in Nagaland. It consist of a protected forest land towards the top of the hill, water harvesting tanks in the middle and paddy fields at the lower side. Similarly, Bamboo drip irrigation system is practiced mainly in the Jaintia and Khasi hills of Meghalayas for the last 200 years.

Indo - Gangetic plains is the most important region in terms of human concentration. It covers Punjab, Haryana, Chandigarh, Delhi, Bihar and West Bengal. Indus, Brahmaputra and Ganga, rivers play an important role and have definite influences over the area. Bengal once had an extraordinary system of Inundation Canal and were in vogue till about two centuries. While in Bihar Ahars are the indigenous flood water harvesting system. In this system catchment basin embanked on three sides, the fourth side being the natural gradient of the land itself. Ahar beds were used to grow rabi crop by draining out excess water after Kharif Season.

The central highlands comprise the semi arid uplands of eastern Rajasthan and certain portion of Uttarpradesh, Gujarat and Madhya Pradesh. Water conservation method developed by Bhitada village, Zambuwa district of MP is a unique example. It is known as "Pat" system, to divert water from swift-flowing hill streams into irrigation channels. The diversion bunds are made across the stream. In Rajasthan, an open dug well known as "Saza Kuva", which has several owners is also devised for irrigation purpose. These are considered common property resources.

In Thar desert, a stone check dam known as "Naada / Bandha" is constructed across a stream / gully to capture monsoon runoff. In MP, Chandelas (Rajput Families) established a network of several hundred tanks that ensured a satisfactory level of ground water. Similarly in Rajasthan, "Talabs" are developed which are natural or man made

reservoirs to store monsoon run off. Udaipur City is famous for its large number of talabs and is called Lake City.

In Thar Desert Region, "Paar" is a common water harvesting practice. In this system, rain water flows from catchment and in the process percolates into the Sandy Soil. To access percolated water Kuis or Beris are dug in the agor (Storage area). Similarly, "Khadin" is an ingenious construction designed to harvest surface run off. In this system, run off from upland and rocky surfaces, is collected in the adjoining valley by constructing an earthen embankment having a masonry waste weir for outflow of run off excess.

In Bikaner City of Rajasthan and Ahmedabad City of Gujarat, old tankas can be observed. These are underground tanks built in the main house or courtyard. They are circular holes lined with fine polished lime to store rain water. The water was used for drinking purpose only. Similarly, traditional step wells were constructed which are called "Vav" in Gujarat and "bavris" in Rajasthan. These are wells stepped and moving into the bowels of earth, some five to six storey in height.

The Deccan plateau constitutes the whole of South Indian table land the elevated region lying east of Western Ghats. The plateau occupies Maharashtra, Karnataka and Portion of Andhra Pradesh. Phad irrigation is one of the traditional forms of irrigation practiced in Maharashtra. The system starts with a Bandhara built across a river. From the bandharas, branch out Kalvas (canals) to carry water into the fields. While tanks, called "kere" in Kannada were the

predominant traditional method of irrigation in Karnataka and were fed by channels branching off from Anicuts (Check dams) built across the stream. Even today, there are more than 40000 tanks in Karnataka.

The Southern State of Tamilnadu has a rich water resource heritage. A system of tanks called " Eri " was made about 1500 years ago to provide enough water for the area. These thousands of tanks (about 40000 such tanks) not only recharged ground water table after the monsoon but also provided the sources of drinking and irrigation water. These tanks were all interlinked to utilise surplus water flow from each tank. While small tanks called "Oorani" were Constructed in South Travancore because of irregular topography and absence of large open space.

The Western Ghats extend from Gujarat to Kerala, traversing the stretch of Maharashtra , Goa and Karnataka. The terrain is such that there is high discharge in rivers in the monsoon and low discharge in dry months. People have devised special water harvesting structure called "Surangam," which is a horizontal well mostly excavated in hard laterite rock formations. Water seeps out of the hard rock and flows out of the tunnel where it is collected in an open pit.

The Eastern Ghats, a rugged, hilly terrain run almost parallel to eastern coast of India. It covers portion of Orissa, Andhra Pradesh and Tamilnadu. " Kolambus" are constructed in this region , which is a temporary dam stretching across the mouth of channels, made of brushwood, mud and grass. They are built twice a year, before onset of monsoon for Kharif Crop and before rabi season for rabi crops.

CONCLUSION ::

India has been a source of knowledge since time immemorial. In water conservation, traditional wisdom has been still witnessed in the form of water harvesting structures alive in different parts of the country. Fundamental principles of science are best applied with necessary modifications as per topography, climate, social practices, etc. and myriad of techniques got developed. Local people still know much about them.

With our ecology and environment today facing severe questions of sustainability it is the right time now to focus on ecological friendly and economically viable innovations. Certain ecological viable and sustainable innovations that still see the light today offer tremendous opportunities for incorporating them with the modern science. The blended technologies / innovations from the two systems should be able to retain the ecological strength of the indigenous knowledge and at the same time be able to derive and demonstrate from the modern science, a good amount of productivity.