Irrigation techniques of Ancient and Medieval India

March 20, 2019

Manifest Pedagogy

Irrigation systems of Ancient and Medieval India is a important topic for Preliminary and Mains. With the government and INTACH trying to bring back the traditional harvesting structures a look at all the irrigation systems of Ancient and Medieval India will be a good addition to the students content.

In news

Indian National Trust for Art and Cultural Heritage (INTACH) stepped in and took on the responsibility of recharging and sustaining groundwater

Placing it in the syllabus

History of India

Static dimensions

- **Irrigation systems of Indus valley civilization**
- Irrigation system in Ancient India-Ringwells and their uses.
- Araghatta system / Persian wheel and its usage
- Cholan tank irrigation system
- Medieval India- Canal construction by Firoz Shah thuglaq and Shahjahan

Current dimensions

- Traditional water conservations taken as models under Pradhana Mantri Krishi Sichayi Yojana
- Traditional India water harvesting systems- INTACH preservation

Content

Irrigation systems of Indus valley civilization

- The Harappan irrigation system was one of the architectural feats. Instead of using canals or waterways all year round, they would instead merely use the flood season to their advantage.
- Their cities used a complex irrigation system to bring running water into homes. They also had a citywide sewer system to help facility complex indoor plumbing.
- Their style of irrigation would simply control the water from heavy rainfalls, which caused floods throughout the year.
- This control of such violent natural disasters is quite impressive coming from such an ancient civilization.
- In addition, it is known that Indus civilization people practised rain water harvesting, a powerful technology that was brought to fruition by classical Indian civilization but nearly forgotten in the twentieth century.

Irrigation system in Ancient India-Ringwells and their uses.

- The earliest mentions of irrigation are found in Rigveda chapters. **The Veda mentions well-style irrigation,** where ***Kupa* and *avata* wells** once dug are stated to be always full of water, from which *varatra* (rope strap) and *cakra* (wheel) pull *kosa*(pails) of water. This water was, state the Vedas, led into *surmi susira*(broad channels) and from there into *khanitrima* (diverting channels) into

fields.

- Later, the 4th-century BCE Indian scholar **Pāṇini, mentions tapping several rivers for irrigation**. The mentioned rivers include Sindhu, Suvastu, Varnu, Sarayu, Vipas and Chandrabhaga. Buddhist texts from the 3rd century BCE also mention irrigation of crops. Texts from the Maurya Empire era (3rd century BCE) mention that the state raised revenue from charging farmers for irrigation services from rivers.
- Patanjali, in Yogasutra of about the 4th century CE, explains a technique of yoga by comparing it to "the way a farmer diverts a stream from an irrigation canal for irrigation".
- In Tamil Nadu, the **Grand Anicut (canal) across the Kaver**i river was implemented in the 3rd century CE, and the basic design is still used today.

Araghatta

- In Sanskrit the word Araghatta has been used in the ancient texts to describe the Persian Wheel. The 'ara-ghatta' comes from the combination of the words 'ara' meaning spoke and 'ghatta' meaning pot.
- There is evidence to argue that this system of lifting water from open wells was probably invented in India of the past. As it finds mention in the Panchatantra (3rd Century BCE) and the Rajatarangini (12th century CE) as the 'cakka-vattakka' or the 'ghati yantra'.
- The word 'araghatta' itself became to be called the rahat or reghat in North India, a name by which it is known even now. The Araghattikka or arahattiyanara describes the person or animal working the Araghatta and this description was extensively used in the twelfth century. Usually, men, bullocks, elephants or camels did the job of moving laterally to lift water by this system of Araghatta.

Persian wheel

- The Persian wheel is a mechanical water lifting device operated usually by draught animals like bullocks, buffaloes or camels. It is used to lift water from water sources typically open wells
- With its use in Iran, the then Persia, and perhaps its discovery there, it came to be called the Persian wheel.
- It uses the system of gearing to convert the circular motion of the animal into the vertical motion of wheel on spokes.
- This device made its entry into India with the establishment of Delhi Sultanate. Baburnama gives a pictorial representation and a clear description of Persian Wheel in use in the Punjab province.

Cholan tank irrigation system

- There was tremendous agrarian expansion during the rule of the imperial Chola Dynasty (c. 900-1270 AD) all over Tamil Nadu and particularly in the Kaveri Basin. Most of the **canals** of the Kaveri River belongs to this period e.g., Uyyakondan canal, Rajendran vaykkal, Sembian Mahadegvi vaykkal.
- There was a well-developed and highly efficient system of **water management from the village level upwards**. The increase in the royal patronage and also the number of devadana and bramadeya lands which increased the role of the temples and village assemblies in the field.
- **Committees like eri-variyam(tank-committee)** and totta-variam(garden committees) were active as also the temples with their vast resources in land, men and money.
- The **water tanks** that came up during the Chola period are too many to be listed here. But a few most outstanding may be briefly mentioned. **Rajendra Chola built a huge tank named Solagangam** in his capital city **Gangaikonda Chlapuram** and was described as the **liquid pillar of victory**. About 16 miles long, it was provided with

sluices and canals for irrigating the lands in the neighbouring areas.

- Another very large lake of this period, which even today seems an important source of irrigation was the **Viranameri** near Kattumannarkoil in South Arcot district founded by Parantaka Chola. **Other famous lakes of this period are** Madurantakam, Sundra-cholapereri, Kundavai-Pereri (after a Chola queen).

Medieval India- Canal construction by Firoz shah tughlaq and Shahajahn

Firoz shah Tughlaq:

- To support the newly founded city of Hissar-i-Firoza, in 1355 he constructed a Double System of Canals from Yamuna to Sutlej. They are referred to asrajwahas in the Indo-Persian historical texts.
- He renovated Prithviraj Chauhan era's Western Yamuna Canal, for irrigation bringing more land under cultivation for growing grain and fruit.

Shahajahan

- Emperor Shahjahan (1627-58 AD) first shifted the city from the Aravalli hills towards the plains of the Yamuna. But he made sufficient arrangements to meet the water needs of the new palace, the army, and the common people. His **system of Shahjahani canals and *dighis*** (a square or circular reservoir with steps to enter) was probably the best creation of the time.
- Shahjahan built the Red Fort (1639-1648 AD), and while the city of Shahjahanabad was being built, he ordered **Ali Mardan Khan** and his Persian artisans built a canal from Khizrabad to Safidon (from Karnal to Hissar), and under Akbar the canal was repaired by the then governor of Delhi. However, the canal soon silted and stopped flowing. Ali Mardan Khan not only brought **Yamuna waters**

to the palace, but also linked this canal with another from Sirmaur hills, presently located on the Delhi border near Najafgarh. The new canal, known as **Ali Mardan canal**, channelled the waters of the Sahibi river basin to merge into the old canal.

- The Ali Mardan canal, before entering the city, irrigated orchards and gardens upto 20 km. Across the canal there are many small over bridges like the Chaddrwala pul, Pul Bangash and Bholu Shah.

About INTACH Conservation Institutes

INTACH Conservation Institutes (ICI) was established with the objective to preserve heritage for future generations. The center has undertaken continuous study and research to develop the best methodologies in the field of conservation science in India. As a result, it provides unmatched services in conservation for art collectors. The centre has also worked towards spreading concern for our heritage by conducting seminars and workshops to spread concern for heritage conservation.

Natural Heritage Division (NHD) of INTACH

The Division has gained expertise in various aspects of water management including lakes and wetlands, unconventional wastewater treatment, water policy. The field of activity has broadened into biodiversity, rivers, landscapes and the cultural dimension of nature.

Focus areas of NHM;

1. Lake and Wetland Conservation
2. Water Resource Management and Policy.
3. Unconventional Wastewater Treatment
4. Promoting Urban Biodiversity.
5. Conserving Regional Landscapes.
6. Documentation of Sacred Groves & Trees.
7. Wildlife Conservation.

8. Biodiversity parks.

Traditional Indian water harvesting systems

Water has been harvested in India since antiquity, with our ancestors perfecting the art of water management. Many water harvesting structures and water conveyance systems specific to the eco-regions and culture has been developed.

- They harvested the raindrop directly. From rooftops, they collected water and stored it in tanks built in their courtyards. From open community lands, they collected the rain and stored it in artificial wells.
- They harvested monsoon runoff by capturing water from swollen streams during the monsoon season and stored it various forms of water bodies.
- They harvested water from flooded rivers

Paar system:

Paar is a common water harvesting practice in the western Rajasthan region. It is a common place where the rainwater flows from the agar (catchment) and in the process percolates into the sandy soil. The structure was constructed through traditional masonary technology. Normally six to ten of them are constructed in a paar This is the most predominant form of rainwater harvesting in the region. Rainwater harvested through PAAR technique is known as Patali paani.

Talab/ Bandhis

Talabs are reservoirs. They may be natural, such as the ponds (pokhariyan) at Tikamgarh in the Bundelkhand region. They can be human-made, such the lakes in Udaipur. A reservoir area of less than five bighas is called a talai; a medium sized lake is called a bandhi or talab; bigger lakes are called sagar or samand. The pokhariyan serve irrigation and drinking purposes. When the water in these reservoirs dries up just a few days after the monsoon, the pond beds are cultivated with rice.

Saza Kuva

An open well with multiple owners (saza = partner), saza kuva is the most important source of irrigation in the Aravalli hills in Mewar, eastern Rajasthan. The soil dug out to make the well pit is used to construct a huge circular foundation or an elevated platform sloping away from the well. The first is built to accommodate the rehat, a traditional water lifting device; the sloping platform is for the chada, in which buffaloes are used to lift water. Saza kuva construction is generally taken up by a group of farmers with adjacent landholdings; a harva, a man with special skills in groundwater detection, helps fix the site.

Johad

Johads are small earthen check dams that capture and conserve rainwater, improving percolation and groundwater recharge. Starting 1984, the last sixteen years have seen the revival of some 3000 johads spread across more than 650 villages in Alwar district, Rajasthan. This has resulted in a general rise of the groundwater level by almost 6 metres and a 33 percent increase in the forest cover in the area. Five rivers that used to go dry immediately following the monsoon have now become perennial, such as the River Arvari, has come alive.

Pat:

Jhabua district of Madhya Pradesh developed the unique pat system. This system was devised according to the peculiarities of the terrain to divert water from swift-flowing hill streams into irrigation channels called pats.

Traditional water conservations taken as models under Pradhana Mantri Krishi Sichayi Yojana are:

- Jal Mandir (Gujarat).
- Khatri, Kuhl (H.P.).
- Zabo (Nagaland).

- Eri, Ooranis (T.N.).
- Dongs (Assam).
- Katas, Bandhas (Odisha and M.P.) etc.