

Water Economics and Governance
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Lecture - 49
Water Governance in India : Historical Perspective

Hi everyone. We discussed the basic concepts of water governance; what are the basic elements in water governance what are the major principles that need to be considered while framing the policies and governance practices for water in previous week; this week we are specifically going to talk about water governance in India.

So, earlier we had a general perspective, the basic philosophies basic principles elements good governance practices benchmarking this is what we discussed in earlier week. But this week we will be limited to our own nation we will be talking about what are the major issues, concerns, practices, lapses in water governance sector in India. So, we are going to start with historical perspective of water governance in India.

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Management of Water Sector in India

"If some Asian countries face a water crisis in the future, it will **not be because of physical scarcity of water**, but because of **inadequate or inappropriate water governance**, including management practices, institutional arrangements, and socio-political conditions, which leave much to be desired."

Prof. Asit K. Biswas, Stockholm Water Prize Laureate (in the Asian Water Development Outlook, 2007)

"The water crisis in the Asia region is essentially **a crisis of water governance**."

Tadao China, Former ADB President (in ADB's Water Week celebration, 2002)

"India's water problems are not those of scarcity, **but rather of inefficient use and bureaucratic policies**"

Prof. Gleick P.H., Pacific Institute, Circle of Blue.org(2014)

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Now, the management of water sector in India if we talk about. So, not only in India, but even in the other Asian countries also if we see these are a few remarks by prominent personalities. So, professor Asit K Biswas who is a stockholm water prize winner wrote in Asian water development outlook 2007 that if some Asian countries face a water crisis in future; it will not be because of physical scarcity of water.

But because of inadequate or inappropriate water governance including management practices institutional arrangement and socio political conditions which leave much to be desired ok. Similar opinion was coined by Tadao Chino who is former president of Asian development bank. So, he said that water crisis in a Asia region is essentially a crisis of water governance Professor Gleick P H of Pacific Institute also had similar opinion when said that India's water problem are not those of scarcity; but rather of inefficient use and bureaucratic policies.

So, basically the idea of putting this statement is to make you aware that the major experts opinion in the sector is more concerned on the governance of water rather than just availability of water or practices or engineering aspect of the water.

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Water Management in Ancient India

- *The Laws of Manu* provide indications of the water law of the time. Water was considered indivisible. The law encouraged the use of water bodies as boundaries between villages to ensure that as many villages as possible had access to water. Diversion or obstruction of waters was discouraged. Destruction of embankments was illegal.
- Kings should protect public waters and collect fees for crossing waters and the laws imposed a system of social reprimands and punishments for those who polluted the water or who stole or diverted water.
- Water bodies of enemies, however, could be destroyed in times of war. A water controller was in charge of water administration.

Source: India: Evolution of Water Law and Policy, by Cullet P. and Gupta J. in The Evolution of the Law and Politics of Water, Springer (2008)

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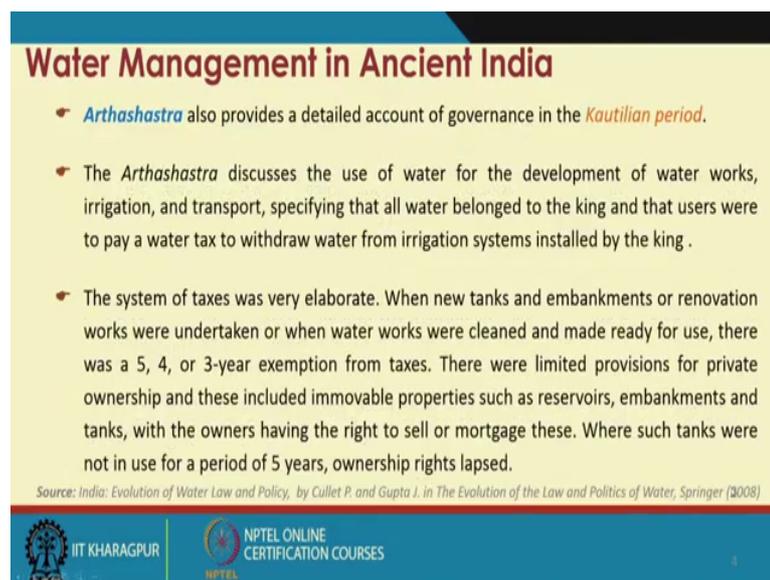
So, governance of water is one of the very prime challenges in the India and in fact, in the entire Asia that way. So, let us see how basically water was being managed in a ancient India and what kind of development of art have taken place; we have moved to what state from which state. So, the water management is basically as old as the start of civilization ok, During the ages of Manu in the laws of Manu basically there are indications are provided on the water law of that time ok.

So, water which was considered indivisible during that period they had considered like water bodies as boundaries between villages and ensure that as many villages as possible had access to the water and specific diversion or obstruction of water was discouraged

even during those phases ok. It was the responsibility of king to protect public waters and collect fee for crossing water. So, fee was not there for using water, but for crossing water crossing river and for this kind of movements; there was fee even in that ages or taxes what we can call.

Then however, water bodies of enemies could be destroyed in time of war. So, during the war because in during war times people wanted or the king wanted to have capture of the territory, capture of the region and make the enemy forces weaker and destroying the water resources or destroying the water bodies of enemies is one of the prime ways is one of the ways to make the enemies sort of because when their basic amenities when their requirement of water, when their requirement of food is not being fulfilled how they are going to fight for.

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Water Management in Ancient India

- *Arthashastra* also provides a detailed account of governance in the *Kautilian period*.
- The *Arthashastra* discusses the use of water for the development of water works, irrigation, and transport, specifying that all water belonged to the king and that users were to pay a water tax to withdraw water from irrigation systems installed by the king .
- The system of taxes was very elaborate. When new tanks and embankments or renovation works were undertaken or when water works were cleaned and made ready for use, there was a 5, 4, or 3-year exemption from taxes. There were limited provisions for private ownership and these included immovable properties such as reservoirs, embankments and tanks, with the owners having the right to sell or mortgage these. Where such tanks were not in use for a period of 5 years, ownership rights lapsed.

Source: India: Evolution of Water Law and Policy, by Cullet P. and Gupta J. in *The Evolution of the Law and Politics of Water*, Springer (2008)

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So, that is why these water bodies were target during the wars; more elaborative description of the water management from the ancient India is available for the Kautilian period. So, the Kautilian period who basically framed the Arthashastra; so, he has provided a detailed account of governance particularly about the water also including all other aspect.

So, the Arthashastra discuss the uses of water for the development of waterworks, irrigation, transport and overall sort of all other needs ok. And users were pay a water tax to withdraw water from irrigation system installed by the ruler. So, that was the

framework; so, there was basically taxes or charges for irrigation water back in that period there were far more elaborative discussion on to the system of taxes.

So when let us say a new tank or embankment is being done or renovation of some existing water bodies or this thing is being taken up during the Kautilian period. So, there was because it was considered beneficial for society. So, there was exemption of taxes for a specific period of time; it could be 4 year, 3 or 5 years. So, there was some time frame some time period for which there was tax exemption.

So, this like in these today's age we get such things for industrial zones ok; we several state governments in order to promote the industries to come there and open new companies, new factories new setups. So, they encourage like the rebate in the terms of taxes state taxes. So, that was there also in back in Kautilian period there was rebate in the taxes on water as well for maintenance of water works.

There were limited provisions for private ownership and however, embankment and tanks which were owned by someone they had right to sell or mortgage these water bodies as well. Whereas, such tanks were not in used for a period of 5 year ownership rights was used to be lapsed and it comes under the purview of the king or the ruler.

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Water Management in Ancient India

- All those who leased, hired, or shared such a body had the responsibility to maintain them.
- Private owners were allowed to give waters to other parties through irrigation works in exchange for produce. The taxes that were owed to the King were specified in great detail and these were collected by the Chief Superintendent of Crown Lands.
- The *Arthashastra* stated that in irrigating one's own field, no harm is to be caused to others. It prohibited the release of water from dams without a legitimate reason, the obstruction of the legitimate use of water by others, the obstruction or diversion of the watercourse, and the building of water works on the land belonging to someone else.

Source: India: Evolution of Water Law and Policy, by Cullet P. and Gupta J. in *The Evolution of the Law and Politics of Water*, Springer (2008)

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Back at that time further the Arthashastra says that all those who leased hired or shared water body has a responsibility to maintain them; the private owners are allowed to give

water to other parties through irrigation works in exchange of various products or produces.

The taxes that were owned to the king were specified in much more detail in great depth in the Arthashastra and these taxes were usually collected by the chief superintendent of the crown land. It further says that irrigating ones own field no harm is to be sort of created to the others ok; if prohibited or for those who are defaulting on these laws particularly on the laws of water.

Basically like prohibited release of water from dam without a legitimate reason or obstruction of the legitimate use of water by others. So, all those water related issues has sort of specified punishment as well ok.

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Water Management in Ancient India

- Where damage was caused to another party as a result of overflowing waters, compensation was owed to the other party.
- The Arthashashtra provides a list of damage types and the corresponding compensation or penalty due. These included the death penalty (death by drowning)
- Water routes could be used for the purposes of transport and trade and the principle of good neighbourliness was a civic duty.
- The *Arthashastra* elaborates in great detail on foreign policy, but does not say much explicitly about water. It leaves room, however, for treaties to develop joint water works.

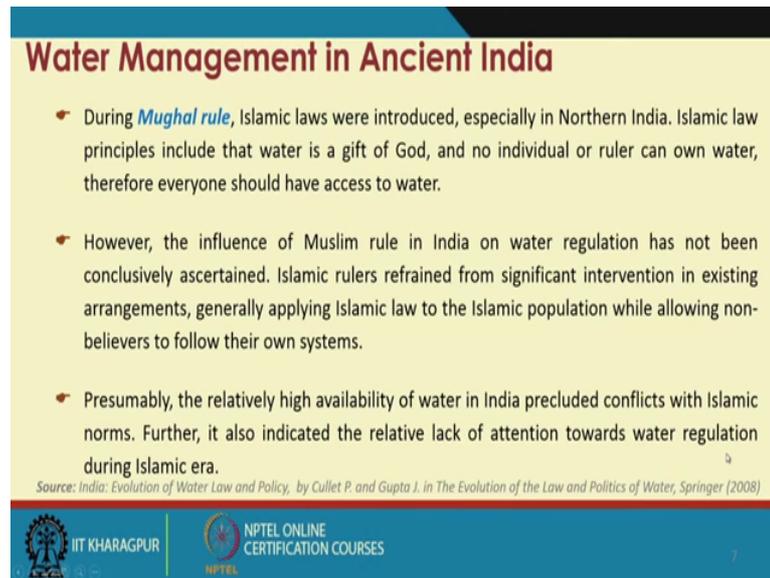
Source: India: Evolution of Water Law and Policy, by Cullet P. and Gupta J. in *The Evolution of the Law and Politics of Water*, Springer (2008)

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And these punishments could be very senior very severe punishments at time ok. The arthashashtra says that has a list of damage types and corresponding compensation or penalty due and this penalty due was up to death penalty. So, death by drowning; that means, basically they used to dip those defaulters; the extreme level defaulters in water bodies itself to ensure their death by drowning. The water routes could be used for the purpose of transport and trade and the principles of sort of good neighbourliness was civic duty.

So, was we coming under the civic sense; further the Arthashastra elaborates in gate detail the foreign policy, but does not say much explicitly about the water; however, there was room available for developing treaties for joint waterworks along with the Foreign nations.

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Water Management in Ancient India

- During *Mughal rule*, Islamic laws were introduced, especially in Northern India. Islamic law principles include that water is a gift of God, and no individual or ruler can own water, therefore everyone should have access to water.
- However, the influence of Muslim rule in India on water regulation has not been conclusively ascertained. Islamic rulers refrained from significant intervention in existing arrangements, generally applying Islamic law to the Islamic population while allowing non-believers to follow their own systems.
- Presumably, the relatively high availability of water in India precluded conflicts with Islamic norms. Further, it also indicated the relative lack of attention towards water regulation during Islamic era.

Source: India: Evolution of Water Law and Policy, by Cullet P. and Gupta J. in The Evolution of the Law and Politics of Water, Springer (2008)

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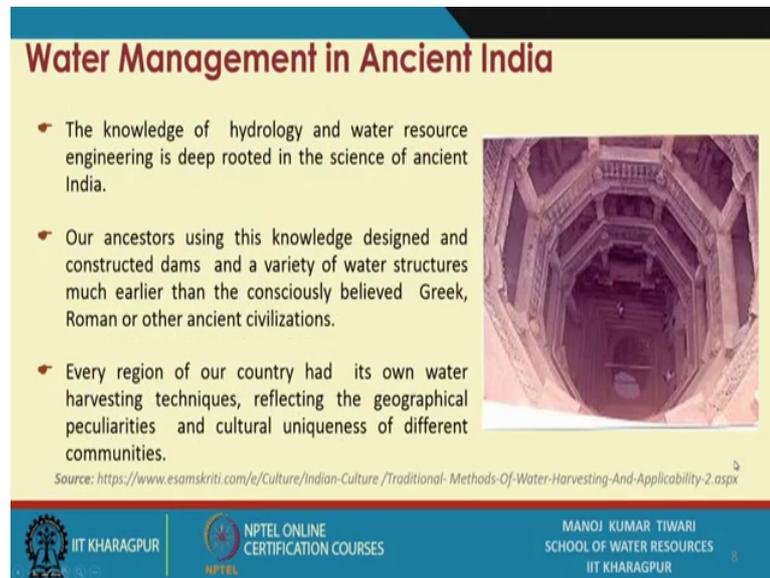
Post this when India moved under the Mughal age. So, the Islamic laws were introduced especially particularly in the northern part of India.

And this Islamic law principles included sort of said that water is a gift of god and no individual or no ruler or king can own water and therefore, everybody should have access to the water. In Muslim rule particularly there was not much attention was paid on to the water which could be two reasons ok; one could be the possibility of that there are relatively high availability of water was there in India at that time. So, there was enough of resources less population.

So, there was no issue of less water availability or scarcity. So, there was not much conflicts that way with the Islamic norms and people were used to basically people were authorized to use water in whichever way they desire ok. So, the Islamic followers used to used to consume water by their belief and non believers were also allowed to follow their own systems or their own practices because there was not much of dispute or conflicts.

Ok; however, it could be basically presented in a another form as well that it also indicates that there was relative lack of attention towards water regulation during that Islamic period.

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Water Management in Ancient India

- The knowledge of hydrology and water resource engineering is deep rooted in the science of ancient India.
- Our ancestors using this knowledge designed and constructed dams and a variety of water structures much earlier than the consciously believed Greek, Roman or other ancient civilizations.
- Every region of our country had its own water harvesting techniques, reflecting the geographical peculiarities and cultural uniqueness of different communities.

Source: <https://www.esamskriti.com/e/Culture/Indian-Culture/Traditional-Methods-Of-Water-Harvesting-And-Applicability-2.aspx>

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Now the if you see specific practices of water management it was particularly in the ancient India; there was it is it becomes very apparent that the knowledge of hydrology and water resource engineering was used to a great detail. So, that is supposedly deeply rooted in the Indian culture; Indian ancient culture and by following the science of ancient India, if you just look some of the structures related to the water one can say that how nicely the principle or the concepts of hydrology hydraulics and water resources engineering or even the quality protection has been used in the construction, design, maintenance of those structures.

So, our ancestors using this knowledge design and constructed dams variety of water structures much earlier then sort of generally believed that Greek, Roman or other ancient civilization has taken up this initiation. Every region in our country has its own water harvesting technique which reflects the geographical peculiarities and cultural uniqueness; how what is the culture what is the trade tradition what is the practices. So, according to that we like different parts of India has its own different cultures a.

Water management structure let us say in the hills of Garhwal or Himachal would surely be different than that in the plains of northern or central part southern practices are different.

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Some example of ancient water engineering

- **Jhalaras** are typically rectangular-shaped stepwells that have tiered steps on three or four sides.
- Jhalaras were built to ensure easy and regular supply of water for religious rites, royal ceremonies and community use.
- The city of Jodhpur has eight jhalaras, the oldest being the Mahamandir Jhalara that dates back to 1660 AD.



Source: <https://www.thebetterindia.com/61757/traditional-water-conservation-systems-india/>

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So, they will likely to have sort of their own culture tradition and that way the water management structures are also very specific to the regions many of them. In fact, these are some of the examples of our ancient water engineering ok. So, what is apparent on screen is actually the is typically called Jhalaras which is typic which is a sort of rectangular shaped step wells stepwells which can be seen from here it can be seen in this way that there are the different stepwells one over the other in the rectangular shape there is passage through the steps.

So, these were built to ensure the easy and regular supply of water for religious rites royal ceremonies and even community use at the time of scarcity or at the time of draught. The city of jodhpur has 8 such Jhalaras the oldest being in the Mahamandir jhalar that is dated back in 1660 ok. So, that is one of the type of structure.

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Some example of ancient water engineering

- *Talabs/bandhi* are reservoirs that store water for household consumption and drinking purposes.
- Could be natural (*pokhariyan* ponds at Tikamgarh) or man made (the lakes of Udaipur).
- A reservoir with an area less than five *bighas* is called a *talai*, a medium sized lake is called a *bandhi* and bigger lakes are called *sagar* or *samand*.

Source: <https://www.thebetterindia.com/61757/traditional-water-conservation-systems-india/>



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There are talabs or also known as bandhi which are the basic reservoirs that store water for household consumption and drinking purpose ok. So, it would be a simple structure like this; it could be natural which is also known as pokhary or pokhariyan pond at local level in different places ok.

So, those type of like there are pokhariyan ponds in tikamgarh or it could be manmade like the lakes various lakes in Udaipur a reservoir with an area less than 5 bigha is called talai a medium sized lake is called bandhi and bigger lakes are called sagar or samand which is derived from the some under samudra or sagar that way.

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Some example of ancient water engineering

- **Bawari** a type of stepwell used to be a part of the ancient networks of water storage in the cities of Rajasthan.
- The little rain that the region received would be diverted to man-made tanks through canals built on the hilly outskirts of cities.
- The water would then percolate into the ground, raising the water table and recharging a deep and intricate network of aquifers.



Source: <https://www.thebetterindia.com/61757/traditional-water-conservation-systems-india/>

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So, these are there there are bawari which is type of stepwells used in the part of the ancient network of water storage in the cities of rajasthan again. So, you see that rajasthan from the beginning has been very like there the availability resource availability was less. So, this type of structure has taken up development of these structure has taken up on a larger scale on a great scale because when there is a need there is a requirement.

So, people will find the way to store, harvest or design the structures to for storing water. So, that it can be used at the time of need. So, the little rain in the region is received will be diverted through the various manmade tanks through these canals built on the hilly outskirts of the cities ok. The water would then percolate into the ground raising the water table and recharging a deep and intricate network of aquifer.

So, this was an artificial kind of recharge facilities as well not that it was being pumped, but through harvested water was stored over a place from where the groundwater recharge could take place. It was not limited to groundwater recharge only of course, it was the surface water was also available for uses.

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Some example of ancient water engineering

- ☛ **Kuhls** are surface water channels found in the mountainous regions of Himachal Pradesh.
- ☛ The channels carry glacial waters from rivers and streams into the fields.
- ☛ The Kangra Valley system has an estimated 715 major kuhls and 2,500 minor kuhls that irrigate more than 30,000 hectares in the valley.
- ☛ Built either through public donations or by royal rulers.



Source: <https://www.thebetterindia.com/61757/traditional-water-conservation-systems-india/>

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There are kuhls which are there in the Himachal Pradesh; so because of the specific terrain specific structures over there. So, surface water channels are there in the mountainous regions of Himachal Pradesh. So, these are known as kuhls these channels carry glacier water from river and streams into the field ok. The kangra valley system has an estimated around over 700 major kuhls and around 2500 minor kuhls that irrigate more than 30000 hectares in the valley. So, this was mostly for the irrigation purpose this could be built either through public donations or by the rulers back then.

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Some example of ancient water engineering

- ☛ **Taanka** is a traditional rainwater harvesting technique indigenous to the Thar desert.
- ☛ A Taanka is a cylindrical paved underground pit into which rainwater from rooftops, courtyards or artificially prepared catchments flows.
- ☛ Once completely filled, the water stored in a taanka can last throughout the dry season and is sufficient for a family of 5-6 members.



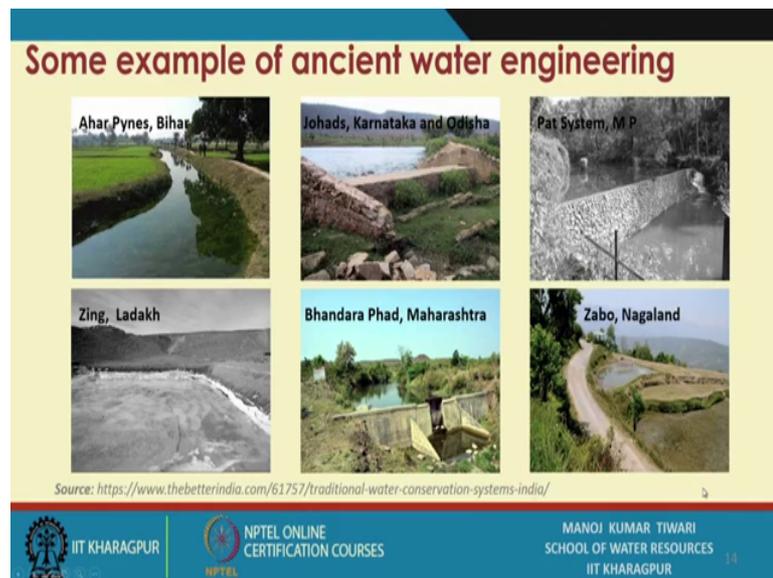
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Then there are Taankas which is again a traditional rainwater harvesting technique; this is indigenous to Thar desert. So, in Thar desert area they use such systems a lot there are still several such systems. So, this Taanka is actually a cylindrical paved underground pit as is apparent from the figure over here.

So, it is from this underground pit is there and the water which received elsewhere is put through from the like rooftop courtyard or artificially prepared catchment flows and that is sort of put into the pit through proper system. And once it is completely filled the water is stored in a Taanka can last throughout the dry season in and typically one Taanka the size of one Taanka is such that it will be sufficient for a family of 5 to 6 members for the entire summer season.

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There are some more example such examples many of them exists that way there are the Ahar Pynes in Bihar which is again a channel like this you can see over here this one; so, simple channel again for irrigation purpose.

There are Johads which are there in Karnataka and Odisha which are similar to lake or pond kind of structure for storing water. Then there are pat systems which are used in a few regions in Madhya Pradesh ok. So, for like putting stone based retaining walls or barrages for the storing water and then channelizing it through a fine section in a controlled manner then there are zing which are there in the Ladakh area.

So, there the water is particularly the ice or this thing glaciers or the freezed water is stored over there and as the ice melts and these things. So, the water becomes available for the uses then there are Bhandara Phad in which are small kind of not exactly dam small kind of barrage for retaining water. And whenever there is a need it can be the gates can be opened and it can circulate for it can be circulated for irrigation purpose in the channels ok. There are Zabo in Nagaland for again irrigation purpose agricultural fields are used as a to harvest rainwater systems.

So, that way there are various specific structures in the specific regions of India in the different parts, different sections of India these kind of structures are there. It is not only limited to the one that we just see there are many such again many many many such structures are available locally, made locally designed and that can be eventually used for the purpose of irrigation, for the purpose of fulfilling domestic need, for the purpose of rainwater harvesting, for the purpose of groundwater recharge. So, you see the kind of objectives that are being fulfilled by these small scale attempts.

At a village level at a small level or a community level or a city level. So, with these kind of even small attempts these structures are found to satisfy the purpose the basic purpose of their own building or constructions ok.

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Some example of ancient water engineering

- **Rani-ki-Vav**, a 11th century stepwell situated in Gujarat, was Internationally recognized as World Heritage in 2014.
- It was acknowledged as "*an exceptional example of technological development*" in utilising ground water resources and an unique water management system which illustrates "*the exceptional capacity to break large spaces into smaller volumes following ideal aesthetic proportions*".



Source: <http://www.mea.gov.in/n-focus-article.htm?23601/International+recognition+of+Indias+world+heritage++New+exciting+projects+on+anvil>

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It is not only limited to just recognition in the in the engineering or this aspects; there are international recognition has been received for some of these structures one such

structure that you see here is actually Rani ki Vav which is a eleven century stepwell situated in Gujarat and it was internationally recognized as a world heritage site in 2014.

So, it was basically acknowledged as an exceptional example of technological development that too in the ancient in ages which utilizes groundwater resources and a unique water management system which illustrates the exceptional capacity to break large space into various smaller volumes following ideal aesthetic proportions. So, it is aesthetically very good as well as it satisfies its purpose for the water overall water resources management ok, where in the because it is a it is a structure such that it can tap the groundwater like any well dug well kind of system. So, it can trap groundwater it can basically retain the rainwater for over a large period of time.

So, the flow of the groundwater is in both ways it can be at the times of rainfall or high rain events it can be utilized as a recharged structure or at times of draught; it can be utilized as a resource from which the groundwater can be withdrawn. So, these are some of the examples for the water structure and water engineering from the ancient periods.

So, we will end this session here. And, in next session we are going to talk the further water governance and management practices some of the water governance and management practices in the India this pre and post independence.

Thank you.