Chemical Process Utilities
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Lecture - 16
Water Governance

Hello friends, let us talk about water governance under chemical process utilities. If you recall, we have covered the treatment methodology of boiler water. We discussed the internal water treatment we discussed the external water treatment and the concept of deaeration. We discussed the entire concept in detail about the efficacy of all these water treatment protocols.

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In this lecture, we will discuss the various governing laws about water. We will discuss various tasks to be taken for water governance and the different challenges associated with water governance. We will discuss the hierarchical governance concept. We will also discuss cross curing and water governance in India.

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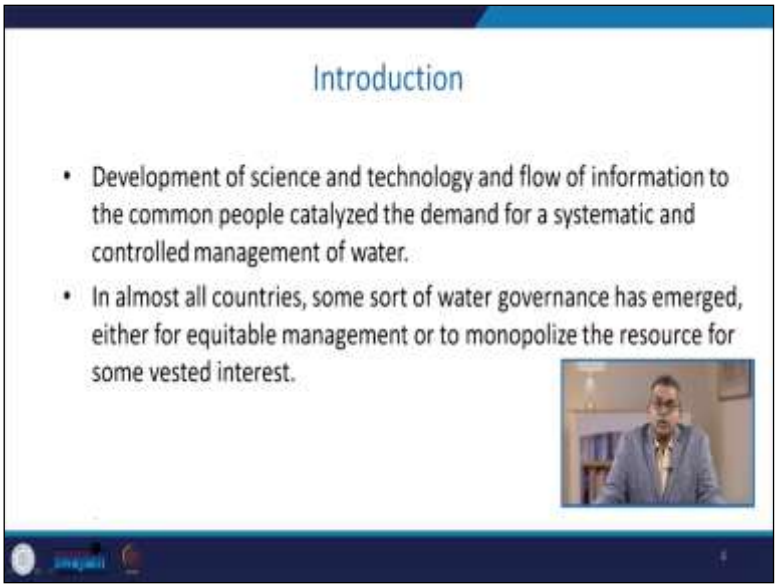

Now the development of science if you see that, and technology and especially in the flow of information to the common people, has catalyzed the demand for a systematic and controlled management of water because day by day the awareness about water conservation, water reuse, water balancing is growing day by day. And especially all parts of society are tutored by all these concepts.

Similarly, in almost all countries, some water governance has emerged either for equitable management or to monopolize the resources of some vested interest. Because see we discussed that every drop of water counts concerning the economy and the environment. Then there is some concept about water governance. Now efforts to develop a model for good water governance led to the realization that one universally applicable model that can cover all scenarios is not feasible.

Each country must formulate its water governance policy to ensure feasibility. Now let us talk about water governance usually. What is the concept of water governance? Water governance is defined as an administrative, political instrument tool to regulate the withdrawal, use, and disposal of water without causing any serious adverse effect on the ecosystem again to maintain a balance of interest among the system stakeholders.

Now you see that in India, there are several states where the boring of water is banned just to develop the ecosystem. Similarly, there are so many political issues of the distribution of water

from the river and canals. So, all these things indicate how important proper water government governance is and how many water commissions have been established in the Indian context.

So, therefore a water governance framework oversees how freshwater from a different source is exploited, managed, and cared for by the different users such as the manufacturing sector, agricultural sector society at large. So, we; must have a proper optimization among its uses among all different segments of society and day-to-day life. Now the water governance machinery prioritizes water allocation.

So, that essential sector they do not suffer from water uncertainty because the source of water is limited may be surface water may be groundwater. So, all these things are limited, and above all, the portable water supply is again very uncertain, and you can say depleting day by day. So, a water framework may be defined as a framework for protecting all waters, including rivers, lakes, different types of coastal waters, ground waters, and their dependent wildlife habitats, under one place of environmental legislation.

In India, the first draft of the water policy was released in 1972, which was modified several times and was later replaced by the national water framework act 19 2012, based on the national water policy 2012. The domain of water policy covers water management in river basin flood management. Water transport withdrawal uses water supply pollution, ecosystem management, and sanitation. So, all these aspects and perspective of water use has been covered in this particular domain of water policy.

Now, this also covers the government-level activities that may include the formulation and implementation of interrelated policy instruments for the management and development of the water resource system. It covers both directives like top-down and implementation at the bottom down activities. It includes the transfer development and implication of governance principles and water resource management and development policies.

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Now formulation of structures, what kind of different policies are needed for a different part of society? What kind of goal do we need to set up and provide funds for organizations? So many organizations deal with water management, water balancing reuse, recycling, and water conservation recharging things. So, how can they get funds? So, all these things are covered under this water policy.

Then the preparation of government policy in dealing with the international water policies research education and capacity building concerning water governance.

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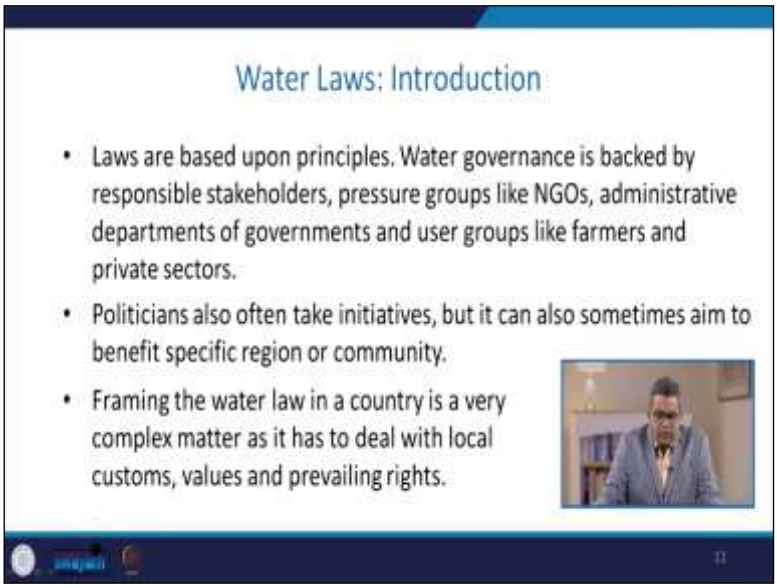

Now let us talk about the different water laws. Now, these are these laws. They are based on principles. Now water governance is backed by the responsible stakeholder's pressure groups like various NGO administrative departments of the government, and user groups like farmers and private sectors politicians also often take the initiative. Still, it can sometimes aim to benefit a specific reason and community.

There are different types of agitations being promoted by various parts of the societies and different states. They have non-harmonious relations just because of the water, and sometimes when learner scientists say that the fourth word or third worldwide will be based on the water supply. Now framing the water law in a country is a complex and tedious matter as it has to deal with the local customs values and prevailing rights.

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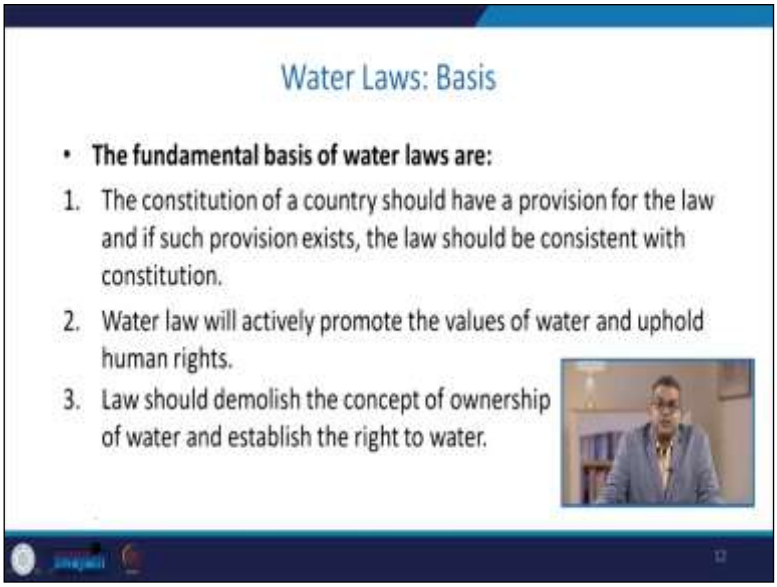

The fundamental basis of water laws is that a country's constitution should have a law provision. If such a provision exists, the law should be consistent with the constitution. Water law will actively promote the values of water and uphold human rights because it is fundamental. You can say the right to have a portable or good quality. Water law should demolish the concept of ownership of water and establish the water right.

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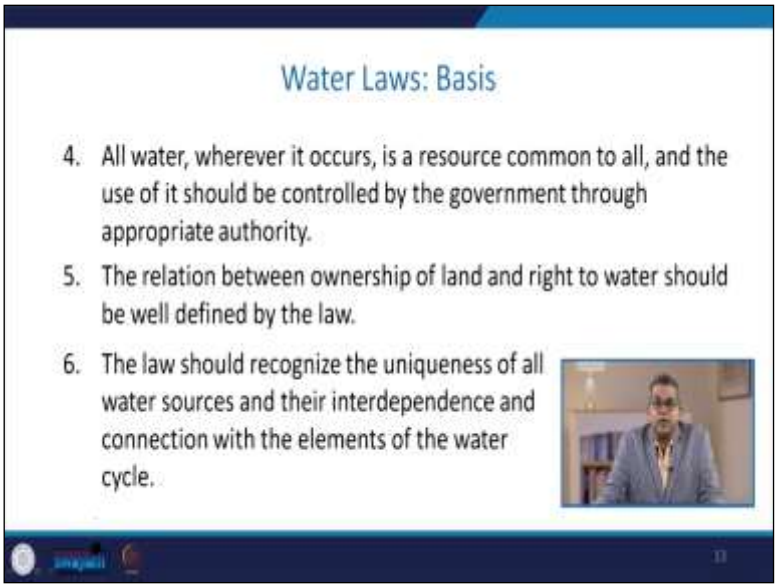

And all water, wherever it occurs, is a resource common to all, and the government should control its use through appropriate authority. The law should define the relationship between land ownership and water rights. The law should recognize the uniqueness of all water sources and their interdependence and connection with the water cycle elements.

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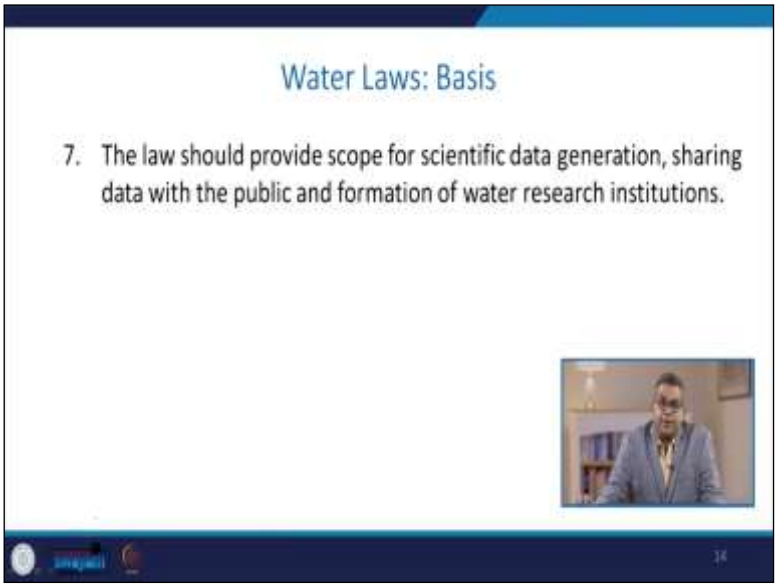

And the law should provide a scope of scientific data generation, sharing of data with the public, and formation of water research institutions.

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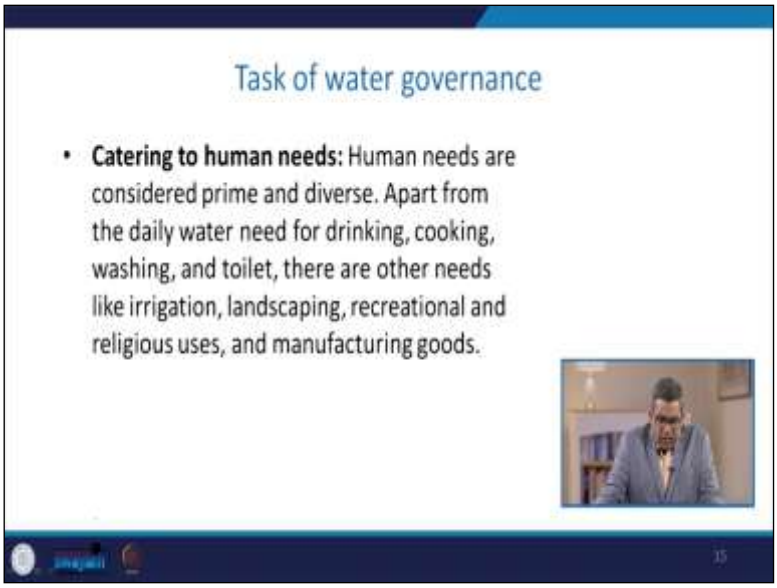

Now let us talk about the task of water governance. The first task is catering to human needs because without water, and no civilization can survive. So, human needs are considered prime and diverse. Apart from the daily water needed for drinking, cooking, and daily needs, there are other needs like irrigation, landscaping, recreational, and religious regions. Apart from this, we cannot overlook the importance of the manufacturing aspect or a manufacturing sector where we need to manufacture different goods.

To cater to all these needs, people have to regulate certain things like the flow of water by the quantity and direction in different streams, water reserves in aquifer and surface water bodies, and the amount of flow. Finally, required for the environmental regulation of groundwater withdrawal is a major component of water governance in many countries.

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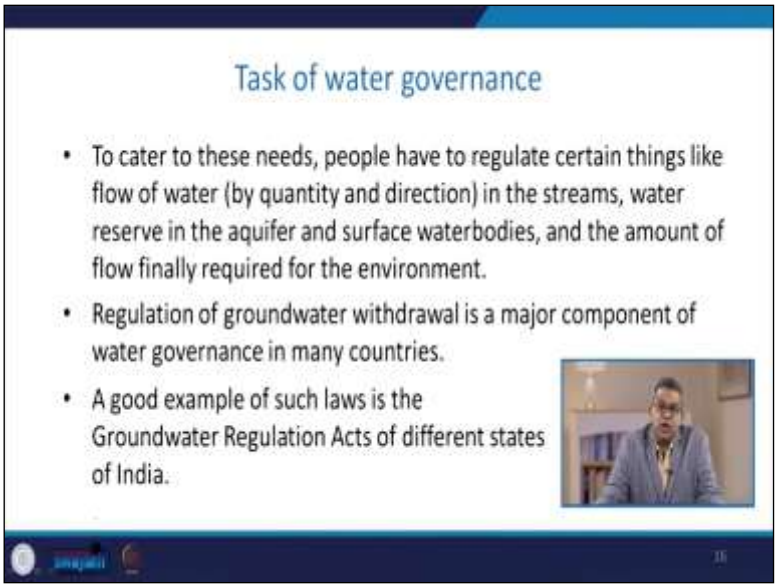

A good example of such a law is the groundwater regulation act of different states in India. N

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The second task is to maintain the water quality because 97% of the earth's area is submerged with seawater, but you cannot use it. So, because of the water quality and you are having the river water and after the use, you cannot discharge it as such because of the quality aspect. So, regulation is required to maintain water quality. So, discharges from the industries and irrigation overflow do not contaminate surface water bodies, groundwater, stream, or the maritime marine environment.

Many countries have developed pollution control acts and laws to protect effluent water quality. Like the united states, the environmental protection agency is a very good example of institutional governance on water quality in the United States of America.

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The third task is regulating changes in the land use industry and agriculture play a crucial role in the distribution of water quality water. Now regulation is required in this sector to avoid contamination and conflict. Land use boards, urban development authorities, municipal authorities, and land development boards are formed in m any countries. Who often act as a regulatory body for water resources in the urban context or work collaterally with other regulatory bodies.

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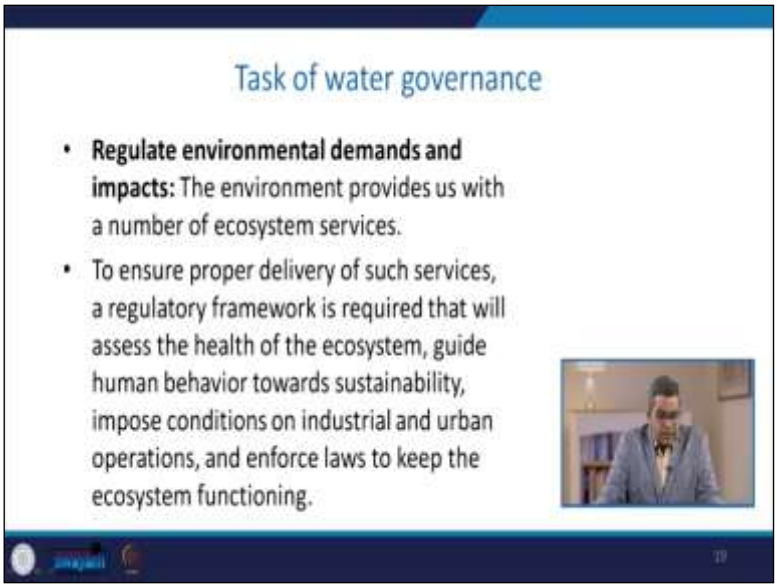

Another task that is number four is to regulate the; environmental demand and impacts because when we talk about the manufacturing sector. There are many aspects related to efficient water that may contaminate the environment or ecosystem. So, the environment provides us with several ecosystem services. To ensure the proper delivery of such services, a regulatory framework is required. That will assess the ecosystem's health and guide human behavior toward sustainability, impose a condition on the industrial and urban operations and enforce the law to keep the ecosystem functioning.

There are several acts in many countries like wetland protection acts, coastal zone regulation acts, and so on that look after the ecosystem functions.

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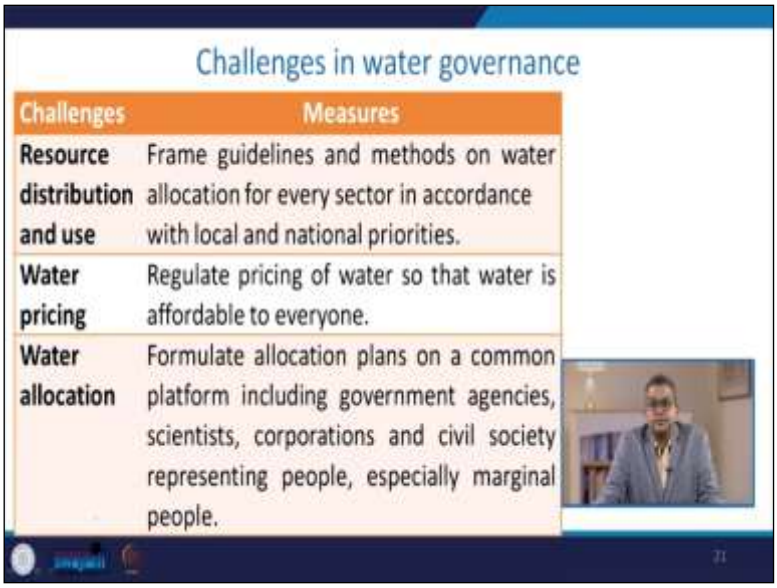

Now, when you talk about the challenges in water governance, there are various challenges attributed to resource distribution and use. Now the measures are to frame the guidelines and methods on water allocation for every sector according to local and national priorities. Then water pricing as far as the industrial aspect is in question. We have already discussed that we need a certain quantity and quality of water and for this, we need to go for water conditioning.

Similarly, if we take the water from either surface water or groundwater to extract the water, we need to pay for certain things. Therefore the measure is to regulate the pricing of water. So, that water is affordable to everyone. Then water allocation the measure is to formulate allocation plans on a common platform, including government, government agencies, scientists, various kinds of corporations, and civil societies representing the people, especially the marginal people.

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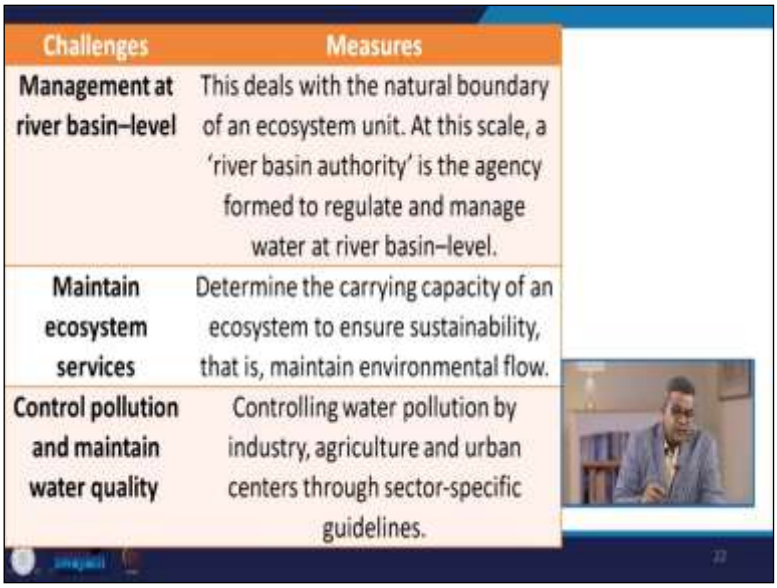

Another challenge is attributed to the management at the river basin level. This particular aspect deals with the natural boundary of an ecosystem unit. At this scale, a river basin authority is an agency formed to regulate and manage water at the river basin level. Then you have to maintain the ecosystem services. The major aspect of this particular thing is that to determine the carrying capacity of an ecosystem to ensure sustainability and maintain environmental flow.

Then after the use, we need to control the pollution and maintain the water quality. Controlling water pollution by industry, agriculture and urban centers through sector-specific guidelines is an important measure for this task.

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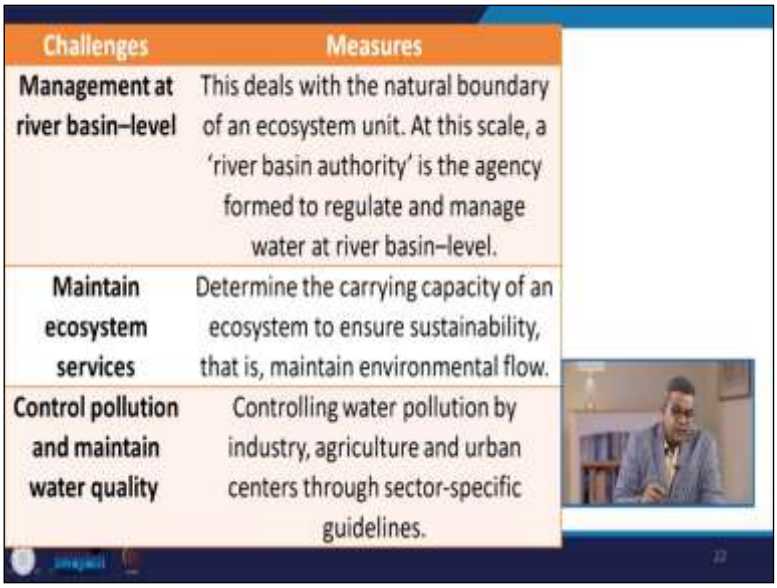

Then we need another challenge attributed to land use management which means regulating land use changes due to urbanization and neocolonial activities to ensure balanced sharing of fresh water resources, which is very important. Then, managing public and stakeholders' demands and aspirations because day by day, as per the population increase and their expectations and hike, we need to see the stakeholders' demands and aspirations.

Then the basic measure is to motivate and educate the public and stakeholders and engage them in resource assessment and monitoring to optimize their usage and aspiration. Then behavioral changes that impact the use of water recover the cost of water from the users and motivate them to pay for water.

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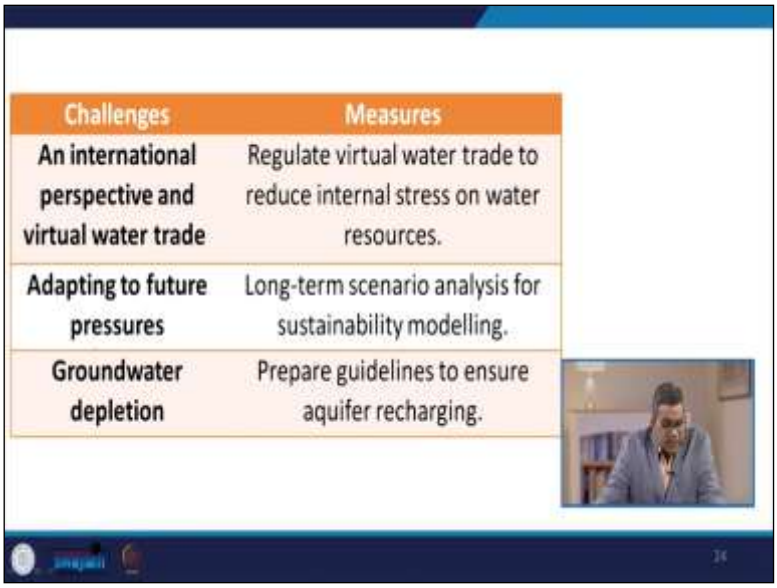

Another challenge is the international perspective and virtual water trade. This way, the measure regulates the virtual water trade to reduce the internal stress on water resources. Another challenge is attributed to the adoption of future pressure. The long-term scenario analysis for the sustainability of modeling is the major task of this particular approach. Then as we are extracting water from the groundwater, the groundwater level goes down, which is attributed to the head of the groundwater depletion.

So, one must prepare a proper guideline to ensure the aquifer for recharging. We always talk about the rain water recharging etc. That is one of the aspects that we are worried about this groundwater depletion.

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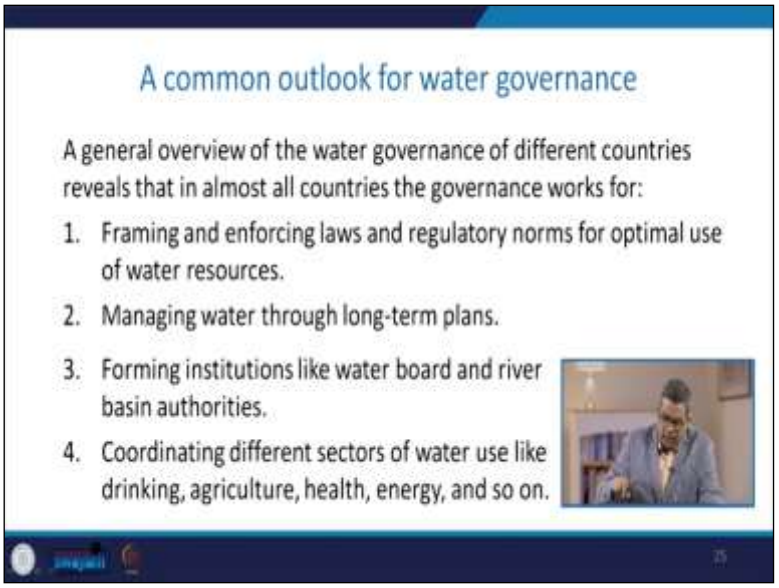

Now let us talk about the common outlook for water governance. A general overview of the water governance for different countries reveals that in almost all countries, the governance work for framing and enforcing laws and regulatory norms for optimal use of water resources because the water resources are depleting day by day. Then managing water through long-term plant farming institutions like water boards and river basin authorities is very common. If you see the Indian context, we have various water commissions, water boats, and river basin authorities. They were then coordinating different sectors of water use like drinking, agriculture, health, energy, etc.

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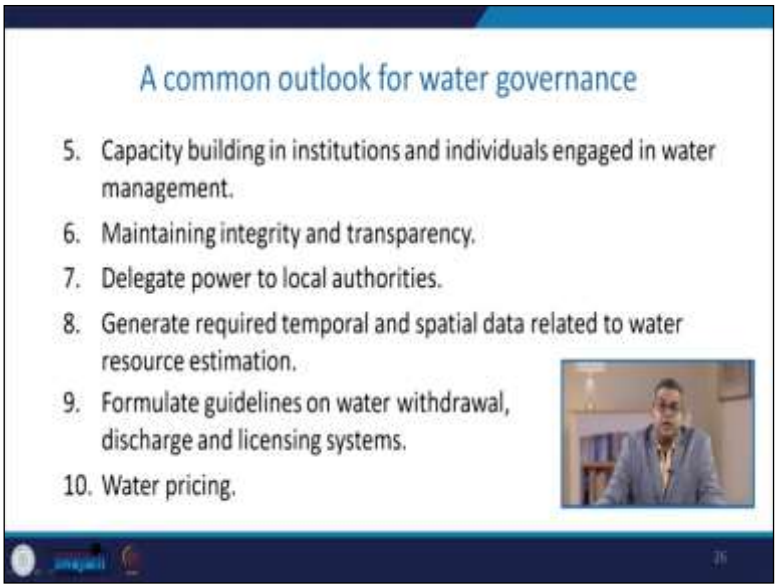

Then the capacity building in the institutions and individuals engaged in water management. Then one must maintain integrity and transparency among the water governance aspect. One must delegate power to the local authorities, which is under the edges of water governance. Then generate required temporal and spatial data related to water resource estimation, formulate guidelines on water withdrawal and discharge, and, if required, then license the system and fix the water pricing.

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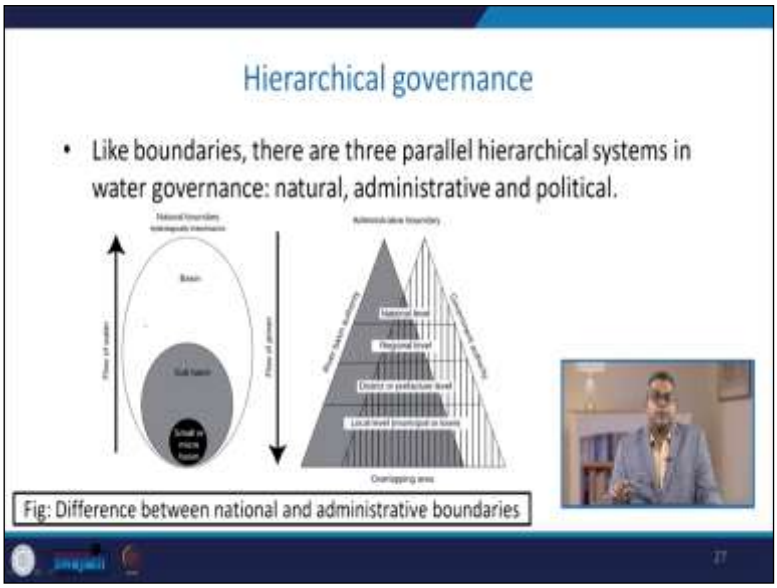

Let us talk about hierarchical governance like boundaries. There are three parallel hierarchical systems in water governance natural administrative, and political. Now here you see that this is everything like the flow of water and small or micro basin sub-basin and basin. So, a natural boundary is dependent on the hydrologically linked basin. Now here you see that river basin authorities are covered with different aspects like national, regional, district, and local levels and governmental and administrative authorities. So, this is the difference between the national and administrative boundaries.

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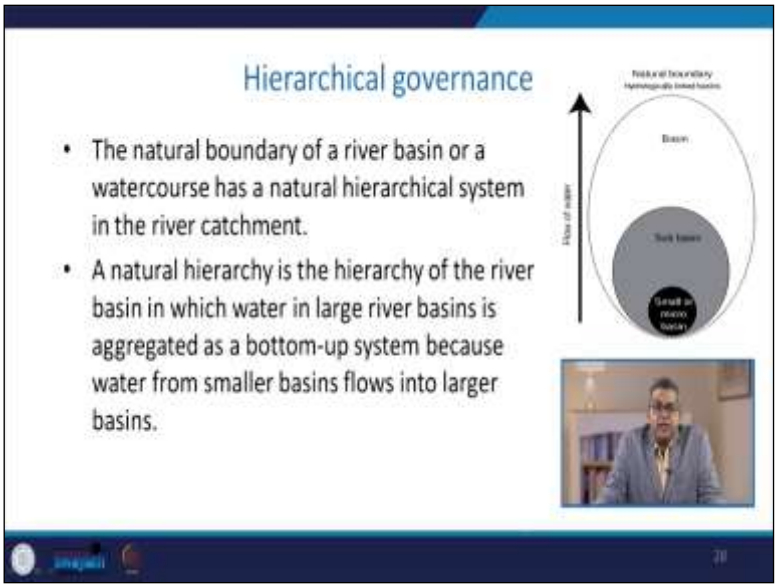

The natural boundary of a river basin or a watercourse has a natural hierarchical system in the river catchment. A natural hierarchy is the hierarchy of the river basin in which water in a large river basin is aggregated as a bottom-up system because water from smaller basins flows into a larger basin.

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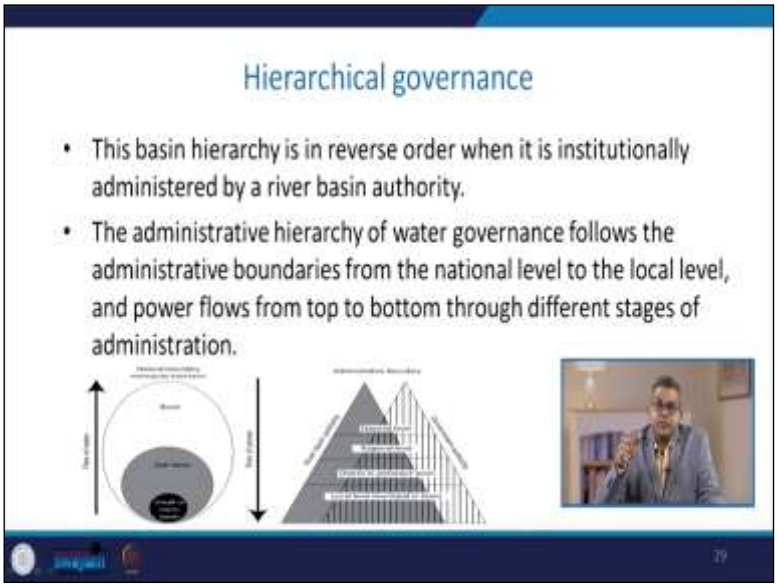

This basin hierarchy is in reverse order when a river basin authority institutionally administers it. The administrative hierarchy of water governance follows the administrative boundaries from the national level to the local level, and power flows from top to bottom through different administration stages.

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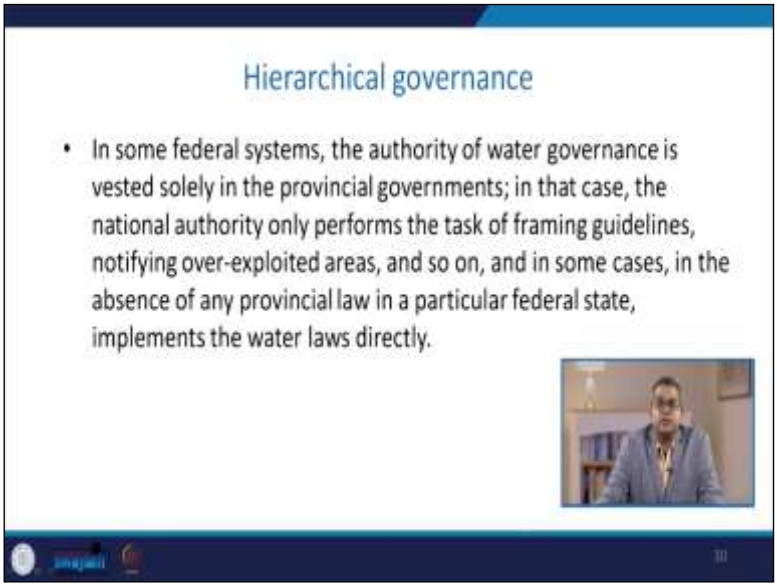
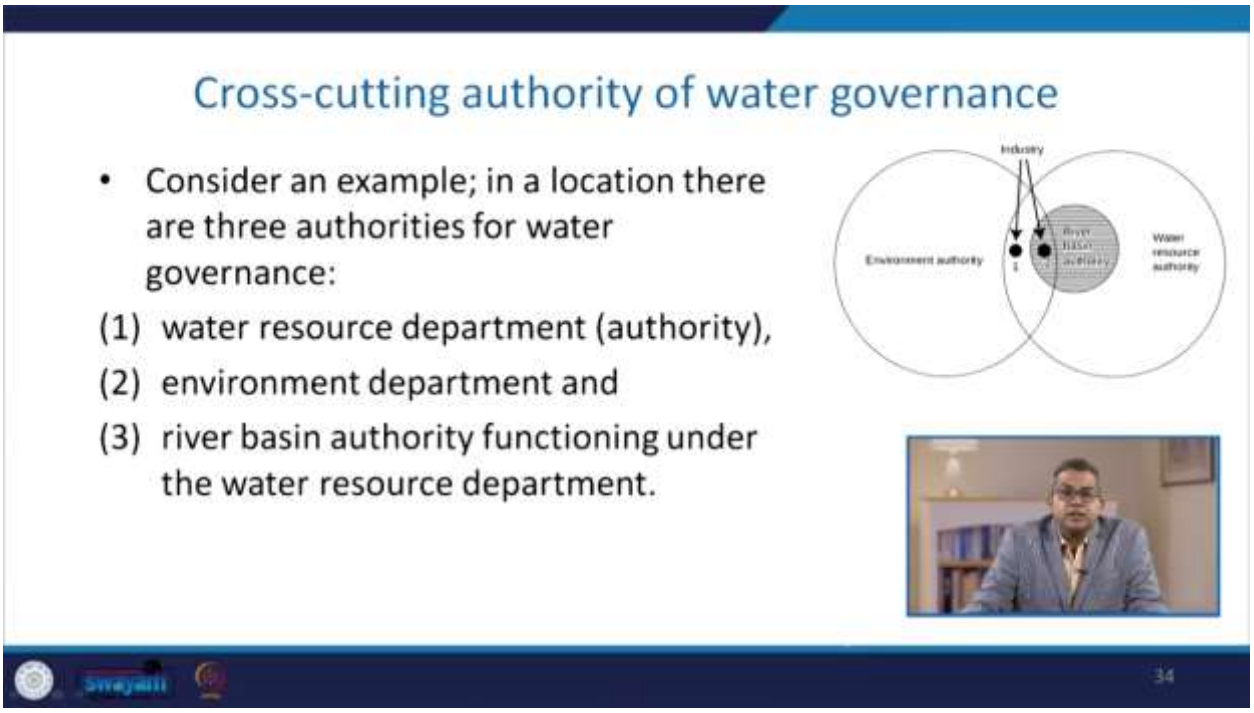


Now in some central systems, the authority of water governance is vested solely in the promotional government. In that case, the national authority only performs the task of framing guidelines notifying over-exploited areas, and so on. And in some cases, the absence of any provincial law or state law in a particular central state implements the water law directly.

For example, in the Indian context, there is a national groundwater authority and state groundwater authorities in 11 out of 28 states so far. National authority functions in those states where state law is not present. Power-sharing by political parties in water resource governance exists in rare instances, like in the People's Republic of China, where the political authority shares power with administrative counterparts.

Now there are cross-cutting authorities of water governance. So, in any country, government departments and agencies' local authorities are structured so that the mandate and the issues are balanced. But water being everybody's business, several departments may claim authority over a water resource. For example, the state groundwater board is empowered to issue the permit for groundwater withdrawal but if the site is located on a large river basin for which a separate authority exists the second authority will also have its own mandate to act on that particular issue.

The environment department also has its role to play in such cases coordinated action is required to resolve the horizontal cross cutting issues.



Now for example in location there are three authorities of water governance water resource department that is an authority environmental department river basin authority functioning under the water resource department. So, these may be be existing and you may see that in case if any industry lies in between. Then it needs to address all these things maybe the river basin authority or environment authority etc.

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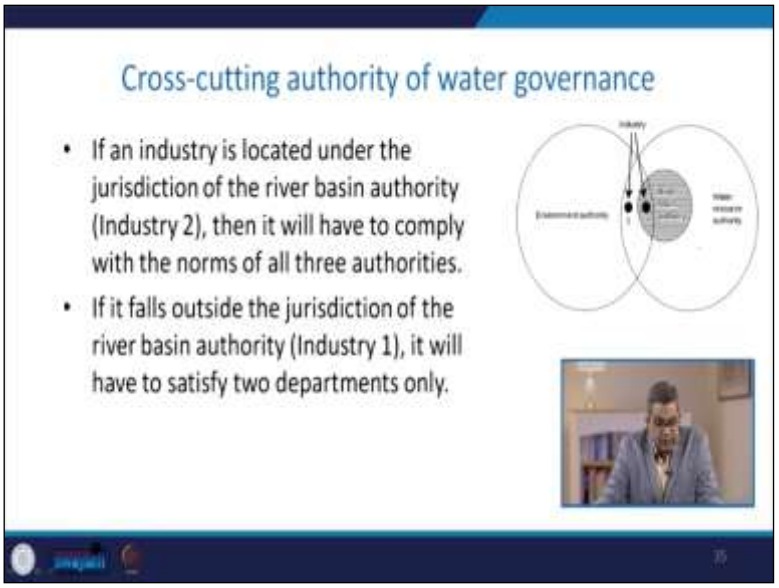

So, if the industry is located under the jurisdiction of river basin authority. Then it will have to comply with the norms of all three authorities. So, you need to look the overlapped zone. Now if it falls outside the jurisdiction of the river basin authority that means this particular industry it will have to satisfy the two departments only.

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So, in the event that there are local authorities like industrial development boards land reform department and urban development authorities industry will have to follow their norms as well as. Now let us talk about the water governance in India.

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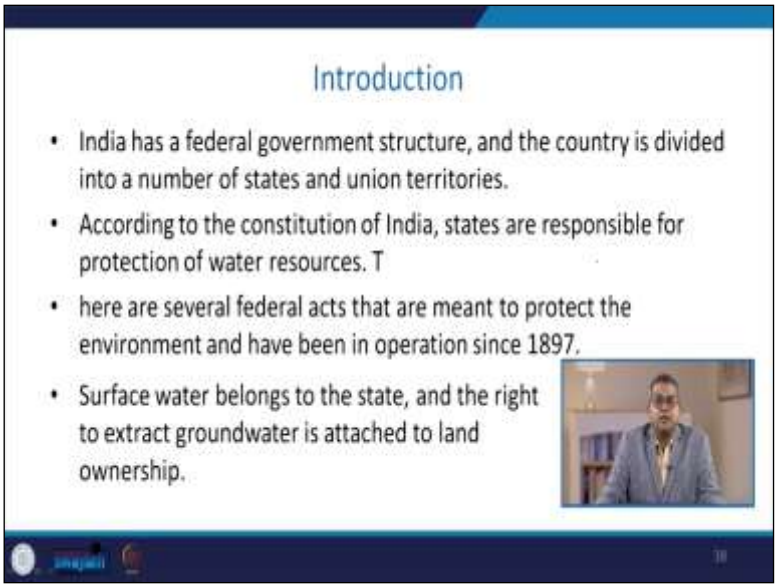

Now India is has a central government structure and the country is divided into number of states and union territories. According to the constitution of India the estates are responsible for the protection of water resources. Now there are several federal acts that are meant to protect the environment and have been operational since 1897. Now surface water belongs to state and the right to extract the groundwater is attached to the land of ownership.

And sometimes it is not even to the the land ownership because sometimes in some cities the government has planned to extract the groundwater.

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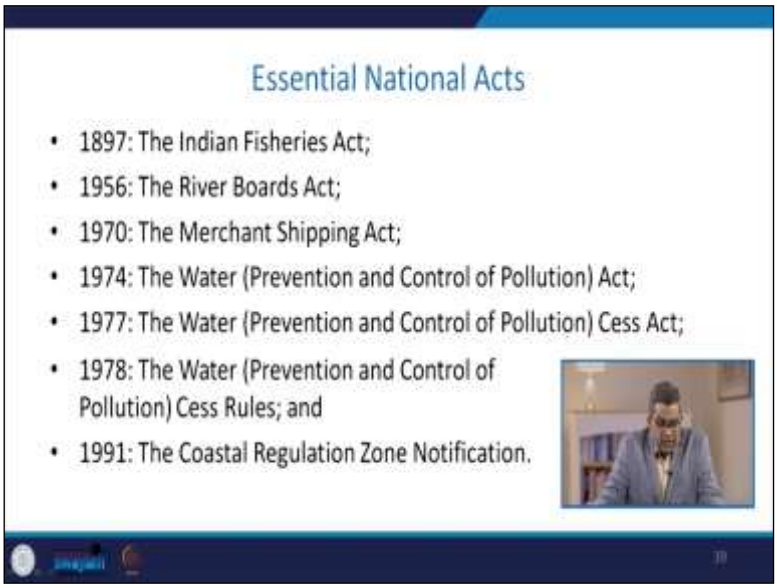

Now here you see that there are a chronological order of various essential national acts like in 1897 the Indian Fisheries Act was passed, in 1956 The River Board Act in 1970 The Merchant Shipping Act 1974 was dedicated to the Water Prevention And Control of Pollution Act, in 1977 the parliament has passed the water Prevention And Control of Pollution Assess Act, in 1978 the water Prevention And Control Of Pollution Says Rules and in 1991 The Coastal Regulation Zone Notification.

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Now there are various ministries those who are administering this these water law one is the environment ministry or ministry of environment this deals with the water pollution and water based ecology. Now there is a central pollution control board under this ministry and in every state there are state level pollution control boards. Then ministry of water resource rural development and Ganga regeneration.

Now this ministry deals with all other aspects of surface and groundwater including water relocation and guidelines on water.

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Now there are various licensing authorities in India and they are administering river boots and we are having in Indian context various research and development institutions. Like licensing authorities the central water commission and central groundwater board there are various reward boards like Upper Yamuna River Board, Bhadra Board, Brahmaputra Board between reward board, Bansagar Control Board, Sardar Sarovar Construction Advisory Committee etc.

Then R and D institutions like national Water Development Agency, National Institute of Hydrology Central Water qnd Power Research Station Central Soil and Material Research Station. So, these institutions they are created for the water governance.

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Now apart from this in various states there are so many state departments attributed for the water governance and most of the states in India have state departments dealing with the water. Water governance is generally interested to the state department of environment and forest state ground water, water resource department and state irrigation department. Now these state departments are headed by the ministers and each department has the power to frame regulatory laws. Now water laws of any states are derived from the problem specific to the state only ah.

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Now there are various licensing authorities at the state level like state irrigation department state groundwater board state groundwater authorities state pollution control boards.

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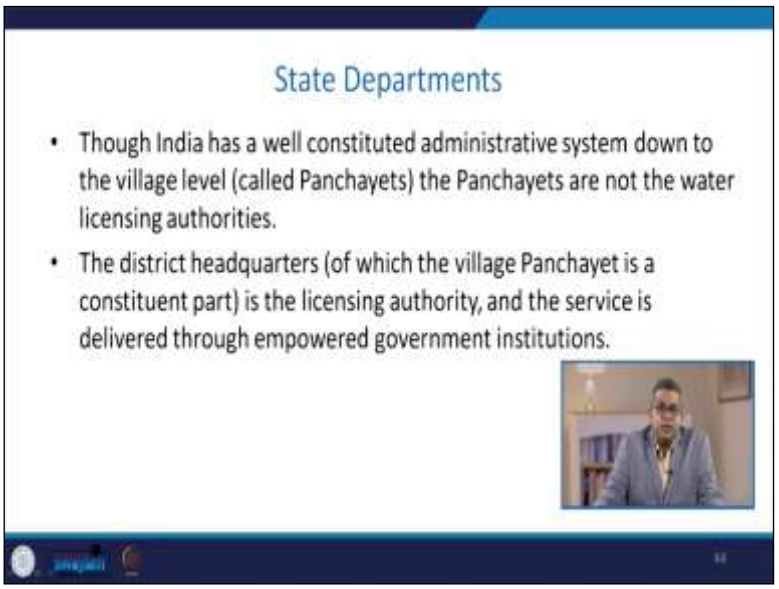

Now though India has a well constituted administrative system down to the village level that is called Panchayat and Panchayats are not the water licensing authority. The district headquarter of which the village Panchayat is the constituent part is the supposed to be the licensing authority and the service is delivered through the empowered government institutions.

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Municipalities of some cities also regulate water abstraction and water discharge into environment in some metropolitan cities in India after propagation of state laws municipal control over water is restricted to protection of urban wetlands sewage discharge and industrial effluent discharge.

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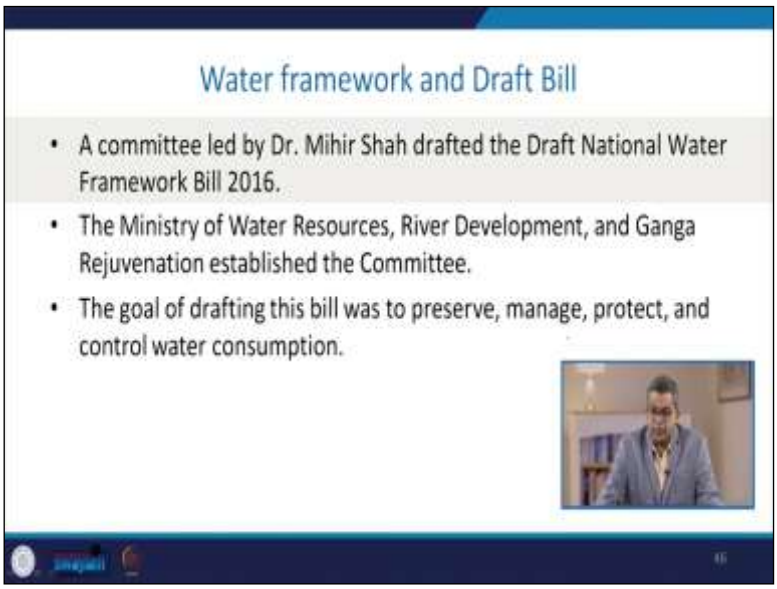

Now let us talk about the water framework and draft bills a committee led by Dr Mihir Shah drafted The National Water Framework Bill 2016. The ministry of water resource river development and Ganga regeneration established by the committee the goal of drafting this bill was to preserve manage protect and control water consumption.

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Now when we talk about this water framework there are various features of draft national water bill that is right to water for life. Now every person has a right to a sufficient quantity of safe water

every drinking water agency must comply with the manual of the public health and environmental engineering organization.

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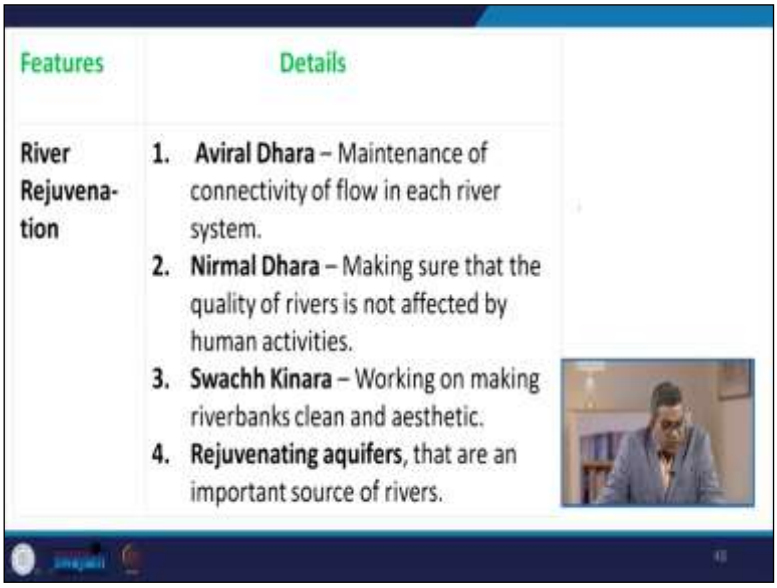

When we talk about the river rejuvenation then it must have a concept of Aviral Dhara maintenance of connectivity of flow in each river system. Then Nirmal Dhara making sure that the quality of river is not affected by the human activities then Swatch Kinara that is working on making riverbank clean and aesthetic then regenerating aquifers there are an important source of river.

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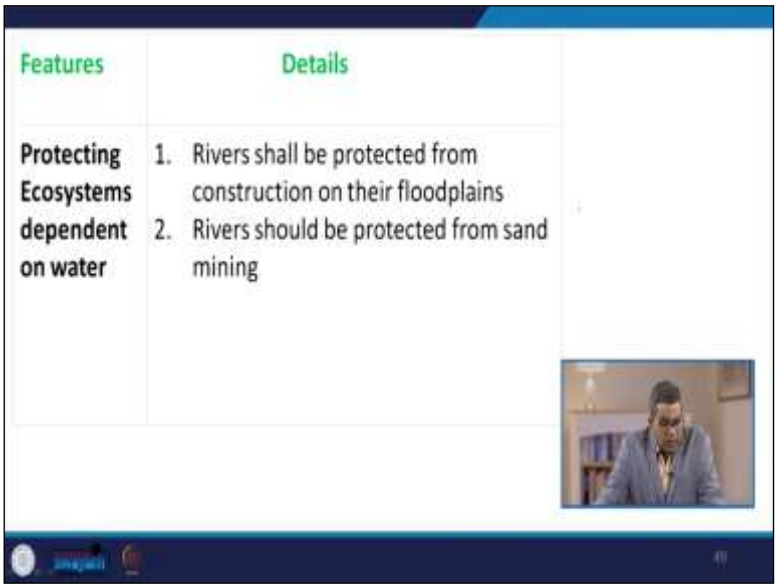

Then one another important feature is the protecting ecosystem dependent on water. Now it the river shall be protected from the construction on their flood plains. River should be protected from sand mining.

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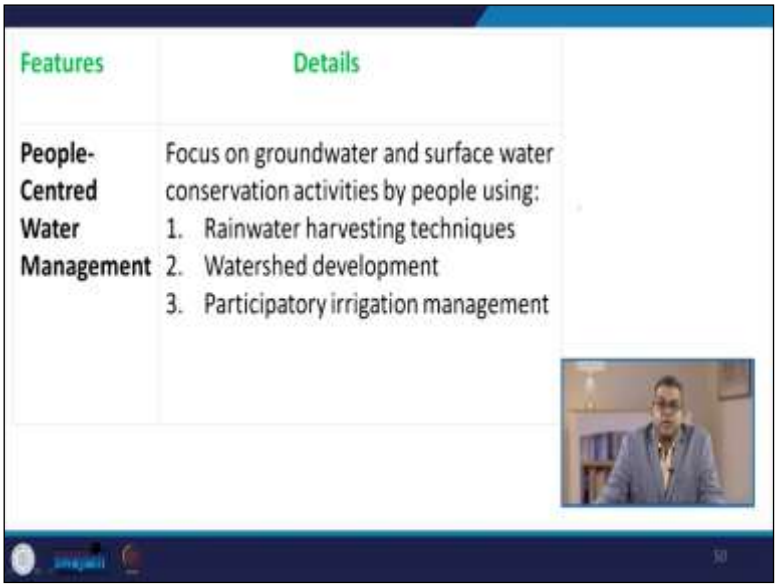

Then people-centered water management is another feature of this particular bill. The concept is to focus on people's groundwater and surface water conservation activities using rainwater harvesting technique then watershed development and participatory irrigation management.

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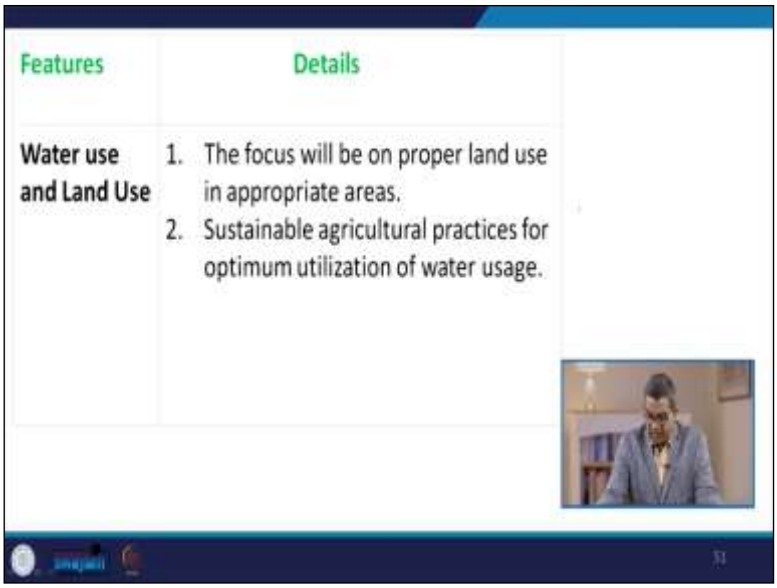

Another feature is that water use and land use. The focus is on the proper land use in appropriate areas sustainable agricultural practices for optimum water use utilization.

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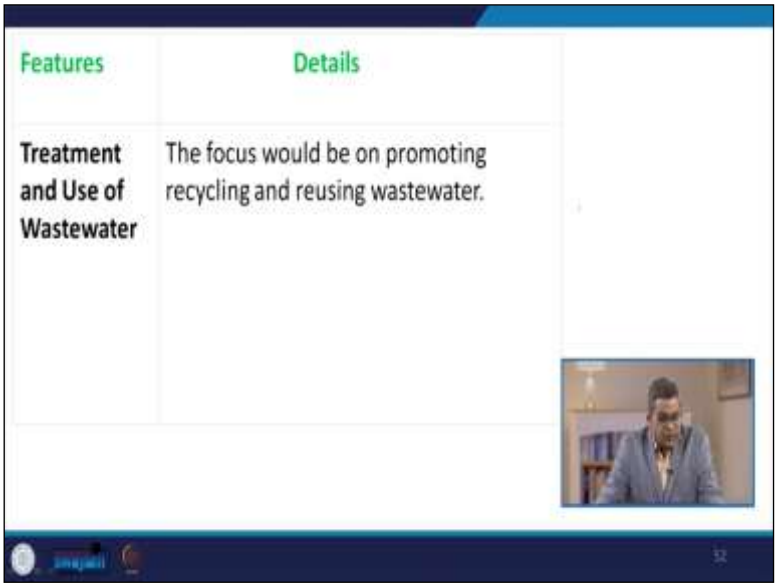

The treatment and use of wastewater is another feature of this particular bill. Now the main objective of this is to promote the recycling and reuse of wastewater.

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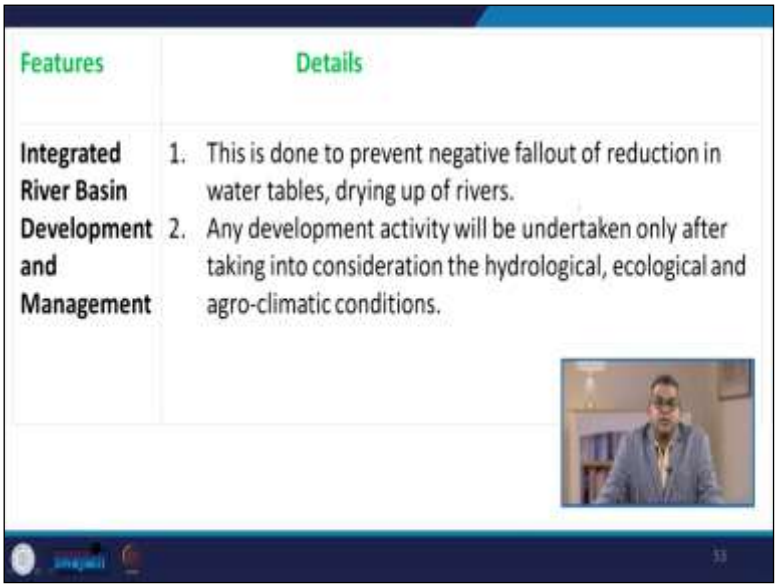

It then integrated river-based development and management. This is done to prevent the negative fallout of reduction in water table drying up of rivers. Now any development activity will be undertaken only after considering the hydrological, ecological, and agroclimatic conditions.

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The central government shall establish the river basin authority for every interstate river and valley. The river basin authority will work on land use's social and economic development in rural urban development.

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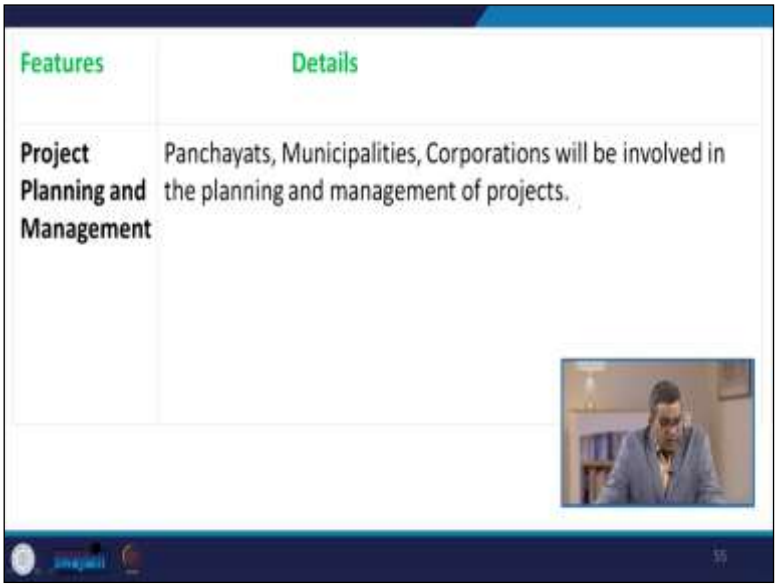

Then another feature is project planning and management. The basic concept is to involve the Panchayat, municipalities, corporations they must involve in the planning and management of the projects. Then another feature is that planning for water security, the water security plan should be prepared to ensure water security at all times, even during emergencies like drought and floods.

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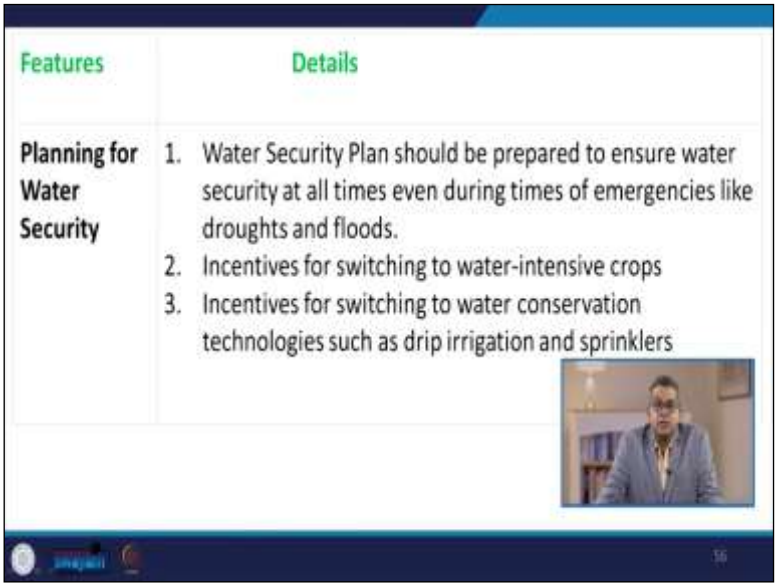

The incentive for switching to water-intensive crops is for switching to the water conservation technologies such as drip irrigation and sprinklers.

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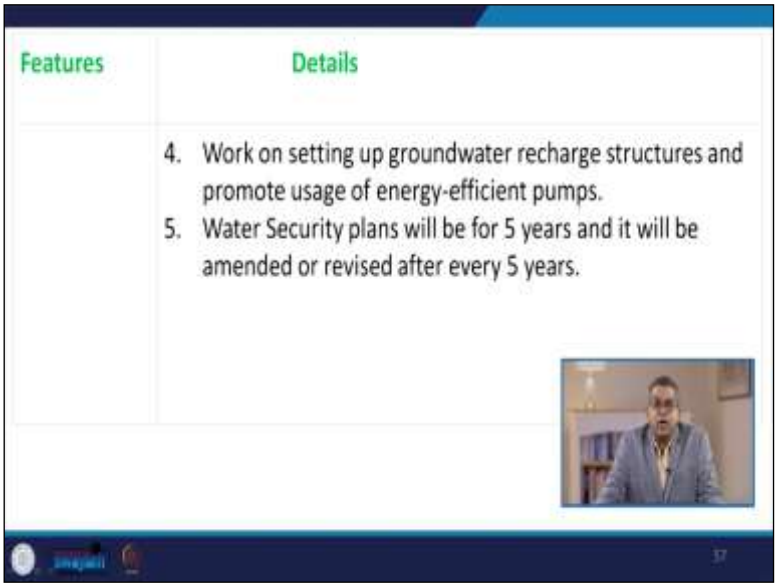

Work on setting up groundwater recharge structure and promoting energy-efficient pumps' uses. A water security plan applicable for five years should be amended or revised every five years.

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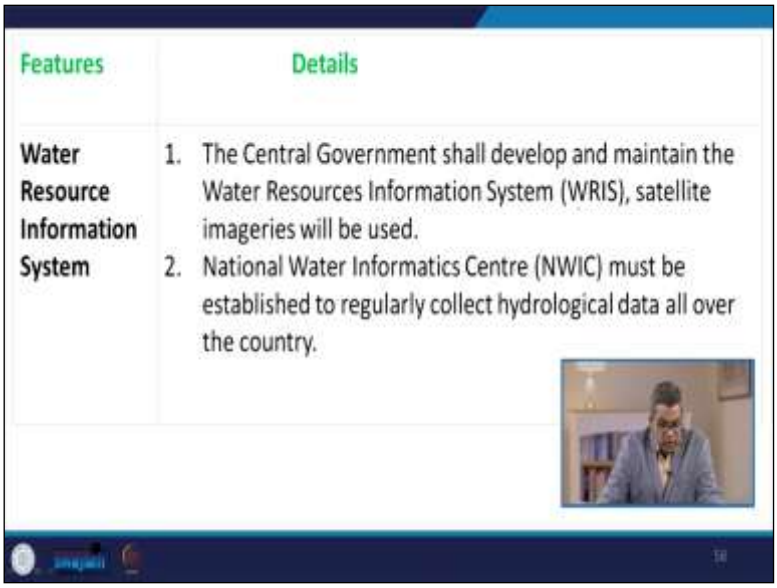

Then water resource information system the central government shall develop, maintain and maintain a water resource information system satellite imagery will be used. The National Water Informatics Center must be established to regulate regularly control the hydrological data all over the country.

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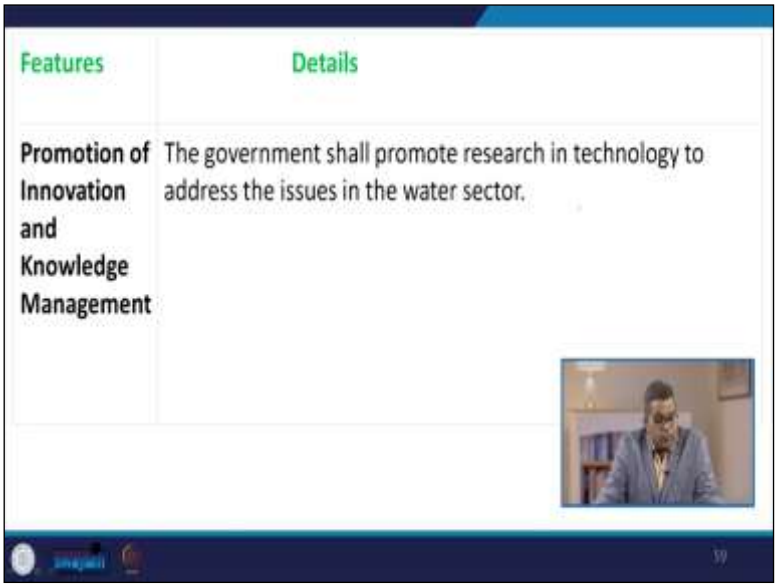

Then the promotion of innovation and knowledge management, the government shall promote the research and technology to address the issues in the water sector. There may be certain water conflicts among the various states.

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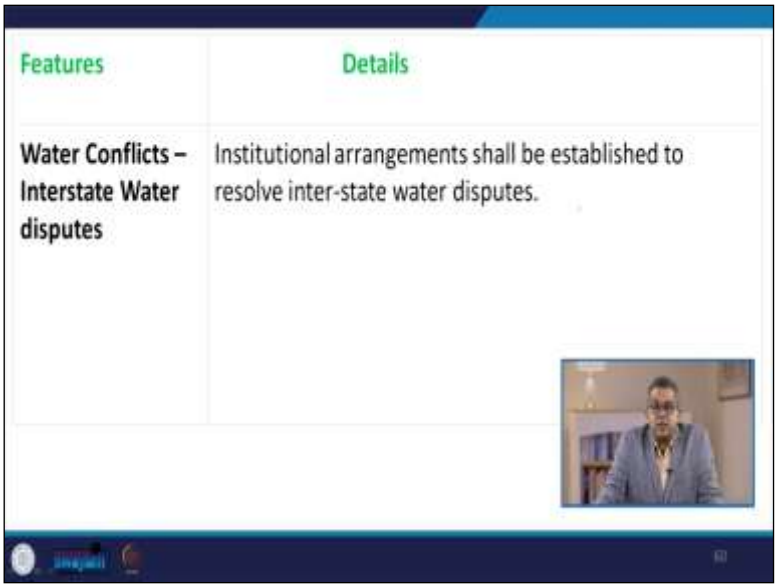

So, the institutional arrangement should establish water conflicts interstate water disputes to resolve various kinds of interstate water disputes. Then industrial water under the draft bill. Now this bill for the industry-specific water rights is categorically outlined with the struck structure that industry are to take concrete steps to reduce the water for prints. All industries using a large volume of water must disclose their water footprint.

And include in their annual report information such as water utilization per unit of production, efficient discharge details, rainwater harvesting, water reuse detail, and freshwater consumption. In water-short areas, industries can withdraw water to the extent of makeup water requirement only.

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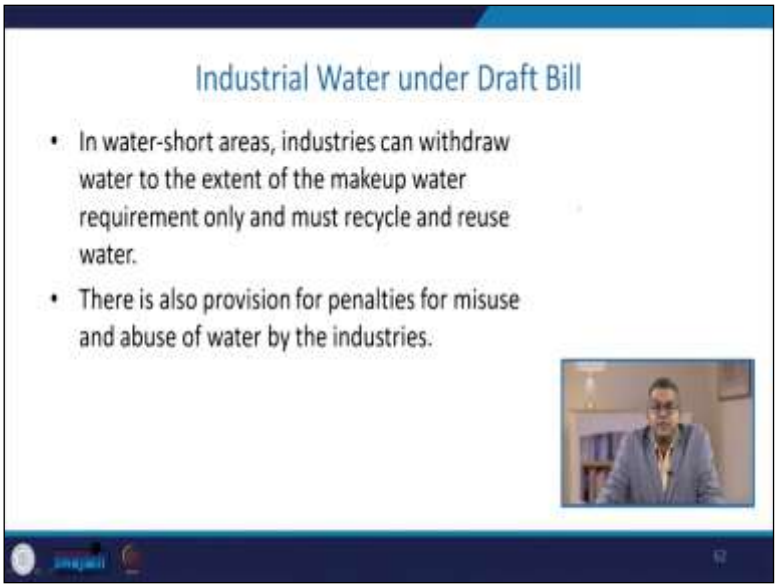

And must recycle and reuse water which is called water balancing. There is also provision for penalties for misuse and abuse of water by the industries. At last, in this particular chapter, we discussed the various governance of water. We discussed the various concepts of laws, different types of regulatory structures, etc.

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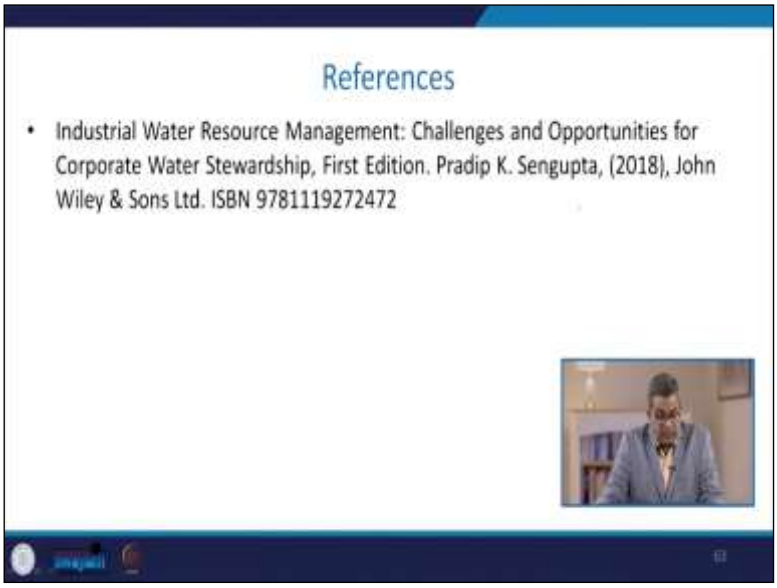

For your difference, we have included one reference for further reading. Thank you very much.