MODULE 4 – THE STORY OF WATER

OBJECTIVES

At the end of this session the students will learn about:

1. Use and over utilization of water
2. Water cycle in nature
3. Different uses of water
4. Various natural sources of water
5. Over utilization of surface and ground water
6. Water hazards like Floods and Drought
7. Disputes between different countries and different states on distribution of water
8. Dams- Their benefits and problems

SUMMARY

Water is considered as liquid of life. With advance in civilization and science and technology water is being used in multifarious ways. River Valley Civilization is the oldest civilization of the world. With advancement, expenditure of potable water per person has increased. The objective of this film is to acquaint the viewers about the problems like floods, drought and construction of dams. There is shortage of portable water and drinking water has become a salable commodity in states like M.P. The time has come when we have to save everyday of water and learn about the conservation of water. It is presumed that if there in 3rd World War, it shall be for distribution of water only.

This program deals with Use and over utilization of surface and ground water, floods, droughts, conflicts over water, Dams - benefits and problems.

TRANSCRIPTION

USE AND OVER UTILIZATION OF WATER –

Water is the most precious resource because it is considered as the liquid of life. Animal body has 50 to 80% water while plant body has 60 to 90% water. In several chemical reactions water is either a medium in itself or acts as a catalyst. Water is also necessary to maintain the fertility of the soil. It is believed that 2/3rd part of the earth is water but potable water is only 3% which can be used for drinking, cooking, bathing, washing clothes, hydroelectricity generation, irrigation and industrial purposes. Water flowing in the stream and rivers is 0.0001% that means 1 bucket in 10,000 buckets. Fresh water lakes contain 0.009% of total water. Groundwater up to the depth 150mts accounts for only 0.625%. Water found in frozen state on the poles and mountains and which cannot be used directly accounts for 2.15%. The map shows that Andhra Pradesh and Tamilnadu have the least quantity of usable groundwater. Since potable water is scarce, different water resources should be exploited with caution.

WATER CYCLE –

The oceans are the main sources of water. The volume of water in ocean is about 12700 lac cubic kilometers. In the presence of sunlight, water evaporates in the form of vapor. The evaporation occurs in rivers, lakes, ponds, streams, and swampy areas. Plants also transpire water in the form of vapor.

Water vapor forms clouds and ultimately, there is rainfall due to which water is returned to the soil, rivers and the oceans. Some water is found in frozen state on the poles and mountains in the form of glaciers. Glaciers melt and become a part of rivers. Thus, water evaporated from rivers and oceans is returned back. This is called the water cycle.

VARIOUS USES OF WATER

1. Domestic purposes and urban management: - Water is necessary for drinking, bathing, washing, gardening and animal husbandry needs. On an average 170 liters of potable water is necessary per person per day. As regards drinking water, it is 3 liters per day per person. Potable water should be colorless, odorless and transparent. In Indore a city of Madhya Pradesh potable water is brought from Mandleshwar through 75 kms. Long pipeline.

   In the state of California in U.S.A., potable water comes to the famous city of Los Angeles, from the distant mountains of Sierra Nevada through a 416 kms. Long pipeline. The Kalgoorie desert of Australia is connected with 560 kms. long pipeline for transporting potable water.

   River Valley Civilization flourished in the ancient world. Even today major cities of the world are situated along river banks:-

   1. Kanpur and Varanasi are situated along the banks of river Ganga.
   2. Agra and Delhi are situated along the banks of river Yamuna.
   3. London is situated along the banks of Thames River.
   4. Stalingrad is situated along the banks of Volga river

2. Industrial water supply: - Cement factories, textile industries, chemical industries, paper pulp industry and leather tanning industries need plenty of soft water. Hard water containing salts of calcium and magnesium is of no use because it spoils the machines and also corrodes the pipeline.

   Manchester is well known in the world for textile industry, but underground water being hard the washing & printing processes are carried out at Maine where soft water is available.

3. Agriculture: - Agriculture is the oldest occupation of the world. Most of the world's population lives in East Asia and South Asia where agriculture is the most common profession of the people. River water, rain water and water from dams is used for agriculture. It is believed that irrigation was started in India. Irrigation canals are dug out from rivers and dams. In South India ponds and lakes are the

source of irrigation. Rice, wheat, cotton, sugarcane, pulses and oil seed crops are grown on rain fed as well as irrigated fields.

4. Navigation and shipping: - Heavy articles are transported by ships and steamers to different parts of the world.

5. Hydroelectricity: - Water from dams is allowed to fall on turbines and hydroelectricity is produced.

6. Minerals: - Sea water and Sambhar lake of Rajasthan are source of common salt. Pearls are also obtained from pearl oysters growing in water.

7. Mineral oil:- In the Gulf countries wells are dug in the sea to obtain mineral oil. In India, Bombay High and Ankleshwar in Gujrat are well known for mineral oil.

India uses 90% of its water for agriculture, 7% for industry and 3% for domestic use.

CLASSIFICATION OF WATER RESOURCES:

Water resources are classified as under:

WATER RESOURCES

Terrestrial

Marine

*Upper Ground

1. Rains
2. Sea
2. Rivers
3. Ponds
4. Lakes
5. Glaciers
6. Springs

* Underground

1. Wells
2. Hand Pumps & Tube wells

1. Ocean

QUANTITY OF WATER IN DIFFERENT SOURCES IS AS SHOWN:

S.No.	Source	Potable Water (cubic kms)
1.	Glaciers	240,00,000
2.	Lakes and Ponds	280,000
3.	Rivers and Waterfalls	1000
4.	Moisture in soil	85,000
5.	Underground Water	60,000
	TOTAL	2,44,26200

OVERUTILIZATION OF SURFACE AND GROUNDWATER

The problem of overutilization of potable water is no longer confined to a small territory or even a nation but has assumed gigantic proportions spanning the entire world. So much so that it is presumed that incase there is a 3rd world war, it will be for water. The reasons for scarcity of potable water are:

1) **Population explosion** – The population of India in 1981 was 68.5crores. In 2000 it rose to 100 crores and in 2010 its about 125 crores. Availability of potable water in 1951 was 5117cu.mt per person per year. In 2000 it has reduced to 1869 cu.mt. per person per year.
2) **Urbanization** – Villages are gradually getting vacated and cities are facing population pressure. The result is agricultural and forest land near cities is getting converted to residential areas.
3) **Water pollution** – Fertilizers and pesticides are the basic requirements of modern agriculture. During rains and irrigation plenty of them flow into nearby rivers and lakes causing pollution of potable water. Industrial effluents containing toxic substances like mercury, lead fluorides and arsenic flow into nearby water bodies resulting in pollution of potable water.
4) **Irregular rains** – Due to climatic changes the rains have become irregular and scanty.
5) **Deep tube wells** – Hand pumps and tube wells are dug to supply drinking water as well as water for industries and irrigation. The result is that underground water is getting exhausted and places like Sitamau (Mandsaur), Fanda (Bhopal), Depalpur (Indore), Badnagar (Ujjain), Susner (Shajapur), Manawar (Dhar)have almost no groundwater now.
6) **Life style** – Public pipelines at most of the places have no taps. Hence large quantity of water is wasted. Flush latrines also increase the consumption of water. Tub bath and coolers also consume plenty of water.
7) **Cheap rates of water** – Drinking water and water for irrigation are supplied at subsidized rates. This encourages the tendency to misuse water.

FLOODS

Flood is a natural hazard caused due to excessive rainfall or the meandering route of the river. During floods the rivers swell, burst their banks and flood waters spread to engulf fields, farms, houses and even railway lines.

Man is also responsible for encouraging floods due to the following reasons:

a. Felling trees along river banks
b. Soil erosion
c. Bursting dams
d. Deforestation in hilly areas
e. Construction of houses along river banks

3.5% area of the earth which supports 16.5% population is flood affected. In India the rivers Brahmaputra, Ganga, Kosi, Mahanadi and Narmada are well known for flood. In U.S.A. Mississippi and Missouri, in China Yangze and Yellow, in Myanmer (Burma) Iravadi, in Pakistan Sindhu river, in Nigeria Niger river, in Italy Po River are well known for causing floods.

In September 2008 Kosi river in Bihar changed its course. Thousands of people became homeless, railway lines were damaged at several places and thousands of animals died.
U.P., Bihar, West Bengal, Assam and Orrisa suffer badly every year due to floods.

CONTROL MEASURES FOR FLOODS

1. Plantations – Plantation along river banks should be encouraged because roots of trees act as soil binders and check soil erosion.
2. Construction of dams – Fast flowing rivers should be provided with dams, which should be looked after properly.
3. Construction of walls – Walls should be constructed along river banks to check excess flow of water.
4. Flood control centers – Flood control centers should be established in sensitive areas. In India, the following centers are working in this direction:
    a. Delhi – Yamuna river
    b. Varanasi – Ganga river
    c. Jalpaigudi – Teesta river
    d. Patna – Ganga river
    e. Bhuvaneshwar – Swarnarekha river
    f. Hyderabad – Godavari river
    g. Guwahati – Brahmaputra river
    h. Bharuch – Narmada river

These centers inform people in the respective area in advance so that they can move to safer places. Administration also remains alert.

DROUGHT

Drought is a major problem in India due to failure of one or more monsoons. Sometimes the failure is so acute that even drinking water becomes a problem. In 1990 potable water was supplied to Dewas in Madhya Pradesh by trains. Droughts effect homes, agriculture and industry. Drought prone areas are faced with irregular periods of famine. Government of Madhya Pradesh and other states start drought relief programs in which people are given wages in bad years to build roads, minute irrigation works and plantations.

According to Indian Meteorological Department a state or area is considered as draught hit if the rainfall is 75% less than the average. Drought is a natural hazard but several human activities are also involved in its creation, specially the felling of trees. Therefore good environmental management can reduce its ill effects. Due to drought people of Rajasthan migrate for few months to nearby states along with their camels, sheep, goats, etc.

REASONS FOR DROUGHT:-

1. Scanty rain fall
2. Surface runoff of water
3. Deforestation
4. Uncontrolled grazing

5. Desertification

EFFECTS OF DROUGHT:-

1. Migration of animals and human beings as observed in Rajasthan, Gujrat, Maharashtra and Andhra Pradesh.
2. Famine conditions
3. Extinction of some species of animals.

CONTROL MEASURES:-

1. Plantations
2. Starting dry farming
3. Conservation of groundwater
4. Judicious use of groundwater
5. Proper maintenance of conventional sources of water

CONFLICTS OVER WATER

Water an important natural resource is the basic need of mankind. Due to technological advancement water is needed for irrigation, fishing industry, hydroelectricity and industries. The amount of potable water being limited, it creates conflicts at national level and state level. Every year about 8 crores new people assert their claim over water resulting in conflicts.

There is conflict between Russia, Germany and Austria for the share of water from Danube River.

Farakka water dispute between India and Bangladesh is related to distribution of water of Ganga river.

There is dispute between India and Pakistan on the distribution of the water of Sindhu river.

Government of India has appointed several tribunals to overcome the conflicts over water for example:

a) Kaveri Water Dispute Tribunal
b) Godavari Water Dispute Tribunal
c) Krishna Water Dispute Tribunal
d) Narmada Water Dispute Tribunal
e) Ravi- Vyas Water Dispute Tribunal

DAMS: BENEFITS AND PROBLEMS

There are about 45000 large dams around the world, out of which China and India, the world's two most populous countries, have 50% of the dams. Dams are built on rivers for irrigation and hydroelectricity. In India also, several large dams were built after freedom. Some of the important projects connected with large dams in India are:

- Damodar Valley Project – West Bengal
- Bhakra-Nangal Project – Punjab
- Hirakud Dam – Orrisa
- Gandhi Sagar Dam, M.P. – Rajasthan
- Kosi and Gandak Project – Bihar
- Sardar Sarovar Dam – Gujrat

- Mayurakshi Project – West Bengal
- Nagarjun Sagar Dam – Andhra Pradesh
- Narmada Sagar Dam – M.P.
- Tawa Project – M.P.
- Tehri Dam – Uttaranchal
- Tunga Bhadra Project – Karnataka & A.P.
- Almati Project – Karnataka

BENEFITS OF DAMS

1. Irrigation – It increases the yield of agricultural products because more than 1 crop can be taken in one year.
2. Hydroelectricity – Water of dams is allowed to fall on turbines and electricity is produced which is the basic requirement of present day life.
3. Development of Industries – Industries need plenty of water which is easily supplied by dams.
4. Underground water – The level of underground water rises.
5. Fisheries – Dams encourage fishing industry.

PROBLEMS

1. Fragmentation and physical transformation of rivers.
2. Disturbances of river ecosystems.
3. Displacement of people, as in the case of Nagarjun Sagar Dam and Sardar Sarovar Dam due to which around 2.5 lakh people were displaced.
4. Salinity of soil increases due to water logging.
5. Animal population gets dislodged because their habitat undergoes submergence.
6. Emission of green house gasses from reservoir due to decomposition of vegetation.
7. Earthquakes – Due to heavy weight of water the rocks become prone to earthquakes. In 1967, Koyena Dam near Pune, resulted in earthquake in which 2000 people died. M.P., Jabalpur and Khandwa have also faced earthquakes.
8. Malaria – Due to stagnant water and muddy areas there is increase in mosquito population and chances of Malaria increases.

It is therefore, advisable that small ponds should be constructed to supply water for irrigation with less investment of money.

CONCLUSION –

Water is the most precious natural resource. It is considered to be renewable but potable water is hardly 3%, which is used for drinking purpose, irrigation, industries and hydroelectricity generation. Potable water is becoming short day by day. Several states have developed disputes over water. We have to be cautious as well as conscious about potable water and take care that development does not prove at the cost of destruction.

GLOSSARY

1. Civilization – Advanced social development
2. Precious – Valuable
3. Catalyst – Substance which increases the rate of chemical reaction without changing itself.
4. Potable water – Drinkable water
5. Fertility – Fruitfulness
6. Hydroelectricity – Generation of electricity through hydel power
7. Glacier – Iceberg
8. Scarce – Insufficient
9. Swampy – Marshy
10. Transpire – Evaporation of water in the form of vapours from plant leaves
11. Odourless – Without any smell
12. Transparent – Clear
13. Textile industry – Weaving industry
14. Irrigation – Supply of water in field through channels
15. Navigation – Sailing through river or sea
16. Rainfed – Dependent on monsoon rains
17. Dam – Barrier on river
18. Pesticide – Chemicals needed to kill insects, pests, rodents, etc.
19. Effluent – Flowing out
20. Pollution – Making dirty
21. Toxic – Poisonous
22. Exhausted – Finished
23. Subsidized – Supportive
24. Flood – Overflow
25. Hazard – Disaster
26. Felling – Cutting down
27. Erosion – Worn out
28. Deforestation – Destruction of forests
29. Alert – Aware
30. Conservation – Protection
31. Conventional – Routine
32. Meteorological – Related to weather
33. Judicious – Lawful
34. Conflict – Dispute

F.A.Q'S

Q1.Which substance is called liquid of life?
Ans. Water.
Q2. Why water is called liquid of life?
Ans. Because animal body is made of 50 to 80% water while plant body has 60 to 90% water.
Q3. Which civilization is the oldest in the world?

Ans. River valley civilization.
Q4. What is the oldest culture of the world?
Ans. Agriculture.
Q5. How much part of the earth is occupied by water?
A. 2/3 rd part.
Q6. What is the percentage of potable water on earth?
Ans. 3%.
Q7. What is potable water?
Ans. Water that can be used for drinking, bathing and irrigation purposes.
Q8. What is fresh water?
Ans. Water without salts.
Q9. What is the percentage of ground water?
Ans. 0.625%.
Q10. List 2 states of India with low groundwater potential.
Ans. Andhra Pradesh, Tamil Nadu.
Q11. Why water is considered as a renewable natural resource?
Ans. Because there is water cycle or hydrological cycle.
Q12. What is the requirement of drinkable water per person per day?
Ans. 3 litres.
Q13. List 3 qualities of drinkable water.
Ans. Colourless, odourless, tasteless.
Q14. What is the source of potable water for Indore city of Madhya Pradesh?
Ans. Narmada river, Mandleshwar tehsil at the distance of 75 km.
Q15. List 3 big cities of India situated along the banks of Ganga river.
Ans. Kolkata, Varanasi, Kanpur.
Q16. On the banks of which river are Delhi and Agra situated?
Ans. Yamuna river.
Q17. List any 5 factories which need plenty of water for their working?
Ans. i) Leather tanning
ii) Textile mills
iii) Paper pulp industry
iv) Chemical industry
v) Cement factory
Q18. Which place in the world is well known for textile industry?
Ans. Manchester.
Q19. Which city is called “Manchester of India”?
Ans. Ahmedabad
Q20. What is hard water?
Ans. Water containing salts of Calcium and Magnesium. It does not produce lather when soap is applied.
Q21. Name an ornamental article obtained from sea water.
Ans. Pearl.
Q22. Which countries are earning petrodollars?
Ans. Gulf Countries.
Q23. What are sources of mineral oil in India?
Ans. i) Bombay High

ii) Ankaleshwar (Gujarat)

Q24. In what proportions potable water is used in India for agriculture, industry and domestic purposes?

A. Agriculture 90%, Industries 7% and Domestic uses 3%.

Q25. List 6 upper ground sources of terrestrial water.

Ans. i) Rains
ii) Rivers
iii) Ponds
iv) Lakes
v) Glaciers
vi) Springs

Q26. List various causes of scarcity of potable water.

Ans. i) Population explosion
ii) Urbanisation
iii) Water pollution
iv) Irregular rains
v) Deep drilling
vi) Life style
vii) Cheap rates of potable water

Q27. What is one main cause of the scarcity of potable water?

Ans. Water pollution due to industrialization.

Q28. What is the main cause of flood?

Ans. Excessive rains.

Q29. List any 5 rivers of India which frequently cause floods.

Ans. i) Brahmaputra
ii) Ganga
iii) Kosi
iv) Mahanadi
v) Mahananda
vi) Narmada

Q30. Which river was responsible for flood in Bihar?

Ans. Kosi river.

Q31. How felling of trees results in floods?

Ans. Roots of trees bind the soil. Due to cutting of trees the soil becomes lose and gets eroded to banks of rivers. The rivers become shallow and water level rises up resulting in floods.

Q32. What is the most conventional way to check the floods?

Ans. By planting trees along the river banks.

Q33. What is the cause of drought?

Ans. Failure of rains in one or more subsequent seasons.

Q34. What types of works are started by the Governments under drought relief projects?

Ans. i) Road construction
ii) Minor irrigation
iii) Plantation

Q35. Under which condition a state is declared as drought affected?

Ans. If the rain fall is 75% less than the average.

Q36. Which river was responsible for floods in Hoshangabad in 1973?

Ans. Narmada river.

Q37. Which state of India is mostly drought hit?

Ans. Rajasthan.

Q38. Which human activity is responsible for drought?

Ans. Deforestation.

Q39. List 3 bad effects of drought.

Ans. i) Migration of human beings and animals to Border States.
ii) Famine conditions
iii) Extinction of some species of animals as well as plants.

Q40. List 6 control measures for drought.

Ans. i) Plantation
ii) Starting dry farming
iii) Conservation of water
iv) Judicious use of ground water.
v) Construction of water reservoirs.
vi) Proper maintenance of conventional sources of water.

Q41. Proper sharing of water of which river is the cause of conflict amongst Russia, Germany and Austria?

Ans. Danube river

Q42. Water of which dam is the cause of conflict between India and Bangladesh?

Ans. Farakka dam on Ganga river.

Q43. Water of which river is cause of dispute between India and Pakistan?

Ans. Sindhu river

Q44. Water of which river is the cause of dispute between the state of Karnataka and Tamil Nadu?

Ans. Kaveri river

Q45. List 3 states covered by Narmada river.

Ans. i) M.P.
ii) Gujrat
iii) Maharashtra

Q46. From where does Narmada river originate?

Ans. Amarkantak in M.P.

Q47. What is the catchment area of Narmada river?

A. 98796 sq km.

Q48. Out of various big rivers of India which river is the least populated?

Ans. Narmada river.

Q49. List 2 most populous countries of the world which have maximum number of dams.

Ans. India and China

Q50. In which state Bhakra Nangal dam is located?

Ans. Punjab state.

Q51. What is the location of Hirakund dam?

Ans. Orrisa state.

Q52. List 3 dams of M.P.

Ans. Sardar Sarovar Dam, Narmada Sagar Dam, Tawa Dam

Q53. List 3 advantages of dams.

Ans. i) Irrigation
ii) Generation of hydroelectricity
iii) Development of fisheries.

Q54. List 4 disadvantages of dams.

Ans. i) Displacement of human population
ii) Salinity of soil
iii) Outbreak of Malaria
iv)Earthquake

CASE STUDY

Shri Ratan Singh a retired army personnel of Mattu village, 65 km from Jammu has presented a wonderful example of water conservation by constructing a dam on Kachha Nala in 2006. He used waste material brick kiln owned by him along with 50 trolleys of stones brought from Chinab. He spent 3 lacs to construct a Kachha dam. He irrigated his land through this dam and produced 40 bags of paddy in 2008 in place of 4 bags in routine.

The length of this dam is 400 meters, breadth 11 meters and depth 7 meters. Now he has started cultivation of potatoes. Now the village and the government are also taking interest to convert this dam for multipurpose uses. The height of the dam shall be increased so that overflow could be checked and other villages can also bring their fields under irrigation.