

MODULE 11 - RESERVOIR ECOSYSTEM (PART-1)

OBJECTIVES

After going through this module, students will be able to understand:

1. Importance of water.
2. Merits and demerits of dams.
3. Transition of ecosystem from running water to standing water.

SUMMARY

Here we study the different purposes that the reservoir meet and the intricate ecological transformation that gradually takes place there. An introduction to the different trophic levels and their significance is also studied as well.

TRANSCRIPTION

Reservoir Introduction

I come from haunts of coot & herm,
I make a sudden sally
And sparkle out among the fern
To bicker down the valley

I Chatter Chatter as I flow
To join the brimming river
For men may come & men may go
But I go on forever.

This never-ending journey of the river has been restricted by man to make available this vast resource of freshwater which would otherwise be lost as the sobbing throbbing river falls into the sandy lonesome shore. Thus are created large reservoirs of freshwater to meet the varied needs of man.

Reservoir General

A Reservoirs may be defined as a large expanse of impounded water created by putting across a stream or a river an earthen stone masonry concrete bundh or dam.

Reservoirs solve many purpose like:

Irrigation, Generation of power, Meet domestic water supply, flood control, Recreation Development of aqua cultural activities & sport fishing and Navigation.

For all the important purpose solved by reservoirs Pt. Jawaharlal Nehru had rightfully said “These are the temple of modern india.”

In India irrigation of about 70 mega hectare land area has been provided by major & minor reservoir projects.

An installed capacity for generating hydroelectric energy has increased to over 41 million kwh. It is the cheapest source of energy & provides about 50% of the total electrical energy produced.

Of the major multipurpose projects 17, have been identified as flood control projects through the capacity of flood control at two levels can be attained by all major & minor projects.

Fishery activity in the reservoirs is increasing day by day.

Dams of India

In India reservoirs are distributed over 15 states. Some Major ones are –

- a) Nagar Junasagar Dam on Krishna in Andhra Pradesh.
- b) Panchet, Konar & Tilaiya on Damodar, Konar & Baraker rivers respectively in Bihar.
- c) Ukai on Tapti & a part of the gigantic sardar Sarovar Project on Narmada in Gujarat.
- d) Lidder Project on Lidder river in Jammu & Kashmir.
- e) Periyar Barrage on Periyar river in Kerala.
- f) Tawa Multipurpose project on Tawa & Gandhisagar reservoir on Chambal in M.P.
- g) Krishnarajsagar reservoir on Cauvery in Tamil Nadu.
- h) Shivajisagar reservoir on Koyna in Maharashtra.
- i) Hirakud the one of the largest dam in the world on Mahanadi in Orissa.
- j) Govindsagar reservoir i.e. the Bhakra Nangal Project on Satlaj in Punjab & Himachal Pradesh.
- h) Ranapratapsagar reservoir on Chambal in Rajasthan.
- i) Rihand on River Rind & Tehri Dam in Uttar Pradesh .
- j) The DVC Konar Dam on river Damodar in W.Bangal.

Tropic 1

Changing the course of a flowing river into a stationary water resource brings about a great change in its ecology.

Here we meet the most fascinating phenomenon of a gradual transformation from riverine to lacustrine ecology.

The life of a reservoir in a river valley project begins with its initial filling.

With greater accumulation of storage water there is a rise in reservoir level its rate depending upon the river flow & draw down releases.

Thus the trophic phases of reservoir stats as –

- a) Initial Fertility i.e. when gradual filling causes inundation of vast tracts of topsoil bearing a cover of terrestrial vegetation which decays & the putrefied submerged vegetation causes initial fertilization of water. This leads to an intense development of fish food reserve in the form of benthic, Micro & macro flora & fauna plankton etc. followed by rapid establishment of aquatic vegetation. This initial surge of biota may last for two to three years.
- b) The next stage is trophic depression caused by gradual diminution of the rate of nutrient release due to –
 - Blanketing effect of the reservoir bed by continuous sedimentation.
 - Increase in volume of impounded water.
 - Using up of available nutrients by aquatic vegetation.
 - The nutrients arising from the decomposition of the vegetation, which becomes unavailable to the water column because of thermal stratification and formation of density layers.
 - Regular withdrawal of water from reservoir which becomes a routine matter & deprives it continuously of nutrients brought in by inflowing water.

Trophic 2

The phase of trophic depression is characterized by low fish food reserves.

Its duration is variable & may last for as long as 25-30 years.

After the stage of trophic depression a fertility level is reached in the reservoir which is at a much lower level than that obtained at the stages of initial fertility. The fertility regains itself depending upon accumulation of organic substances in bottom soil. This is called the stage of final fertility.

So, in this programme we have seen the importance of reservoirs & how exactly the gradual filling up of reservoirs brings about a change in the stages of fertility. In the next part of this programme we will deal with the aspect of reservoir

productivity & delve into the depths of the ecosystem in the reservoir to make ourselves familiar with the biotic community living down.

GLOSSARY

1. Reservoir: Large expanse of impounded water created by putting a bandh or dam across a river or a stream.
2. Ecosystem: An area where interaction between living organism and its environment may be studied i.e., lake, pond, river etc.
3. Ecology: Study of relationship between living organism and their environment.
4. Lacustrine: related to lakes.
5. Multipurpose Projects: Reservoir projects which are utilized for generation of hydel power, fishery, irrigation, recreation activities, etc.
6. Hydel Power: Electricity generation from water.
7. Initial Filling: Accumulation of storage water and rise in reservoir level.
8. Initial Fertility: A trophic phase in a reservoir characterized by surge of benthic micro and macro flora and fauna, planktons etc mainly fish food reserve.
9. Trophic Phase –Phase of reservoir fertility.
10. Trophic depression – A trophic phase characterized by gradual diminution of nutrient release.
11. Benthic – Bottom dwelling
12. Sedimentation – A process in which there is continuous deposition of fine matter at the bottom of a reservoir settling of insoluble particulate matter

13. Blanketing effect- Diminution of nutrient release by continuous sedimentation in a reservoir.
14. Final fertility – Stage of reservoir fertility when accumulation of organic substances in bottom soil helps to regain fertility.

FAQ's

Q1. What is a reservoir?

A. Reservoirs are manmade lakes formed by building dams or impoundments across a river.

Q2. Name 5 uses of reservoirs.

A. Reservoirs are used for irrigation, generation of electricity (hydel power), Meet domestic water supply, flood control, fisheries.

Q3. What is the cheapest source of Electricity?

A. Hydel Power.

Q4. How much of land areas are irrigated by major and minor reservoir projects in India?

A. 70 mega hectares.

Q5. How do reservoirs help in flood control?

A. Canals with sluice gates where in excess water is made to flow off helps in flood control.

Q6. What is the installed capacity for generating hydroelectric power in our country?

A. Over 41 million KWH.

Q7. What is the full form of KWH?

A. KWH is kilo watt hour. It is the unit of measurement of power generation.

Q8. How does a reservoir change an ecosystem?

A. A reservoir changes the ecosystem from a running water one (lotic) to a standing water system (lentic).

Q9. What is the ecological transformation after building impoundments over rivers?

A. Transformation from riverine to lacustrine (or lake) ecology.

Q10. What is ecology?

A. Study of interaction between an organism and its environment.

Q11. What is the functional unit of ecology?

A. Ecosystem is functional unit of ecology.

Q12. Name two major reservoir projects of India.

A. a) Bhakra Nangal Project on river sutlej in Punjab and Himachal Pradesh

b) Hirakud on river Mahanadi in Orissa.

Q13. How does the life of a reservoir begin?

Ans. Life of a reservoir in a reservoir project begins with initial filling.

Q14. What is initial filling?

Ans. Rise in reservoir level due to greater accumulation of storage water depending upon river flow and draw down releases.

Q15. What are the trophic phases of a reservoir?

Ans. Trophic phases are:-

a) Initial Fertility.

b). Trophic Depression

c). Final Fertility

Q16. How is initial fertility of reservoir water achieved?

Ans. By putrefication of submerged vegetation.

Q17. How is fishery influenced by initial filling?

Ans. Initial filling causes a surge in benthic micro and macroflora, fauna and planktons, increasing fish food reserve and growth of fisheries.

Q18. Which stage of a reservoir is most profitable for fishery?

Ans. Initial filling.

Q19. What is meant by benthic micro and macro flora and fauna?

Ans. Flora and fauna found at the bottom of a reservoir.

Q.20 What happens during trophic depression.

Ans. There is gradual decrease in rate of nutrient release.

Q.21 Name four reasons for decrease in nutrient release.

Ans.

- a) Blanketing effect of reservoir by continuous sedimentation.
- b) Increase in volume of impounded water.
- c) Using up of available nutrients by aquatic vegetation.
- d) Regular withdrawal of water from reservoirs.

Q.22 What is blanketing effect?

Ans. Continuous sedimentation arrests growth of benthic macro and micro flora and fauna causing decrease in nutrient release. This is blanketing effect.

Q.23 What characterizes phase of trophic depression?

Ans. Presence of low fish food reserve.

Q.24 What happens during final fertility?

Ans Fertility is regained depending upon accumulation of organic substances in bottom soil.

Q.25 What are the duration of the 3 trophic phases of a reservoir?

Ans.

- 1). Initial Fertility – 2 to 3 years.
- 2). Trophic Depression – 25-30 Years.
- 3). Final Fertility - Beyond 30 Years.