

Fresh Water Pollution and Riverine Fisheries (The Ganga River System) in Course of Study under Integrated Teacher Education Programme (ITEP)

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Abstract - Under the Programme of integrated teacher education not a single study is recommended, the study of fish and fisheries is recommended with the study of fresh water pollution. This type study may be integrated with the study of Earth and Earth's layers of Atmosphere, Hydrosphere and Lithosphere. Pollutants are spreaded by any source in the air, soil and water. The Pollution may represent as Air pollution, water pollution and soil pollutions. The pollution is named as per their availability:- Air pollution water Pollution and Land Pollution, Land and Air Pollutants may be dissolved in water, to produce more harmful effects on the life of fishes.

Keywords: Earth, Biosphere, Fresh water, Pollutants, Fishery.

I. INTRODUCTION

Earth is unique among the nine planets that circle the sun. It is the only one that can support of life, because it has enough oxygen in its atmosphere and plentiful water in fact seen from space, the Earth looks almost entirely blue. This is because about 70% of its surface is under water, submerged beneath four huge oceans, the Pacific, Atlantic, Indian and Land makes up about 30% of the Earth's surface it is divided into seven land masses of varying shapes and sizes called continents. These are from largest to smallest: Asia, Africa, North America, South America, Antarctica, Europe and Australia,

The Earth can also be divided into land and water hemispheres. The land hemisphere shows most of the land on the Earth's surface. The water hemisphere is dominated by the vast Pacific Ocean - from this view, the Earth appears to be almost entirely covered by water.

No, other Substance on Earth is an abundant as water. It is almost everywhere in air, clouds, Oceans lacks, rivers, springs or glaciers in the 5 km. layer below the sea level in an aqueous solution. Thus water readily dissolves hydroxyl compounds, amines, esters, ketones, and a wide variety the other organic compounds. When molecules that contain internal hydrogen (H) bonds dissolve in water, some or all of

their internal H bonds may be exchanged for H bonds to H₂O (water)

The solubility of hydrophilic substances depends on their energetically favourable interaction with water molecules. It is therefore not surprising that substances like hydrocarbons, which are non polar and nonionic and cannot form hydrogen) bonds, show only limited solubility in water. Molecules that behave in this way are called hydrophobic or water fearing.

Amphipathic substances include fatty acids and detergents. Amphipathic molecules have a head group that is strongly hydrophilic, coupled to a hydrophobic tail - usually a hydrocarbon. When we attempt to dissolve them in water, amphipathic substances strongly hydrated by water around them.

II. FRESH WATER RESOURCES OF INDIA

India has plenty of freshwater. The sub-continent receives most of its fresh water during monsoon months (almost 75%). Rests of the months are drier which necessitates the use of ground water or stored water during the dry spells.

The year is matched by its equally uneven over different regions of the country. Parts of Rajasthan receive very little rains while there are places like Cherapunji which had the reputation of being the wettest place in the world.

On Earth, water is nearly 6 times as abundant as all other substances per together. And, none other occurs in 3 states-solid, liquid and gaseous - at the same time. It is water that had conditioned our climate, Water is a renewable source but it is finite too. So it has to be used judiciously. The daily water requirement of an average person is as follows:

15 liters - for cooking and drinking needs.

35--40 liters - for toilet needs.

65 liters - for bathing, washing and other sundry needs.

Water is the mother liquor of all forms of life. It is the vital essence, miracle of nature and the great sustain of life.

The essentiality of water for living system is quite evident as without water, there is no life. The essentiality of water for living systems is quite evident as without water, there is no life.

The processes of life require a wide variety of ions and molecules to more about in proximity that is to be soluble in a common medium. Water serves as the universal intracellular and extracellular medium.

Molecules with groups capable of forming hydrogen bonds tend to hydrogen bond with water, called Hydrophilic Molecules.

A) The Resource Base

India receives about 4,000 cubic kilometers of fresh water as precipitation every year. About 760 cubic kilometers

of water thus received evaporate immediately and are lost to the atmosphere. About 2,150 cubic kilometers go to the soil whereas about 1,650 cubic kms are retained as soil moisture while about 500 cubic kms permeate through the soil surface to underground water deposits. Only 1,150 cubic kms of fresh water received annually are retained on land surface. Water resources in our country can be grouped as under:

1) Surface Waters: To 1,150 cubic kms of fresh water which appears as surface water may be added about 200 cubic kms of surface flow which comes from outside India. The surface flow is further enlarged by addition of about 450 cubic kms of fresh water from ground water flow while about 50 cubic kms are added as runoff from irrigated areas. The surface loses almost 50 cubic kms of its water which percolates down to the ground water deposits. The total surface flow per year is about 1,800 cubic kms which are distributed among a number of river basins as detailed in following table

Table 1: Distribution of surface flow in rivers of India

S. No.	Rivers	Total flow	Utilizable flow	1974-Use
1.	Indus basin	77.0	46.0	37.0
2.	Ganga basin	510.0	250.0	85.0
3	Brahmaputra basin + Barak	540.0	24.0	5.0
4.	Mahanadi + other east moving rivers	123.0	91.0	28.0
5.	Godavari, Krishna + other east moving rivers	225.0	190.0	73.0
6.	West-flowing river south of Tapti	218.0	30.0	10.0
7.	Narmada and Tapti	62.0	49.0	7.0
8.	West-flowing rivers north of Narmada	25.0	200	5.0

All quantities in cubic kilometres. (Source: Kathpalia 1983).

2) Ground Water: The major portion of fresh water which goes to earth's crust is retained by its upper layers as soil moisture (about 1,650 cubic kms). Only 500 cubic kms percolate down to the ground water deposits. A large amount of fresh water applied to agricultural fields (about 120 cubic kms) moves down to ground water table while about 50 cubic kms of surface flow also end up as ground water.

B) Requirement of Fresh Water in India

Like rest of the world, agriculture sector is the major consumer of fresh water in India. It is followed by domestic needs and requirement for live-stock management which taken together use about 13.5 cubic kms of fresh water. Thermal power generation sector is the next biggest consumer of fresh water in India as estimated for the years 1974 A.D., 2000 A.D. and 2025 A.D.

Table 2: Estimates of fresh water requirement in India

S. No.	Water needed for	1974	2000	2025
1.	Irrigation	350.0	630.0	770.0
2	Thermal power generation	11.0	60.0	160.0
3	Industries	5.5	30.0	120.0
4.	Domestic requirements	8.8	26.6	39.0
5.	Livestock management	4.7	7.4	11.0
	Total	380.0	754.0	1100.0

All quantities in cubic kilometres. (Source: Kathpalia 1983).

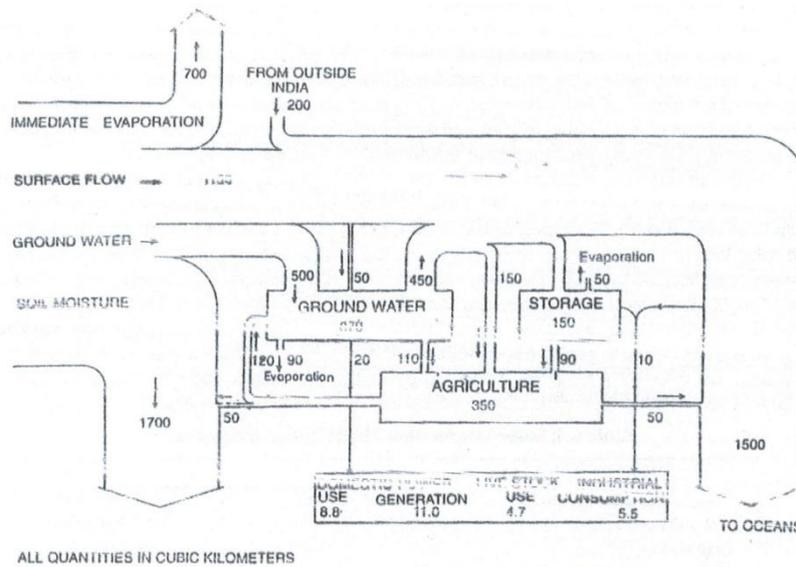


Figure 1: Distribution of Indian fresh water resources (1974 A.D.)

By 2000 A.D. the total water requirement is reported to double itself while about 2025 A.D. we shall be requiring almost thrice as much water as we did in 1974 A.D. This extraordinary rise of demand for fresh water shall not be uniform in various sectors of our economy. In 2025 A.D. the requirement for irrigation water will be doubled whereas our domestic needs as well as water requirement for livestock management shall be about four times than those of 1974 A.D. By the third decade of next century industrial sector in India shall require about 20 times and power-generation sector about 15 times more water than it did in 1974. A glance at Table above reveals that the utilizable surface flow in India amounts to about 700 cubic kms only. Our requirement shall exceed this amount by 2000 A.D. We shall have to bank more and more upon our ground water resources.

III. FRESH WATER CONSERVATION IN INDIA

India has a long history of water resource development and conservation. Due to concentration line of precipitation during monsoon months (75%) much of the fresh water is lost as flood flows and during the remaining month's scarcity of water develops. Ponds, tanks embankments have been made since time immemorial to resolve the water crisis during the drier months. The Delhi Sultanate and the late Moghuls engaged in large-scale irrigation works in Northern India during 1350 to 1780 A.D. By 1900 A.D., irrigation facilities already covered an area of about 40 thousand sq. kilometers. After independence as food problems plagued the Nation, huge irrigation projects were undertaken to raise agricultural productivity under a series of Five Year Plans. These projects involved an enormous amount of public money which was largely ... to raise the surface storage capacity of our country and dig huge canals for irrigation purposes.

The Ministry of Water Resources, Govt. of India classifies various projects undertaken from time to time under the following two major headings:

1. Minor surface irrigation sector.
2. Major and Medium irrigation sector.

Minor surface irrigation sector (MSI) comprises of small projects which irrigate only up to 2,000 hectares each. Ground water irrigation sector is also placed under this category. This sector employs wells, tube wells, tanks, bunds, traditional lift irrigation etc. to provide water for agricultural purposes. As a matter of fact. Minor surface irrigation sector seems to be in a very poor shape, however because of its grouping with ground water irrigation sector which is almost doubly efficient and productive; the actual performance of MSI is masked from general observation.

Major and medium irrigation sector involves huge projects under which huge dams and bunds are constructed with a capacity to hold billions of cubic meters of water and to irrigate millions of hectares of land surface. These projects have enhanced country's surface storage capacity to about 180 cubic kilometers and a net potential to irrigate about 78.1 million hectares of land projects completed till date are: Damodar valley project, Bhakranangal dam, Kosi project, Hirakund dam, Tungbhadra project, Nagarjuna sagar dam, Rehand dam etc. Along with these dams a network of canals has been dug to cater to the needs of farmers in drier regions. The energy of flowing water from these dams is used to generate hydro-electric power which is a completely pollution-free source of energy. By 1986-87 A.D. alone, India had developed an installed capacity to generate about 19,20,000 KW of hydro-electricity. These waters are also used to brand fishes.

Table 3: Some information about Indian irrigation

S. No.	Description	Area in hectares
1.	Total Land area	3,287,585,000
2.	Net cultivated land	142,220,000
3.	irrigated crop-land	46,200,000
4.	Net area served by surface water	22,700,000
5.	Net area served by ground water	23,500,000
6.	Net area served by Major and Medium Irrigation sector	16,000,000
7.	Net area served by Minor Surface Irrigation sector	6,700,000
8.	Reported Irrigation potential of our country	78,100,000
9.	Total surface water storage capacity	180 cubic kilometers

Source: Diverse

Fresh Water Pollution:

Pollution in Yamuna's: A dip in the Yamuna in Delhi no longer cleans the body or uplifts the soul; it only saps the body and saps the soul. A pure body river has been turned into an open sewer. The river has been affected by the dumping of toxic effluents by various industries of Delhi. When it enters Delhi at Wazirabad the water is much cleaner than when it leaves Delhi at Okhla. This 48 km stretch is the most polluted segment of the river. The Yamuna water near Delhi is not fit even for irrigation, what to say of drinking, bathing, swimming, fisheries, industrial cooling etc.

Pollution in Ganga: Ganga along with its tributaries is the largest and a very important river basin of the country. It has been a symbol of purity but today it is grossly polluted, that is in utter disregard to its sanctinity.

Essentially there are three types of pollutants - Silt, Biological and chemical. Sedimentation may be reduced by rehabilitation of catchment area through tree plantation. The Present emphasis is biological and chemical pollution.

Riverine Fisheries:

A) The Ganga River System: This is the largest river system in India, having the rivers Ganga and Yamuna as its major components. Besides these other rivers are Ram Ganga, Gomti, Ghagra, Kosi, Gandak joining Ganga from the northern side and Chambul, beture, Tons and Sona Rivers are to the tributaries from Southern side. Yamuna join the Ganga at Allahabad (Prayagraja). The total catchment area of the Ganga river system has been estimated to be more than 9.70 lakh sq. km. and its fisheries consist of the following species:

- a) Major Carps - Cirrhinus mrigala, Labeo rohita, Catla catla, Labeo calbasu.

- b) Other Carps Labeo bata, Labeo dero, Cirrhinus reba.
- c) Cat fishes is Wallago attu, Mystus seenghala, Moar, Bangarius bangarius, Silonia silondia, Rita rita, Eutropiichthys vacha, clupisoma garua, to Ompok bimaculatus, O.pabda, Clarias batera- chus, Heteropnustes fossils.
- d) Clupeids: Hilsa ilisha, Gadusia chapra, Setipinna phasa.
- e) Others: Notopterus chitala, N. notopterus, Anguilla hemgalensis (eel), Mastacembelus armatus, Channa punctatus, charmer marutus, Amabes, ele.
- f) Prawn: Macrobrachium malcolmsonii, Palaemon spp.

The commonly available fish species in the Himalayas are the Mahseer (Tortor, Torputitora), the snow trout (Schizothorax), Labeo dero, Crossochellus, Garra gotyla, some Catfishes like Bagarius, Glyptothorax and Glyptostermus.

Various kinds of gears are used to catch fishes in Ganga and it's tributaries. These are Dipnet (Hellajal, Kharra jab, khoused. Khoursala jal), cast net (Ghagara jal) Pusse net (Kharkijal, Shanglajal), drug net (Konajal), drift net, trawl net, begnet. Besides these long lines with hooks and small trap nets are also used.

Diseases caused by Pollutants on Fresh Water Fishes

Water, the most abundant and wonderful natural resources is extremely, essential for survival of all living organisms, However, its quality is threatened by numerous sources of pollution. The important are as follows:

1. Sewage and domestic wastes

(Oxygen deficiency also leads to the production of obnoxious odours in aquatic body).

2. Industrial effluents

(Methyl mercapton and pentachlorophenol lower the photosynthetic rate of aquatic flora and affecting adversely the growth of herbivorous fishes) (Arsenic cause cellular degeneration in Colisa fasciatus).

3. Agricultural discharges

Excessive addition of nitrates and phosphorous in aquatic ecosystem, makes it highly productive or entrophic causing "entrophication" in water, which leads to depletion of oxygen due to excessive algal growth, thereby increasing BOD of water. It also leads to death of fishes and other aquatic biota).

4. Toxic Metals

(Strong alkalies like NaOH and KOH are known to produce asphyxiation by Coagulation of gill secretions in fishes. Aluminum salts and alums create the same effects on fishes due to hydrolysis followed by formation of hydrogen ions.)

5. Detergents

(Respiration of Fishes).

IV. DISCUSSION AND CONCLUSION

The earth is made up of interconnected spherical layers that contain air, water, soil and minerals, and life. The atmosphere is a thin envelops or membrane of air around the Earth. Its inner layer, the troposphere, extends only about 17 km above sea level. It contains the majority of the Earth's air, nitrogen (78%) and oxygen (21%)

The next layer, stretching 17-48 km above the Earth's surface, it the stratosphere Its lower portion contains enough ozone (O₃) to filter out most of the sun's harmful ultraviolet radiation. This allows life to exist on land and sat in the surface layer of wafer bodies.

The hydrosphere consists of the Earth's water. It is found as liquid water ice (polar ice, ice bergs and ice in frozen soil layers called permafrost) water vapour in the atmosphere. The Earth consists of an intensely hot to core, a mantle consisting mostly of rock, and a thin crust. The lithosphere is the Earth's crust and upper mantle.

Biosphere, the life zone of the earth include all forms of living organisms inhabiting air (atmosphere), water (hydrosphere), and soil (lithosphere). All parts of the biosphere are interconnected just as the parts of our body. Any change in one of the biosphere's Components or processes can have a ripple effect on other parts.

Pollution caused by substances, on which biotic and abiotic agencies of decomposition are influensive, is a unique type of pollution; chemicals causing it are a part and parcel of inorganic matter which constitutes this planet. Toxic trace elements and heavy metals under the category of non-degradable pollutants. The problem caused by these elements is in fact due to their concentration in the environment in bio available state. They cannot be destroyed. Dispersal and dilution in such a manner that these toxic elements are no longer available to the biosphere in toxic state and quantities eliminate this type of pollution.

Earth's surface possesses a large number of depressions in which rain water collect to form lakes, ponds or reservoirs

is about 280,000 cubic kilometers while water which is available in streams and rivers at any point of time amounts to about 1200 cubic kilometers, these provide an excellent habitat for aquatic life to develop. However, collectively, Fresh water systems represent a very small fraction, less than 0.02% of the total amount of water present on our planet. That is why the total cont contribution of fresh water to global harvest is about 10-12%, only,

Nutrients are generally not scarce in fresh water systems but the productivity is often affected by pollution of aquatic environment. Discharge of sewage effluents then got the fresh water system creates unhealthy conditions which result in pig disappearance of desirable fishes and other organisms and abundance of undesirable ones.

National Council for Teacher Education (NCTE) has launched Teacher Education Programme (ITEP) in 57 Teacher Education Institutions (TEIS) from the academic Session 2023-24 through the country. This is flagship programme of NCTE under NEP 2020. ITEP course was conceived with a crucial objectives to prepare teachers for any align their competencies with the new school structure that symbolize 5-3-3-4 structure, structure sty structure, Foundational, Middle and Secondary. This new structure came into existence as per of NEP 2020 and has the cove endeavor to attract competitive and committed student talent to transform its efficient teachers. One of the key highlights of the integrate Teacher Education Programme is that it keeps the students grounded and closer to the Indian ethos, Values cultures, and traditions, ITEP helps students understand Indian languages and their diversity, ends It lends them an immense de opportunity to be exposed to modern effective, and experiential pedagogy and teaching advancement - It is concluded that Integrated study of fresh water pollution and riverian fisheries under the programme of integrated teacher educations programme will be more effective with the may study of Earth, In other words it may be represented by the following concluded points as for the integrated study:

1. Earth and its Biosphere.
2. Atmosphere, Hydrosphere and Lithosphere.
3. Pollutants may be common factors for the pollution of land soil, water and air.
4. Effects of pollutants on the riverian Fishes.

In the end it my represents that the combined study of Earth, Biosphere, Atmosphere, Hydrosphere and Lithosphere,

Recommendations:

The rapid advances in science and technology have put the scientists and technologists on their heels to cope up with the simultaneous changes that have occurred during the past

decay decades. Various types of revisions, rectifications as well as modifications and sometimes even all together innovated ideas that developed in numerous fields of specializations have required to be incorporated with the advanced level concepts in order to keep pace with the recent researches advanced in the concerning fields of the study The innovative techniques have put the researches on consistent 'think' and 'rethink' to entertain higher concepts related to the biology.

1. Awareness towards health and hygiene through cleanliness of the rivers, drainage, ponds, lakes, etc.
2. Awareness about the protection of fauna and fauna, especially the former to check the soil erosion and water resources.
3. Awareness to construct small dams in hill areas and larger dams in plains in order to avoid any untoward accidents that cause great losses to humidity and property, health and hygiene through flash floods.

REFERENCES

- [1] Essential Reference World, Atlas, D.K.
- [2] Answer Book. National Geographic.

- [3] Asthana D.K., Meera Asthana (1999) ENVIRONMENT: PROBLEMS and SOLUTIONS, S. Chand and Company Ltd., NEW DELHI.
- [4] Gupta A. K. (1992) - Study of Effectiveness of Local Resources in conservation of Phenomena of Life and Programme of Biology Education, Thesis submitted to the H.N.B, Garhwal University, Srinagar (Dist, Pauri) U. P.
- [5] Khanna, S. S., H.R. Singh (2005). A Text Book of FISH BIOLOGY AND FISHERIES, Narendra Publishing House. DELHI-110006 (INDIA).
- [6] Mathews Christopher K., K.E. Van Holde, Kevin and Ahern, (2007). Biochemistry, Dorling Kindersley (India) Pvt. Ltd. Delhi (INDIA).
- [7] Pandey Kamleshwar, Shukla J., P. (2012). FISH AND FISHERIES. Rastogi Publications. Meerut (INDIA).
- [8] Sharma PD, (2013) Environmental Biology and Toxicology. Rastogi Publications. Meerut (INDIA).
- [9] Yadav R.S. (1980). An Experimental Study of Comparison between Lecture Method on VII Grade Students. J. Edu.-Res, Ext, 17:51-52.
- [10] [tutoroot.com/bicg/what-is-4-year-itep-programm-highlight-details-course-intnation-course-details](https://www.tutoroot.com/bicg/what-is-4-year-itep-programm-highlight-details-course-intnation-course-details).

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