

Program: Water Equity Access Workshop
Michigan State University, USA

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Topic: The Impact of Anthropogenic Mechanism on Bio-diversity
– Perspective: Fresh Water Habitats of the World.

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Introduction:

The term 'Fresh Water' signifies any natural liquid or frozen water with a very low concentration of dissolved salts (less than 1000 ppm) with other solids. But, some sources may have upper salinity limits like, 1000 ppm to 3000 ppm (parts per million). Any water more than this concentration is Saline or Salt water. So, the term excludes sea and brackish water, but includes non-salty mineral-rich waters like the springs. The sources of Fresh water worldwide may be - frozen or melt-water in the Ice caps, Ice bergs, snowfields, glaciers etc.; natural precipitations like, rainfall, snowfall, hail or sleet and surface runoffs that form inland water bodies such as, wetlands, ponds, lakes, rivers, streams and the groundwater in aquifers, subterranean rivers and lakes.

Water all over the globe is critically important for the survival of all living organisms. Many of them can survive on salt water, but most of the insects, amphibians, reptiles, mammals and birds, and above all, the great majority of higher plants need fresh water for their survival. Again, this water is not always potable, i.e., safe drinking water by humans; much of the surface and ground water is to a given level is unsuitable for human consumption without treatment. But, those can be used directly by plants and animals without treatment, lest those have been polluted by human activities or natural process like erosion etc.

Fresh water is a renewable and inevitable but finite natural resource for our livelihood. It can only be replenished through Water Cycle, in which water from the sea, river, lake, pond, marsh, reservoirs, landmass, and forest areas, evaporates in the form of clouds, and falls in the form of precipitation, maintaining a balance in nature. However, if more fresh water is consumed by human sources either for drinking or other purposes, or the normalcy of it is hampered through contaminating it due to human interference or uneco-friendly purposes, may result in water scarcity or unavailability situation. So, such situation may result in serious damage to our surroundings and associated environments due to Water Pollution of surface and ground water sources, resulting in subsequent eutrophication and reduction of fresh water level in an area or all over the world. So, anthropoid uneco-friendly mechanisms for the drive to modernization, urbanization, power generation, use of atomic reactors, deviating the perpetual flow of natural water by the construction of Dams, Barrages, Head-works etc. and polluting the surface water by liberating harmful or toxic wastes can seriously enhance the scarcity and unavailability of fresh water.

Wetlands and their importance

'Wetland' means a very low-lying Eco-System where the ground water level is always at or very near to the surface. It includes - Marshes, Bog areas, Floodplains,	and shallow coastal areas. Wetland is basically divided into Estuarine and Freshwater zones which are again subdivided according to their soil types and plant life.
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The **Ramsar Convention** defined wetlands as - “Areas of marsh, fen, peat land, or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres.” So, wetlands lumps together a wide range of contrasting habitats like - the fluvial, estuarine, coastal and marine habitats. Based on their biological, physiological and ecological identities. So, far 39 categories of wetlands have been globally recognized, of which 30 are natural and the rest artificial.

The wetlands of the world serve as a diverse habitat for a huge number of floras and fauna which are very important from their socio-economic point of view and their roles in the eco-systems. The more diversified they are, the more benefited we become. So, biodiversity is so important for our survival. The livelihoods of people inhabiting the wetlands are solely dependant on their natural resources. Besides, Culture programs like - rice and shrimp production and dike marketing are also directly involved with wetlands and their biodiversity. So, the harboring the resourceful wetlands is as essential as caring of people themselves. The degradation of those areas has been causing problems like -

1. Extinction and reduction of wildlife as well as many endemic varieties of rice and aquatic plants, herbs, shrubs and weeds
 2. Loss of natural nutrients and natural water reserves, resulting is scarcity of water for drinking and irrigation.
 3. Due to the application of insecticides and pesticides, the land, water and groundwater have become polluted and unsuitable for use.
 4. Percolation of such chemicals with surface water and withdrawal of ground water more than the estimated target, has increased the Arsenic problem in the ground water, causing uncomfortable dermal diseases.
 5. Such contaminated ground water with chemical leech to the adjoining fresh water bodies making the water unusable for drinking, cooking, or other household purposes, and above all, killing all aquatic fauna and flora destroying the total Biodiversity. The industries operating at the bank of running water bodies and liberating their harmful toxic wastes directly to the water has aggravated such problems largely.
- So, a scientific endeavor to preserve and culture the wetlands could help protect them promote the sustainability of Biodiversity of the wetlands.

Types of Wetlands: The wetlands of the world, based upon their types and their hydrological or ecological functions, can be categorized in the following way –

Wetlands	Types	Characteristics
Saltwater	Marine	Shallow waters at low tide, as Bay coral reefs.
	Estuarine	Intertidal sand, mud or salt basins with specific vegetation, like - newly accreted intertidal land, marshes, forests and mangroves etc.
	Lagoonal	Brackish to saline lagoons with narrow connection with the sea.
Freshwater (FW)	Riverine	Rivers and streams with their tributaries including the <i>Chars</i> .
	Lacustrine	Lakes of different sizes and shapes distributed all over the world.
	Palustrine	Marshes and Swamps with emergent vegetation or swamp forest, or peat-forming swamps.
Anthropoid		Aquaculture ponds (brackish and FW), irrigated lands and irrigation channels, salt pans or Hydro-dams, Barrages, Headwork, Riparian modifications etc..

Anthropoid mechanism on Water bodies and its consequences:

Many studies have found that damming a river can change downstream hydrology, sediment transport, channel morphology, and fish habitat. However, little is known about river dam effects on downstream riparian wetland dynamics and their quantitative relationship with hydrological alterations. For instance, in a study of nearly 40 years (1978-2016) on the Nenjiang River in Northeast China, hydrological time series and wetland distribution data spanning before and after the construction of a large dam in 2005 across it were used to reveal the impact of dam

on the downstream discharge regime and wetland degradation. Hydro-statistical and stepwise multiple regression analyses were performed to quantify the relationship of riparian wetland area with a metrics of 33 hydrological indicators. Dam construction caused decline in peak discharge, flood frequency, and magnitude. Moreover, 150 km riparian wetlands along the downstream of the dam was largely reduced. The count and duration of high flow pulses, 1-day maximum, and date of maximum discharge changed significantly after the dam construction. The hydrological changes have made a significant contribution to the 44% reduction in riparian wetlands following the dam construction. So, the results indicated that hydrological alterations caused by dam regulation led to the area reduction of downstream riparian wetlands. The findings provide relevant information for developing best dam operation practices to protect and restore downstream wetland ecosystems.



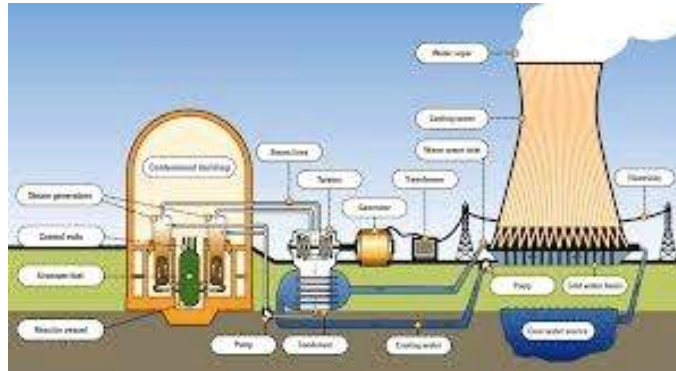
Anthropoid mechanism on Water Pollution and its consequences:



A common senerio at the bank of the river or swamp areas in Bangladesh. Household and other hazardous wastes, including medical wates may be left uncared on a open space, a grave concern for human health and even other animals and plants of that area. The wastes have become one of the most intolerable burden for the municipal areas in many of the countries everyday. We have to come out of its some how and our water bodies and its inhabitants are affected most.

Anthropoid mechanism on Nuclear reactor and its consequences:

We all know Atomic reactors are used for power generation and other purposes, but we also know their side effects.



Anthropoid mechanism on nuclear test and its consequences:

The consequences of nuclear tests performed by many countries in the last centruy are well known to all of us.



Anthropoid mechanism on Oil spilling and its consequences:

December, 09, 2014 an oil taker, Southern Star VII was dashed by a cargo in Shela river, Sunderbans, a UNESCO



heritage, and the first oil spill incident in our fresh water in such a huge amount happened for the first time in the country's history. It was carrying 350,000 litres of furnace oil. In such an incident 350 Km² was under oil cover, killing hundreds of fish and animals.

Water body Conservation:

The conservation programs adopted so far are not few and funds allocated in this concern are much encouraging. The Wetland Conservation Fund is an international policy and legal assistance adopted for the nature conservation. Funds have been allotted so far to Bangladesh (according to my knowledge) from -

1. WWF-USA	7. Bangladesh Rural Advancement Committee (BRAC)	12. Australian Nature Conservation Agency
2. WWF-Malaysia	8. Ashoka-Innovators for the Public of USA	13. Royal Society for Bird Preservation (RSBP), UK
3. Canadian International Development Agency (CIDA)	9. Birdlife International, UK	14. Excelsior Group of Companies
4. Embassy of Switzerland	10. Forest Department, GoB	15. Sena Kalayan Sangshtha, GoB
5. Wetlands International Asia-Pacific of Malaysia	11. Ministry of Science and Technology, GoB	16. Bangladesh Centre for Advanced Studies (BCAS)
6. Nagao Natural Environment Foundation (NEF) of Japan		

Water body Conservation Recommendations:

The environmental conservation programs comes under four major heads, like

1. **Education** - It is very important from the grass root level to the civil society. Without a proper education, a sustainable conservation is almost impossible. Mass motivation is one of the most important education program, as none of the rules can be implemented without public support. Moreover, environmental clubs and societies may conduct programs for all walks of life for the propagation of the conservation spirit. The curricular boards should introduce nature education from top to bottom in an Hierarchical way. The rural and urban less literate people can be directly involved in certain programs so that they can support sustainability.
2. **Legislation** - The most important part of the process is the formation of substantial rules or laws for maintaining and punishing the rule breakers and exaggerators. But, at the same time it must be made sure that the law enforcement agencies are serious in maintaining their duties. Only rules without public support is vague, but on the other hand, strong rules with public support but incapable or insincere law enforcement agencies is also valueless. The diplomatic and political should take the conservation issues seriously before forming a law. On the other hand international or endemic problems could be solved through dialogues and treaties, instead of fighting with each other using weapons of mass or environmental destruction.
3. **Reclamation** - Soil erosion is a natural process, and nature does it for certain causes. We should learn from nature why a place erodes and what are the spots that needs a reclamation upto a level. This can help in better habitation, crop rotation, better yield, utilization of unused land mass and above all security from natural calamities. So, this should be done with scientific understanding under logical grounds.
4. **Research** - It is the foremost topic to guide all the above three. Without a perfect timely research, an decision can be either conclusive or detrimental. Researchers should perform research in quarry of facts, and not the present trend for hunting better funds.

For instance, in Bangladesh for the few recent decades the following type of conservational programs have been conducted with support from the Government or the donor agencies for the protection and development of our resourceful wetlands and their biodiversity -

- Non-formal Environmental Education for Biodiversity Conservation - Supported by BRAC.

- People-Participatory Biodiversity Research & Conservation - Supported by Nagao Natural Environmental Foundation (NEF), Japan.
- Survey of a Turtle - *Batagur baska* - Supported by WWF-Malaysia / IUCN-SSC-Fresh water Turtle Specialist Group.
- Survey of Biological and Trade-Status of Monitor Lizards - Supported by CMC/CITES.
- Survey of Otters - Sponsored by WWF-US / IUCN-SSC-OSG
- People-Participatory Eco-system Conservation - Supported by Ashoka: Innovators for the Public, USA
- Wetlands Biodiversity Assessment - Supported by NERP/CIDA/AWB.
- 10th Asian Waterfowl Census, 1987-1996, - Sponsored by Wetlands International (AWB/IWRB/WA) & CIDA
- Survey and study of Green Frog, Turtles & Tortoises, Threatened Waterfowl, River Dolphin and Elephants - Supported by - Govt. Forest Department and Ministry of Environment & Forests.

Conclusion:

To sum up the whole and to recommend for a better future we should think over a few vital points. At the top is the pressure of Population and their basic requirements. So, organizations should come forward to develop sustainable pathways to conserve our wetland especially our fresh water resources through collaborative and participatory action plans. But, it the public is not concerned or included in this program and are not supported through some alternative income generating sources - all those scientific endeavor will end into smoke. A next massive threat lies on dumping or spelling of local pollutants from household to industries directly into our water bodies without recycling. So, a better law and its implementation is required everywhere. To do that mass people should come forward with proper education and understanding. The real solution of Wetland Management and fresh water habitat conservation lies on scientifically approved policies accepted by the Government and the public as well. This can be possible when an enthusiastic group should train and monitor each and every sector in this concern to achieve a sustainable and perpetual natural system.

Key words: Fresh water habitat, Wetland, and their usefulness, Limnological features before and after human mechanism, anthropogenic interference in the natural perpetual flow, impact upon Bio-diversity and future generation.

Acknowledgement:

I am highly thankful to Professor Carl and his team for organizing a timely workshop on such an important issue, the crying need of the present world. Special thanks go to Mr. Tanzilur, for his continued communication and information. I would also like to thank all participants and speakers of the workshop for giving much of their valuable time. It is fine of them, that they have very gracefully come forward in encouraging such a talk of the time. I am afraid, should the world communities get involved in further warfare, such a workshop would not be possible. Above all, I thank the Michigan State University authority for their support for arranging such an important international workshop, needful for all walks of life round the globe. Thank you all for participating and listening.

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