

River Bank Erosion and Environmental Degradation

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Abstract

Environmental Degradation is a widespread problem in our society. It causes in different ways, either man made or natural. In different natural causes River bank erosion one of the prominent factors. It has many looks, like flood, land slide, soil erosion which directly or indirectly effects on the environment of river basin area. Many cases are recorded in hill and semi-hill, even plain region also, where riverbank erosion creates huge losses like destruction of forest due to land slide and erosion, loss of land and degrade of water quality etc. So, it is a very silent killer of basin environment.

Key words:- River Bank, Environmental Degradation, Side Erosion, Loss of land, Bank Erosion, Soil Erosion, Flood, Tsunami.

Introduction

River is a life line of our civilization. It is very true that beginning of life was highly connected with the river. River bank is very important to any society but some time it creates a difficulty to grow the civilization. The side erosion of river brings different problems like loss of land, loss of agricultural resource, settlement, communication and forest etc. So it creates dual problems environmental and socio-economic.

The bank erosion badly effects on environment as like soil erosion, land slide, forest destruction etc. In mountain region deforestation, land slide, soil erosion regularly happened

in a river basin zone due to rapid force of water. It is also happened in plain region at the time of flood and tsunami and heavy force of the movement of water at rainy seasons.

Concept of River Bank Erosion

River bank erosion is one of the most unpredictable and critical type of disasters that takes into account the quantity of rainfall, soil structure, river morphology, topography of river and adjacent areas, and flood.

The riverbank word refers to the land besides a river. Geomorphologically it is a result of river gradation. Riverbank erosion has now become a common phenomenon and one of the major natural hazards. Every year millions of people are affected by the river bank erosion. That's destroying our resource like agricultural land, home, transport route, and crop etc. The impacts of riverbank erosion not only found on our human life but also on the environment. There are lots of examples of long tram suffering of human life by these problems. Human suffer in economic, health, education, transportation, settlement etc.

Process of Riverbank Erosion

Erosion is the process which takes place in the river channel. The erosion process of the rivers is performed two ways i) Chemical erosion ii) Mechanical erosion. Chemical erosion involves corrosion or solution and carbonation, mechanical erosion comprises corrosion or abrasion, hydraulic action and attrition. River erosion is divided into two parts i) Vertical erosion or down cutting ii) Lateral erosion. There is various type of fluvial erosion:

- 1) **Solution:-** This is the process of river basin erosion. It involves the dissolution of soluble materials through the processes of disintegration and decomposition of carbonate rocks. The soluble materials are removed from the parent rocks and mixed with the running water of the river. There are many types of salts removed from the bed rocks through the carbonation process.
- 2) **Abrasion:-** it is the process of the removal of loosened materials of the rocks of valley walls and valley floors with the help of erosional tools. (Boulders, pebbles, cobbles, gravels etc.). The erosional agents are moving down the channel gradient along with water and thus strike against the rocks which come in contact with them. The nature and magnitude of abrasion depends on the nature, size and calibre of

erosional agents. It erosion process operates two ways i) vertical erosion ii) lateral erosion.

- 3) **Attrition:-** This is the mechanical process. When the erosional material moving by the river water they collision each other than the erosional materials break into small part. Small pieces of rock turn into round shape due to collision each other again and again.
- 4) **Hydraulic action:-** it involves the break-down of the rocks of valley sides due to the impact of water currents of channel. Hydraulic action is the mechanical loosening and removal of materials of rocks by water alone.

Different Factors of River Bank erosion

River bank erosion occurs by dually, facts Physical and human. Rivers and streams are dynamic systems as they are constantly changing. The natural process of riverbank erosion can produce favorable outcomes such as the formation of productive floodplains and alluvial terraces. Some stable rivers have a healthy amount of erosion; however, unstable rivers and the erosion taking place on those banks are a cause for concern.

Physical Factor of erosion

- a. Stream bed lowering or in fill
- b. Flooding of bank soils followed by rapid drops in followed
- c. Saturation of banks from off-stream source
- d. Redirection and acceleration of flow within the channel
- e. Poor soil drainage
- f. Wave Action
- g. Excessive Sand/Gravel Extraction
- h. Intense Water from Rainfall
- i. Effects of Tsunami

Human Factors of Erosion

- a. Deforestation
- b. Dam and bridge construction

c. Unscientific river boundary

Concept of Environment Degradation

Environmental degradation refers to the deterioration in the physical component of the environment, mainly due to biological processes, but more especially due to human activity, so such a great extent that it cannot be easily restored by the self-regulatory mechanism or homeostatic mechanism of the environment

Environmental degradation may be due to extreme events and hazards or due to pollution.

Environmental degradation is process through which the natural environment is compromised in some way, reducing biological diversity and the general health of the environment. Another concept of the Environmental degradation is the deterioration of the environment through depletion of resource. It is can be entirely natural in origin, or it can be accelerated or caused by human activities.

There are a number of ways in which environmental degradation can work like air pollution, water pollution, deforestation, river bank erosion, soil erosion etc.

Presently, Environmental degradation becomes common concern in the world over the past few decades. Its mean that the situation of present environment is faces the problem by the various causes.

According to Wikipedia, “Environment degradation is the deterioration of the environment through deterioration of the environment through depletion resources such as air, water, and soil, the destruction of ecosystems.

The United Nations International Strategy for Disaster reduction defines environmental degradations as, “the reduction of the capacity of the environment to meet social and ecological objectives and needs”.

Many international organisations recognize environmental degradation as one of the major threats facing the planet, since humans have only been given one earth to work with, and if the environment becomes irreparably compromised, it could mean the end of human existence.

There are mainly three different type of environmental degradation like land degradation, water degradation and air degradation. All the environmental factors are connecting one another and that’s impact or degradation leads to the breakdown of the other factors in nature.

The primary causes of environment degradation is human disturbance and the other causes of environmental degradation are Overpopulation, Deforestation, Landfills, Consumption behaviour, Waste production, Lack of education, Illegal dumping, Agricultural pollution, Littering, Mining, Plastic pollution, Resource depletion, urbanization, industrialization etc. this causes are led to environment change and that have harmful our live and also in our society and nature.

River bank erosion is one of the causes of environmental degradation. It is the causes of climatic-hydrological characteristics of the river basin and another important cause of river bank erosion is human activity. Human activities led to quick erosion of the river bank and that's why quickly change of the river biodiversity.

Some causes of Environmental degradation

- a. Growth of Population
- b. Deforestation
- c. Landfills
- d. Consumption behaviour
- e. Waste production
- f. Lack of education
- g. Illegal dumping
- h. Agricultural pollution
- i. Littering
- j. Mining
- k. Plastic pollution

Some effects of environmental degradation

- a. Acid rain
- b. Biodiversity loss
- c. Floods
- d. Landslides
- e. Soil erosion
- f. Endangerment species
- g. Natural disaster
- h. Global warming

- i. Loss of livelihood for many people

Effect of River Bank Erosion on Environment

Stream bank erosion occurs when the bank along a river or stream gradually wears away during periods of high stream flow. When this process occurs naturally, development and changes to our environment.

Due to river bank erosion the environment is badly affected. There are three types of environment like Physical environment; Biological environment and Socio-economic environment are affected equally by the bank erosion. In this chapter we discuss about the effect of biological environment.

A. Deforestation:- Forest provides a protective cover and prevents soil erosion from occurring. Plant roots also hold soil onto the ground and prevent it from washing away into our streams, lakes and rivers. Presently there are various causes of deforestation in our society like agriculture, infrastructure, forest management, mining etc. but there, a most important cause of deforestation, is river bank erosion.

Deforestation happened at river boundary portion in different ways as like flood and Tsunami and land slide, erosion of soil etc. In the Himalayan belt most of the river highly effect on the forest area beside the basin by its heavy water force. Some time it happened due to over loaded situation at rainy seasons. Continuous side erosion of river creates soil erosion which effect on the plant.

B. Land Slide:- Due to bank erosion landslide happen through the bank line. When in the river channel covered by the siltation material then flooding along the bank line due to heavy rainfall and it's the causes of river bank erosion. When the river water eroded the bank soil through different process then the landslide happened through the bank line. So the landslide mainly occur during the rainy season when in the high flood.

Another causes of the landslide when the river channel migrated due to natural causes then the river eroded the new place and the land slide take place through the bank line.

During rainy season in every year when the water rise in the Dihing River then the water eroded loose material through the bank and the landslide take place through the Namsai district.

C. Soil Erosion:- Presently, Soil erosion is the most important issue in our society. Soil erosion, specifically in the form of bank erosion along a stream channel can cause flooding in several ways. Due to our fault soil erosion increases in the river bank area or in forest area. It has occur in two ways, naturally or man-made. The tree or forest prevents soil erosion. But when due to flood or we cut the tree then the soil erosion is start.

There are various causes' river bank erosion (Current, wave action, flood and other causes) so when wave frequently hit on the bank then the loose soil of the bank eroded quickly and another causes of bank erosion is river current, depending of flow-direction of a river both of the current direct and secondary may hit the river bank and it erodes the bank soil and other material.

Other causes of soil erosion when streams and rivers change their course by cutting one bank and depositing the silt loads and on the other bank. During flash floods, the damage is much accelerated.

Due to deforestation by the man, soil eroded quickly by the heavy rainfall and deposited in the river channel and that's why soil erosion may lead to flooding during the rainy season of the river basin area. The water of the flood is excess so when the water flows it even takes the soil with them and deposited in the river channel and this process continues in cycles every year.

The Kosi river in Bihar is reported to have changed its course westwards by 100 km within the last 100years. The lots famers are suffer and some time they cannot produce the crop, that's why they faced the economy problem.

D. Water Pollution:- Due to erosion of river bank the sediment deposition in river channel and increases water turbidity making it difficult for light to penetrate the water. This causes problems for aquatic plants that need sunlight for photosynthesis. Soil erosion introduces contaminants and sentiment into aquatic life and also resource. The erosional material is also rich in nutrients like phosphorus and nitrogen, this promotes excessive growth of algae in the water, and that's why aquatic animal are death due to lack of oxygen. Another causes of water pollution is due to flood litter and trash are mixed with the flood water and after this water mixed with the river water and polluted the river water.

E. Change in River Biodiversity:- Erosion creates two major water quality problems- excess nutrients and excess sediment which can negatively impact aquatic life. Rivers and their floodplains are among the most important environments in our society. There are various types and large number of species of animal and plants are found in the river water and bank of river. Indian rivers are some of the last global frontiers of rich freshwater bio diversity, endangered and threatened species. Presently, due to massive erosion of the river bank area and dynamic nature of rivers, the habitat includes aquatic and terrestrial face the problem and them often changing their life style. So the biodiversity of river are seriously affected by the erosion. Due to massive deposition of siltation material in river channel the river biodiversity is change day by day and river plant and aquatic life is face the problem.

Also, due to deforestation by the river bank erosion there are biodiversity losses in the bank area of river.

Conservation of Environment of Degradation of Basin Area:- Today, India's Rivers, riverine biodiversity are facing major threats. So conservation is need to environment in the basin area.

In current circumstance, there are increased human activities and natural phenomena of the environment like cyclone, floods, landslide, and deforestation by nature and human etc. which degraded the environment, so conservation is needed in our society for our future. Actually conservation means to protect of the environment. It can be defined as the management of environment so that the present generation may gather sustainable benefit from the environment while effectively maintaining its potential to meet the requirements of the future generations. Conservation methods in general can be in-situ or ex-situ.

So in the basin area to protect our natural environment, take necessary stapes or apply various methods to conserves the environment degradation:

A. Soil Conservation: The conservation and restoration of land is necessary to protect our cultivated farms and expand available food production for the future. Soil of the river bank is highly fertile so it is necessary to protect of the bank soil. The loss of topsoil is dangerous because most of the soil nutrients are found in this soil layer.

To conservation measures of soil is necessary but it also fulfilling the following objective:

- a. Protection form surface from direct rain drops.
- b. Increase in rainwater infiltration.
- c. Decrease the volume and velocity of surface runoff.
- d. Enhancement in soil resistance to erosion.

The soil conservation measures mainly two types a) Crop management and b) providing mechanical protection and soil conservation devices and practices.

Therefore, to protect the soil some steps we can follow:

1. Extensive survey of affected areas.
2. Classification of agricultural and forest lands on the basis of land capabilities.
3. Identification of areas affected by low, moderate and severe soil erosion.
4. To use the different method to protect the river bank soil like tree plantation, beautification of river bank etc.

B. Water conservation: There should be vigorous efforts to control water pollution with the involvement of individuals, communities, governments and social activist groups. According to WHO the lots of people who suffer for water and they did not get healthy water for drinking. The people who lived near the river bank they used the river water for their various household purpose, so it is necessary to protect the river water and also conserved the water.

So we can take the following steps to protect the water pollution:

- a. Mass social Awareness should be inculcated regarding the nature and effects of water pollution.
- b. Strict laws by the government
- c. Used material we throw the specified place.
- d. We can use net in front of drain.

C. Stop Deforestation:- in order to mitigate the adverse of environment degradation, it is crucial that we stop or least reduce the issue of deforestation. Tree did not give only oxygen and also protect our environment. Forest protects the soil erosion, landslide,

and it's protecting biodiversity. It is a natural habitat for many animals and plants which may become endangered due to cut down the forest.

Therefore, stopping deforestation is crucial for our environmental system. So we can take some stapes for deforestation.

- a. Awareness program for importance of forest.
- b. Afforestation and reforestation program.
- c. Social forestry.
- d. Taken necessary laws by the Government.

So we can take the various stapes to reduce the landslide like Increase in vegetation cover, Land use practices, Surface drainage control, to constructed retaining walls etc. and the other stapes can take to protect the valuable land near the river.

So conservation is necessary to protect our environment and also the biodiversity of river because river is one of the value able resources in our society. There are found lots of precious material and other river product which is main income source of the river basin people. The forest of the river bank protect of the fertile soil so it is need to protect the forest and also soil of the river bank. There we found the various type of biodiversity so it is necessary to protect this biodiversity.

Conclusion

Though river bank is very necessary for the development of society but its negative imprint always create a great environmental loss in different ways. It is a serious problem in our society & becomes dangerous in day by day in our world. If we don't care such a serious issue of environmental degradation, then a severe environmental disbalance situation will be occurred in future at river basin region. So we have taken necessary steps to protect our environment degradation by preserving the river bank in proper scientific ways it is also necessary to increase social awareness regarding this issue for increase the sustainable situation of environment.

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