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# EARTH ROOT

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**Can We Still Turn a Blind Eye to Climate  
Change?  
( Dr. Bharti Sharma )**



# About E-magazine

“Earth Root” is an open access e-magazine in the discipline of Environmental sciences published by Earth Root Foundation. The aim of the e-magazine is to provide information and upgradation of knowledge about environmental issues on wider scale and to share ideas and resources to the readers. Using essential knowledge people can lead a healthy life, which is more sustainable and can connect with ongoing efforts for stopping catastrophically the climate change. E-magazine caters to all related environmental aspects ranging from big issues like climate change, renewable energy and pollutants in the atmosphere to the health of human and living beings on Earth. We also take topics of water resources and efforts and measurement to provide optimum use of it; including large scale atmospheric circulation linked with oceans and ecology.

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# CAN WE STILL TURN A BLIND EYE TO CLIMATE CHANGE?

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“We are the first generation to feel the effect of climate change and the last generation who can do something about it.”

**- Barack Obama, Former US President**



Should we be surprised that climate change has made its way into our day-to-day vocabulary, so much so that it sounds absurd and judgmental to propose its definition while attempting to discuss the major concerns relating to climate change? The even greater irony of the matter is that despite the awareness about the issue and how grave it is becoming with each passing day, we still seem to only talk about it, express our concern, discuss its hazardous results and then continue with the activities that led to the starting point of climate change in the first place. It is high time that we should feel worried about it, as the disaster caused by climate change is approaching us at an accelerated speed, and any time, the future ecological dystopia will become our present reality.

Environmentalists constantly revolt against the mindless experimentation and exploitation of natural resources and, often, are perceived as people who do not understand the importance of a forward-looking mindset and are ignorant of the role of technological and scientific advancement at this juncture of human civilisation.

Their concerns are often ignored as the irrelevant words of the ones with primitive approaches towards life – how can the environment's health be perceived to affect human life in such a grave manner in the face of all the technological and scientific progress we have so painstakingly made over the years?

But the bitter truth is that in the last few years, the effects of climate change have become so conspicuous that one cannot ignore them even if one wishes to. There is a crisis posed in terms of our basic survival needs. This should alarm us from the long slumber that ‘the average temperature of the Earth’s surface is now about 1.1°C warmer than it was in the late 1800s (before the industrial revolution). The last decade (2011-2020) was the warmest on record, and each of the last four decades has been warmer than any previous decade since 1850’.<sup>1</sup> Studies show that the Arctic Sea ice is reducing by 13.1% per decade; 418 billion tons of ice sheets melt yearly and the global sea level is rising by 3.3 mm per year.<sup>2</sup> All these are affecting planet earth's health and drastically changing our living conditions in an unprecedented manner.

Water scarcity and contaminated water are only part of the problem, as what follows are the various health issues that sometimes are beyond treatment. Floods, forest fires, droughts, storms and societal damage are the other ends of the extreme related to water. Even the geophysical phenomena are eventually affected by climate change; volcanic eruptions, earthquakes, and tsunamis are all indicators of how climate change is causing a danger to human existence. Warmer land and air are one of the initial effects of climate change, and no one is untouched by its harmful results. The warming of the oceans, melting of sea ice and glaciers, rising sea levels, ocean acidification, changes in ocean currents and unusually extreme weather conditions<sup>3</sup> are the starting points of more alarming issues directly affecting us. Mass migration due to climate change and other related factors has led to problems that require immediate attention and solutions. Not only that, climate change has also led to the extinction of many animal species and habitat destruction. Changes in seasonality, infrastructure damage, and food insecurity affect our way of living and cause behavioural changes that often go unnoticed.

Martina Igini, the Managing Editor of Earth.Org, points out in her article on the 'tipping points of climate change', "Prior to the Industrial Revolution and all the subsequent detrimental human activities, the global average amount of carbon dioxide was about 280 parts per million (ppm). Today, that level is close to 420 ppm; and every tonne of CO<sub>2</sub> emissions adds to global warming."<sup>4</sup> Every step taken in the name of advancement is leading us towards a catastrophe. One cannot deny that greenhouse gas emission constantly changes the weather pattern and our ecological system, and may result in irreversible consequences. Our day-to-day activities or one can rather say the mere act of living on our terms, is causing drastic changes in the environment – the burning of fossil fuels in the modes of transportation, emissions by industries,

, unnecessary use of electricity, internet usage, the recent introduction of cryptocurrency, use of fertilisers and deforestation<sup>5</sup> – everything is making us responsible for turning the earth into a deadly gas chamber for posterity.

Before it is too late, we need to be mindful of the choices we are making for ourselves. Unfortunately, every step we take in the name of human progress and evolution moves us farther away from our connection with and fulfilling our responsibilities towards the environment. The gravity of the matter can also be put in perspective by the fact that, in recent times, even the entertainment has focused on the issue of climate change. To name a few among many at the regional, national and international level, in films, series and documentaries like Bhopal Express (1999), Kadvi Hawa (2017), Bhatinda (2017), An Inconvenient Truth (2006), The Day the Earth Stood Still (2008), Chasing Ice (2012), Eating Our Way to extinction (2021), Burning (2021), Don't Look Up (2021), the filmmakers have constantly drawn attention to the causes and impact of catastrophic climate shift including issues of scanty rainfall, barren lands, fires, water-contamination, increasing number of thermal power plants and factories, melting glaciers, political indifference and inaction, lack of media attention, dire consequences of human actions, and the negative impact of the food industry while also suggesting the possible solution to the global issue.

As intelligent as the human species is believed to be, we know that rarely any environmental change happens overnight. Therefore, when we express our concern for climate change, it is inevitable for us to look back and analyse what led to the current situation to find out solutions to it and see if it is only a retreat in certain aspects that can redeem us or if it will take an entirely different course of action to save the climate and ourselves. In both scenarios, a consciousness of the past and future is what we need. What we now need to realise is that the emergent need to remove that blindfold of selfishness and self-

importance is standing face-to-face in front of us, and if we do not still pay heed to it and continue with our destructive actions, we will soon be devoured by our desire for control and self-sufficiency. Now is the time to address and hold conclusive discussions to answer all the questions that climate change has posed before us. We must efficiently execute our plans and take measures to avoid environmental deterioration. We must ensure that we immediately stop all the activities impacting the environment negatively and, if not that, adopt more environment-friendly alternatives even if it is done at the cost of initial inconvenience. We need to sincerely and altruistically address the issue of the continued burning of fossil and look for methods that are not harmful to our climate. There is also a need to accept that many of the recent natural calamities are part of the vicious circle of destruction by human beings and vindication of nature in turn; therefore, we must stop our destructive steps before it is too late. Most of all, we must ensure the success of the 'green' agenda and limit activities that increase carbon footprints in any way.<sup>6</sup>

At an elementary level, we can adopt some preventive measures to avoid further deterioration of climate conditions. It is vital to encourage the use of renewable energy resources and invest in energy-efficient and good-quality electric appliances to reduce the harmful effects of energy consumption. Saving water in whichever way possible also reduces the energy consumption used in water treatment. No food wastage, and composting the leftover food helps create a better environment.<sup>7</sup> It requires a little effort until that first step becomes a habit.

A change in our socio-political approach and increased sensitisation towards climate will ensure the well-being of our environment. With that, as we continue making technological, industrial and scientific advancements, we should also remember that renewable resources and immaterialist behaviour patterns are a --

we should also remember that renewable resources and immaterialist behaviour patterns are a way to a healthy ecological system that benefit all. Systematic approach and thoughtful development patterns are a way to construct a sustainable society that paves the way for a future that would be more welcoming than dystopic. Even the most minor step taken in the right direction makes a huge difference and can lead to collective consciousness and actions to reverse the negative impacts of climate change.

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# IN-SITU BIOREMEDIATION AND ITS APPLICATIONS

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## Introduction -

Bioremediation is the process, which abates or cleans up contamination. It is a type of waste management technique which that uses living organisms or their by-products to remove pollutants and contaminants from the environment.

Bioremediation also involves the use of organisms to remove or utilize the pollutants from a polluted area. There are several remedies where contaminated water or solid is purified by chemical treatment, incineration, and burial in a landfill. Bioremediation has no use of toxic chemicals. Microorganisms like bacteria and fungi are the main role player in the process of Bioremediation. Bacteria break down the waste into nutrients and organic matter. Even though this is an efficient process of waste management but bioremediation cannot destroy 100% contaminants. Bacteria can easily digest contaminants like chlorinated pesticides or clean oil spills but microorganisms fail to destroy heavy metals like lead and cadmium. In this article further we will discuss about In-Situ Bioremediation.

## In-situ Bioremediation -

This involves treating contaminants directly in the contaminated soil or water without removing them. This approach is more cost-effective and less disruptive than Ex-situ bioremediation. In-situ bioremediation can be further classified into:



## Bioaugmentation-

Adding microorganisms to the contaminated site to increase the population and activity of indigenous microorganisms. This technique can be used to enhance the biodegradation of organic pollutants, such as petroleum hydrocarbons and chlorinated solvents. The addition of microorganisms, such as bacteria or fungi, can increase the activity of microorganisms, resulting in faster and more complete degradation of pollutants. In wastewater treatment plants, the biodegradation of contaminants or pollutants by harnessing microorganisms present in activated sludge is one of the most important strategies to remove organic contaminants from wastewater.

## Applications of Bioaugmentation -Chlorinated and Fluorinated Compounds Removal

Halogenated compounds are used in various applications, such as plastic components, lubricants, adhesives, solvents, degreasing agents, pesticides, fungicides, and worldwide, the total amount of chlorinated solvents used as 764,000 metric tons.



Such as extensive use in both industry and homes leads to contamination of wastewater, and bioaugmentation has proven to be an important strategy for their elimination.

### **-Lignin Removal**

The pulp and paper industry generates large volume of wastewater with a high lignin content, Known as black liquor. Selection and addition of lignin-biodegrading microorganisms into waste water provides an attractive strategy to remove specific pollutants originated from black liquor.

### **-Quinoline and Pyridine**

Quinolines and pyridines are N-heterocyclic aromatic compounds commonly found in industrial and pharmaceutical raw materials and used as solvents for dyes, paints, and wood treatment chemicals, which leads to their presence in industrial wastewater. They persist in the environment because of their low biodegradability, and they are carcinogenic. A report showed the enhancement of quinoline biodegradation by using *Bacillus* sp. Isolated from soil in a 250mL batch reactor, filled with petroleum refinery wastewater.

### **-Synthetic Dyes**

Synthetic Dyes, which primarily consist of azo- and anthraquinone-based molecules, are extensively used in textile and cosmetics, and over 7 x 10<sup>5</sup> tons of dyes are produced per year. It is estimated that 2%-10% contaminate the environment, primarily through industrial waste water.

### **-Cyanides**

The industrial wastewater must be treated before being discharged into the environment. To enhance the efficiency of the biological removal of cyanides, bioaugmentation was applied to a full-scale coke wastewater treatment process by using cyanide-degrading yeast *Cryptococcus humicolus* and unidentified cyanide-degrading microorganisms in waste water that contained ferric cyanide.

### **-Bio stimulation**

It involves providing nutrients or other substances to stimulate the growth and activity of indigenous microorganisms. In this technique the biodegradation of organic pollutants, such as petroleum hydrocarbons and chlorinated solvents are enhanced. The addition of nutrients, such as nitrogen and phosphorus, can increase the activity of microorganisms, resulting in faster and more complete degradation of pollutants.

### **Applications of Bio stimulation**

The major contaminants that can be successfully remediated through biostimulation are petroleum hydrocarbons, sulphate and polyester polyurethanes.

### **- Phytoremediation**

Using plants to remove or detoxify contaminants from the environment. To remediate a wide range of contaminants, heavy metals, organic pollutants, and radioactive substances. Plants can absorb, store, and/or metabolize contaminants in the soil or water, resulting in the breakdown or transformation of contaminants into less harmful substances.

### **Applications of Phytoremediation**

#### **-Heavy Metal Removal**

It can affect soil and water quality, plant and animal growth, and human health. Metals have metallic properties such as density, conductivity. This is where phytoremediation and its application come in. Most of the plant species can immobilize metals.

#### **-Removal of Fly Ash**

Thermal power plants produce a large amount of coal fly ash (600 million (tons/year). The disposal of fly ash causes important health and environmental hazards. Thus, its disposal has become a major worldwide concern. Phytoremediation is a practical, and cheap way for revegetation of fly ash dump sites. A study has shown that (*Vetiverianzizanioides*) grass can remediate fly ash dump sites.

Besides Phytostabilization of heavy metals, *Vetiveria zizanioides* also reduces genotoxicity.

### **-Phytoremediation of landfills**

Landfilling offers an inexpensive means of waste disposal. But if not managed it can cause serious contamination to the environment. Phytoremediation has proven to be a promising technique. Phytoremediation technique use trees to remediate the contaminants on landfills sites.

### **-Phytoextraction**

It is uses to collect metals. It involves root uptake of metals and their migration from the xylem to the shoots and leaves. These are then harvested and removed from the site. Sunflower (*Helianthus annuus*) has been the most used species for phytoextraction. Its growth and high potential are good for the remediation of toxic contaminants.

### **-Phyto-stabilization**

This approach uses plant root to restrict contaminant in the soil through adsorption. The main purpose of Phyto stabilization is to detain the contaminants in the rhizosphere. It is a cost effective approach for stabilizing and reducing the bio-availability of contaminants.

### **-Phytodegradation**

This involves microorganisms in association with plant metabolic to detoxify pollutants such as: Herbicides, Chlorinated solvents, Insecticides, Inorganic pollutants. This approach uses plants to absorb and then break down the pollutants. The pollutants convert into inert substances that release into the air.

### **-Phytovolatilization**

This is used to absorb contaminants from polluted sites. It converts them into volatile compounds. Phytovolatilization uses plants for contaminants like mercury (Hg).

### **-Rhizofiltration**

It combines phytoextraction and Phyto stabilization. This procedure involves absorption, concentration, and participation of contaminants in wastewater, surface water. This process uses grown terrestrial plants, such as mustard and sunflower. These remove Cu, Cd, Cr, Ni, Pb, Zn, and Fe from aqueous solutions. Terrestrial plants are more helpful for rhizofiltration due to their fibrous and much longer root systems.

## **Advantage of In-Situ Bioremediation**

### **-Eco-Friendly**

At its core, bioremediation is a means to eliminate harmful environmental impacts. Unlike excavation-based remediation processes, which can be disruptive, bioremediation is less intrusive and can facilitate remediation of environmental impacts without damaging delicate ecosystems.

### **-Cost-Effective**


Bioremediation can be a highly cost-effective technology. Typically, the cost of treating a hazardous waste site using bioremediation is quite lower than the cost of using conventional treatment methods.

### **-Scalable**

Bioremediation technology is easily scalable, treating a range of areas from small landfills to massive water treatment plants, For example, sewage treatment plants are the largest bioremediation enterprise in the world, with approximately 34 billion gallons of wastewater collected exactly.

## **Limitations of In-Situ Bioremediation**

The major limitation in In-Situ bioremediation is that the sites are directly exposed to environmental factors like temperature, oxygen supply etc, along with that the seasonal variation of microbial activity also exists.



# THE REVIVAL OF INDIA'S RIVERS: A JOURNEY THROUGH THE PAST, PRESENT, AND FUTURE

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India's rivers have always held an immense cultural and economic significance. They have nourished civilizations, provided sustenance to millions and served as sacred spaces for the people. Over the years however, these lifelines have faced numerous challenges that have led to degradation and pollution of these sacred rivers. Today, as we stand at a critical juncture, it is essential to reflect on the past, evaluate the present, and envision a sustainable future for India's rivers.

In the past, India's rivers flowed freely and supported thriving ecosystems. They were a symbol of abundance and also played a central role in the lives of people. But with rapid urbanization and industrialization, human activities began to take a toll on these water bodies. Unregulated dumping of waste, discharge of industrial effluents, and unsustainable agricultural practices led to deterioration of rivers. The Ganges, Yamuna, and many other rivers suffered from severe pollution, causing harm to both human health and aquatic life. In the present, efforts are being made to rejuvenate India's rivers and restore their former glory.

The Government of India launched the Namami Gange program in 2014, aiming to clean and conserve the Ganges, one of the most sacred rivers in the country. The program focused on sewage treatment, riverfront development, and public participation to bring about a holistic transformation. Similar initiatives have been taken for other rivers as well, such as the Yamuna Action Plan and the National River Conservation Plan. These efforts, coupled with increased awareness and citizen participation, are slowly bringing about positive changes in the health of India's rivers.

However, the future of India's rivers is still at stake. As the country continues to develop, the pressures on these water bodies will only intensify.

Climate change, population growth, and unsustainable water management practices pose significant challenges. Changing rainfall patterns and glacial melt threaten the flow and availability of water in rivers. Deforestation and encroachment along riverbanks disrupt ecosystems and exacerbate the problem.



Moreover, the increasing demand for water, both for domestic and industrial use, puts additional stress on these already fragile systems. To take an example the Yamuna River, one of the major rivers in India, has a rich historical significance dating back centuries. It has been revered as a sacred river and has played a vital role in the development of civilizations along its banks. However, over the years, the Yamuna has faced significant challenges. Rapid urbanization, industrialization, and population growth have led to the discharge of untreated sewage and industrial waste into the river, causing severe pollution and degradation of water quality.

Today, the Yamuna is considered one of the most polluted rivers in the world. The high levels of pollutants, including heavy metals and harmful chemicals, have had detrimental effects on the river's ecosystem, aquatic life, and the health of those who depend on it. Efforts have been made to address the issue, such as the Yamuna Action Plan launched by the government, but significant challenges remain in achieving a clean and healthy Yamuna River.

Continuous efforts are needed to restore and revive the Yamuna, ensuring its ecological well-being and the sustainable use of its water resources for the benefit of present and future generations.

To secure a sustainable future for India's rivers, a holistic and integrated approach is necessary. It requires a shift towards sustainable agricultural practices that reduce water consumption and minimize pollution. Industries must adopt cleaner production methods and treat their effluents before releasing them into rivers. Urban planning should prioritize waste management and sewage treatment infrastructure. Reforestation and conservation of riverine ecosystems are crucial for maintaining the health of these water bodies.

In conclusion, the past, present, and future of India's rivers tell a story of both challenges and hope. While the degradation of these water bodies is a reminder of the detrimental impact of human activities, the current efforts towards rejuvenation provide optimism. By learning from the past, addressing the present challenges, and working collectively towards a sustainable future, we can ensure that India's rivers continue to flow as lifelines for generations to come. Let us join hands to revive and protect these invaluable natural treasures, for they are the lifelines that shape our nation's prosperity and well being.



# SABARMATI RIVERFRONT DEVELOPMENT PROJECT

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## SABARMATI RIVER and AHMEDABAD

- The River Sabarmati flows from north to south splitting Ahmedabad into almost two equal parts.
- For many years, it has served as a water source and provided almost no formal recreational space for the city.
- As the city has grown, the Sabarmati river had been abused and neglected and with the increased pollution was posing a major health and environmental hazard to the city.
- The slums on the riverbank were disastrously flooded and prone to lack basic infrastructure services.
- The River became back of the City and inaccessible to the public

## SABARMATI RIVER and AHMEDABAD

- As a source for drinking water
- As a place for recreation
  - As a place to gather
  - Place for the poor to build their hutments
  - Place for washing and drying clothes

## Abuse of the River

Due to increase in urban pressures, carrying capacity of existing sewage system falling short and its diversion into storm water system releasing sewage into the River.

- Illegal sewage connections in the storm water drains
- Abuse of the River Sabarmati became a place to dump garbage
- Storm water drains spewed untreated sewage into the river
- Open defecation from the nearby human settlements spread over the entire length.
- Discharge of industrial effluent through some SWDs.
- Illegal construction/encroachment of huts/slum on the river bed.
- Encroachments reduced the river's flood carrying capacity
- The river was inaccessible to the public

## SABARMATI RIVER FRONT DEVELOPMENT PROJECT

KPMG (Klynveld Peat Marwick Goerdeler), one of the world's top advisory firms has included Sabarmati Riverfront Development Project in '100 Most Innovative Projects' in the field of urban regeneration(2012) that make cities live as well as sustainable. Ahmedabad Municipal Corporation (AMC) Received Hudco National Award 2012 for innovative infrastructure development for the riverfront project. The project consists both banks of the Sabarmati for a 10.5 km stretch, creating approximately 202 hectares of reclaimed land. There is a water management system for minimizing flooding and clean up the river with new sewage treatment infrastructure.

The Sabarmati River Front Development Corporation Limited (SRFDCL) was established in 1997 for the development of the riverfront in the city. (1)SRFDCL reached out to a number of NGOs and citizen groups for planning and implementation. The process of implementation was done by build, maintain, operate and transfer. SRFDCL appointed Independent Third Parties to supervise the private sector contractors who were selected on fixed time and rate. The fund for the project is to set out different sources that are equity capital, loan funds and proceeds from land sale.

### **Riverfront Land Use :**

The proposed development is of mixed land use that includes commercial, recreational and residential developments within both sides of the river bank from Gandhi Bridge to Sardar Bridge.

### **Development in different sector:**

The major component of the project concludes embankment and reclamation works, construction of roads and installation of infrastructures such as water, sewer network, storm water drainage, etc., resettlement and rehabilitation work, construction of promenades and gardens and maintenance of public spaces.

### **Rehabilitation of slum dweller:**

There were around 12,000 hutments on both sides of the river bank that cover nearly 20% of the critical project area. More than 10,000 families are allotted with houses for resettlement, and 9,078 odd families have already been shifted. Each house is of 26.77 sq m carpet area. Commonly the relocation of a slum is provided on the outskirts of the city, but in this case, it is located near to the prime location of the city.

### **Guzari bazar:**

It is an age-old Sunday market, where 40% of traders were women and half of them describe themselves as Dalits. It was unhygienic and also there is a risk of flood in monsoon. Now, it is spread over 20,00 sq m and 1,600 vendors can do their business on 788 pucca platforms and 783 laris.

### **Dhobi ghat:**

Around 172 Dhobis were using both banks of the river for washing activities. On the eastern bank of the river near Vana Hama is constructed as those ghats spread over approx. 9,400 sq.m area has utility area of about 600 sq m.

There are seven blocks in modern Dhobi Ghat, and each block has 24 units with well-developed water supply and drainage system with a water meter for inlet watering.

### **Event area:**

Earlier the dry river had wood to host events like circus and cricket etc. However, a mega city like Ahmedabad requires a proper event management and grand facilitation. So that in an area spread between Sardar Bridge and Ellis Bridge on the west bank has been designed for hosting events such as the Kite Festival, the Marathon, the Cyclothon and Garth Kalyan Mela are organized.

### **Urban forestry:**



Between Vasna Barrage and Ambedkar Bridge, the unique afforestation project is situated over 1 lakh sq.mt area. The natural forestry is being developed with different plant species from Gujarat, including certain very rare species

### **Sewage system:**

To intercept the sewer running into the river and divert it to the treatment plants, the interceptor sewer system was constructed. Earlier the sewage from 36 drainage points directly falls into the river that makes the water dirty, mosquito ridden and unhealthy environment. Now, there is an extreme change in the environment around the river because all sewage goes to a pumping station for transformation it to river quality

### **Promenade:**

A key feature of this project is a two-level, continuous walk on both sides of river bank built just above the water level for pedestrians and cyclists. So there will be no private ownership of the river bank and the whole stretch is open for every citizen.

### **Public garden / flower garden :**

For parks and garden space 27% of project land is developed. There are three gardens. Garden of 60000 sq.mt between Sabhash Bridge and Dadhichi Bridge; Garden of 25000 sq.mt at Usmanpura between Gandhi Bridge and Nehru Bridge on West bank and Flower garden of 40000 sq m near the event area on the west bank of the river

### **Water recreation:**

Various water sports are provided in the project on both sides of the river. Boating facilities are available on both side of the river bank in different places. For the future plan, there will be a zip line. Amphibian bus, Sabarmati Darshan through ferry and adventure water sports

### **Project Benefits and Impacts**

It is made possible to retain surface water in the river all year round and also utilized for boat rides etc.

The water recharges the ground strata extensively with storage of 12.5 million cubic meter river water.

Interceptor sewers and sewage diversion network has diverted more than 250MLD sewage from the river and eliminated the pollutants.

Diaphragm walls in the bed of the river have protected from scour and stopped erosion of the river banks.

Retaining walls along both banks has made 202 Ha. land available for further development for the city and also contributed to flood protection.


The embankments on either side of the river has provided wide walkways, many other facilities and green space for the public with extensive tree plantation.

10000 slum dwellers residing on the riverbed have been rehabilitated and resettled in very good PAKKA houses. Many of River users of River like washer men and unorganized vendors are now provided with well organized facilities.

Easy access to the river water through Ghats, Stairs/Ramps.

### **Key Learning from the Project**

- The abused river can be brought back;
- To the city by utilizing the resources of the river itself
- To convert the abandoned land of riverbed and nuisance at the centre of the City into;
- people's attraction
- tourist destination
- to create infrastructural and recreational facilities
- to transform the city more livable with environmental improvement and inclusive development.



# DEPENDENCY OF LIVES ON RIVERS

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## INTRODUCTION

Rivers are more than just flowing bodies of water. They have played a crucial role in shaping the Earth's landscape, influencing climate patterns, and supporting diverse ecosystems throughout history. The dependency of life on rivers is undeniable, as they provide numerous essential resources and services that sustain both human and natural systems. This essay explores the intricate relationship between life and rivers, backed by data that highlight the significance of rivers in our world.

**Water Source:** Rivers serve as a primary source of freshwater, which is essential for the survival of all living organisms. According to the World Wildlife Fund (WWF), over 1.2 billion people depend on rivers for drinking water, particularly in developing countries. This data highlights the critical role rivers play in meeting the basic needs of a significant portion of the global population.

**Biodiversity and Ecosystems:** Rivers are home to a rich array of biodiversity, supporting diverse ecosystems. The flowing water and varying habitats within rivers create a unique environment for countless species.

The Amazon River, for instance, hosts an estimated 5,600 species of fish, making it the most biodiverse river in the world. Furthermore, rivers act as corridors for migratory species, facilitating their movement and contributing to the ecological balance. These data points emphasize the importance of rivers in maintaining healthy and thriving ecosystems.

**Agriculture and Food Security:** Rivers play a pivotal role in agricultural practices and food production. Their water supply is vital for irrigation systems, enabling farmers to cultivate crops and sustain livestock. According to the Food and Agriculture Organization (FAO), irrigated agriculture accounts for approximately 20% of the world's cultivated land but contributes to about 40% of the total food produced globally. This statistic highlights the significance of rivers in ensuring food security and sustaining agricultural activities.

**Economic Importance:** Rivers have substantial economic value, supporting various industries and livelihoods. They serve as transportation routes, allowing for the movement of goods and facilitating trade.

Inland waterways account for around 15% of the world's trade volume, as reported by the United Nations Conference on Trade and Development (UNCTAD).

Inland waterways account for around 15% of the world's trade volume, as reported by the United Nations Conference on Trade and Development (UNCTAD). Additionally, rivers often attract tourism and recreational activities, generating revenue and employment opportunities. These data illustrate the economic dependency on rivers and their contribution to local and global economies.

**Cultural and Historical Significance:** Rivers hold immense cultural and historical importance for many societies. They have shaped human settlements, influenced the development of civilizations, and provided a source of inspiration for art, literature, and religious practices. Numerous historical sites and landmarks are located near rivers, attracting visitors and preserving cultural heritage. This cultural and historical data further emphasizes the deep connection between rivers and human societies.

**Hydropower Generation:** Rivers are a significant source of renewable energy through hydropower generation. The flowing water in rivers can be harnessed to produce electricity, providing a clean and sustainable energy alternative. According to the International Hydropower Association, hydropower contributes to approximately 16% of the world's electricity production. This data underscores the role of rivers in meeting energy demands and reducing reliance on fossil fuels.

**Nutrient Cycling:** Rivers play a vital role in nutrient cycling within ecosystems. As rivers flow, they transport sediments, organic matter, and nutrients downstream, replenishing downstream areas and supporting productive habitats.

Nutrient-rich river sediments are often deposited in floodplains, enhancing soil fertility and facilitating agricultural activities. The data supports the significance of rivers in maintaining nutrient cycles and supporting the productivity of terrestrial ecosystems.

**Climate Regulation:** Rivers influence climate patterns by transporting heat and moisture across regions. Large rivers, such as the Nile and the Mississippi, can act as natural heat exchangers, moderating temperatures in surrounding areas. Additionally, rivers contribute to the water cycle by evaporating water, which then condenses into clouds and contributes to precipitation. This data highlights the role of rivers in regulating local and regional climates, supporting agriculture and influencing weather patterns.

**Flood Control:** Rivers can help mitigate the impacts of floods by absorbing excess water during heavy rainfall events. The natural flow and storage capacity of rivers help regulate water levels and prevent flooding in downstream areas. Floodplains act as natural buffers, absorbing and storing water during periods of high flow. By managing and preserving river systems, societies can reduce the risk of catastrophic flooding and protect human settlements and infrastructure.

**Conclusion:** The dependency of life on rivers is multifaceted and far-reaching, encompassing water supply, biodiversity, agriculture, economy, culture, energy, climate regulation, flood control, and well-being. Rivers are integral to the functioning of ecosystems and the sustenance of human societies. Recognizing and preserving the essential role of rivers in our lives is crucial for maintaining a sustainable and thriving planet for future generations.



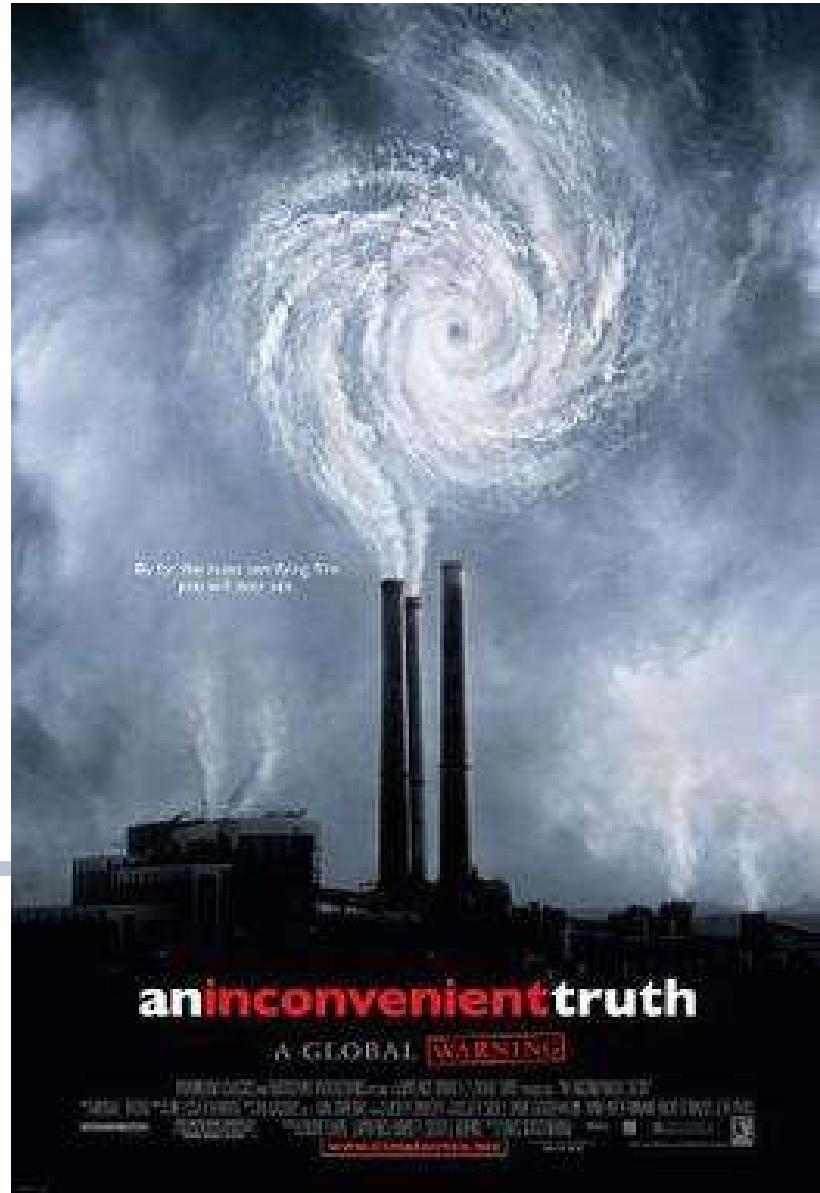
# MOVIE

# RECOMMENDATION

## AN INCONVENIENT TRUTH,(2006)

An Inconvenient Truth presents in film form an illustrated talk on climate by Al Gore, aimed at alerting the public to an increasing "planetary emergency" due to global warming, and shows re-enacted incidents from his life story which influenced his concerns about environmental issues. He began making these presentations in 1989 with flip chart illustrations;[6] the film version uses a Keynote presentation, which Gore refers to as "the slide show".

The former vice president opens the film by greeting an audience with his well-known line about his campaign in 2000: "I am Al Gore. I used to be the next President of the United States." He is shown using his laptop to edit his presentation, and pondering the difficulty he has had in awakening public concern: "I've been trying to tell this story for a long time and I feel as if I've failed to get the message across." Gore then begins his slide show on Global Warming; a comprehensive presentation replete with detailed graphs, flow charts and stark visuals. Gore shows off several photographs of the Earth taken from multiple space missions, as Earthrise and The Blue Marble. Gore notes that these photos dramatically transformed the way we see the Earth, helping spark modern environmentalism.



# ARE THERE POSITIVE BENEFITS FROM GLOBAL WARMING?

Yes, there will probably be some short-term and long-term benefits from global warming. For example, the flip side of increased mortality from heat waves may be decreased mortality from cold waves.

In the short term, farmers in some regions may benefit from the earlier onset of spring and from a longer warm season that is suitable for growing crops. Also, studies show that, up to a certain point, crops and other plants grow better in the presence of higher carbon dioxide levels and seem to be more drought-tolerant. [1] But this benefit is a two-edged sword: weeds, many invasive plant species, and insect pests will also thrive in a warmer world. Water availability will be impacted in drier agricultural areas that need irrigation. At some point, the benefits to crops of increased carbon dioxide will likely be overwhelmed by the negative impacts of heat stress and drought.

In the long term, shipping commerce will benefit from the opening of the Northwest Passage for longer periods of the year due to the loss of Arctic sea ice. However, in the long run, if a "business as usual" approach to emitting heat-trapping gases is maintained at the present rate, or faster, then the negative costs and impacts of global warming are very likely to far outweigh the benefits over the course of this century, with increased potential for catastrophic impacts from more extreme events. [17] In part, this is because any substantial change, whether warmer or colder, would challenge the societal infrastructure that has developed under the current climate.

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SOURCE: -[HTTPS://WWW.CLIMATE.GOV/](https://www.climate.gov/)

# RIVER CONSERVATION

Upon the river's tranquil flow, A story of life begins to grow.  
Its waters dance with shimmering grace, A precious resource we must embrace.

Let's weave a tapestry of conservation, For the river's eternal preservation.  
With mindful hearts and caring hands, Let's safeguard its beauty across all lands.

Cleanse its depths of pollution's taint, Restore the ecosystem's delicate paint.  
From mountain peaks to the ocean's embrace, Let's ensure the river's enduring grace.

Educate and inspire, spread the word, The call for preservation must be heard.  
Together we stand, united and strong, For the river's health, we'll right the wrong.

For in its current, a symphony plays, A harmony of life in myriad ways.  
Let's cherish and protect this vital source, For generations to come, let's stay its course.



## WORLD ENVIRONMENT DAY 2023: HISTORY

The first United Nations conference to have the environment as its primary topic was held in Stockholm in 1972. It also acknowledged that every human being has the fundamental right to live in a healthy environment. The United Nations Environment Programme was established as a result of the conference, which became a historic global effort to preserve the environment.

In addition, this event marked the official establishment of June 5 as World Environment Day. Since then, the UNEP has made numerous international efforts to safeguard our natural environment.

## WORLD ENVIRONMENT DAY 2023: IMPORTANCE

World Environment Day serves as a voice for a number of environmentalists in the face of these environmental disasters. It is a day that commemorates and calls attention to the ongoing negative effects of climate change and global warming. As a result of environmental ignorance, some of the effects of climate change include the loss of life, property, biodiversity, and even resources. Over the course of more than 50 years, World Environment Day has served as a platform for environmental activists to assist common people in comprehending and assisting our natural environment.

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