

ECHOES OF THE MARSH

Institution Name

BHAVANS VIDYAMANDIR, ELAMAKKARA

Date of Submission

25 -11-2024



PROJECT LEADERS

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MODEL CONFERENCE OF PARTIES 5

REPORT

MODEL CONFERENCE OF PARTIES 5 ACTION PLAN

School Name: Bhavan's Vidya Mandir, Elamakkara

MCOP5: Target 1: Adopt a wetland in your city and work to conserve it through building public awareness, leading collective action and promoting effective implementation.

ACTIONS	HOW?	WHO?	WHEN?	HOW WILL PROGRESS BE MEASURED?
1 Survey/Investigation	1.Exploring the surroundings and identifying at least two plots. 2. Getting to know people's opinion by interviewing them. 3.Identifyingthe different aspects/features of the wetland.	Students with the help of teachers.	August-September 2024.	Recording the information acquired in a word file.
2 Identification of the problem	1.Check for physical pollution in the form of littered garbage. 2.Check for invasive species, weeds and other unwanted plants.	Students participating in the MCOP5 Challenge.	August-September 2024.	Find out reasons for pollution and weighing of collected garbage. List out weeds and invasive species.
3 Getting authoritative sanction	1. Talking to the required authorities and getting consent.	Students with the help of teachers	August-September 2024.	Sanction from the authorities.
4 Spreading Awareness	1. Rallies, pamphlets.	Students and the local community.	September 1 st week.	Conducting quizzes, seminar sessions, etc.
5 Preserving/Conserving of endangered species of plants and animals.	1.Identification and researching of endangered species.	Students participating in the MCOP5 Challenge.	September 2024.	Entering the information in a tabular form.

THE DRIVING QUESTIONS

- How can we redesign a wetland to make it more environmentally sustainable?
- How can we create awareness about our diminishing wetlands with a showcase project?
- How can we teach children to be stewards of the environment?

PROJECT SUMMARY

Teachers and students of Bhavans Vidya Mandir, Elamakkara took up the challenge of creating an environmentally sustainable redesign of a plot of land located near Bhavans South Road, Elamakkara and Shreyas Lane, Puthukalavattam. Students visited the plots; researched the local context, needs, resources, and constraints. They investigated the principles of environmentally sustainable wetland biodiversity design, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions. We engaged in critique and revision processes to come up with a plan to redesign the plot to recreate a wetland ecosystem. The study was conducted from the month of August-November 2024. Two sampling locations were chosen randomly intending maximum spatial coverage of the wetlands. The checklist survey method was adopted for the study (Royer et al. 1998). In every site, the observer searched all the available microhabitats for an hour and recorded the species encountered. All the field visits were made between 9am and 3pm when the adult coordinators were observed to be most active.

BACKGROUND

Ecosystem restoration at a global scale is important if we are to mitigate the extent of the ecological crisis that we are currently facing, and protect the biodiversity for future generations. Our food systems and the revival of forest and agrarian crops depend on healthy soils.

Many of the world's ecosystems have undergone significant degradation with negative impacts on biological diversity and peoples' livelihoods. There is now a growing realization that we will not be able to conserve the earth's biological diversity through the protection of critical areas alone. The question is, how can a community provide enhanced biodiversity outcomes as well as improve human well-being in degraded landscapes in such a way that ecological restoration becomes a fundamental element of ecosystem management.

Wastelands are ecologically unstable lands which are low in productivity and severely affected by soil erosion, stress conditions, and hostile environmental conditions. Poor land use practices result in loss of soil quality and land productivity. To restore the productivity and functions of the wasteland, it is important to restore its vegetation and soil cover similar to pre-disturbance conditions.

STATEMENT OF PURPOSE

Restoring degraded land is often seen as an inspirational or aspirational concept. In many cases, reverting land to an absolute pristine state is not feasible due to the high diversity of species in nature (including plants, animals and microbes), some of which are lost during the period of land degradation. However, restoration aimed at igniting the ability of land to deliver on its ecological services in a sustainable way is a small step towards mitigating the adverse change due to land degradation. This project also aims at sensitizing the youth about the natural ecosystem and the importance of adopting sustainable practices and restoration of the natural flora and fauna.

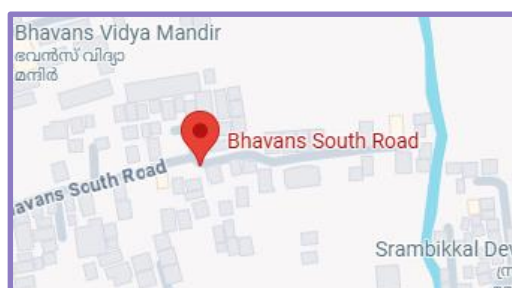
AREA CHOSEN FOR THE PROJECT

Location

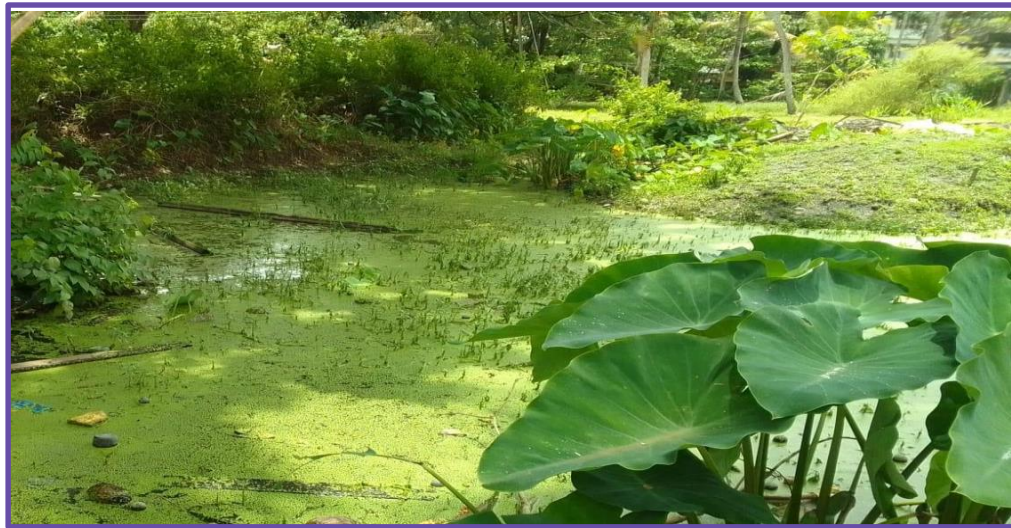
Over the past few years, the project area, adjacent to the BTS South Road has suffered severe neglect and has undergone serious land degradation which has manifested as decreased land productivity, urbanisation, invasion of exotic plants, weeds and plastic litter.

Plot 1

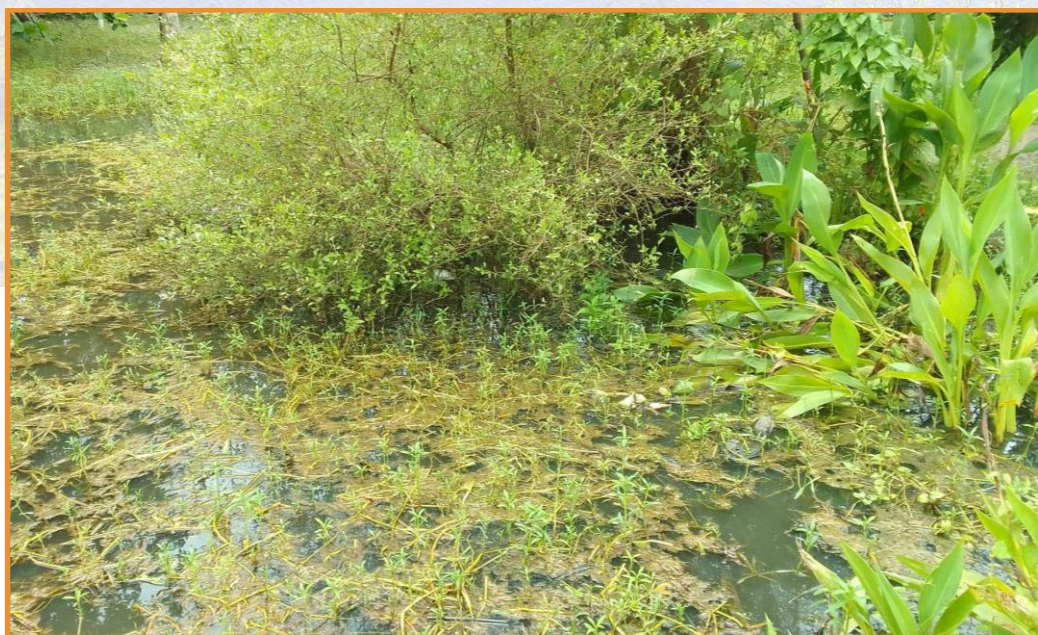
Location



Before Planting



After Planting



Removing weeds



Removing wastes



Videos

Planting

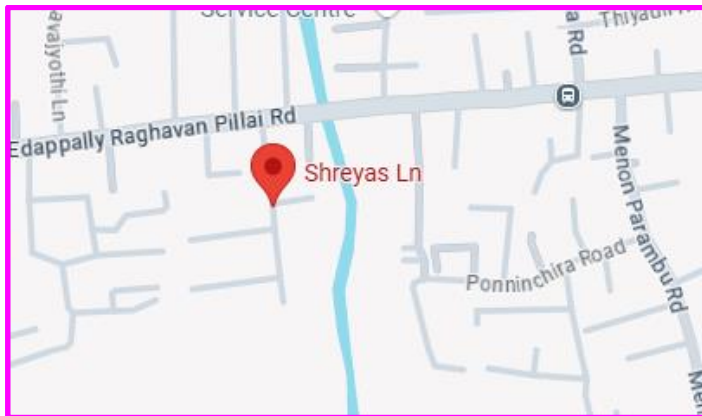
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After introducing fishes

<https://drive.google.com/file/d/1KjvcfrCByPVo6J-8V0xJiCcmgyyKJX9-/view?usp=drive link>

Plot 2

Location



Before Planting



Growth Of Plants



After planting



WETLAND CONSERVATION

The ecosystem functions of wetland:

Wetland Plants-They improve water quality by taking up nutrients, metals, and other contaminants. Wetland plants influence the hydrology and sediments of wetlands by stabilizing shorelines, modifying currents, and abating the effects of flooding.

Dragonfly larvae-The introduction of dragonfly larvae could play a significant role in the regulation of mosquito populations. While they are most effective in their larval stage, adult dragonflies can still eat up to 100, if not many more, mosquitoes per day.

Azolla- Azolla is a water fern which is also used as a bio fertilizer. There are around 80,000 symbiotic cyanobacteria present on its leaves. Symbiotic cyanobacteria, Anabaena Azolla is responsible for nitrogen-fixation which increases the fertility of the soil and in turn enhances the yield.

Reeds-As part of a wetland, reed beds can also help remove excess nutrients from the water, since bacteria on the stems of the reeds can break down the nutrients. Reeds can thus help in cleaning up water

OPPORTUNITIES AND BENEFITS

- Awareness on Biodiversity conservation
- Importance of wetland conservation
- Soil restoration
- Air purification

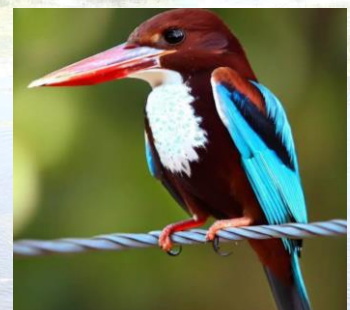
PLANT SPECIES THAT WERE OBSERVED







ANIMAL SPECIES THAT WERE OBSERVED







Observation table

	PLOT 1	Date of observation 9-9-24	Date of observation 15-10-24	Date of observation 9-11-24
PLANT SPECIES	Duckweed	plenty	NIL Water dried up	plenty
	Cattail	uncountable	uncountable	uncountable
	Hydrilla	uncountable	few plants were immersed in mud	plenty
	Osmunda Regalis	one	two we added nutrients to the area	observed flourished growth of plants
ANIMAL SPECIES	White Throated Kingfisher	one		two
	Red Veined Darter		many	many
	Kerala Mystus	5-6	many	many
	Cattle Egret	2-3	2-4	5
	Thula Dragonfly		6	many
	Water Strider	around 10	nil	many
	Damselflies	many	many	many
	Water Hen		2	2
	mosquitoes	plenty	10	2-3
	Tadpoles	nil we released 30 tadpoles and guppy fishes to this area	a few late tadpoles observed	2 young frogs

We collected many waste materials like plastic covers, used slippers, thermocol and other plastic wastes of around five kilograms and disposed of the garbage to Haritha karmasena and removed weeds from the area.

We also introduced **guppies and tadpoles** to this area and we are astonished to observe that it helps to decrease the number of mosquitoes and increase the number of other animals and the growth of plants.

	PLOT 2	Date of observation 12-9-24	Date of observation 16-10-24	Date of observation 10-11-24
PLANT SPECIES	Azolla	NIL	many	plenty
	Floating Lace Plant	uncountable	uncountable	uncountable
	Woolly Sedge	uncountable	few plants were immersed in mud	plenty
	Soft Stem Bulrush	many	many we added nutrients to the area	plenty
ANIMAL SPECIES	White Throated Kingfisher	2-3	2-3	2-3
	Swami Thumbi	many	many	many
	Little Egret	5-6	5-6	5-6
	Onam Dragonfly	many	many	many
	Dragonfly Nymph	around 10	nil	many
	Damselflies	many	many	many
	Ruddy Marsh Skimmer	2	2	2
	Tadpoles	plenty	10	2-3
	Asiatic Water Snake	NIL	NIL	one

We collected many waste materials like plastic covers and other plastic wastes of around seven kilograms and disposed of the garbage to Haritha karmasena and removed weeds from the area.

We also introduced **azolla and added nutrients** to this area and increase the number and the growth of plants.

SPREADING AWARENESS

Wetlands are critical ecosystems that provide numerous environmental, economic, and social benefits. However, they face rapid degradation due to human activities such as industrialization, urbanization, and pollution. Raising awareness about their plight is essential to foster conservation efforts.

Objectives

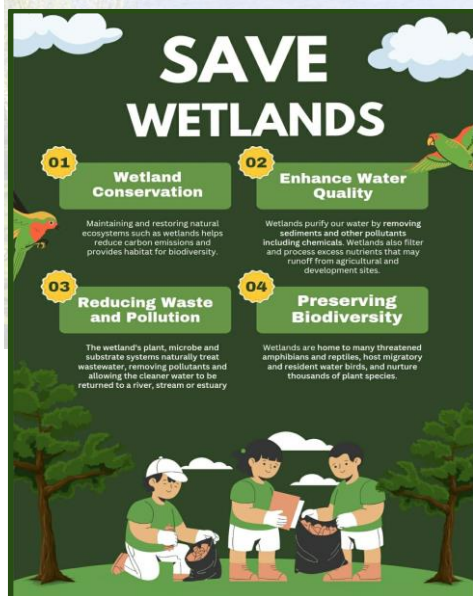
- To educate the public about the importance of wetlands.
- To highlight the causes and consequences of wetland degradation.
- To inspire individuals and communities to take action for wetland conservation.

1. Pamphlets

Pamphlets are cost-effective and accessible tools for disseminating information.

- Content:

- Definition and importance of wetlands.
- Causes of wetland degradation (e.g., pollution, deforestation).
- Impacts of degradation (e.g., loss of biodiversity, increased flooding).
- Ways to help (e.g., community cleanups, eco-friendly practices)





Video link on awareness

https://drive.google.com/file/d/1JOIHZ4m4Go-2dVBfVj-n3lC0UqtoHxd4/view?usp=drive_link

https://drive.google.com/file/d/1mJ6QdwrSr8RxDl1G_JSZCkXnFlb4v5Pv/view?usp=drive_link

2. PowerPoint Presentations

Presentations are dynamic tools that allow for in-depth explanations with visual and auditory engagement.

- **Structure:**

- **Slide 1:** Title slide with an impactful image and slogan (e.g., "Wetlands in Crisis: Act Now").
- **Slide 2-3:** Importance of wetlands (e.g., biodiversity hotspot, flood control, water purification).
- **Slide 4-5:** Causes of degradation, supported by visuals (e.g., photos of polluted wetlands).
- **Slide 6-7:** Consequences of inaction (e.g., extinction of species, climate change impact).
- **Slide 8:** Success stories of wetland conservation.
- **Slide 9:** How individuals and communities can help.
- **Slide 10:** Call to action with motivational quotes and links to initiatives.

PowerPoint link

https://docs.google.com/presentation/d/1IBbbsaBJvf-BfuijiYBb1ZuptCbEQ4F5/edit?usp=drive_link&ouid=102411324920733158325&rt=pof=true&sd=true

Slides of PowerPoint presentation



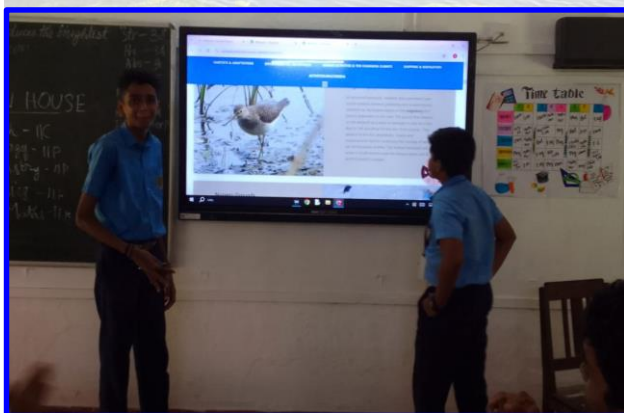
IMPORTANCE OF WETLANDS

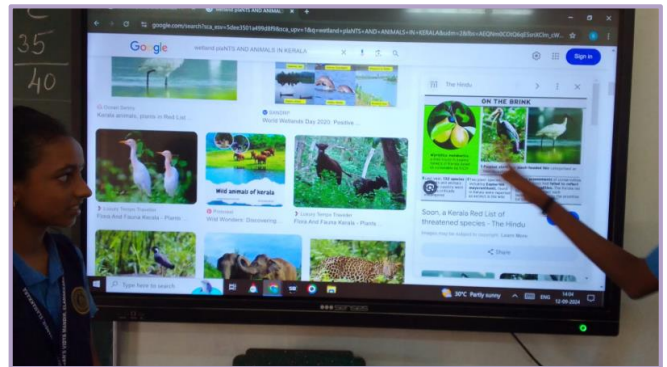
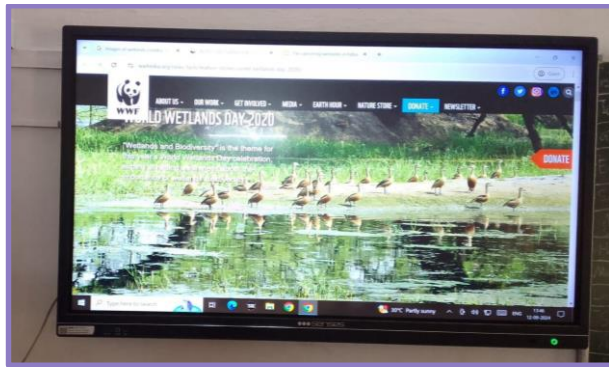
- **Biodiversity:** Wetlands support a wide range of plant and animal species, providing essential habitats for many species, including migratory birds.
- **Flood Control:** Wetlands act as natural buffers, absorbing excess water during floods and reducing the impact of storm surges.
- **Water Filtration:** Wetlands filter and purify water by trapping pollutants, improving water quality.
- **Carbon Sequestration:** They store carbon in the form of peat and soil, helping mitigate climate change.
- **Erosion Control:** Wetland plants stabilize soil and reduce erosion along coastlines and riverbanks.
- **Livelihood:** Wetlands support fisheries, agriculture, and tourism, providing economic benefits to local communities.
- **Groundwater Recharge:** Wetlands help recharge groundwater supplies, supporting ecosystems and human needs.

CONSEQUENCES OF IN ACTION

- **Loss of Biodiversity:** Many species dependent on wetlands may face extinction, disrupting ecosystems.
- **Increased Flooding:** Without wetlands to absorb excess water, flood risks and damages to communities and infrastructure rise.
- **Accelerated Climate Change:** Wetlands will release stored carbon into the atmosphere, contributing to global warming.
- **Decreased Livelihoods:** Communities relying on wetlands for resources and services will suffer economically and socially.
- **Reduced Groundwater Recharge:** Depletion of groundwater supplies, affecting agriculture and drinking water availability.
- **Economic Losses:** Loss of resources for fishing, tourism, and agriculture, undermining local economies.

Awareness classes for grade 3 to 12





CHALLENGES WE EXPERIENCED

Difficulty in planting in wetlands because of

1. Pollution caused itching and skin rashes when we try to planted

We solve this problem by adopting shallow areas and by wearing gloves.

2. When we introduced tadpoles and fishes not able to find out and demarcate them.

3. When we planted in shallow areas mainly grass varieties local people used them for feeding cattles.

4. Slow Growth and High Mortality Rates

Wetland plants typically grow more slowly than upland species, and many have high mortality rates in the early stages of planting. This requires patience and may necessitate multiple rounds of planting or additional maintenance to ensure establishment.

5. Regulatory and Permitting Issues

Planting in wetlands often requires permits and adherence to regulations due to the sensitive nature of these ecosystems. These requirements can add time, cost, and complexity to planting projects.

Permission letter

Lekshmi G (lekshmiepf@gmail.com)

Permission letter

Dear Lekshmi,

I am writing to formally request your permission for modify the wetland near Bhavans South Road, Elamakkara, as part of a project.

The activity will be conducted by the students participating in the project and the teacher coordinates. We anticipate that the process will be conducted between September and November and we promise to take every precaution to ensure that there is no disruption or inconvenience caused.

We want to assure you that we respect your property and will make sure to comply with any regulations or restrictions you may have in place. We will also take full responsibility for any damage that may occur as a result of the activity.

Your cooperation in this matter would be highly appreciated.

Please let us know if you grant this permission.

Thank you for considering our request.

Best regards,

Project Team of Bhavans Vidya Mandir, Elamakkara



Lekshmi G

to me ▾

Yes, permission granted

Dear Arshad sir,
I hope this message finds you well. I 'am reaching out to request permission to work on your land, specifically to plan and plant different types of plants. Our team is eager to collaborate with you and enhance the land's beauty and productivity.

Could you kindly grant us permission to:

1. conduct a site assessment
2. removal of waste products and unwanted weeds
3. plant different types of plants found in wetlands
4. observe inversive species of animal, insects birds etc found there.

We assure you that our work will be done utmost care and respect for your property. Thank you for considering our request.

Best regards,

<arshmanzi@gmail.com> wrote:

Permission to Conduct Site Assessment in Wetlands

I Arshad Khadar , hereby grant permission to Abhinav Shankar to conduct a site assessment in my wetlands

Please comply with all applicable laws, regulations, and guidelines related to wetlands and environmental protection.

Contact me for any questions or concerns.

Sincerely,

Arshad Khadar

<abhinavsankar.3c@gmail.com> wrote:

6. Access and Equipment Limitations

Wetlands are often difficult to access due to muddy or unstable ground, making it hard to bring in equipment for planting or soil preparation. Specialized tools and techniques are often required, increasing costs and effort.

7. Invasive Species Competition

Many invasive plants, like reed canary grass and purple loosestrife, thrive in wetland environments, competing aggressively with native or newly planted species. Controlling invasives is essential but challenging, often requiring ongoing management.

8. Nutrient Limitations and Soil Composition

Wetlands often have unique soil compositions (e.g., acidic bogs or low-nutrient swamps) that may not support typical plant growth. This means that specific, nutrient-tolerant species are needed, and additional soil treatment or amendments might be required.

9. Waterlogged Soil and Poor Drainage

Wetland soils are often saturated, which limits oxygen availability for plant roots. Most plants can't survive in these conditions, as they require oxygen for root respiration. Special techniques, like using wetland-adapted species with a tolerance for low oxygen, are often necessary.

10. Variable Water Levels

Water levels in wetlands fluctuate seasonally or with rainfall, which can drown plants or leave them too dry. Finding species that tolerate these fluctuations is essential, but it still makes establishment difficult.



11. Time constraints.

12. Difficulty in taking photographs.

Overcoming the challenges of planting in wetlands requires a strategic approach that focuses on careful planning, appropriate species selection, and ongoing management. Here are some key strategies we followed:

1. Selected Suitable, Native Wetland Species

Choosing plants that are naturally adapted to the specific wetland conditions (e.g., waterlogged soils) is essential. Native species are typically more resilient and compatible with the local ecosystem. Working with wetland ecologists to select species increases the likelihood of plant survival.

2. Plant During Optimal Conditions

Timing the planting season to coincide with lower water levels or mild weather can give plants a better chance to establish before being exposed to more extreme conditions.

3. Prevent Invasive Species Encroachment

Managing invasive species is critical for giving native plants a chance to establish. Regular monitoring and removal of invasives (through techniques like manual removal, and safe herbicides) .

4. Preparing herbicides and applying photos.

5. Use Special Planting Techniques

Using methods like deep planting (placing plants deeper into the soil to stabilize them) and root stabilization devices can help. Seedlings can also be anchored with stakes or biodegradable netting to prevent uprooting.

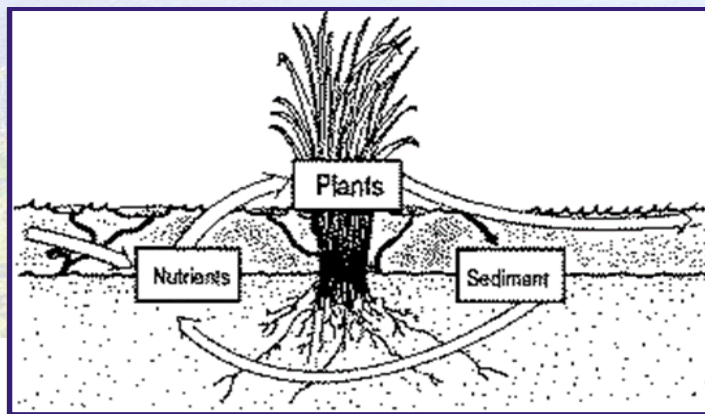
6. Collaboration with Conservation Experts

Partnering with wetland ecologists, and local conservation groups to bring valuable insights and resources to the project. Collaboration ensures that conservation practices align with the specific

Result

Wetland conservation has proven to yield numerous positive outcomes for both the environment and human communities. Some of the key results and benefits include:

1. **Biodiversity Preservation:** Wetlands are habitats for a rich diversity of species, including birds, fish, amphibians, and plants. Conservation efforts help to protect these ecosystems, preserving species that might otherwise face extinction.
2. **Water Quality Improvement:** Wetlands act as natural filters, trapping pollutants, sediments, and nutrients. By conserving these areas, we reduce pollutants entering rivers, lakes, and coastal areas, improving water quality for human use and for aquatic ecosystems.
3. **Flood Mitigation:** Wetlands absorb large amounts of water, reducing the severity and frequency of floods. By restoring and protecting wetlands, conservation efforts help buffer surrounding communities against floods and storm surges, providing critical protection against extreme weather events.
4. **Carbon Sequestration:** Wetlands store large amounts of carbon in their soil and vegetation, which helps in mitigating climate change. Conserving and restoring these areas prevent carbon release that would occur if wetlands were drained or degraded, playing a key role in reducing greenhouse gas emissions.
5. **Economic Benefits:** Wetlands support activities like fishing, tourism, and recreation, which contribute significantly to local economies. Conservation creates sustainable job opportunities, such as in eco-tourism and conservation management, providing an economic incentive to maintain healthy wetlands.
6. **Soil Health and Erosion Control:** Wetlands stabilize shorelines and reduce soil erosion, particularly in coastal areas. Their plant root systems help bind the soil, reducing erosion from waves and runoff, which protects nearby lands and habitats.
7. **Cultural and Recreational Value:** Wetlands hold cultural and historical significance for many communities and Indigenous peoples. They offer spaces for recreational activities, education, and scientific research, contributing to cultural heritage and community well-being.



When these plants die, a large portion of the nutrients return to the water and sediment from decaying plant material. During this period (in late fall and early spring), wetlands serve as a nutrient source when water flows from the wetlands to ecosystems downstream.

Overall, wetland conservation supports both ecological balance and human resilience, making it a vital area for global environmental efforts.

HIGHLIGHTS AND ADDITIONAL INFORMATION

Wetlands are incredibly diverse and provide a unique range of ecological, cultural, and economic benefits. Here are a few additional highlights and insights into why these ecosystems are so crucial:

1. Types and Diversity of Wetlands

- Wetlands include a wide range of ecosystems, such as **swamps, marshes, bogs, fens, mangroves, and peatlands**. Each type of wetland has distinct characteristics and supports different species and ecological functions.
- Coastal wetlands, like **mangroves** and **salt marshes**, serve as buffers against storm surges and are vital for fisheries. Inland wetlands, like **bogs** and **fens**, are unique ecosystems that store carbon and preserve ancient plant materials.

2. Critical Habitat for Migratory Birds

- Wetlands are essential stopover sites for migratory birds, providing them with food and shelter during long migrations. Many species rely on wetlands for breeding, resting, and feeding, and some of the world's most famous bird sanctuaries are located in wetland areas.

3. Reservoirs of Carbon (Blue Carbon)

- Coastal wetlands, including **seagrasses, mangroves, and salt marshes**, are often referred to as **blue carbon** ecosystems because of their exceptional ability to capture and store carbon for centuries, sometimes even millennia. Preserving these wetlands is considered a powerful nature-based solution for combating climate change.

4. Water Supply and Recharge

- Wetlands play a significant role in recharging groundwater supplies. They retain water that gradually filters into underground aquifers, which are crucial sources of drinking water for communities around the world. This process also helps regulate water availability, particularly in arid or drought-prone areas.

5. Economic Value and Sustainable Livelihoods

- Beyond tourism and recreation, wetlands provide livelihoods through fishing, agriculture, and harvesting of materials like reeds and medicinal plants. Sustainable practices within wetlands offer long-term economic benefits without degrading the ecosystem.

6. Natural Disaster Resilience

- Wetlands help communities adapt to and recover from natural disasters. For example, during tsunamis or hurricanes, mangroves absorb much of the wave energy, minimizing damage to coastlines and reducing human and economic losses.

7. Educational and Scientific Importance

- Wetlands are “living laboratories” where scientists can study ecosystem functions, climate resilience, and biodiversity. They also serve as important educational sites, helping communities and students understand ecological interactions and the importance of conservation.

8 Threats to Wetlands

- Despite their importance, wetlands are some of the most threatened ecosystems globally. Draining for agriculture, urban development, pollution, and climate change are major threats, causing significant habitat loss and degradation.

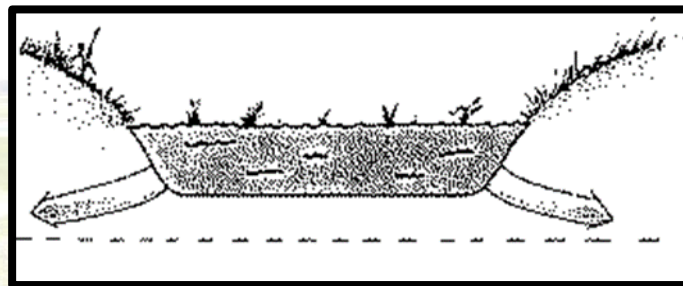
9. Conservation Initiatives and Ramsar Convention

- The **Ramsar Convention on Wetlands** (1971) is an international treaty dedicated to the conservation and sustainable use of wetlands. Ramsar sites are wetlands of international importance, recognized for their biodiversity, and signatory countries work to protect these vital areas.

Wetlands serve as irreplaceable ecosystems that support a vast array of life, sustain human communities, and contribute to global climate stability. Their protection is essential for a balanced environment and resilient societies.

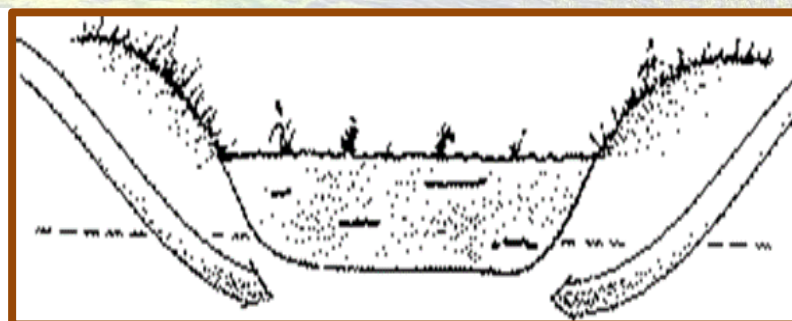
CONCLUSION

Wetlands are invaluable to the environment and human well-being. Efforts to protect, restore, and sustainably manage them are crucial for biodiversity, climate resilience, and ecosystem health.



Water in wetlands, located above the water table, enters into groundwater supplies if the underlying soils allow movement.

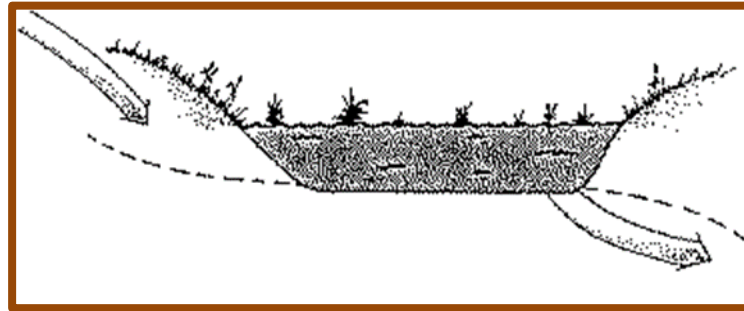
Ecosystem restoration at a global scale is important if we are to mitigate the extent of the ecological crisis that we are currently facing, and protect the biodiversity for future generations. Our food systems and the revival of forest and agrarian crops depend on healthy soils.



Wetlands located lower than the water table can receive groundwater discharge.

Many of the world's ecosystems have undergone significant degradation with negative impacts on biological diversity and peoples' livelihoods. There is now a growing realisation that we will not be able to conserve the earth's biological diversity through the protection of critical areas alone. This

paper explains what is meant by the term "ecological restoration" and outlines how it can provide enhanced biodiversity outcomes as well as improve human well-being in degraded landscapes. In this way ecological restoration becomes a fundamental element of ecosystem management, although until recently, its potential has not always been fully recognized.



The water table slopes into a portion of the wetland and slopes away from the rest of the wetland. Where this "through flow" condition exists, wetlands are often referred to as semi-permanent.

EXPERIENCE

We found that wetland conservation, as demonstrated through this project, is both a challenging and rewarding endeavour that requires a multifaceted approach. The restoration and protection of wetlands play a crucial role in maintaining biodiversity, regulating water cycles and combating climate change through carbon sequestration. The project showcased that significant progress can be made in wetland conservation when a combination of scientific expertise, community engagement and long term commitment are integrated into the process.

Wetlands are dynamic systems and their conservation must therefore be flexible and resilient, adjusting to the natural variations in hydrology, climate and human activities.

Moreover, successful conservation efforts are not possible without the active involvement and support of those who directly interact with the wetlands. Engaging local populations in conservation activities, spreading awareness at the grassroots level are vital components for ensuring the sustainability and long term success of restoration initiatives.

This project underscores the significance of wetlands as natural buffers against climate-related disasters, such as floods and droughts, and their role in enhancing resilience in the face of climate change. The restoration of wetlands not only brings ecological benefits but also provides socio-economic advantages for local communities, through improved agriculture, fishing and tourism opportunities.

Ultimately, this experience reinforces the need for a holistic, integrated approach to wetland conservation—one that balances ecological, social, and economic factors—and encourages continued innovation and collaboration in wetland restoration and protection. The work done so far, while promising, is just the beginning. Future conservation efforts must build on these foundations, with a focus on scaling up successful models, addressing emerging threats, and ensuring that wetlands continue to provide their invaluable ecosystem services for generations to come.

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Contributors M. Jayakumar ((Of the State Committee on Science, Technology, and Environment, Government of Kerala)), Kamalakshan Kokkal, P. N. Premachandran, A. Biju Kumar, Kerala (India). State Committee on Science, Technology, and Environment.

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