BIOINVASION

EIACP newsletter on Biological Invasion

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Ipomea cairica

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Wetland Day Special Issue

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Vitamin D3-rich weed among 18 plants stifling Kaziranga

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The Wildlife Institute of India has sought permission for a pilot project to check the expansion of the invasive plants threatening the rhino habitat more than anything else.

June 23, 2022 03:32 pm | Updated 05:33 pm IST - Guwahati

RAHUL KARMAKAR

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ELACP Editorial Tenn



Dr. Maya Mahajan Coordinator EIACP RP



Sushmita Krishnan Programme officer EIACP RP

From the Coordinator's desk

Ministry of Environment, forest and Climate Change's (MoEFCC) Environmental Information Awareness Capacity Building and Livelihood Programme (EIACP) resource partner at Amrita Vishwa Vidyapeetham is established to disseminate scientific, technical, and semitechnical information on various issues related to biological invasion/Invasive Alien Species and conduct related research and extension activities.

Some of the objectives of the EIACP Centre are:

1. To promote, implement, and coordinate Green Skill Development Programme (GSDP), an initiative to skill youth in environment, forest, and wildlife sectors and enable them to be self-employed. E.g., lantana craft and furniture making, herbal kitchen gardening of native species.

2. To implement and coordinate National Environment Survey (NES) a Grid-based Resource Information and Decision Support System (GRIDSS) for sustainable management of natural resources to fill in data gaps with respect to various environmental parameters such as emission inventory and pollution; forest and wildlife (flora and fauna); wetlands; rivers and other water bodies; public health, etc.

3. To implement and coordinate a community driven Environmentally Sustainable Village Programme (CESVP) with the objective of mobilizing communities on environmental issues, creating decentralized models of development to empower local communities and build an awareness driven atmosphere in villages to adopt environmentally sustainable practices at community level.

4. To build a repository and dissemination centre in Environmental Science, Information and Management (ESIM).

5. To support and promote research, development and innovation in ESIM.

6 To promote national cooperation and liaise with agencies concerned for exchange of environment and biological invasion related information.

Dr. Maya Mahajan

Ipomea cairica - an invasive weed in South India

Bioinvasion poses a significant conservation challenge in the present era, as it endangers native biodiversity, leads to extinctions, and disrupts natural evolutionary processes on a global scale. Many invasive plant species rely on animals as vectors to colonize, establish, and spread by utilizing their digestive systems to disperse seeds through ingestion and subsequent defecation. When non-native plants interact with animal-mediated dispersal of native plants, it disrupts the mutually beneficial relationships that have evolved over long periods of time. Therefore, it is crucial to comprehend the dispersal mechanisms of invasive plants and identify the native seed dispersers to effectively manage them in the future (Anoop et al., 2021). Ipomea sp. Is a significant threat to the native biodiversity of the country.

Ipomea cairica – an overview

The Convolvulaceae family consists of approximately 59 genera and 1880 species. Among these, the genus lpomoea stands out as one of the largest, comprising over 700 species. These species are primarily found in tropical and warm temperate regions across the globe and are commonly known as "**morning glories**." The majority of plants within this genus are characterized as twining climbers and encompass a variety of life forms, including annual and perennial herbs, lianas, shrubs, and small trees (Stevens et al., 2016).

Ipomoea cairica is a robust and enduring climber that has been widely introduced as an ornamental plant in tropical, subtropical, and temperate regions. It is a fast-growing vine that easily spreads through seeds and fragments of its stems. Once established in a new environment, it possesses the potential to outcompete native plants and completely dominate the available space by climbing and overshadowing other plant species. The trailing and climbing stems of I. cairica wrap around neighbouring plants, suffocating native shrubs and trees and hindering their growth and ability to regenerate (CABI Digital Library). Ipomoea cairica propagates through both seeds and vegetative means, as it can root along its stems. Wind and water play a role in dispersing its seeds, while stem fragments are commonly dispersed through discarded garden waste and can also be carried by water.

Taxonomic Position

Domain	: Eukaryota
Kingdom	: Plantae
Phylum	: Spermatophyta
Sub-phylum	: Angiospermae
Class	: Dicotyledonae
Order	: Solanales
Family	: Convolvulaceae
Genus	: Ipomoea
Species	: Ipomoea cairica



Source - CABI Digital Library - compendium

Distribution

Reproduction



Ipomoea cairica possesses flowers with both male and female reproductive structures, making them bisexual. These flowers are visited by various pollinators, including bees from the Apidae family, flies from the Diptera order, and butterflies from the Lepidoptera order. In China, carpenter bees (Xylocopa spp.) have been identified as particularly effective pollinators for this species. Experimental studies involving controlled hand selfpollination have revealed that I. cairica exhibits selfincompatibility, as indicated by the absence of fruit formation in the flowers (Jia et al., 2007). Fruits and viable seeds are only produced when cross-pollination occurs. It is worth noting that spontaneous selfpollination in I. cairica resulted in a failure of fruit formation (Maimononi – Rodella et al., 1982).

Impacts on the Environment

Ipomoea cairica is currently classified as a highly problematic weed and poses significant harm to the environment in various regions, including southern China, India, Japan, Australia, Singapore, the Canary Islands, Cuba, and numerous islands in the Pacific. This invasive vine, known for its rapid growth, has the ability to suffocate native vegetation and disrupt native ecosystems by reducing biodiversity and altering the natural progression of ecological succession. I. cairica spreads rapidly, forming thick mats on the ground or climbing over trees, leading to detrimental effects on both the host trees and the plant species in the understory. The trailing and climbing stems of the vine coil around nearby plants, suffocating and killing native shrubs and trees, and blocking sunlight from reaching the plant species in the lower layers. This habitat destruction can also result in the displacement of native animals (Weber et al., 2006).

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National Workshop on Mission LiFE- 2023 MoEFCC , New Delhi

We are happy to share a comprehensive report on our participation in the National level workshop and exhibition conducted by the Ministry of Environment, Forest and Climate change. As our founder Mata Amritanandamayi rightly quoted "The world should know that a life inspired by love and service to humanity is possible". True to this saying, our efforts were lauded with another feather of appreciation to our cap by the Ministry of Environment by inviting us to exhibit in the National Workshop in New Delhi.



Participants of the workshop





On 30th January, 2023, Ministry of Environment, Forest and Climate Change organized a National Workshop and Exhibition on Mission LiFE (Lifestyle For Environment). The team led by Dr. Maya Mahajan consisting of Programme Officer Sushmita and GSDP master trainer/tribal community representative Mr. Veerasamy represented the Amrita EIACP team at the workshop conducted in New Delhi. The team set up an exhibition showcasing the Lantana furniture at the exhibition stall.

The Honorable minister for Environment Shri Bhupendra Yadav visited the stall and lauded the efforts of Amrita team in showcasing a significant show. Other senior dignitaries of the Ministry visited the exhibition and expressed their appreciation to Dr. Maya Mahajan for successfully embarking a mission of sustainable future through efficient utilization. Mr. Veerasamy was appreciated for breaking societal odds and taking forward his outcomes of the GSDP training to a sustainable business model. There was a brainstroming session on Mission LiFE, in which Dr. Maya shared her views on actionable solutions for sustainability. Her views were appreciated by the Ministry.







The video of the Honorable minister visiting our stall can be found in the following YouTube link.

When the exhibition was open to public after 12pm, many scientists from reputed institutes of MOEFCC, other institutes of eminence and officials from other ministries visited our stall and were enthralled to see the miracles of transforming a weed to a commercial product with extensive durability and value.





Naming a few, some two IFS officers (photo attached below text) from the Delhi National Zoo were amazed by how the *Lantana camara* stem has been utilized as they have seen the menace of Lantana in Indian forest on - ground.



At the end of the exhibition, as a token of appreciation and motivation, many visitors and officials of the Ministry purchased our Lantana furniture and showed their support to scale grassroot efforts of ENVIS at Amrita led by Dr. Maya in uplifting tribal communities to greater heights. This reflected the potential of Lantana in finding it's significant place in the global market and the impacts of the projects taken up at ENVIS. They also appreciated her grit and determination to constantly engage with projects at the grassroot level with global impact.









G20 Working Group on Education -2023 at Amritsar, Punjab

The Ministry of Education hosted the 2nd Education Working Group (EdWG) meeting in Amritsar, Punjab from 15th-17th March, 2023. 28 G20 member countries, guest countries & invited organizations (OECD, UNESCO & UNICEF) participated in the 3 day event consisting of seminar/exhibition and working group meetings.

The seminar on 'Strengthening Research and Promoting Innovation through richer Collaboration' was organised at Khalsa College by IIT Ropar with collaborative inputs from prominent Higher Education Institutions such as IISc Bengaluru, IIM Amritsar and TISS Mumbai. Dr. Maya Mahajan also participated in the panel discussions and shared her insightful remarks on the various topics. The panel discussion had participants from France, the United Kingdom, Australia, India, Oman, South Africa, UNICEF, China and UAE,





An exhibition was organised which provided a physical format to the participating countries along with industry, academia to present the practices research, best in innovation, collaboration and partnership. The EIACP team at Amrita University presented the Lantana furniture during the exhibition and a documentary was screened about the Green Skill **Development Program.**







The meeting provided a platform to deliberate on the four priority areas including building Capacities, promoting Life-long Learning in the context of Future of Work and Strengthening Research, promoting Innovation through richer collaboration and partnerships

On the second day of the meeting, **Dr. Maya Mahajan**, coordinator of EIACP RP and Associate Professor at Centre for Sustainable Future was invited to speak on Lantana furniture making and how community participation can help achieve forest conservation and sustainability.

Joining the Dots: Why Connections Are Important for Management of Invasive Freshwater Species - Part One

Author Information

Steve Lockett Executive Director - Mahseer Trust, Bournemouth, UK

When we discuss invasive species in freshwater, we may immediately think fishes but we also need to consider insects, plants, molluscs, amphibians, birds and reptiles. Any one of these groups may have individual species that are or may become invasive and each will also be affected by invasive characteristics of the others. Understanding connections in freshwater ecosystems means going beyond individual focused study to being aware of diverse areas of mutual interest. Those connections are vital parts of a conservation strategy and have implications for how people live as well as the protection of natural heritage. Further, as well as in conservation action plans, the fragility of those interactions has to be protected while considering any fish breeding or stocking programme for food security. Those connections extend beyond the freshwater habitat itself and into neighbouring ecosystems and ecotones.

In Part One, I will consider invasive fish for food security and in Part Two, I will look at conservation action. While my focus for these two articles is primarily on rivers, we cannot ignore the influence of management actions in freshwater over those in riparian habitat, or nearby forest or grassland and vice versa.



Fig 1 - Steve in Western Ghats

Are invasives really better breeders?

Among the arguments for the use of invasive species in aquaculture is that they are chosen due to being more fecund species. This immediately raises the question of: are they outperforming native species due to their invasion strategy? Or are they really more fecund than native species?

Invasion theory suggests that these species will reproduce much more rapidly than normal in response to any ecological space. Invasive species also tend to perform better in degraded habitat than native species, which not only allows them to colonise, it may also give a false impression of habitat health.

Studies in Malawi show that where tilapia are native, they are not favoured as a target for farming as the introduced common carp are far more productive, growing faster and larger (Chirwa et. Al., 2017).

While the better known invasive species certainly do tend towards being more fecund, there is little doubt that introducing them into a new habitat gives them opportunity to outcompete natives. These characteristics not only help them to succeed, they also have probable impacts on their own cohorts and maximum sizes, thus proving to be a declining benefit for food security. Tilapia have been in Cauvery river for as long as I have been visiting (more than 20-years). In fisher's catches, where once a tilapia of 1kg was a good fish to catch, it seems that now a total catch of 1kg is often typical. This finding came during research by The River Otter Conservancy (pers. comms.) to understand the impact fishers' attitudes to declining catches has upon conservation of otters. In waters where common carp are introduced, the fish are known to reproduce at such rates that the fish become stunted. Agri-India Today (Agriindiatoday 2012) has previously reported on the stunting of introduced species in Indian waters.

Local aliens

While we rightly target alien invasive species, those from within the country cannot be ignored. In terms of so-called native species, the **Indian Major Carps** (IMCs) are common targets for breeding and release. Catla (*Catla catla*) are a popular species due to its fast growth rate and potential large size. Even in 1951, a paper published by Bombay Natural History Society (Jones and Sarojini, 1952) stated "**natural distribution is from Sind and the Punjab in the north along upper India to the Krishna river in the south**", yet the authors go on to say that "**transplantation of the fish in the south**" was of fish from the wild in Godavari system moved to various water bodies of Pennar, Periyar and Cauvery rivers. The story is much the same for rohu (*Labeo rohita*). Although the original distribution of this fish was far more restricted, it is now just as widespread.



Fig 2 - Catla catla

Fig 3- Image sourced from internet





In lectures to aquaculture students, I have questioned this move to increase the spread of IMCs. The argument for such transplants or captive breeding and release is that they are native and that they represent an easily accessible large food fish. My response is that often fishing communities (in particular among indigenous peoples) prefer to eat smaller fish and that many traditional fishers are not equipped to take advantage of such large fishes.My findings are borne out by the recent publication on the importance of wetland habitat and biodiversity (Barkatullah University, 2023).

In the report, they look at the importance of smaller species compared to IMCs in catches within Bhoj Lake, a RAMSAR site. They state that: "The wetland is stocked with seed of Indian Major Carps every year." And that "IMC contribute only 15% of the total catch...whereas the rest of the 85% catch is contributed by the species which are not stocked and are known as Self Recruiting Species."

Removing the aliens

In the 2017, **National Wildlife Action Plan, MoEFC**C called for the removal of the introduced Deccan mahseer, *Tor khudree* (also known as blue-finned mahseer) from River Cauvery and likewise for exotic trout from rivers of Himalayas. These actions were intended to help give ecological space for the reintroduction of the native hump-backed mahseer *Tor remadevii* (also one of two species called orange.finned mahseer) in Cauvery and golden mahseer Tor putitora in rivers of Himalaya. Among the issues here are: how to enact effective removal? And will these removals allow stocking of native species to be successful?



Fig 4 - Golden Masheer from Kabini river Source - Dencin Rons

Fig 5 - *Tor remadevii* (Native hump backed Masheer)

Image source - Author's field photographs



Fig 5 - *Tor khudree* (Blue finned Masheer)



In most acts of removal of invasive species of fishes, poisoning using something like rotonone is the quickest and most effective method. Clearly this has implications for other fish species (indeed, all other aquatic species) and usually is only attempted in enclosed water bodies after netting of remaining natives. It would be impossible to use such a method in a large river system.

The second question is far more nuanced. Unless all invasives are removed in a very short period of time, the very attributes that make them invasive mean that there is unlikely to be enough space created for a successful introduction of native species. The invasives will rapidly breed to take up any space created plus they often move into degraded habitat that native fishes will not inhabit. The act of creating more ecological space has to be through habitat rehabilitation.

Studies conducted by both Mahseer Trust and Wildlife Association of South India have found evidence of successful recruitment of hump-backed mahseer within several parts of the River Cauvery basin. This shows that introductions are now very low on the list of priorities and may not have the desired effect. Whereas, allowing native species to recruit naturally if they have the habitat space is far more likely to prove sustainable.

Before introducing any species, whether alien or native, invasive or not, there should be a clear and comprehensive understanding of why we are carrying out such an intrusive programme. Likewise if we are to attempt removals.

In Part Two, I look at the specific frameworks and organisations involved in management of freshwater invasive species in India

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National Bird Day Celebrations - 2023













On 5th January, 2023, EIACP RP office at Amrita University, Coimbatore in collaboration with Nature club of Amrita university organized a **Bird photography exhibition**. Mr. Saleem from **Environment Conservation Group** showcased his photographs and engaged the audience in an enthralling discussion about birds. The nature club members had an engaging session with the resource person. Students from Amrita Vidyalayam , Ettimadai and Western Ghats International School, Coimbatore visited the exhibition. The students were screened a movie on birds to understand about biodiversity.

Many were curious about the different phenomena in nature and were drawn towards the beauty of nature. Dr. Maya Mahajan addressed the audience and shared her experience about birds in mangroves.

Amazing photographs collection of strikingly beautiful and colourful birds on display at this venue by Mr. Saleem and team on the occasion of National Birds Day !! Really enjoyed watching the pictures and listening to the stories behind them!!

-Dr. Krishnan , Corporate Industrial Relations



Really unique and breathtaking photos!! The books by the centre were truly informative !! Thank you for arranging such an amazing event in campus.

-Sruthika . A , Aerospace Engineering



It was really an eye candy experience that I got to see different bird species. The photography is really exceptional. Thank you for the opportunity. -Rishika . K , Electronics and Communications Engineering



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World Wildlife Day Celebrations - 2023

"The tree is the most conspicuous component of nature" – Mata Amritanandamayi

On the occasion of World wildlife day, the EIACP RP (formerly ENVIS) and nature club of Amrita Vishwa Vidyapeetham, Coimbatore conducted various programs under the Azadi ka Amrut Mahotsav and Mission LiFE to commemorate the occasion. On March 3rd, 2023, a national level webinar was organized on the title "The Himalayan Gray Langur of Kashmir". The resource person was Dr. Mehreen Khaleel, founder of Wildlife Research Conservation Foundation and researcher at IISc, Bengaluru. The webinar registered 85 participants nationally and internationally. Participants included researchers from University of Copenhagen and Smithsonian National History Museum. Dr. Maya Mahajan, coordinator of EIACP shared her thoughts on biodiversity conservation and the importance of World Wildlife Day.



GDALS IN FOCUS SDG 4 - Quality Education SDG 15 - Life on Land







15

After the presentation by speaker, the participants came up with some wonderful questions and drew new perspectives on conservation strategies of Indian wildlife. The speaker shared her unique observations from Kashmir and the lesser known facts about Himalayan Gray Langurs.

"Lovely Personation and very informative webinar. I have only heard about this particular species and through this webinar I am very keen to see these langurs. Looking forward for such type of webinars" – Yash Srivatsava

The state of the second of a bar

""The webinar was very informative. It was pleasant listening to someone who is passionate about a lesser-known field. The discussion session was also enlightening." – Maryam Asad

On 6th March, 2023 we conducted a nature trail and session for students at the Centre for Sustainable Future, Amrita Vishwa Vidyapeetham. Mr. Vrijulal, an ace ornithologist and environmental educator. The members of nature club participated in a nature trail in the early morning of 6th March, 2023. They had an amazing time in the laps of nature observing birds, butterflies and were amazed to know some interesting facts about the trees in our campus.



In the afternoon of 6th March , 2023 40 students from Amrita Vidyalayam , Ettimadai participated in nature trail and session on "Biodiversity for Life". The students were bubbling with enthusiasm and were curious to know about campus biodiversity. Some students felt that they have not paid attention to so many phenomena in their surroundings.

Overall, this was a very fruitful program and the students had an amazing learning experience.

As it was rightly quoted by Mata Amritanandamayi – "Trees, animals, birds, plants, forests, mountains, lakes and rivers – everything that exists in nature – are in desperate need of our kindness and protection of man."





International Biodiversity Day Celebrations - 2023

GOALS IN FOCUS



SDG 3 - Good Health and well being SDG 4 - Quality Education SDG 13 - Climate Action SDG 15 - Life on Land



Elephant biologist who studied elephants in the forests of Karnataka, Tamil Nadu and West Bengal to understand their stress response in relation to ecological and humaninduced challenges.She is a cartoonist and a poet too.

> Date : 22nd May , 2023 Time : 5:00 pm

"The tree is the most conspicuous component of nature" – Mata Amritanandamayi

The center conducted a Webinar on "**Why do Elephants visit our village?**" on 22nd of May 2023. Dr. Sanjeetha Sharma , an elephant ecologist who has worked extensively on the stress response of elephants in the Western Ghats delivered a talk on the importance of how to deal with human – animal conflict. She also explained the physiology and ecology of elephants. The participants were enthralled by her field experiences.

Around 200 participants from across the globe participated in the webinar. They had very insightful discussions with the speaker on human - wildlife conflict, green corridors.

Really useful session. Speaker was impressive with clear explanations during the session as well as during interaction. - Dr Priya T V



aaws Corner

Bird rescue by Amrita Animal Welfare Society

Nandita CEN , Amrita Vishwa Vidyapeetham





11 January happened to be a memorable day for me. My friends Jairam and Sampath who were coming on a bike were suddenly hit by a small bird and the bird fell down. They found it was hurt due a fight with another bird. The bird was bleeding and they brought it to me as they knew I am a animal lover . The wonderful color and beauty of the little cute thing made me wonder at the beauty of nature and GOD'S creation. I first thought of pacifying the agitated scared little one by petting and offering water using a cotton piece. The bird eagerly took the drops of water and settled down and became calm.

I tried wiping the drops of blood oozing from a wound under its wing. I thought it needed medical attention immediately and approached our college Amrita Animal rescue team and handed over the Purple sun bird to them. They took it to the hospital to get the help of a Veterinarian. I was very happy to hear that the little one was doing pretty well in the evening and flew away to join its friends.. I thank my friends and animal welfare team of Amrita who helped in healing the bird and hopefully it will resume it's normal life.

Weekly feeding drive by the volunteers of AAWS





The volunteers of AAWS organize weekly feeding drives for campus animals in partnership with EIACP resource partner at Amrita Vishwa Vidyapeetham, Coimbatore. The drive was initiated by EIACP coordinator Dr. Maya Mahajan. The dogs in campus are fed with nutritious food on every Thursday evening like boiled eggs, rice with dal and omlette. Through this drive , we have been monitoring the health of the campus animals by routinely treating them when they are found with external wounds.



Crossword on Sustainability



Across

4. To reclaim parts or materials and make use of them in a different way is to _____.

6. _____ fuels are not renewable

and aren't clean energy sources.

11. To use less of something is to _____.

12. _____ energy sources are better for the environment.

14. Pollution in the air is leading to a hole in the _____ layer.

Down

- 1. It's important to reduce our ______ usage.
- 2. To use something again is to _____
- 3. Food scraps can be put in the _____
- 5. When you throw rubbish on the ground, you are _
- 7. Humans need ______ to breathe.
- 8. Planting ______ helps to make more clean air for us to breathe.

9. Another word for litter is _____

- 10. Rubbish on the street can end up on the _
- 13. It's important to always throw your rubbish in the ____

1) Energy 10)Ocean 2) Reuse 3) Compost 11)Reduce 12)Renewabl

3) Compost 4)Recycle 12)Renewable 13)Bin Answers 5) Littering 6)Fossil 14)Ozone

7)Oxygen 8)Trees

9)Rubbish

Source - www.twinkl.com

Illustrating Science



Invasive crayfish have proven to displace fish from shelters, putting them at a higher risk for predation. Moreover, comparisons to native crayfish species showed that these had less negative effects on fish—due to lower consumption and reproduction rates and population densities.







Illustrated by Sabareesh Illustrator , Scicomtoons





Illustrated by Dr. Kannan Kanthaih Assistant Professor American College Madurai

Wetland Day Essay Contest results Role of Invasive Species in wetland ecosystem Samuel Shinde, Chiplun, Maharashtra

It was a pleasant late January evening and Jagvi was sitting on her favourite brown saddle sofa. She was browsing through the news on her laptop, while having her coffee. Her daughter, Jigna, came and sat beside her. Jagvi came across some captivating news. Being a hydrologist, the title 'Madhya Pradesh's newest Ramsar wetland covered in invasive water hyacinth, threatening biodiversity' immediately caught her attention. Young Jigna also peeped into the laptop and read the words 'Water Hyacinth'. True to her name that means "intellectual curiosity", she excitedly asked the mother, what water hyacinth meant. As a child, Jigna was always quick to seek answers and she knew she could always turn to her mother Jagvi – one who is a trove of great knowledge of the world. Her mother explained it to be an invasive floating plant found in wetlands.

"For you to know more about water hyacinths, you need to first know what Wetlands are", the mother said, "a wetland is a land where we have water either covering the soil or is present at or near the surface of the soil. The water can be present all year round, or for varying periods of time during the year. It can be salt water, fresh water, or anything in between." Taking a breath, the mother expounded, "every wetland's ecosystem is distinct from each other." "How do we identify a wetland, mom?" the daughter excitedly interrupted. To this the mother replied, "a wetland can be identified based on the predominance of wetland vegetation and their soil, and the presence of water in it!" Inquisitively, the child proceeded with her line of questioning "Mom! Are there a lot of wetlands on the planet?". The mother gently replied, "wetlands cover only 6 % of the Earth's land surface, darling! However, 40% of all plant and animal species live or breed in wetlands. Its biodiversity is of utmost importance for our health, our food supply, and even for tourism. And in India, they're classified as coastal wetlands. The coastal wetlands are within coastal watersheds, and inland wetlands are not". "So, the inland wetlands include places like marshes, ponds, lakes, and swamps?" Jigna exclaimed, confident of being correct, and Jagvi nodded yes.

The mother sipped some more coffee and continued, "I believe now you know how much we all, including animals and plants, depend on wetlands!" Jigna also asked about birds breeding in wetlands. Beckoning towards the laptop, Jagvi pointed to an excerpt of the article which read, Sankhya Sagar has virtually disappeared under the water hyacinths, blocking sunlight and reducing oxygen levels in the lake. Tracing the line which read, "No migratory birds visited Sankhya Sagar this winter", she said, "see how invasive species like water hyacinth are affecting Sankhya Sagar, a lake in our country! Even migratory birds stopped visiting us!" She went on to explain, "invasive species like water hyacinth clogs several water ways of rivers and lakes, leading to flood during monsoon, which leads to eutrophication, meaning the water body becomes overly enriched with nutrients which cause increase in..." Jigna, raising both hands and gesturing her to stop, said, "Mom, simple English please!" So the mother continued with a smile, "Okay, any wetland should ideally benefit everyone. But because of the invasive species like water hyacinth, the wetland becomes useless, rather dangerous to all. This subsequently affects other species depending on these wetlands." "That includes us, right?" "Exactly!" the mother exclaimed and continued, "Just like water hyacinth, Giant Salvinia, and water cabbage or lettuce cause severe damage to our wetland ecosystem.

Not just plants, but as per recent updates, Indian wetlands and its fish diversity are facing a new risk due to the invasion of ornamental fishes." Gawking at her mother, Jigna asked, "Ornamental fishes! Really? How?" The mother replied, "Yes, once a healthy ornamental fish can't fit in the aquaria, some release them in a wetland." Keeping the coffee mug on the table, the mother continued, "Studies clearly emphasize that alien fishes frequently alter the aquatic ecology by changing water quality, water assimilation, and nutrient cycle. This results in extinction of native fishes through predation by destroying the eggs, larvae, and reduction of food availability due to competition." They spent the entire evening discussing how alien fishes cause destruction of aquatic vegetation and pollute the native gene pool through cross breeding.

During the Republic Day celebrations on the following day, Jigna presented a speech on wetlands in India for an elocution competition arranged in her society premises. She recounted her discussion with her mother, and explained to the crowd what Wetlands and the effect of invasive species on the same. Her knowledge about wetlands astounded the crowd. Despondent, with downcast eyes, Jigna shared truths about why this might be happening in India. She summarized the possible reasons as the lack of existing detailed and in-depth study in India to quantify the economic and biodiversity loss due to aquatic invasion in inland waters like other countries. Secondly, the National Committee on Introduction of Aquatic Species is entitled to screen the entry of exotic aquatic species before they are introduced into India. However, the traders and hobbyists frequently breach the rules and introduce several ornamental fish species, including the notorious carnivorous piranha. Stringent measures should be taken to monitor such actions. Lastly, continuous monitoring is needed to ensure the long-term success of control and eradication of invasive alien species in any given ecosystem. The native community can play an important role in both control and monitoring.

Jigna concluded saying, "wetlands are believed to be the world's most economically valuable ecosystems, however, they are sadly disappearing three times faster than forests these days. This is especially worrying in the face of climate change as wetlands store twice as much carbon as forests and help reduce the risk of flooding in surrounding areas. In such situations, we cannot just leave everything to the authorities and the government and blame them for the degradation of the wetlands. I believe, we are equally responsible to support the government to save our wetlands." She signaled everyone to repeat as she went on saying, "Let us all take an oath that we would take concrete efforts to be better informed about the wetlands around us, follow the necessary measures and protocol to keep it clean, be cognizant about ornamental fishes, and assist local authorities in controlling and monitoring the eradication of invasive species, with whatever we can contribute." People were moved by the poignant speech and were encouraged to take the oath.





In this episode, the speaker imagines a future where some Indian cities expand underground. Population in our cities is at an all time high and there's limited space to grow outwards. So city administrators decide to move downwards, below the land the city already has. Is it technically possible for Indian cities to expand underground?

Imagined Tomorrow is created and hosted by Shreya Dasgupta.

Scan to listen





Imagine a place with soft sunlight overhead, light fog in the early morning and a cool breeze blowing. A plethora of colourful birds including some incredibly rare species are flitting about, while lush greenery envelops the nearby water body. Amidst the twittering of birds, a sense of calmness and tranquillity fills the air, making it feel almost magical. Sounds like a dream, doesn't it? Well, let me tell you that this place I am flaunting about actually exists! This enchanting place I've described is actually a special ecosystem known as wetlands.

Wetlands are areas where the land is covered by water for at least part of the year. They are characterised by unique soil and plant communities that thrive in wet conditions. Wetlands are important for providing habitat for wildlife, filtering water, and mitigating floods.Wetland also protects our coastlines and stores carbon dioxide to regulate climate change. Not only wetlands provide a haven for rare and endangered species of birds, but they also purify our water and protect us from floods. These precious habitats are truly a wonder of nature, no doubt they are widely referred to as the 'kidneys of the earth.'



Moreover, wetlands have also been providing a variety of ecological, biological and hydrological functions which offer economic, aesthetic, recreational, educational and other values to the society. But over time these wetlands have shrunk drastically due to a lot of factors.Wetlands and its biodiversity are getting depleted alarmingly due to habitat destruction, pollution, overexploitation of aquatic resources and by replacing them by creating paddy fields. Among all these major causes another big cause goes rather unnoticed is the introduction of invasive exotic species which imbalances the whole wetland ecosystem. An invasive species is a non-native species that poses a threat to the biological diversity of its new environment. Invasive Alien Species have become the second most significant global threat to biodiversity, following habitat destruction. Wetlands are particularly vulnerable to the invasion of non-native species, including both plants and animals.

Water hyacinth, Water cabbage/lettuce, and Giant salvinia are examples of introduced alien flora that have become prevalent in water bodies across India.

Fish species introduced by humans as food source are now also disrupting the natural ecosystems.Nile/Red Tilapia, African Catfish, Thai Pangus and Common Carp have emerged as a great threat to Indian aquatic diversity and pose a serious threat to regional and local economy.Especially, the Indian fish diversity is highly affected due to this invasion.

India is endowed with unique and immense aquatic diversity of which many have homes limited to the water bodies of wetlands. Invasive species not only take up their space but also compete for the limited food which is available, thus jeopardising the survival of the native species. Introduced from South America to the water bodies of India for its attractive lavender coloured flower, Water hyacinth has reigned havoc in the Indian fresh water bodies. Water hyacinth has a variety of negative impacts once introduced into a freshwater environment. It forms dense, impenetrable mats which clog waterways, making boating, fishing and almost all other water activities impossible. It also reduces biodiversity by crowding out native plants at the water's surface and below. Water hyacinth mats also degrade water quality by blocking the air-water interface and greatly reducing oxygen levels in the water, eliminating underwater animals such as fish. It also creates a perfect habitat for breeding of diseasecarrying mosquitoes.

Thus, it is not only a danger to the ecosystem but also to the humans that depend on these wetlands for their livelihoods. Common carp introduced in India for its food value, is known for its ability to stir up sediments in wetlands, reducing water clarity and altering nutrient cycling. Common carp can also uproot aquatic plants and consume large amounts of invertebrates, reducing habitat for other species.

Careless hobbyists and aquarists may release their exotic pet fishes into these pristine water bodies, which then adapt to the surroundings and multiply thus, threatening the native fish population. Several exotic ornamental fishes ranging from the tiny Guppy fish to the large and aggressive Red Piranha have been recorded in rivers, lakes, traditional village ponds and other inland freshwater bodies in several states of India. One of the exotic aquarium species that has damaged these biomes extensively is the Suckermouth catfish. This species has been identified as a great threat to global freshwater diversity. Occurrence of the species in the wild is reported to alter the habitat and has changed the physicochemical nature of water. A constant decline of native species biomass due to high invasion of suckermouth fishes was reported in Thiruvananthapuram, Kerala. Another species of this genus was reported to cause huge damage to the native species diversity of Vandiyur Lake, Madurai. Their biomass was statistically significant compared to the indigenous varieties.

Not only do these species fight for space and resources of the native species but also they may prey on the native species especially the young and the eggs. Lack of native fishes means lack of food for migrant birds and thus they may stop visiting, leading to more imbalance and also stress in these bird species to find a new suitable habitat to stay.

Prioritising the wetlands thus became important to protect and conserve these beautiful ecosystems and the livelihood that are supported by it. Hence, to give them the recognition they deserve after consideration, few of them are given a special tag of 'Ramsar site.' A Ramsar site is a wetland site designated to be of international importance under the Ramsar Convention, also known as "The Convention on Wetlands". It provides for national action and international cooperation regarding the conservation of wetlands, and wise sustainable use of their resources. Ramsar identifies wetlands of international importance, especially those providing waterfowl habitat.

India is lucky enough to have the luxury of having 75 of these Ramsar sites. To maintain and care for these wetlands, the Indian government recently launched the 'Amrit Dharohar' scheme which aims to conserve wetlands by promoting their optimal use. This scheme will also focus on increasing eco-tourism and carbon stock, and also will help the local communities in their income generations.

The government is now giving the much needed attention to these 'kidneys of the world' and we too can contribute a little to this important cause by caring for nearby water bodies by not throwing plastic materials in them, avoid buying plants of invasive species for your garden, encouraging the growth of native flora and fauna, reporting overgrowth of invasive plants in water bodies to the respective authority and at the end by not introducing any invasive plants or fish to these incredible biomes!



Impact of Invasive alien species on wetlands in India

Ram Dayal Vaishnav

Wetlands are among the most productive and biologically diverse ecosystems on Earth. They provide many important ecological services, including water purification, flood control, and carbon sequestration. Known as the Kidneys of the earth, the average value of ecosystem services provided by Wetlands is more than 22 Lakh Rupees per hectare, which is more than twice than that of Tropical Forest Ecosystem (as estimated by TEEB - The Economics of Ecosystems and Biodiversity). In India, we have 1.243 wetlands which includes 75 wetlands which are declared as Ramsar Sites. These wetlands support 20% of known Indian biodiversity. But the Wetlands are disappearing three times faster than forests with severe consequences for our future unless urgent action is taken to ensure their survival. Many of India's wetlands are under severe threat from a variety of factors, and one of these biggest concerns is the harmful effects of invasive alien species. Invasive alien species are non-native plants or animals that have been introduced to an ecosystem and have the potential to cause harm to native species or disrupt ecosystem functioning. The Convention on Biological Diversity (CBD) defines IAS as "an alien species whose introduction and spread threaten ecosystems, habitats, or species with sociocultural, economic and environmental harm and harm to human health". According to the National Biodiversity Authority, Out of 169 Invasive alien species in India, 55 are identified in the aquatic ecosystem. These include fishes, plants and microorganisms.



The fishes found under invasive alien species were introduced as food fishes, ornamental fishes, larvicidal fishes, and unauthorized introduction for aquaculture. These fishes heavily affect the survival of native species. For example, recently alien mussel species were found invading Ennore wetlands of Tamil Nadu. Mussels are bivalve molluscs which are consumed as seafood. Eleven of 52 fishing sites in Ennore have been infested by an alien mussel species, wiping out valuable fisher resources like locally prevalent yellow clams (Manja matti) and green mussels (Pachai aazhi).

Some of the common invasive plant species found in Indian wetlands include water hyacinth, alligator weed, common reed, salvinia, and water lettuce. Water hyacinth (Eichhornia crassipes) is a free-floating aquatic plant that is native to South America but has been introduced to many parts of the world, including India. Water hyacinth forms dense mats on the surface of water bodies, blocking out sunlight and reducing oxygen levels in the water. This can lead to a decrease in the growth and survival of native aquatic plants, as well as a decrease in the populations of fish and other aquatic animals. Water hyacinth can also interfere with boating and fishing activities, which can have economic impacts on local communities that rely on these activities for their livelihoods. Alligator weed (Alternanthera philoxeroides) can grow to a maximum height of two meters. Its dense mats block light from penetrating water bodies and it can inhibit native aquatic plants from growing. In addition, it can interrupt water flow and possibly cause flooding in nearby areas. Alligator weeds are also causing significant threat to human health by providing ideal habitats for mosquito larvae, resulting in heightened risks of mosquito-borne diseases. To control the growth of alligator weed, herbicides like liquid glyphosate formulations have been effective on alligator weed above the water line, but ineffective on plants in the water.

The common reed (Phragmites australis) is a tall, perennial grass that can grow up to five meters in height. It can form dense stands that outcompete native vegetation, leading to a loss of biodiversity. In addition, common reed can alter hydrology and sedimentation patterns in wetlands, which can have negative impacts on water quality. Hence we can summarize the implications of various invasive alien species of plants and fishes in India from ecological and economical perspectives. From ecological point of view, these species can alter natural hydrology of wetlands by changing the way water flow through them, they can disrupt the nutrient cycle by outcompeting native species for resources, and can alter the food web by wither outcompeting native species or by providing a new food source for predators. Invasive alien species like water hyacinth which are highly flammable can also increase risk of wildfires. Eventually all of these ecological impacts lead to loss and biodiversity. Economically, managing and controlling invasive alien species can be expensive and challenging, and it requires ongoing efforts to prevent their spread and minimize their impact on wetland ecosystems. The loss of various services provided by wetlands, including water storage, groundwater recharge, flood control, and climate regulation, can have significant socio-economic implications heavily affecting local communities that rely on wetlands for their livelihoods, food, and water security.



As we can see that the invasive alien species can have very far fetching impacts on wetlands, biodiversity and humans which makes it very clear how crucial it is to control and manage the invasive alien species from wetlands. Some of the ways to deal with these alien species include the use of mechanical and chemical control methods, as well as biological control using natural enemies of the invasive species.

For example, water hyacinth weevils (Neochetina spp.) have been introduced to Indian wetlands as a biological control agent for water hyacinth. These weevils feed on water hyacinth and can reduce its growth and spread. However, the use of these control methods can also have unintended consequences, and hence more research is needed before applying them on a large scale. Preventing the introduction of invasive alien species in the first place is the best approach to managing them in wetland ecosystems. Measures such as regulation of the trade in live aquatic organisms, screening of imported plant material, and public education and awareness-raising campaigns can help to prevent the spread of invasive alien species in Indian wetlands. In addition, monitoring and early detection of new invasive species is important and very crucial to prevent their establishment and spread. The impacts of invasive alien species on wetlands in India are significant and pose a threat to the health and functionality of these critical ecosystems. Addressing this problem will require a concerted effort from all stakeholders, including government agencies, NGOs, and local communities. By working together to prevent the introduction and spread of invasive species, and implementing effective management strategies, we can help to preserve and protect the valuable ecological services provided by wetlands, and ensure their continued use and enjoyment by future generations.



Effect of anthropocentrism on wetlands - Policies and actions

Brindha S 3rd year BCom Nallamuthu Gounder Mahalingam College, Pollachi

INTRODUCTION:

Anthropocentrism at its basic meaning is the belief that human beings are the most important entity in the universe, which at the worst starts troubling its co-species. This is commonly termed as Human supremacy. This belief leads to the feeling of superiority among human beings, who at last does not care for its co-species, that are also there in the universe to live alike the human species.

INVASION OF WETLANDS:

Anthropocentrism generally, indirectly affects its co-species by invading into their environment which results in overpopulating and harming the new environment. Since the 20th century, the anthropocentric activities of human beings have become a serious threat to the wetlands and its habitats. Simply, a wetland is a distinct ecosystem that is flooded by water. Due to the increasing population of the human species, they have started to extend the limits of their living space by occupying the other species'. This leads to the extent of those as they are left with no living areas. This act of human beings has a very bad impact on the overall environment which would after some years affect themselves. The main cause of these invasion is said to be the increased anthropocentrism mindset in the human beings, who has totally forgotten that, the wetland flora and fauna are also equally important for the survival of humans.

EFFECT ON WETLANDS AND THE HABITATS:

Wetlands, the functions and services they provide as well as their flora fauna, are affected by several means by human disturbances. The disturbances can be either direct or indirect, reversible or not, and isolated or cumulative. These exceed the levels or patterns normally found within wetlands of a particular class in a particular region. One of such human caused impacts on wetlands is the Freshwater acidification. This results in changes in the pH of freshwater which imposes physiological changes on individual organisms, may decrease native biodiversity, and can alter ecosystem structure and function entirely. Macro- invertebrates and large vertebrates alike are particularly sensitive to acidification. Water bodies are contaminated with solid wastes as they are dumped through untreated sewage, urban runoff, people discarding garbage into the environment, wind carrying municipal solid waste from landfills and so forth.

Due to their productivity, wetlands are often converted into dry land with dykes and drains and used for agricultural purposes. The construction of dykes, and dams, has negative consequences for individual wetlands and entire watersheds. Their proximity to lakes and rivers means that they are often developed for human settlement which is indirectly an anthropocentric activity. Once settlements are constructed and protected by dykes, the settlements then become vulnerable to land subsidence and ever-increasing risk of flooding. Wetlands are also illegally occupied for the purposes of building houses which can lead to the blockage of areas that are especially made for the purpose of water flow by nature. A best example for the impact is the 2015 Chennai flood incident, where unplanned and often illegal urban development has led to many wetlands and natural sinks being built over that blocked the natural waterflow into water bodies, resulted in an increased frequency of severe flooding causing over 500 people to be killed.



POLICIES AND ACTIONS:

To be honest, no human or people would take actions against anthropocentric activities because they too are also a part of the same. They would only take actions aftermath .The government of India has introduced the Wetlands (conservation and management) Rules, 2017 in accordance with the provisions of the Environment (Protection) Act, 1986 as a regulatory framework for the conservation and management of wetlands in India. The regulations outline the National Wetland Committee's advisory duty, which includes reviewing the development of integrated management of Ramsar Conservation areas as well as advising state agencies on the wise-use concept when it comes to wetlands. Centre for Wetland Conservation and Management (CWCM) is run by the Ministry of Environment,

Forestry, and Climate change. Its goal is to work toward the management, restoration, and conservation of India's wetlands. It would help the federal, state, and local governments with the development and application of legislative and policy frameworks, management planning, monitoring, and focused wetlands conservation research. The Tamil Nadu state government began a massive slum clearance programme, demolishing dozens of illegally constructed dwellings in the areas of Chennai, as a result of the 2015 Chennai flood.

Wetland Day Photography Contest results



First Prize Suraj Prathap Singh



Second Prize Paritosh Ahmed Ph.D. Environmental Studies Department of Environmental Studies, University of Delhi

Wetland Day Poetry Contest results

Under the Moisture

Anushri Rajesh Class 9th , SSVM World School, Coimbatore

Wetlands aren't lands filled with moisture, They are infact the caretakers of mankind. It's distinct ecosystem creates a unique picture, Stowing a glorious title which is defined.

The unique soil helping in sustainable farming Thus, flourishing greeneries bestow us treasure. A sudden cool breeze that is very calming, Creates a peaceful atmosphere as a pleasure.

The lands perfecting it's stern and sacred duty Such a brawny barrier as the world's frame. It concludes the frame with extreme tender, Hamessing us in striking habitats with exclaims.

We must not neglect on what sustains us As these lands are our country's future. With not much time left,without any fuss. We'll create a better leafage much newer.

Let's stay in nature's tight embrace Striving to save it's intrinsic culture. Let's face the ships with loads of grace To change earth back to its own colour!

Cartooning Science



Image credits greenhumour.blogspot.in

Wetland Day Painting Contest results



Pradhyum



BIOINVASION

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The articles and other relevant information should be neatly typed in double space not exceeding five pages. The figures, graphs/drawings should be of good quality and clarity. Photographs should be of minimum 300 dpi resolution. References should be limited and cited in the text by name and year.





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