

CLIMATE CHANGE MISSION



The Constructive initiative towards addressing
Climate Change, Global Warming and
Bio-Diversity in Kanniyakumari district



by

HEAL

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HEAL

HEAL is a registered non-profit voluntary organization involved in rural development process since 1986.

It envisions an egalitarian society based on equality, justice and opportunity to all irrespective of caste, religion and socio economic status.

Its mission is to facilitate forming and strengthening people's organizations at the grassroots and federate them at various levels to find solutions for the betterment of the marginalised and the downtrodden to march towards establishing an equal and just society.

Its main thematic areas are child development, empowerment of youth, women, dalits and the physically challenged, development of sea shell collectors / workers, welfare of bonded labourers, restoration and conservation of environment and ecology, specifically marine environment, education, health, community development, strengthening community based organizations and panchayat raj institutions, capacity building, skills training, micro enterprises development, disaster management, research and supporting networks.

With this perspective in mind, HEAL movement partners with children, youth, women, physically challenged, dalits, widows, fisherfolk, sea shell collectors/workers and other marginalised communities and involves them in a participatory development process.

HEAL works across both Kanyakumari and Tirunelveli districts in Tamilnadu, India.

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I. INTRODUCTION

The current scenario of our country: A perspective on impact of climate change, global warming, pollution and endangerment of species affecting the ecosystem.

Climate Change(*Sustainable Development Goal – 13: Climate Action*):

The Intergovernmental Panel on Climate Change (IPCC), in its latest climate assessment, made it very clear that the climate crisis is accelerating at a pace like never before and warned that it is “now or never” to limit global warming to 1.5C. From deforestation and droughts to air pollution and plastic waste, there are several factors exacerbating global warming, with consequences felt everywhere in the world. However, some nations suffer more than others. Despite making little to no contribution to climate change, countries in the Global South historically bear the most brunt as they often lack financial resources to tackle the emergency and mitigate the impacts of extreme weather events. Here are some of the biggest environmental issues in India right now and how the country is dealing with them. In 2021, India was among the world’s most polluted countries, second only to Bangladesh.

According to the IPCC, India is the country expected to pay the highest price for the impacts of the climate crisis. Aside from extreme weather events such as flash floods and widespread wildfires, the country often experiences long heatwaves and droughts that dry up its water sources and compromise crops.

The heatwave has also contributed to an economic slowdown due to a loss of productivity, as thousands of Indians are unable to work in the extreme heat. The agriculture sector – which employs over 60% of the population – is often hit hard by these erratic droughts, impacting food stability and sustenance. Currently, farmers are struggling to rescue what remains of the country’s wheat crops, piling on existing fears of a global shortage sparked by the war in Ukraine.

The indiscriminate use of water for irrigation, coupled with the absence of conservation efforts and the huge policy gap in managing water resources has left over 10% of the country’s water bodies in rural areas redundant.

Waste Management(*SDG 6: Clean Water and Sanitation*)

Among the most pressing environmental issues in India is also waste. As the second-largest population in the world of nearly 1.4 billion people, it comes as no surprise that 277 million tonnes of municipal solid waste (MSW) are produced there every year.

The plastic crisis in India is one of the worst on the planet. According to the Central Pollution Control Board (CPCB), India currently produces more than 25,000 tonnes of plastic waste every day on average, which accounts for almost 6% of the total solid waste generated in the country. India stands second among the top 20 countries having a high proportion of riverine plastic emissions nationally as well as globally. Indus, Brahmaputra, and Ganges rivers are known as the ‘highways of plastic flows’ as they carry and drain most of the plastic debris in the country. Together with the 10 other topmost polluted rivers, they leak nearly 90% of plastics into the sea globally.

To tackle this issue, in 2020 the government announced that they would ban the manufacture, sale, distribution, and use of single-use plastics from July 1 2022 onwards. Furthermore, around 100 Indian cities are set to be developed as smart cities. Despite being still in its early phase, the project sees civic bodies completely redrawing the long-term vision in solid waste management, with smart technologies but also awareness campaigns to encourage community participation in building the foundation of new collection and disposal systems.

Biodiversity Loss(SDG 13 and 6)

Last but not least on the list of environmental issues in India is biodiversity loss. The country has four major biodiversity hotspots, regions with significant levels of animal and plant species that are threatened by human habitation: the Himalayas, the Western Ghats, the Sundaland (including the Nicobar Islands), and the Indo-Burma region. India has already lost almost 90% of the area under the four hotspots, according to a 2021 report issued by the Centre for Science and Environment (CSE), with the latter region being by far the worst affected.



Moreover, 1,212 animal species in India are currently monitored by the International Union for Conservation of Nature (IUCN) Red List, with over 12% being classified as ‘endangered’. Within these hotspots, 25 species have become extinct in recent years.

Due to water contamination, 16% of India’s freshwater fish, molluscs, dragonflies, damselflies, and aquatic plants are threatened with extinction and, according to the WWF and the Zoological Society of London (ZSL), freshwater biodiversity in the country has experienced an 84% decline.

Forest restoration may be key to India’s ambitious climate goals, but some argue that the country is not doing enough to stop the destruction of this incredibly crucial resource. Indeed, despite committing to create an additional carbon sink of 2.5-3 billion tonnes of CO2 equivalent through additional forest and tree cover by 2030, Narendra Modi’s government faced backlash after refusing to sign the COP26 pledge to stop deforestation and agreeing to cut methane gas emissions. The decision was justified by citing concerns over the potential impact that the deal would have on local trade, the country’s extensive farm sector, and the role of livestock in the rural economy. However, given these activities’ dramatic consequences on biodiversity, committing to end and reverse deforestation should be a priority for India.

The right to a clean and pollution-free environment has been included in Article 21 of the Constitution(SDG 3: *Good Health and Wellbeing*) guaranteeing the fundamental right to life. The improvement of public health also includes the protection and improvement of environment without which public health cannot be assured. With the current situation in the country, our focus being narrowed down to Kanniyakumari district with various pressing issues is the need of the hour for solution-based approaches.

II. Conceptualization – Addressing the issues through constructive approaches in Kanniyakumari district:



Kanyakumari is the strategic southern tip of India in the bio-hot spot of the Western Ghats, UNESCO Heritage Site and part of the Agasthiarmalai Reserve, which has a rich repository of coastal and fresh water wetlands.

While covering only 6% of the Earth's surface, wetlands provide a disproportionately high number of ecosystem services, in addition to maintaining biodiversity.

Coastal wetlands are vital for helping to mitigate climate change to manage extreme weather events through the multiple services they provide. Important wetland functions include water storage, groundwater recharge, cyclone protection, flood mitigation, shoreline stabilization, erosion control, and retention of carbon, nutrients, sediments and pollutants.

Presently, wetland ecosystems are severely affected by impacts of climate change such as sea level rise, coral bleaching, hydrological effects, changes in water temperature and alterations in water availability and quality.

Coastal wetlands are nature-based defense that can provide critical protection against cyclone, storm surges.

Mangroves and salt marshes reduce the speed and height of storm surges. Their roots bind the shoreline, resist erosion by wind and waves, and augment resilience against climate change according to Ramsar Convention – an International Convention on Wetlands by the UN in 1971.

The coastal wetlands of Kanyakumari are critical habitats for local, local migratory and migratory avifauna species, where migratory birds as garganey, shoveller, pintail duck, wigeon, black tailed godwit, pacific golden plover, red shank, green shank and Caspian tern visit from August to December annually. Local birds as greater flamingo, spot billed duck, herons, black winged stilt, open billed stork, white ibis, black ibis, glossy ibis, spoon bill and pelican are found in the wetlands. Ground nesting birds as black winged stilt breed in it.

Considering the rich avifaunal biodiversity, the Tamil Nadu Government has declared the Suchindrum-Theroor wetland Complex and the Manakudy Estuary areas as Bird Reserves. To

view the birds and to boost eco-tourism, the Kanyakumari Division of the Forest Department has installed watch towers to view the birds by the public and to monitor the birds. Earth mounds have been raised at Theroor lake, Rajakkamangalam lake to enable the birds take rest after a meal. A visitor can see the birds sitting on the mounds and taking rest. Pelican, Open billed stork, white ibis, cormorants, darter breed annually in the Suchindrum Wetlands. Two species of the polyandrous Jacana breed in the freshwater wetlands, which build floating nests on water, while painted stork and pelican make local migration to breed in Koonthankulam about 65 kms away.

The Mangroves in Manakudy are a fertile area of fish including crabs, prawns and other inland fish and the fresh water wetlands provide livelihood to many people who earn their living with freshwater inland fish in wetland ponds and lakes. The faunal diversity and abundance of bird species provides immense potentialities for Eco-tourism and Bird Watching and potential areas for researchers for avifaunal study.

Some of the threatening factors to the wetlands are severe encroachment of the banks of the ponds and lakes, pollution by degradable and non-degradable substances, sound pollution created by heavy vehicles and constant traffic, use of chemical based soaps for washing purposes and bathing, illegal leasing of the ponds and lakes for lotus culture, using the wetlands as dump yards, conversion of paddy and agricultural wetlands into residential areas, excessive growth of exotic weeds and non-maintenance of wetlands.

III. Interventions of HEAL at various levels:

The threats affecting the natural conservation and eco-balance in the district has been widely and intensely addressed through ongoing initiative and community participation by HEAL for the past 30 plus years.

III.a. The Mangroves of Kanniyakumari district – Manakudy:

(Sustainable Development Goals : 13, 14 and 15)

Origin of Mangroves in Kanyakumari district (1993):



With HEAL's involvement in various environmental initiatives across the district, the origin of mangroves has an interesting story to relate. As a part of the assignment for Equations from Bangalore, a requirement of "Impact of coastal ecosystem through coastal tourism" was studied in 1992. HEAL ventured into the coastal villages across the belt in order to analyze the impact of tourism especially Muttom, Chothavilai, Kanyakumari and Colachel. One such intervention led to find out the displacement of households of fishing community from their land to a different place due to the impact of tourism in Kanyakumari. Valuable lessons towards problem solving and sustainable solutions was drawn from such findings. Accumulation of plastic waste in the long run had created a deeper impact of the lives of the people. This further led to the exploration of Rajakamangalam and Manakudy with swampy areas out of five estuaries in the district having a scope for mangrove cultivation and thus protecting the environment, species that will be extinct otherwise and contributing towards biodiversity. Like minded environmental activists joined hands to support this cause. The great environment scientist, Dr. G. Santhana Kumar pioneered this cause resulting in the vast breeding of mangroves turning out to be an important landmark of this district since 1993. Seeds of two varieties of mangroves plantation – *Avicennia* and *Rhizophora* were brought from Kerala.



Manakudy estuary covering an area of 145 hectares with a depth of 6 to 10 meters is the largest estuary in Kanayakumari district, Tamilnadu. Pazhayar River originating from Western Ghats Mountains converges at Manakudy to create the estuarine water system. The rich estuarine fish stock provides livelihood to 46 estuary dependent vulnerable fishermen families.

More than 80 wetland bird species are found in Manakudy estuarine system. These birds belong to about 50 genera and 20 families, exhibiting a high degree of avifaunal diversity. Prominent among them is gorgeous Greater Flamingo. Other birds include; Dabchick, two species of Pelicans, three species of Cormorants, Snake Bird, over ten species of Egrets and Herons, Open bill Stork, Painted Stork, Spoonbill, Black Ibis, Glossy Ibis, Blockheaded Ibis, Plovers, Sandpipers, Black winged Stilt, Gulls, Terns, Kingfishers and Wagtails.

- However, the estuary is facing a threat from the following sources; the thick growth of ***Prosopis Julifora*** on either side of the banks has been posing a threat to the estuarine eco system as this poisonous bush tree destroys any eco system under its shade.
- The disposal of solid waste and plastics into the estuary by tourists and local population pollutes the water and causes depletion of the fish stock.
- The coir retting units located around the estuary release poisonous effluent called ret liquor into the estuary. Heavy concentration of Hydrogen Sulphide in the effluents reduces the oxygen in the water and thereby causing the depletion of the fish stock.
- The estuarine mouth on the southern side is blocked by sands washed ashore by sea waves and hence it prevents the mingling of sea water into the estuarine water. The free exchange of sea water into the fresh water in the estuary is vital to maintain the salinity of the estuary water system where fish breed and flourish.



Epifaunal species are important in the balance of ecosystems as they are extremely prolific in coastal and shallow reef ecosystems. The **meiobenthos**, especially those in the mangrove environment plays an important role in the food web in recycling of detritus organic matter.

Fiddler crabs coming out of their abode. Recent observation of the fiddler population indicated the polluted estuarine environment enhanced ecological health



The **fiddler crab** or **calling crab** found in mangroves of Manakudy estuary is of more than one hundred species of semiterrestrial marine crabs well known for their sexually dimorphic claws; They also live in salt marshes, and on sandy or muddy beaches brackish intertidal mud flats, lagoons, swamps, and various other types of brackish or salt-water wetlands playing a pivotal role in enriching the biodiversity of the land. Hence its an indicator that Manakudy estuary is rich in fauna and flora enhancing a viable ecosystem for all species thriving in the mangroves.

Conservation efforts of HEAL for the Mangroves:

With a target of about 10,000 mangrove saplings to be planted in a patch of land on the western side of the estuary, Dr. G. Santhana Kumar, Environmental Advisor of HEAL started the process in 1992 which has resulted in thick mangrove forest cover for estuarine based birds and bats now.

- Since 2005, Heal has been implementing the following programs/activities to improve the estuarine eco system, sensitized the local community on the importance of estuary and mangroves for their livelihood and protection against sea-based disasters, thereby securing their involvement and participation in the restoration and conservation of the estuary.

- The local community gathered Rhizophora propagules and raised a nursery. Dr. G. Santhana Kumar trained them to raise the nursery in an innovative KEM method – an environment friendly method with minimum casualty.
- 12,000 Rhizophora saplings planted on the eastern bank of the estuary with the participation of the community.
- Reed bed management system was established at the entry points of ret liquor effluents through Reed Bed system which is Typha and Cyper grass the roots of which breaks the sulphur from the effluent water coming from the retting ponds. The Reed bed treatment teaches the local community about bio filtration. The roots absorb the sulphur and thereby reduce the pollution of the estuary.
- 360 coir retting unit owners had been sensitized of the environment damaging effect of ret liquor and motivated them to install Reed Beds inside their factories to save ground water from pollution and estuarine water also.
- The youth in Manakudy village were formed under a youth forum, sensitized and motivated them to protect the estuary from pollution and the saplings from grazing by cattle.
- Kayal development committee was formed to monitor and protect the estuary with members from Manakudy Estuary Development.
- In 2014, the then Superintendent of Police, S.P.Manivannan inaugurated the plantation of 50,000 saplings.
- The plantation of saplings has been a regular activity since this inauguration.

The current need for the conservation of the Mangroves:

The initiative taken by HEAL for the development of Eco Tourism Center near estuary to popularize the Bird Sanctuary and the Mangrove Forest should be further strengthened and with more emphasis on involvement of youth and children through education and awareness. Eco Tourism will also promote/strengthen the conservation activities as it will improve the local livelihood options of the community. Eco Tourism, thus will be a conservation linked livelihood initiative. It will have a watch tower to view the birds and a boat service to ferry along the backwaters.



The Bird Sanctuary is the felt needs of the hour for the following reasons; For example, Grey Pelican, Snake Bird, Painted Stork, Black headed Ibis and the Black tailed Godwit are listed as near threatened species by Bird Life International. The migratory birds visiting this estuary breed in the northern latitudes as far as the Arctic Circle. The smallest migratory species is Little Stint which weighs about 25 gram.

We have developed an Eco Park on the western side of the bank to educate the tourists and the fishermen community in the 42 coastal villages and the school children on the importance of the coastal eco system to protect their lives and improve their livelihood.



This park is part of the Eco Tourism initiative and a pond was developed as a model fish hatching and breeding pond in technical collaboration with the Department of Fisheries. A fresh water fingerling seed bank needs to be developed to replenish the fish stock in the local ponds and estuary.

There are 325 hectares of marshy land available on the either sides of the estuary to plant at least 5, 00,000 to 10, 00,000 mangrove saplings.

Before planting the saplings, it is imperative to destroy the deadly **Prosopis Julifora** from the area.

Another important felt need is to remove the accumulated sands from the estuary mouth with machines and local community participation to ensure free mingling of sea water with estuary water.

Anticipated benefits and impact

- The thick growth of mangroves in future will be habitat for migratory birds to roost and breed. Moreover, endangered species will find their habitat here.
- The estuarine eco system with their evergreen canopy will improve and it will contribute to mitigating the global warming.
- The leaf litters falling from the mangrove trees will feed the estuarine fish and it will improve the quantity of fish stock, thereby considerably improving the livelihood of the estuary dependent families.
- The Eco Tourism Center will attract eco tourists and the area will emerge as a marine eco-tourism spot in future. The local economy will get a boost through eco-tourism and the local community will get conservation linked livelihood income.
- Eco Park will be a community education center for tourists, local community and school children. It will contain information on marine fish stock. It will protect and conserve the Anguilla (eel) which is under endangered species.
- Thick mangrove forest cover will act as a bio shield to protect the local community in the event of natural disaster like Tsunami in future.

Removal of Prosopis Julifora: photo

The scattered occupation of Prosopis Julifora nearly 65% of the locality has been a major threat to the environment. The removal of this species will not only empty the area but also will be filled as barriers for cattle to protect the mangroves. This is a tedious and ongoing process that has to be paid primary attention to save the mangroves and support the ecosystem.



III.b. REED BED MANAGEMENT SYSTEM

(SDG 6 – Clean Water and Sanitation, 11 – Sustainable Cities and Communities, 13 – Climate Action and 15 – Life on Land)

The heavy rains in 2008 created a disastrous situation along the coast of Manakudy- west leading to massive death of shrimps and other species in the river. This is due to the coir retting units along this region who make use of the water for the entire process. The contaminated water containing Hydrogen Sulphide is a threat to the organisms breeding and hence need to be addressed. This is where HEAL ventured into creating awareness and introducing reed bed management system to contribute towards protecting the ecosystem. This paved way to expand this system in other areas of Rajakkamangalam and Colachel also. The coverage of water contamination due to coir retting units was more than 100 hectares across Thekurichy in Ganapathipuram town panchayat. Through the venture of “Improvement of Living conditions by Improving protection of natural resources and sustainable resource management” project HEAL took over this challenge in three important areas and addressed this issue successfully through minimal initiatives.

According to the *“Study on Environmental Quality of Manakudy Mangroves, Kanyakumari District, Tamilnadu Southwest Coast of India”*, conducted in the year 2016 (V.Ramamurthy, R.L.Abhinand and R.Rajakumar) the present information of physico-chemical properties of water and soil samples from Manakudy mangroves shows relatively high content of salinity than the riverside. Salinity level is the main factor responsible for variation in the hydrobiology. The quality of water and soil in the mangroves is deteriorated by ret liquor of the retting industry adjacent to the estuary, domestic sewage and agricultural runoff along natural and artificial sources. The quality of water is not stable and it may be changed due to seasonal variations. Water nutrients shows variations among mangroves and revering side because the accumulation of artificial and natural calamities. It is concluded that the necessity of monitoring the water resource of Manakudy mangroves.

Coconut groves

Coconut plantation is one of the principal crops in Kanyakumari district. Various products such as coir, broomsticks and roofs made of coconut leaves are manufactured from Coconut. It is therefore understandable that coconut fibre processing units are flourishing in the district. Coconut fiber-based units provide employment to the local population as well as boost the local economy. It is unfortunate that these coconut fiber processing units are located, by and

large, along the estuary banks and along the coastal region for the simple reason that during coconut coir retting the coconut husks are soaked in the salty water. Therefore, estuaries are the ideal places for coir retting units.

Estuary ponds

In Kanyakumari district, the coir retting units are highly concentrated around Manakudy, Rajakamangalam estuaries and along the AVM channel in Mondaikaud/ Puthoor. The negative impact of the coir retting units is that pollutes the estuary water and cause the death of the fish stock pollution is caused due to Hydrogen Sulphide released during the microbial activity. This Sulphide pollution destroys estuarine water and also ground water resources. The massive death of fish was observed by the research scholars who has done the work on these retting ponds.



Coir retting units

The coconut fiber processing units located around the Manakudy Estuary release effluents that contain highly poisonous chemicals such as Hydrogen Sulphide. These effluents enter into the Estuary and pollute the water. The fish stock in the Estuary reach the estuary banks during breeding season. During this period, they consume the polluted water along with Hydrogen Sulphide and die.

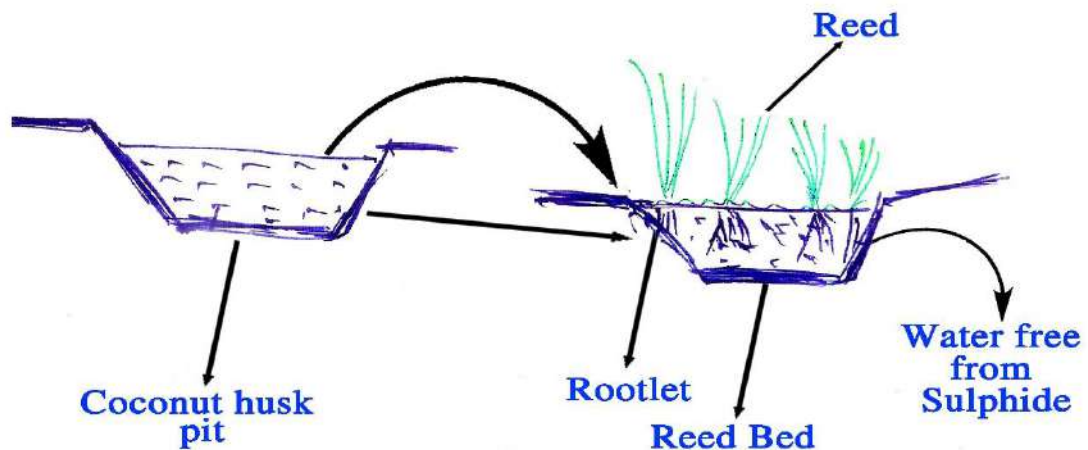
Reed and retting ponds

The only alternative is to grow Reed beds such as Typha and Cyper grasses along the entry points of effluents. These grasses have fibrous roots that lodge different types of bacteria, particularly Sulphide mobilizing bacteria. When we grow such bacteria and plant association along the banks of the estuary, these grasses serve as bio filter.

Bio filter (SDG 6 and 7 – Affordable and Clean Energy)

When the retted water or effluents pass through the roots of these grasses, the bacteria breaks the Hydrogen Sulphide into Hydrogen and Sulphide. The effluents that come out of the reed beds are free from the poisonous pollutants. This process reduces the pollution load through the bio filter mechanism.

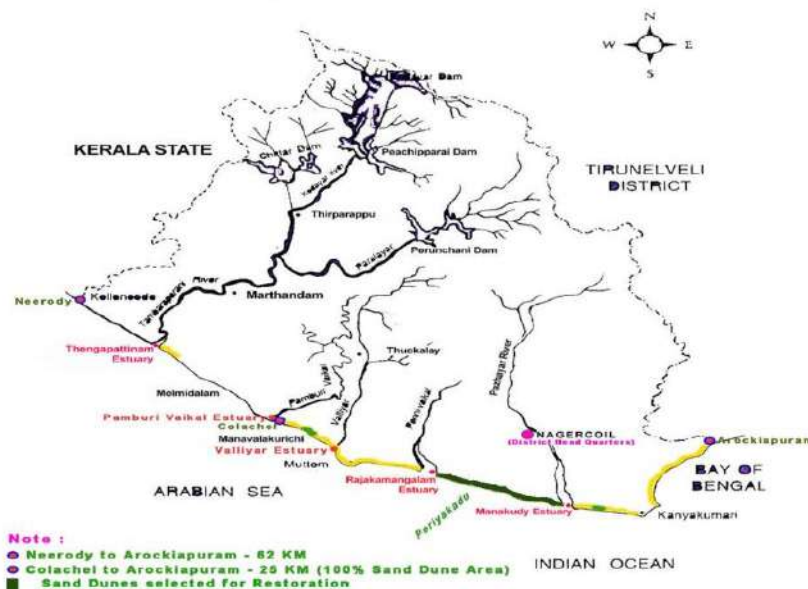
Reed Bed Management



Initiatives of HEAL for Reed Bed Management:

- Training of Reed Bed Management to 8 companies near the mangroves in Manakudy emphasizing the importance of reed bed.
- Awareness on reed bed to the coir unit workers rendering about 8 training programs.
- Training for 72 units of coir retting in Thekkurichy.

III.c. Coastal Sand Dunes of Periyakadu: (SDG 3, 11, 13)



Intervention of HEAL in addressing the issue of sand dunes:

Coastal sand dunes are one of the important landmarks of Kanyakumari district. When the 2004 tsunami struck the coastal belt of Kanniyakumari district, Siluvai Vasthian of HEAL, had a devastating experience of seeing so many lives lost and was at the burial. A survey of coastal villages affected by the 2004 tsunami found significant damage in areas where sand dunes had been destroyed due to lifestyle changes. The HEAL Movement, therefore, involved people to be aware and active in taking into account the destructive factors of sand dunes to protect them from natural disaster.



Restoration and Conservation of Costal Sand Dunes for Biodiversity and Disaster Risk Reduction

Taking the Periyakadu sand dune that had survived the devastation as a model intervention area, project activities were carried out over a distance of eight kilometres. Sand dunes were later perceived as one of the most important factor for coastal biodiversity conservation and livelihoods of people. This was followed by the preparation / drafting of relevant documents.



HEAL focused on

1. To create awareness among key stakeholders on the importance of coastal sand dunes and the need for preserving;
2. To form Greening Committees at village level and federate them at district level;

3. To train the community members on restoration, conservation and management of costal eco-systems;
4. To identify suitable plant species;
5. To propagate the importance of sand dunes among communities;
6. To involve the community members in advocacy and lobbying to protect sand dunes from sand mining; and,
7. To motivate the student community, local stakeholders, general public and the Line departments on the importance of preservation and conservation of costal sand dunes.

Sand Dunes as a barrier to Disaster

Risk Reduction:

- India has a coastal line of 6,090 km.
- Tamil Nadu has a coastal line of 1,100 km.
- Sand dunes are important to;
 - Prevent Natural Disasters from marine environment.
 - Enrich the Biodiversity to strengthen the ecology of marine environment.
 - Absorb and retain rainwater for flora and fauna to flourish and cherish.
- Prevent sea-water Intrusion;
- Breeding ground for animals like Turtles, Crabs, etc.
- They Contribute fisheries resource
- Livelihood for Sea shell collectors
- Places of recreation
- Sandy fauna, Flora Economical and Ecological Value



Sand Dunes Formation and sustenance:

- Sand dune is the outcome of deposit of sands in the shore of the sea by tidal waves.
- It is a temporary phenomenon.
- It offers protection to the human inhabitants from sea related disasters.
- It is a natural barrier.
- The naturally formed sand dunes protected the coastal inhabitants from tsunami.



Human interventions on sand dunes:

- Urbanization
- Location of Industry
- Aquaculture
- Mangrove Destruction
- Mining
- Tourism
- Loss of Biodiversity

Benefits of Sand Dunes:

- Protect humans and animals from the impact of Tsunami, sea erosion, high tides, sea-water intrusion, cyclones, etc.
- Absorb and retain rainwater underground.
- Function as breeding grounds for marine species.
- Stabilize specific plants for restoration.
- Prevent sea water during high tide waves from entering into the coastal villages



Current situation of the sand dune with initiatives of HEAL

- The sponge effect absorbs and retains the rain water during monsoon.
- Plants found on the Sand Dunes such as Adambas, Thazhai, Cynodondactylon (Ravana's mustache) prevent soil erosion from wind.
- The coastal plant absorbs Carbon-dioxide and emits oxygen that improves the environment.
- Useful as natural platforms to dry fish.
- Sand Dunes with natural vegetation balance the eco system.
- Techniques of sand dune stabilization
- Protection against biotic factors.
- Creation of barriers (mulch) from crest to the heel of dune, across the wind direction.
- Fertile ground for vegetative cover of xerophytic trees, bushes and grasses.
- After the above has been completed, dunes have to be properly managed.



Impact of construction of groins:

- When sand dunes are destroyed, the necessity for constructing groins in the sea shore arises.
- Constructing groins in the sea shore leads to the destruction of other natural resources affecting the livelihoods of sea shell collectors.
- Sand mining affects bio diversity.
- Construction of groins involve wastage of huge money, time and manpower.
- All the advantages of sand dunes are lost as a result of constructing groins.
- The risk of natural disasters is increased when sand dunes are destroyed.



Activities Carried Out by HEAL:

- Formed village and district level Greening Committees with representation from natives, children, women and key stakeholders.
- Trained natives and members of village level Restoration and Conservation Committees on sand dune's restoration, conservation and management.
 - Community participated in zonation of the existing sand dune into Pioneer, Middle-shore and Backshore zones. Identified appropriate species and propagated in the respective zones.
 - Promoted special curriculum for the children on eco-system, sustainable management and knowledge on marine biodiversity through Eco-clubs at the school level.



- Children and women participated in the presentations at the village and district levels, common meetings and specialized seminars.
- Excavated accumulated and unwanted sand in the entrance of Manakudi estuary and consolidated with vegetation activities.
- Undertaken and accomplished pollution free practices of life style and livelihood exercises.
- Taken steps to preserve sand dunes as natural barrier in coastal natural disasters.
- Displayed board installation marking the risk, vulnerable group and opportunity map.
- Awareness generated on the identifiable benefits of the plant species.
- Show-cased environment restoration and safer living practices at the district level.

Key Achievements:



- A District Level Greening Committee consisting of 22 Environmental Scientists is functioning with the objective of promoting greenery along the coastal belt and in preventing sand mining and smuggling.
- In most of the coastal villages, sand dune restoration committees are functioning.
- These committees meet twice a month to discuss the problem of sand smuggling in each of the villages.
- A District level Greening Committee is functioning with the objective of promoting greenery along the coastal belt and in preventing sand mining and smuggling. A child from each village, a woman representative and Kanyakumari district environment scientists constitute the Greening Committee.
- In 22 schools along the coastal belt, Eco-clubs active in promoting environmental education, conservation of sand dunes and create an eco-friendly generation.
- In addition, these eco- club members are planting and maintaining neem saplings.
- They have the knowledge on the method of planting the saplings and maintaining them.
- This paved the way for capacity building, leadership training and environmental education, which are the outcome of this process.
- Training on Sand dune restoration is an ongoing process. Sand dune models are displayed to make the students aware of the uses of sand dunes and its importance.
- Coconut saplings are grown by eco clubs as a part of the nursery raising program.



- Eco-club members from three schools have exposure visit to Periacadu sand dune and learnt the uses and the medicinal value of plants grown on the dunes.
- Leaflets are distributed among the students. They also planted saplings.
- 5 vermi compost pits are in place in five schools of Pozhikkarai, Kesavanputhenthurai, Puthenthurai and Mela Manakudi (2 nos).
- Performed street plays and sung songs on sand dunes at public meetings in villages along the coastal belt to protect and restore the sand dune and to promote the plant species on the sand dunes.
- These activities inhibited a sense of conservation of sand dunes among the coastal public.
- Exhibitions were organized at Schools.
- Sand dune conservation and restoration models are exhibited by the Eco-club members in the district level during the science exhibitions.
- This has given way for the development of imagination and originality of thought in the subject by children.
- Nursery development for growing the species of plants that grow in the sand dunes.
- From the project, seedlings/cuttings/vegetative propagation has been raised for different plants like aloe, pantanas, calotropis and ipomeas.
- These seedlings are being distributed to the students and planted by them on the sand dunes.
- We have published a book on sand dune usage and importance titled "PerumanalUlagam" (World of Sand Dune).

As ecological conservation and preparedness has been talked about at a higher level, this project ensured the participation of the local community especially with children, youth and women at the forefront to take initiatives for the cause of climate change and ecological conservation.

A concept of ecological child rights emerged through this process that captured the thoughts and actions of children contributing towards ecological conservation. This involves the



rights of the children to strengthen the ecosystem which enables the healthy livelihood and existence of the children. This can be defined as rights of the children to conserve the ecosystem and strengthen the natural resources for the needs of the children.

III.d. Green and Clean Coast of Kanniyakumari:

(SDG 3, 4,6, 7, 11, 13, 14 and 15)

NegiliIlla Neithal Padai, is a service-oriented voluntary organization started in 2019 working towards Ecological Rights and Environmental Sustainability. It involves a joint action by the people through youth initiatives. The initiative has been recognized with the "Green Champion Award" in 2021.



"Improvement of Living Conditions by Improving Protection of Natural Resources and Sustainable Resource Management", supported by TdH(G)/BMZ and was implemented by the HEAL Movement Nagercoil in 2016 at Chinnathurai. The HEAL movement for media women's group named "Women of Blue Sea" at Chinnathurai in 2016. Women of Blue Sea, Chinnathurai, has conducted the solid waste management project by collecting door-to-door wastes at Chinnathurai for the first time in the coastal areas of Kanyakumari, and this project has led to women's empowerment among them. The Government of India, Field Outreach Bureau, Ministry of Information and Broadcasting, Thirunelveli, has awarded this women's team the "Leading Women Award" on January 12, 2019. Later, the HEAL movement formed an Eco Club at Pious XI Primary School, Chinnathurai, and promoted the "Green and Clean Campus" concept among the students during 2016–2018.

Even though the project was completed in 2018, the sustainability of the project is still being considered by the students. The youngsters, women, and people of Chinnathurai were inspired by this concept and formed a public group named "Clean and Green Chinnathurai". and conducted several awareness programs, including beach clean-ups, tree plantations, etc.



These activities have set an example for the people of nearby villages, and they also requested that the team implement such projects in their villages too. Based on their request, On December 26th, 2019, youths from the coastal region in the



Kanyakumari district founded a youth group named Sea Fenders, later changed to Negili Illa NeithalPadai (Plastic Free Sea Force) at Chinnathurai on September 30, 2020. They later expanded all over the coastal regions of Tamil Nadu. It consists of 500+ youth and community volunteers and implements projects in over 42 coastal villages in the Kanyakumari district. Initial funds were collected from the volunteers and well-wishers afterward by selling the plastic waste to recyclers while we were doing the other marine environmental activities. Youth coordinators in coastal villages measured the impacts through field visits and gathered feedback from rural communities for project improvement.

Vision and Mission:

- To make communities cleaner, greener and safer places to live.
- To empower communities to maintain, promote and enhance green places through creative educational initiatives, community participation and volunteering.

All our community and environmental work is guided by our set of objectives

- To protect promote and enhance the natural environment through sustainable conservation management practices
- To educate current and future generations, using their local environment as a platform to access are as and resources for hands-on learning.
- To support by facilitating planned out door activities, we can promote healthy physical, mental, and emotional well-being.
- To engage with people, connect communities, and engage firms in environmentally friendly practices.
- To appreciate and develop volunteers, as well as promote inclusive volunteering possibilities

Need for this initiative:

The coastal regions of the Kanyakumari district are always sea erosion across the year.

- The high waves and human interactions destroyed most of the coastals and dunes.
- In recent years a greater number of houses were destroyed. Due to coastal erosion, there is a limited amount of space for people to live.
- This can have an impact on the local communities means of livelihood and fishing possibilities. Simultaneously, the population increased and the habitation of the community arises.
- The people are addicted to modern culture and they always use and throw household things. As a result, the coast is filled with plastics and also people use these ashore as a dumpyard.
- Based on fieldwork undertaken between December 26, 2019, and the present, The initiatives listed below can be implemented in all of the coastal areas of the Kanyakumari district.



Milk Packet Segregation

On 30th August 2021, in association with Negili Illa Neithal Padai, Clean & Green Chinnathurai, and HEAL Movement, we started the Milk Packets segregation project. We asked our people to segregate the milk packets unit-wise. Every Sunday they will segregate the milk packets and proceed with the recycling process. Up to **March 2023**, we have collected 10 lakh and 16 thousand milk packets, where a single milk packet can be broken into 150 micro pieces.



Fishing Vessel Plastic Segregation:

We developed a unique technique called fishing vessel plastic segregation to address this persistent problem. All fishing boats that are setting sail receive the segregation bags. Over time, the plastic that the fishermen use while fishing and the plastic that their fishing nets catch will be brought back to the shore by the fishermen.

In collaboration with Negili Illa Neithal Padai and Clean & Green Chinnathurai we launched the Fishing Vessel Plastic Segregation initiative on January 19, 2022. We requested that our fishermen gather the used plastic. After each

sailing, they gather the plastic waste and give it to the collecting team, which then continues the recycling process. We collected **85+** kilograms of plastic waste from the deep sea as of **March 2023**.

Unit Wise plastic collection: *(SDG 3, 4 and 6)*

We launched the Unit Wise Plastic Waste Collection initiative on May 22, 2022, in collaboration with Negili Illa Neithal Padai, Clean & Green Chinnathurai. We requested our village residents to separate the used plastics. They will segregate the plastic waste and drop it off at the collection drum once a week, and then the collecting team will continue the recycling process. As of **March 2023**, we collected over 300 kilograms of plastic waste from Chinnathurai householders.

Environmental Awareness Campaign:



Environmental awareness campaign held on March 6, 2023, in collaboration with Negili Illa Neithal Padai, Clean & Green Chinnathurai, and HEAL Movement. We spread awareness of environmental threats and segregation methods to Chinnathurai residents and conducted a door-to-door pledge campaign at 250 houses.

III.e. River Management – Kanyakumari district: Implementation of River Cleanup checkpoints in Pazhaiyar – Mission Dam, Merku Thamiraparani – Kuzhithurai River and Mankadu Check dam

(SDG 13, 14 and 15)



Water is one of the most important natural resources for the survival of all living organisms. Rivers are providing main water resources for domestic, agricultural and industrial purposes. The quality and quantity of surface water in a river is influenced by

natural factors such as wind, rainfall, temperature and weathering of rocks etc. Kanyakumari district as a coastal district situated at the southernmost tip of Tamilnadu has a rich history of the early Kings of Venad who were conscious of the potential of Pazhayar which originates from the forested area of Surulacode, carries small streams from Mahendragiri peak and flows through Thoivalai and Agastheeswaram taluks. The total length of the river is about 37 km and it passes through Boothapandi, Thazakudi, Putheri, Nagercoil, and Suchindrum finally joins with the Arabian sea. The early kings also constructed about 11 check-dams along the course of the river. A Venad ruler, BoothalaSree Veera Udaya Marthandavarma, who ruled this area in 1517, constructed the Veerapuli dam and its canals. The then rulers also constructed 'Kutty' dam, Palikondan dam, Chattuputhur dam, Veera puli dam, Sabari dam, Kumari dam, CholanKattar dam, Pillaipethan dam, and Mission dam. All these check dams have well-developed canal systems that irrigated the surrounding areas. Pazhayar river starts from Surulacode regulator headworks at which it gets water from Kodayar system and running almost in plain terrain in the ayacut lands of Anandanar channel and Thoivalai channel, N.P. channel. Even though Kanyakumari district there is vast extension of water bodies which includes numerous rivers, streams, ponds and wetland, Now the district is undergoing eco- degradation due to unplanned urban development, deforestation, large scale sand mining, mushrooming, brick kilns, coir retting as well as other domestic, agricultural and industrial waste water being discharged in to various water bodies in this district. The Pazhayar river is one of the important river in this district for drinking and irrigation purposes, Now the major problem faced by the Pazhayar is pollution. According to the Environmental Protection Act, 1986, sewage should not be let into public water bodies. But the current situation shows that the water gets polluted as it enters the Nagercoil corporation. Fifty years ago, one could see hundreds of people taking bath in this river in various bathing gate. The same spot now looks like a cesspool of sewage with solid waste like plastic floating on it. People expect to restore this river and protect the ecological system. Peak demand of the water, corresponding with the population growth, agricultural and industrial development has induced environmentalists to determine the chemical, physical and biological characteristics of natural water resources.

The river Tamiraparani is one of the major rivers in Kanyakumari District. This river is directly and indirectly influenced by human activities. In this river domestic sewage as well as municipal wastes are dumped in several places. The wastes from nearby fish markets are also added to this river. The river is also used for bathing. Many brick industries and some rubber industries are also situated in the bank of the river. Retting of fibre is also done in many places in this river. It has been observed that except dissolved oxygen and hydrogen ion concentration all the other parameters are under permissible limit. In the month of March the parameters like hydrogen ion concentration, electrical conductivity, SAR, alkalinity, dissolved oxygen, amount of chloride, calcium, magnesium and sodium are very high when compared to other months. The increased use of metal-based fertilizer in agricultural revolution of the government could result in continued rise in concentration of metal pollutions in fresh water reservoir due to the water run-off. Also, fecal pollution of drinking water causes

water borne disease which has led to the death of millions of people both in cities and villages. The discharge of these wastes may affect the aquatic animals of such river or adversely alter the chemical composition of the river. Natural water contains some type of impurities whose nature and amount vary with source of water. Metals are introduced into aquatic system through several ways which include weathering of rocks and leaching of soils, dissolution of aerosol particles from the atmosphere and from several human activities, including mining, processing and the use of metal-based materials. Metals after entering the water many be taken up by fauna and flora and eventually, accumulated in marine organisms that are consumed by human beings.

In this scenario, it is high time that we look into the possibilities of protecting the rivers.

- We suggest river clean up systems by constructing barricade like mechanism in each specific point of the river so that all waste gets filtered, collected and removed from the rivers. This can help avoid the wastes reaching the ocean.
- The waste collected can be recycled.
- Intense awareness to the people along the shores to reduce waste disposal and responsible management can further lead to a clean environment along the rivers.
- In this process, community involvement especially youth and volunteering groups can be a strength since regular monitoring can be done through them.
- The government support can play a major role in this venture. Interceptor barricade is the need of the hour for saving our rivers.
- Partnership with local non-governmental organizations and environmental professionals can be an added advantage to keep the issue in check.
- International organizations such as ocean clean up can be partnered with address this cause.



III.f. Tail-End Irrigation Methods – An impact on agriculture and water recharge:



Kanniyakumari District has a pleasant climate and has a unique advantage of both the South-West as well as North-west monsoons. The rainfall is generally very high in the northern parts of the district and considerably low in the southern part of the District. Pazhayar, Paraliar, Kothaiyar, Valliyar, Pechiparai, Perunchani, Chittar I, Chittar II, Kodayar Dam and Pandyan Dams are the water resources system in the District. Tail end irrigation was an age-old method followed since the period of Travancore rule in order to equally distribute water flow for all areas for agriculture and seasonal



cultivational purposes. The first release of water from Pechiparai dam reaches the *Theppakulam* pond of Kanyakumari temple as homage to God. And the next release in each shutter supplies water to the subsequent areas that ensures water availability to all regions of the district. Hence the present 'Kanyakumari – Nanjilnadu' was known as the rice bowl of Kerala. Since 1956 when Kanyakumari was reinstated with Tamilnadu, according to the Tamilnadu water policy, the system has not been favourable to the Travancore irrigation system. The current situation has resulted in water scarcity and affecting the tail end areas. Ground water recharge has been drastically affected and cultivation is out of balance yielding poor results because of this condition. Desilting of the ponds before water release also can create a major difference in recharge. The previous tradition of community ownership called 'kudimaramathu' could have been an ideal system to maintain a balance in water conservation. Our organization has taken meaningful initiatives towards desilting of ponds in the coastal and inland villages, involving community for sustainability and maintenance and thus enhancing quality of water sources. Ponds have been preserved by ongoing measures of monitoring pollution and conservation of the eco system. All schools have been associated and networked with our efforts for rain water harvesting in the coastal villages. Ongoing education of water conservation has been undertaken through eco-clubs among the school children.

IV. Recommendations for aneco-sensitized community in Kanyakumari district protecting the bio diversity and environment:

Mangrove – Manakudy:

- Protection and expansion of the mangrove forests will be a haven for *endangered species*.
- *Estuarine ecosystem* will contribute towards mitigating global warming.
- Improving the *livelihood* of the estuary dependent families by *eco-tourism* center, eco-park, flourishing fish stock by the mangroves.
- *Community education* center promoting tourism and economy.
- Mangrove as a *bio-shield* against natural disasters.
- Removal of *Prosopis Julifora* – a *threat for bio-diversity* and making use of the available landscape for *plantation of mangrove* saplings.
- Identification of the existing landscape around the estuary for *extension of mangroves* and thus enhancing a sustainable eco-system.

Reed bed Management:

- Awareness for the coir workers, coconut farmers, land owners and community about the importance of *reed bed and the impact of pollution* caused by coir units.
- Planting of Reed beds such as *Typha and Cyper* grasses along the entry points of effluents which have fibrous roots that lodge different types of bacteria, particularly *sulphide mobilizing bacteria* at the banks of the estuary serving as *anatural bio filter*.

Coastal Sand Dunes:

- Awareness on the importance of sand dunes in the coastal villages and how they protect the people from *natural disasters in special focus to Periyakadu* and other villages that are under threat with such circumstances.
- Plantation of various species to avoid *coastal erosion* and thus supporting the sand dunes.
- Mobilization of *viable infrastructure* to promote *tourism and heritage significance* for the sand dunes localities.
- *Bio fencing* to support bio-diversity and ecosystem.
- Creating an *eco-sensitised community* through rallies, *eco-walks by children* and youth from schools and colleges.
- Ongoing follow up programmes and *eco-monitoring committee* for the *conservation and protection of sand dunes*.

Green and Clean Coast:

- Creating model villages like Chinnathurai with initiatives of *plastic waste management*.

- Imparting knowledge on *community responsibility* towards climate change and waste management thus address loss of biodiversity.
- Forming green and clean committees in each village across the coastal belt so as to enhance a *greener environment* contributing towards a clean ocean for *endangered species* to not only survive but also to thrive.
- Contributing towards boosting the *local economy* and *community capacitation* by attracting tourism and cross-cultural exchange from other areas and countries to the model villages.
- Promoting *volunteering initiatives* both from the community – *Community based Green Committee* and *social work and development organizations* and institutions towards constructive initiatives for the coastal environment.
- Networking envisioning other coastal areas across the state such as Pichavaram and Punnakayal where there is a threat for coastal erosion and existing mangrove preservation.

Tail-End Irrigation Methods – An impact on agriculture and ground water recharge:

- Ensuring equal water supply to the tail-end areas of the district and thus addressing *water scarcity* and *balanced agriculture and cultivation*.
- Increasing *employment opportunities* through methods of community responsibility, youth engagement and gender responsive conservation of water sources across the district.
- *Ground water recharge* through *tail-end irrigation* across the coastal villages.
- *Desilting of ponds* in the district to increase clean water storage and conservation of flora and fauna around the water sources.
- *Education and awareness* of agriculture and farming methods among the schools, colleges and institutions.

V. Conclusion

Climate change and global warming has been a pressing issue in our district with the concerned escalation of river water pollution, poor waste management and lifestyle affecting the bio diversity and environment. HEAL has been a pioneer taking various measures against this cause and collaborating with other organizations and government to resolve. This concept on the various issues affecting the bio diversity, we present a detailed report to the concerned departments so as to take a major step towards a concrete, sustainable as well as innovative solution. The organization is keen to support and be a part of any initiative that can bring productive results in the areas of climate action and bio diversity. Leadership development, knowledge sharing and networking are the key aspects of shaping this venture towards a better future for the district.

