

Beginning of Our Restoration Journey

The Ram Hattikudur Advanced Training in Conservation by the Zoo Outreach Organisation focuses on a different theme each year. This year, the theme is ecological restoration. The program emphasizes practical and experiential learning, including field visits to relevant sites.

Under the restoration theme, we undertook a four-day journey along the Coromandel Coast, from Auroville to Chennai. During this trip, we visited several places such as Pitchandikulam Forest, Auroville Botanical Garden, Aurovanam, Poorvigam Herbology and Training Centre, the sacred groves in Putthupet and Oorani, Nadukuppam, the Madras Crocodile Bank Trust, and Siruseri Twin Lakes. Along the way, we also stopped at various locations to observe and understand human-centric developments such as the Kazhuveli Bird Sanctuary, salt pans, and artificially planted mangroves.

Throughout the trip, we interacted with experts from various fields, learning about native and non-native species, the importance of tropical dry evergreen forests (TDEF), different reforestation practices and the roles of governments, corporations, and communities in it. We also reflected on the ecological impacts of human-centric development across the region.

Pitchandikulam Bio-resource Centre:

We visited Pitchandikulam's bio-resource centre with Joss Brooks, the founder, and met other staff including Dr. Shanmugam Mani, a botanist, Gopi, an archaeologist and Aurosyllie, who manages operations and consultancy at Pitchandikulam. We first saw a series of pictures of what Pitchandikulam looked like over the years – from barren land in the 1960s to a rich TDEF patch now. The forest as a whole is now around 40 years old. We learned that Pitchandikulam covers about 75 acres and is part of the National Medicinal Plant Conservation Network, run by the Foundation for Revitalisation of Local Health Traditions (FRLHT). It also functions as a plant conservation park for native forest and medicinal species. The bio-resource centre held everything from

brass wildlife sculptures and seed samples to faunal skeletons, antique furniture, and other unique artefacts. There were also several posters depicting Pitchandikulam's education and outreach work in nearby villages. It also functions as a consultancy service, with a corporate-funded project in Chennai to restore lakes at the outskirts of the city.

Much of the art we saw in the posters was done or directed by Eric Ramanujan, an incredible wildlife artist who spent much of his life contributing to Pitchandikulam and other wildlife initiatives with his sketches of Indian flora and fauna. He also ran the Pitchandikulam Art Collective, a group of artists who created sculptures, paintings and other creative work to help spread environmental education messages. We saw many more examples of this artwork as we took a walk through the forest outside the bio-resource centre, where art and information on a wide range of taxa and environmental concepts were painted on slabs of stone for display. These were kept side by side with petrified wood fossils and huge traditional pots used for storing rice, creating a beautifully organic blend of history, education and culture in the midst of the quiet forest.



Sanjay explaining how a check dam changed the ecosystem of the Kazhuveli. © G. Pannagasri.



Wall art in Pitchandikulam for education. © G. Pannagasri.



Gopi showing us the archaeological museum at Pitchandikulam. © P. Kritika.



Walk around Pitchandikulam with Aurosytle. © P. Kritika.



Art by Eric Ramanujan in Patchandikulam Museum. © K. Gokul.



Joss's introductory session. © P. Hrishikesh.

Archaeological Museum:

We were guided by Gopi who showed us around the museum that covers a small part of the area. The museum displays various artefacts such as a bullock-driven cold press for oil extraction, a tool used for bullock shoeing, old terracotta objects, a flour grinder, a jaggery mould made from *Albizia lebbek* wood (chosen

for its heat resistance), a woven coracle, a wooden machine used to extract sugarcane juice, rice storage pots and terracotta stoves. Additionally, the museum features a Kazhuveli Bioregion timeline and a collection of fossils discovered in the area. We also discussed the different types of water sources and their traditional Tamil names.

Morning walk with Aurosylle:

Our second day began with a morning walk through the Pitchandikulam Forest guided by Aurosylle. In the early years, a wide range of species was planted here, including some non-natives, a few of which still persist today. Currently, they focus entirely on restoring native TDEF species. However, one of the most persistent invasive species is *Mimosa pudica*, commonly known as the “touch-me-not” plant.

We explored both the older forest, which has taken about 40 years to reach its current state, and the newer forest, which is growing at a much faster rate. Some of the plant species we observed included *Lantana*, *Ceiba pentandra*, *Toddalia asiatica*, *Khaya senegalensis*, *Abrus precatorius*, *Hiptage benghalensis*, *Albizia lebbek*, *Hura crepitans*, *Mimusops elengi*, *Memecylon umbellatum*, *Pongamia amara*, and several species of lianas. Apart from plants, we also observed a few common bird species, along with various butterflies, insects, and fungi, adding to the forest’s biodiversity.

Joss’s Journey:

Joss shared his journey, being born in Manchester during World War II and then shifting to live in Tasmania when he was six years old. He told us about his upbringing there and how Australian flora and fauna had been sustainably managed by the Aboriginal people across the continent before the invasion of European settlers. They caused immense damage not only to the native human communities but to the ecology of the continent.

Learning about this and the other atrocities perpetrated by Europeans made him give up his law degree and spend his time first as a lighthouse keeper for a while before leaving to travel the world after the Vietnam War started. He lived in different countries, including Turkey, France, and South Africa, before coming to India. During his travels, he passed through Puducherry and decided to stay and start Pitchandikulam after learning about Auroville. He showed us pictures of their efforts over the years and how the forest slowly grew as they



Discussion with Joss in Pitchandikulam Library. © G. Pannagastri.



Manjula giving us an overview of Auroville Botanical Garden. © P. Kritika.

integrated traditional methods of water management. Currently, Pitchandikulam carries out restoration projects for governments as well as corporates, with a major one being the Adyar Poonga. The 358-acre dumping ground was converted into a wetland-cum-forest with walking paths and an environmental education centre.

Auroville Botanical Garden:

At the Auroville Botanical Garden, Manjula (a staff ecologist) guided us and gave a detailed explanation of each section as we walked through the campus. The Auroville Botanical Garden is made up of several themed sections with a coverage of 50 acres of well-defined planted area with around 310 species of trees. The themes include Japanese Zen garden, cactus, butterfly garden, native species and common species.

Apart from this, they also work in different areas such as education, outreach, research and consultancy for restoration projects, especially with mining companies.

At present, they are involved in three mining site restoration projects across southern India. Their work includes soil testing, studying hydrology, understanding the local ecological region, and developing reference systems for restoration planning. So far, they have worked with around 1,200 plant species.

Manjula also mentioned ABG partnering with the Tamil Nadu government to introduce a restoration policy aimed at preventing “greenwashing” by organizations. They also collaborate with the forest department to train staff and raise awareness about native species planting and maintenance. She added that the organization focuses on ecological, economic, and social aspects to ensure a more holistic approach to restoration.

Aurovanam:

Our next stop was at Aurovanam, a 5.6 acre estate run jointly by the Sri Aurobindo Society and Pitchandikulam for experimental nature-based research, particularly with native food plant varieties. While there were many TDEF species grown on about half the estate from saplings provided by Pitchandikulam Nursery, much of it was devoted to water reclamation through a series of ponds as well as organic food production. We were shown around by Shiva, who looks after the place and was very knowledgeable about the different plants grown there. For instance, he showed us three different okra varieties and four different chilli varieties. School students often visit Aurovanam to understand kitchen gardening and start their own plots in their schools. Much of the produce goes to the Auroville Ashram. There was also a resource centre where Shiva showed us several seed,

fruit and vegetable varieties as well as natural products like honey and placemats woven from invasive *Ipomoea* species.

Poorvigam Herbology and Training Centre:

Following Aurovanam, we visited Poorvigam Herbology and Training Centre founded by Dr. N. Loganathan, who is an 11th generation medicinal plant researcher and Siddha ophthalmic surgeon located near Puducherry. Dr. Loganathan shared his academic, historical, traditional and mythological knowledge of the plants with us. The centre houses a nursery with 1,350+ plants with medicinal and therapeutic properties from around the world that is used in AYUSH system of medicine; 460 species of these are used for medicine in this bioregion and 126 are used to treat ophthalmic ailments and the centre does give separate attention to the threatened and endangered plants. Some plants are given special conditions to grow based on location of origin. The training centre also hosts educational classes, herbal tours, seed ball making, and home remedy preparation sessions to educate people about traditional herbology. They also facilitate medicinal preparation in the Poorvigam campus.

Sacred Grove I: Putthupet

We visited the Manjaneeswarar Ayyanar Temple, situated in Keezh Putthupet, which is surrounded by a sacred grove consisting of TDEF. Earlier, this forest had an area of nearly 28 acres, but now it has reduced to merely 12 acres due to various reasons - expansion of temple infrastructure and activity, agricultural encroachment,



Siva showing us the seed bank at Aurovanam. © P. Kritika.



Dr. Loganathan explaining the uses of various medicinal plants. © P. Kritika.



Human waste in Sacred Grove 1. © K. Gokul.

timber collection by the locals, grazing of cattle and goats, and introduction of non-native species. We saw that there was a lot of plastic litter on the ground throughout the grove.

Dr. Shanmugam Mani explained about the different stratifications of the forest to us. There was little to no vegetation in the understory, the middle layer was the most dominant and top layer consisted of just 6–7 trees. *Acacia caesia* is one of the most destructive and invasive species of this forest. The distance between the forest and the coast is just 1 km which makes it prone to cyclonic devastations. As the sacred grove falls under Panchayat’s jurisdiction and not under that of the forest department, it is difficult to undertake restoration efforts. At one point, it served as the seed source for the other restoration initiatives of Pitchandikulam. The temple, which was built by Raja Raja Chola, gets at least 1,000 visitors daily during the peak season which has impacted the forest in different ways:

- The invasive climber *Acacia caesia* shading all the trees not letting other trees grow and regenerate.
- The understory completely vanishing because of the dark/shaded area.
- Significant reduction in the biomass because of the shaded canopy and death of the native species, making the soil more favourable for invasive species.

Sacred Grove 2: Oorani:

We visited another sacred grove which was comparatively cleaner and less disturbed. *Combretum*

albedum, a native woody climber, had largely dominated the forest and had hooded the forest canopy. The girth of the climber we measured was around 140 cm. We learnt that even when the forest seems undisturbed, one could determine the health of the forest by the size and composition of the flora and fauna in different forest patches. For example, in the Western Ghats, when the Sahyadri Forest Rat *Rattus satarae* is replaced by the Common House Rat *Rattus rattus*.

We discussed whether a degraded forest could revive on its own if left alone, especially since competition with non-native species makes it difficult for native species to regenerate. Additionally, we often think of only plants as habitat engineers, but a healthy forest also needs a good mycelial network to support native flora and fauna and help them thrive. We concluded that too much damage results in the forest not being able to recover on its own if the conditions remain the same (with too many invasives and continuous human presence).

Kazhuveli Bird Sanctuary:

Next, we stopped at Kazhuveli Bird Sanctuary, which is one of the largest wetlands of peninsular India and was designated as a Ramsar Site in 2024. Many migratory bird species that utilize the Central Asian Flyway for migration use it as a stopover site. It’s noteworthy that these areas harboured TDEF in earlier times (Ramsar Information Sheet 2024). We saw a lot of diversity of bird species, with many of us observing “lifers”.

However, the construction of the Kazhuveli check dam, which was built to stop seawater from entering the wetland, has resulted in the conversion of a saltwater to a freshwater habitat. As a result, migratory shorebirds that depend on the brackish water have stopped foraging and visiting, and have been replaced entirely by freshwater birds, potentially endangering the ecosystem.

Salt Pans:

Similar to the bird sanctuary, we saw many waterbirds and shorebirds using salt pans along the East Coast Road as a foraging site. A dam built nearby eventually led to the shrinkage of the creek feeding the area. As a result, we learned that the chemical composition of



Birds fly away seeing the arrival of a raptor at Kazhuveli. © P. Hrishikesh.

Kazhuveli Bird Sanctuary Bird Count

12.1221°N, 79.8640°E

25/09/2025, 0945 - 1000 hrs

Sr. No	Species of Bird	Scientific Name	Count
1	Painted Stork	Mycteria leucocephala	2
2	Eurasian Curlew	Numenius arquata	3
3	Western Marsh Harrier	Circus aeruginosus	1
4	Black-headed Ibis	Threskiornis melanocephalus	4
5	Glossy Ibis	Plagadis falcinellus	~76
6	Black-winged Stilt	Himantopus himantopus	54
7	Spot-billed Duck	Anas poecilorhyncha	5
8	Great Egret	Ardea alba	1
9	Pied Kingfisher	Ceryle rudis	1
10	Grey Heron	Ardea Cinerea	1
11	Black Drongo	Dicrurus macrocercus	1
12	Little Cormorant	Microcarbo niger	1

the water changed from brackish water to freshwater, similar to Kazhuveli Bird Sanctuary, which affected the algal and fish composition. This eventually affected birds like swimmers, waders and other creek birds because of habitat unsuitability and fragmentation, gradually changing the bird composition. The salt pans also reduced the flood barriers as they are built in the estuarine ecosystem, increasing the chances of flooding of the nearby residential and agricultural areas. They also result in a high concentration of salts and other heavy metals from the pumped groundwater once the salt is harvested, after which the land is left barren.



Mangroves in saltpan. © G. Pannagasri.



Mangroves in saltpan. © G. Pannagasri.

Mangrove:

The mangrove we visited were also planted in the estuarine area along the East Coast Road. About seven species were planted by the forest department, out of which only two species adapted and rest died. This was because of two reasons. First, the saplings were planted in a non-mangrove area, where they had never existed before, which adversely affected the survival rate of the plants. Secondly, prawn culture in the surrounding area significantly increased the salinity of the water. *Rhizophora microcarpa* and *Avicennia marina* were the mangrove species that survived. We had a discussion around the need for restoration and what drives it; whether it comes from a social need to restore something, the need for greening, or from a genuine ecological crisis. Since the mangroves were not naturally present there, they stood very little chance of surviving and thriving. So it served more like a plantation site rather than the restoration site in this scenario, with the plants then having no other option except dying or potentially becoming invasive. Hence deciding the ecological need/agenda of restoration is the most crucial step in conservation.

Nadukuppam School:

In Nadukuppam, another campus run by Pitchandikulam forest, Joss gave us a brief introduction to the area and the work they do there. We then ventured into the government school nearby, where there was another restoration and education project site. The school once consisted of only two mud huts, but environmental education and government cooperation helped take the school infrastructure and students' academic performance to a whole new level. We were introduced



Various native rice varieties in Nadukuppam School. © S. Naufal Nazim.

to two environment education teachers, who take part in plantation initiatives, help the students learn about the importance of the flora and fauna around them, and maintain a minimalist kitchen garden which supports many butterfly species. Most parts of the school were allocated for native trees, but we also saw a few varieties of non-native trees.

We were then guided to the environmental educational centre of the school where they showed us various examples of arts and crafts done by the students. The teachers described how these were used for awareness drives in the nearby village communities in the form of puppet shows, shadow dramas and *Villu Paatu* - an ancient form of musical storytelling. We were amazed to know that with their teachers' guidance, the students had crafted all the costumes and props themselves. The art gallery also featured a seed bank with collections of native rice and seed varieties. Outside the art gallery, there were infographics showcasing an imaginative picture of the bioregion and methods of ancient water harvesting methods in Tamil Nadu, along with a variety of guides showcasing flora and fauna of the region.



Spirulina culture in Nadukuppam. © S. Naufal Nazium.

After leaving the school, we visited the community hall outside the school campus which is used for awareness workshops, medical camps and also functions as a temporary veterinary clinic for the nearby villages. These camps are supported by Pitchandikulam and operate to garner public support for eco-restoration efforts. Nearby, a spirulina farm not only provided training and education for local livelihoods but also facilitated sales of its products.

Nadukuppam Forest Restoration:

After we returned from the school, we gathered to hear Joss explain how he started the restoration of Nadukuppam. He described how the area was originally barren land with depleted soil and a high rate of soil erosion. In order to fix this, they changed the entire hydrology of the area in order to open the way for restoration. Paths were dug along natural drainage paths for the water to flow gradually into a series of interconnected ponds to support water harvesting and slow soil runoff. Over time, the site was also restored by planting native tree species. We also met Usha, a local community member who has been working at the Pitchandikulam nursery for several years, who explained the entire process of selecting seeds and raising saplings.

In the early stages of the project, she used to collect seeds and saplings from different forests and areas. However, now most of the seeds and saplings are sourced from Pitchandikulam Forest and Nadukuppam. We then took a walk through the campus to understand how natural vegetation has come up around the constructed water bodies.

Madras Crocodile Bank Trust:

At Madras Crocodile Bank Trust (MCBT) in Chennai, we were met by Ms. Pramila Rajan, the director. Established in 1976 to breed Indian crocodiles in captivity for reintroduction, it currently holds 15 species of crocodiles of the 27 in the world and several turtles and snakes, but only consistently breeds endangered species to exchange with other organisations or to release in the wild. An example is the critically endangered Red-crowned Roofed Turtle *Batagur kachuga*.



Conversation between Zai Whitaker and Sanjay Molur at Madras Crocodile Bank Trust. © S. Naufal Nazium.

As we went around, we met Zai Whitaker, the managing trustee. We also saw how different enclosures were adapted to different species, such as a water spray and basking log for the green iguana, and how staff managed duties like cleaning and feeding the animals. We also met Angeline Samuel, the curator, who explained the process of artificially incubating crocodile eggs, microchipping, and sexing snakes, crocodiles, and turtles. She also showed us examples of eggshells and teeth from different species. In addition to their ex situ breeding work, MCBT runs a snake venom extraction programme that partners with people from the Irula tribe, who have historically captured snakes, to collect venom for the synthesis of antivenom. Involving the Irula in venom extraction helps provide them with a livelihood related to their traditional occupation, saves people from snakebite, and preserves the snake population. We were guided by Gnaneshwar, project leader – snakebite mitigation, who guided us as we saw the venom extraction process and learned about the method, the venomous species used, and how the Irular and MCBT feel about continuing the process.

One particularly interesting fact is that venom is geography-specific; that is, the anti-venom made from a snake in Tamil Nadu will have decreasing efficacy against

snakebite as the distance from Tamil Nadu increases, due to the specific proteins in the venom. We left MCBT with a new hoard of knowledge about Indian reptiles and their conservation in captivity.

Siruseri Twin Lakes:

We then visited Periya lake and Chitteri lake in Siruseri on the outskirts of Chennai – a lake rejuvenation project which began in 2019. The project is supported by a CSR initiative of Tata Consultancy Services and guided by Indian Institute of Technology (IIT Madras). The work was executed by Pitchandikulam Forest consultants with support from SIPCOT for a maintenance part which is approved by PWD and Siruseri Panchayat and Public Cooperation. The site included huts for people to sit in, and there are plans to expand further with 17 additional lakes featuring children's parks, huts, and cafeterias. We were assisted by the manager to show us around. He mentioned that the lake was divided by a small path and later made as a road which then slowly turned out to be a landfill.

The whole lake was restored by removing the waste, and the depth of the lake was increased to 4.5 m by excavation. During the rejuvenation process, desilting was undertaken and the mud extracted from the lake was used to create hillocks around the banks for aesthetic reasons. We were informed that it took almost three years for the water level to appear natural again.

However, we saw that many of the plant species were non-native to India or Indian coastal plains; we also learned that people can fish in the lake and most of the fish species are ornamental. Therefore, there didn't seem to be much attention given to ecology and protecting a natural ecosystem. The project leaned more towards beautification and a 'green' space designed for recreation.

Conclusion:

The four-day field trip offered an opportunity to explore different approaches to ecological restoration across forests, wetlands, and urban projects. Each site presented unique perspectives on biodiversity, land use, and community involvement. The experience helped us



Siruseri Twin Lakes Restoration Project. © G. Pannagasri.

connect theory with practice and reinforced the idea that restoration is a gradual process that requires ecological understanding, social participation, and long-term commitment.

Overall, the visit broadened our understanding of restoration efforts across diverse ecological and cultural settings, encouraging us to think critically about what truly defines sustainable restoration practices. It also gave us the chance to observe and learn the fundamentals of restoration from multiple perspectives and long-standing practices.

These varied approaches left us with many unanswered questions, but they also inspired us to think differently—to experiment, learn, and refine methods while remaining flexible to real-world challenges, including corporate and institutional collaborations.

Ultimately, the experience provided a deeper understanding not only of restoration itself but also of the social and political contexts that shape it. It left us with insights that are crucial as we prepare to engage with real-world conservation scenarios.

S. Naufal Nazium, K. Gokul, Pathak Hrishikesh, Sanjana Vadakke Kuruppath, M. Nishigandha, Srijita Pal, G. Pannagasri, Ishika Shah, Yadav Shreya.
RHATC Fellows 2025–26, Zoo Outreach Organisation, Coimbatore, Tamil Nadu, India.

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