# प्रकृति

# Our interactions with Mother nature

A project by

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# Acknowledgements:

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# Prologue

I woke up after another night of restless sleep. I heard Aman moan feebly and saw him tossing and turning on the hospital bed. His face was pale and sweat gleamed on his forehead; seeing him in such a sickly state made me feel as if I had failed my duty as mother. Tears welled in my eyes, as the dreadful chain of events that had led to Aman being admitted to the hospital flashed through my mind.

It all started on June 5th, a Monday to be exact. It was his birthday. Aman woke up early that morning, knowing that gifts and surprises awaited him. I can never forget the utter delight on his face when he saw the Peepal sapling that I had gifted him. He picked up the sapling tenderly and carried it outside. Together, we dug a pit and planted the sapling.

"Ma, let's go for a walk. To the Kaikondrahalli Lake?" He nudged me to a 'Yes.' Aman ran ahead of me to "chat with the birds and trees." I could see him chasing butterflies, and occasionally stopping to wave at me or yelling "Amma, walk quickly!" It was a breezy, cool and cloudy day, typical for that time of the year in Bengaluru.

I turned around the corner; Aman was no longer in sight! "Where is he?" Before I could gather myself, I saw Sumathi aunty gesturing to me frantically. There was panic written all over her face. I saw a child collapsed on the grass. Aman? I ran. Aman was flailing around. I tried to steady him, but I couldn't get a grip on him. "Seizures? Convulsion?" I was terrified beyond words; somehow, I managed to get hold of my phone.

What happened after that was a blur. I called Rihaan, who took the next available flight to Bangalore. Filling-up of forms, sitting in the visitor's room, answering all the questions posed by the doctors...I had done it all, but I didn't remember a thing!

My reverie was broken by Aman's feeble call, "Amma?"

"Aman, don't be scared. You'll be alright..."

He answered back, saying "Ma, how do you handle their emotions?"

THEIR emotions? Confused, I asked "Whose emotions?"

What he said next was something that would haunt me for the rest of my life. "Every being's emotions. They keep invading my mind."

*"I hear you sing, I hear you speak,*

*I don't know what you're thinking; I only feel*

*You talk into my heart; through my lungs you breathe.*

*Stop clinging to my soul, I want to be free''.*

## Chapter 1: A new beginning

Aman walked into the Principal's office. "A new school," he had heard his parents whispering. "You'll like the new school, Aman!" his father had reassured him with a hug. "Hello Aman! I am Rajendra. I'm a teacher here. Come on, sit down," said the principal. He quietly sat down on the chair that was offered to him. "Welcome to Prakriya! How are you feeling today? Your parents tell me that you don't want to go to school these days. This is what I propose – let us take a walk around our school campus. After the campus tour, you decide whether you want join us, or not. Deal?" Aman nodded his head meekly. "Yet another school. How many days here? One month? One term?" Aman thought.

They walked around the campus slowly. Rajendra noticed Aman's smile as they entered the Devara kadu area. Rajendra was struck by the intent with which Aman was closely observing all the trees and plants around him. "An adolescent who's interested in trees and creatures? That's a nice surprise!" He thought to himself.

Aman slowly walked towards the Neem sapling, planted just a few days ago. He crouched and ran his hands over the intricate vein-like designs on the surface of the leaf. He could *feel* the sapling. 'I'm glad you're here.' He could hear the sapling's brisk voice. Aman had observed that trees convey their feelings directly, but there is a subtlety and sensitivity about how they convey. And man, they loved to share stories! Aman had learnt to be careful around trees; and ensured that he didn't chat them up on school days; else he could be there for days, captivated by their stories.

Aman moved deeper into the Devara Kadu. A tiny brown bird flew past them. The bird had flown away too quickly for Aman to feel its emotions. "That's the Tickell's flower pecker," said Rajendra. He continued– "It's one of the smallest birds in India. It loves cherries. Do you see those blackish brown birds flying high up in the sky?" Aman looked up. "Those are pariah kites, which are common scavengers." Aman was struck by the name of the bird. Why not a different name? Why a pariah, why an exile? Rajendra seemed to have read his mind. "Man has created divisions amongst birds too!"

As they walked, they saw and heard many more insects: from small lady bugs climbing the stems of plants, to black spotted butterflies drifting about gracefully. Whenever they sighted an insect or squirrel, Aman would stop to observe it. Ah, and their emotions! The general sense Aman picked up from the space, was that all the creatures, the big and the small, seemed to be happy! "Very different from what I see in the apartment." He remembered the lizards, the pigeons and the crows crying out, "Leave us alone, you idiotic humans". Aman gazed at a spider web and was fascinated by its design. At the centre of the web was a tiny brown spider which stayed absolutely still. He wanted to touch the web but remembered the wise words uttered by a spider in his apartment, "Leave us alone." So he just stood there watching the spider spin her web of delicate designs.

"Aman, sorry to disturb you but your parents are waiting for you." Aman got up, saying goodbye to the millipede that had stopped by to chat with him. Back at the office, Rajendra gave him a detailed chart of the birds in Prakriya. Aman thanked him; as he walked towards the car, his thoughts

wandered towards the insects and birds he had seen in Devara Kadu. Ah, and the trees; flame of the forest, the orchid tree, the badam tree, the fig tree, the amla tree, the silver oak and even the small banana sapling.... All of their emotions made the Devara Kadu seem prettier than it already was.

*"Your subtle emotions soothe me*

*So very different, so very sweet*

*Your presence gives me joy and peace*

*To find myself your help I seek…"*

## Chapter 2: And so life goes.....

It was a Thursday. Thursdays, for Aman, were like an additional holiday in between the week. It's the day of "Nature walk." He liked the idea of nature walks. While his classmates just saw it as an opportunity to chat, Aman truly enjoyed the forty-five-minute walk when he could commune with nature. He stepped out of the bus and walked towards his class. Then off to Nature walk! Aman could feel his muscles relaxing as they stepped out of the school gate.

The morning breeze was crisp and cool and the sky was decorated with occasional patches of clouds. White butterflies which had wings that were outlined with a tint of orange floated in the air. Aman recognized it as the Orange Tip butterfly. He felt a hint of what the butterfly felt; the joy of being free.

"Watch it!" came a feeble warning from below Aman's feet. He looked down to see who had called out to him and was greeted with the sight of an army of ants carrying about their business. Aman had almost crushed them! As he apologized to the ants, he could hear Anu aunty giving the usual instruction; "Reflection time, guys! Be by yourselves, observe quietly, and don't intrude into any creature's space! And get back in twenty minutes."

Aman ran into the nearby eucalyptus groves. He somehow felt a need to give the Eucalyptus trees company; he connected with them in some way! "We are the aliens amidst the locals. See, not one creature wants to come and build their nest here. Our survival itself is so hard that we have to spread our roots long enough to reach the water table," they constantly complained. He remembered the water war going on between Karnataka and Tamil Nadu; a similar water-war amongst the Eucalyptus and other trees!

His thoughts were interrupted by the presence of a black butterfly with white spots, a common crow Butterfly. Aman tried to reach out to it, but he could feel its resistance to interact with him. He decided to *let it be* and ran ahead, but stopped when he was approached by a two winged, sparkling green and gold insect. He was amazed by its combination of bright colours... He felt peaceful vibes; was it meditating? He left the insect to itself and proceeded. He then saw two birds playing about. Sparrows? Definitely not mynas! Barbets? They were small, brown and had a green underbelly. Aman could feel their excitement and joyousness! As he stood mesmerized by the beauty of the birds, he

hesitantly looked at his watch. He was late! Again! “Oops!” Aman ran back in the direction he came from. Nothing looked familiar. He ran for some more time, before long he realized that he had lost his way.

Aman was tired and afraid. He sat under the cooling shade of a Honge Mara. The tree could feel his panic, and kindly said, “Aman, don’t worry. Stay put. Your teacher will come to get you.” And so, Aman waited.... Just as he was about to doze off, a strong rusty voice woke him up. The man introduced himself as a farmer. In no time, Aman found himself chatting up with the old man.

“You city kids are so unlucky. Traffic and pollution. Bagalkot, where I come from is a much nicer place. Hot, but nice. You know young man, nowadays, people want money. To earn money, they cut down forests and cultivate crops. Over the past few years, we’ve lost so much of the open spaces. Each tree cut, means more homes lost for many creatures. We look at only one tree and think it’s not a big deal! But remember, young man, many creatures lose their homes as well. “

“What has happened to all the monkeys I would see in the campus? With so many apartments coming up in the vicinity of the school, many creatures have indeed lost their homes. Ajja is right!” Aman thought to himself. Ajja continued, “Nowadays people have forgotten organic farming. To produce more attractive looking crops for you city folks, people use chemicals and pesticides. That’s why now Bangalore soil is becoming extremely dry and toxic. Even earthworms can’t survive anymore. Although our situation in Bagalkot is better than Bangalore’s it too will soon become uncultivable. The use of pesticides is way too widespread for any action now.”

Aman was disappointed to learn that there was not much difference between the people in cities and those in the villages. In cities, people cut down trees for buildings, and in villages, to grow crops. Noticing Aman’s disappointment, ajja changed the topic. “Do you know, in Bagalkot, during droughts, we have a ceremony in our village wherein we conduct a wedding. You won’t believe it but the brides and bridegrooms are dogs and donkeys!

Aman laughed. “Speaking of rain, how do you water your plants?” asked Aman, keeping in mind the water crisis people were facing all over the globe. “I grow ragi which doesn’t require so much water like *your* rice.”

“Appa let’s go.” Aman looked around and saw a middle-aged man standing around. “This is my son. He lives here in Bengaluru. He fights with people.”

“A boxer!” Aman exclaimed.

The man smiled and said, “No. I am not a boxer. I am an activist.”

Aman was surprised. “I’m Suresh”, said the farmer’s son. He continued saying- “How have you come to such a secluded area?”

“Uh, I kinda got lost. I need to get back to my school.” said Aman sheepishly.

“Do you want a ride back?”

"No, I can walk back, just show the way" said Aman. But he didn't want to go back; not just yet... "Uncle, tell me what kind of an activist are you?"

"I work towards keeping the lakes in this area intact. You know, Bangalore doesn't have any natural rivers. So long back, the founder of Bengaluru, Kempe Gowda built around 800 lakes. Of this, only 263 are healthy or partially healthy, rest have either dried up or encroached upon by big builders to build apartments. For all you know, you and I might be living on a lake bed! I like the Bengaluru of yester years. Simple, manageable. Now…."

Aman suddenly heard a thundering, "There he is!" He quickly said a bye to ajja and Suresh uncle and ran towards Anu aunty.

Lectures. More lectures. Diary notes to parents. "Thanks da. Because of you, Anu aunty has forgotten about the test," said Ashish. Aman just grinned. It's good to be "useful."

*"They say the past is the best lesson*

*But you've taught me better.*

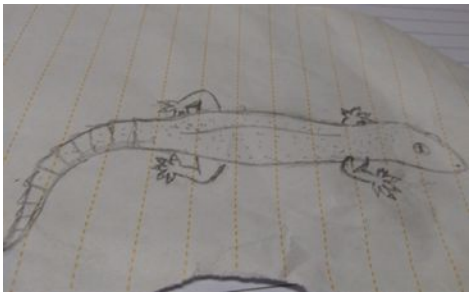
*While it's the backbone of one's conscience,*

*You're the soul to my future".*

## Chapter 3: Back to School

Aman was excited to go to school after a long *dussehra* vacation. He had spent his vacation trying to understand the emotions of animals and plants around him –garden lizards, squirrels, long legged spiders, blue-rock pigeons and a black kite or two; occasionally he saw parakeets. Here and there, he saw a few varieties of bamboo too. Aman was rather curious about the patch of green moss growing on the ceiling of his bathroom.

To know more about the life around his house, Aman had asked his uncle, who was a zoologist, about the animals he had observed. "Well, that would probably be a common house gecko and not a lizard," said Aman's uncle when he asked him about the lizard-like creature that he had seen. "But I can't be sure unless you have a picture of it."



Aman provided his uncle with a hand- drawn picture. "Yes, this is definitely not a lizard." He continued, "Now about that long –legged spider; that would be a cellar spider and it is rather fragile. However, don't be fooled by its appearance, it actually invades other spiders' webs and eat their eggs; not only that, it also eats the prey trapped in the web." Aman was astonished.

Back in school, Aman was looking forward to the games period. He was ecstatic when Anu aunty announced that the last two periods would be taken up for practice towards the Sports Fest. "Children

who are not part of the team will be part of the organizing committee. And you guys need to meet Cheran sir." Ah, what an opportunity. Aman talked Cheran uncle into giving him two periods of observation time.

He first examined the Akash Mallige tree. Aman tried to still his mind so that he can connect with the tree. He steadied himself and quietly said, "Akash, don't flood me with your emotions. Being a child that I am, I can only take things in small doses." He felt the movement of the tiny worms and insects on its bark and leaves. Aman could feel the tree's roots search for moisture in the soil and its leaves reaching out to the Sun.

The passage of time was deemed unimportant by the tree. There was no rush to go back. There was no need to know about the future. Aman could feel the stillness Akash felt. A second, an hour, or even a day - time had no meaning for the tree. There was no comparison - Who is taller? Who is brighter? Who is prettier? Every creature is intertwined with everything else. Everything mattered. Aman just stood there, captivated. He picked up a fallen leaf of the tree and ran his hands over it. The leaf was faded and brown in colour, while the leaves still growing on the tree were yellowish green. Aman vaguely remembered his mother saying something about Krishna bringing this tree from heaven to earth. He placed the leaf in his pouch and then moved on to a Badam tree, but this time he didn't allow its emotions to reach out to him. Again, he picked up a fallen leaf and observed the vein like designs on it. The leaf was red and worn out as compared to the fresh green leaves growing on the Badam tree. He picked up another fallen leaf. Leaf of the Neem tree? Then there was the dark green leaf from the Honge Mara, the deltoid shaped hibiscus leaf, the olive green silver oak leaf, and the oval shaped periwinkle leaf.

Ashish spotted Aman and headed towards him. "Why are you carrying these leaves?" he asked when he saw Aman. "Oh, I was given, uh, work to do. I had to do a collage on the different leaves in our school." Aman lied. Ashish didn't give it a second thought and they rushed back to class.

*"Where our abilities end,*

*There yours soar up, up and high*

*Where our thoughts limit and minds bend*

*There your creations scrape the sky".*

## Chapter 4: The hands-on-activity

Aman headed towards his class room. He had originally planned to "bunk" that day; however, Anu aunty had enticed him with a "hands-on-activity" and interaction with a genuine farmer. Aman dropped his bag on the floor and ran to the auditorium. He was the last one there. Aman joined his friends seated there. Ashish had a perpetually bored look. "Nothing excites me like a game of football," he had heard him say. Neha rolled her eyes when she saw him, "Late again?"

Poornima aunty was standing at the podium along with another man. It was now time for the man to address the students. "I'm Narayana Reddy, a farmer. I'll now tell you guys about home-made

fertilizers, also called composts." Aman heard various phrases -Composting takes about twenty days – something about pH and temperature - acidic - slowly becomes basic - bacteria act on it - later, fungi start acting on it – decomposes - organic material in layers – blah – blah" He saw Anu aunty and whispered to her "How is this hands-on-activity?" She whispered, "Be patient, Aman!"

Narayana uncle sensed the mood of the group and said, "Now let us go to the garden where you will get an opportunity to make your own compost." Aman rushed to the garden. He could hear Neha asking Aishwarya aunty, "Aunty, do we have to touch the cow dung?"

"What are you, a princess?" Ashish remarked loudly. Everyone laughed, except for Neha of course!

Aman liked the compost-making activity. His group put him in charge of 'taking down observations.' His observation sheet looked something like this.

| | pH | temperature | organisms | fungus |
|---|---|---|---|---|
| WEEK 1 | 9 | 24 C | none | none |
| WEEK 2 | 9 | 24C | little worms | mushrooms |
| WEEK 3 | 8 | 23C | red ants ,flies | white mushrooms |
| WEEK 4 | 9 | 28 C | red ants | white mushrooms |
| WEEK 5 | 7.5 | 24 C | flies | white mould |

*"Your beauty touches my heart down deep*

*Everything you created exists for an eternity;*

*Your balance has helped preserve humanity,*

*But our evil ways are silencing you into an everlasting sleep".*

## Chapter 5-A connection...

"Ma, I am going to the Kasavanahalli Lake!" Aman loved visiting the lake that was brimming with emotions. The lake was a pleasant greenish colour. There were mainly two kinds of ducks: one was grey and black and the other had red patches on their heads. The ducks went about their business, they did not want engage with him. "Good for you." He saw a few pond herons. They had brown bodies with white wings. Purple Moorhens. A king fisher waiting patiently to catch her prey. And right before his eyes, he saw the kingfisher gliding swiftly and scooping a fish.

A quiet stillness pervaded Aman, and he sat absorbed in his thoughts:

"Everything that Gaia has ever created seems to be connected. We humans assume that everything belongs to us. The only reason we want to preserve nature is to fuel our own materialistic wants. It hasn't crossed our minds that every being has its own right to existence. There are three ways to look at the world around me: one, everything exists for me, the human; two, everything exists for me,

however I have a responsibility to care for them and three, everything has a right to exist irrespective of whether it is useful to man. Which of these is the best way?"

*"You give us food, help us breathe,*

*And for our textbooks, paper from trees.*

*We destroy you for our needs;*

*But don't you have a right to exist and be free".*

## Epilogue: Few years later

**Dear readers**: As we sit here writing the epilogue, three possibilities emerge as to how Aman would shape up in future. Choose the one that appeal to you. Remember, what you choose also reflects something about yourself.

Possibility 1



Possibility 2

**Curriculum Vitae**

**Name:** Aman Choudhary

Possibility 3

**Qualifications:** Degree in Psychology, PhD in psychology

**Job applied for:** Psychologist

**Experience:** Councelor

**Special abilities:** Understanding the emotions of people

**Weaknesses:** Not being able to handle those emotions

## Part B

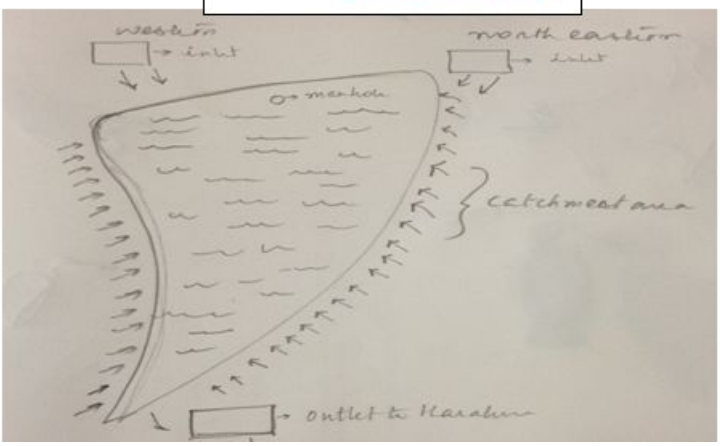
## Biodiversity - A glimpse

*"We should preserve every scrap of biodiversity as priceless while we learn to use it and come to understand what it means to humanity"-E.O.Wilson*

Taking inspiration from this quote, we decided to understand first hand our (human beings') attitude towards Nature and what we as a species are doing our bit to protect Nature's *other* children, namely the diverse life and non-life forms she supports.

As a first step, we decided to study about a lake ecosystem closer to home. Chikka kudlu kere is located off Haralur road, in VGP Layout in Kudlu, Bengaluru. It is surrounded by apartments and supermarkets. The first thing one notices is the level of pollution in the lake - plastic bottles are strewn all over, and pieces of thermocol, big and small, floating on the water surface, and there are also signs of sewage water entering the lake.

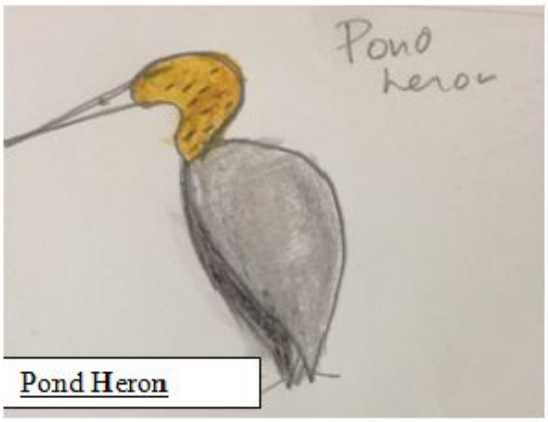
Map of the chikka kudlu kere

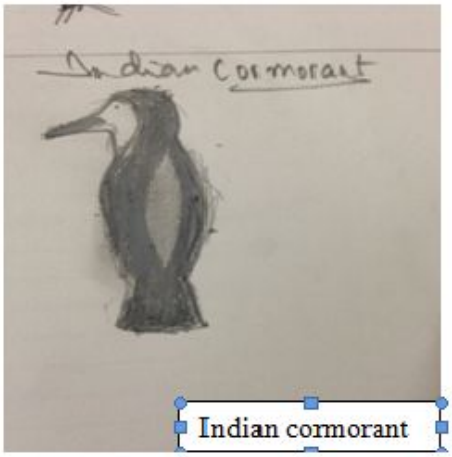



The catchment area of the lake we learnt is about 1.005 Sq. km. In addition to the water run -off from the catchment area, the storm water drainage of the nearby residential areas are linked to the lake. Many inlets on the southern side of the lake allow for sewage inflow from residential layouts and apartments alike. There is also an outlet on the northern side which overflows into Haralur Lake. There is one more inlet on the western side, which is feeding significant quantity of sewage water to the lake. A manhole has been constructed on the lake bed on the south western corner of the lake. The lake also has an outlet on the north eastern side, which facilitates excess water to flow out of the lake and drain further into the Haralur Lake.

The northern part of the lake which is connected to the storm-water inlets is relatively healthy in many ways. We observed that birds such as the purple moorhen, coot, Indian cormorant and kingfisher have adapted to the lake's polluted environment. In terms of vegetation, we didn't see much variety save for a few odd shrubs and grass dotting the periphery; we also did not see trees such as the honge or neem, which we usually see in lake ecosystems of Bengaluru.

Our observations, subsequent research and conversations with people (teachers and parents) gave us a basic understanding of how these lakes have not only defined the culture of Bengaluru, but also in many ways have contributed to the economic wellbeing of the city. How so?








The more we pondered about these, the more we understood the imbedded nature of these lakes, how they support innumerable life forms, how these innumerable life forms in turn support others;

how these lakes are linked to the water tables/aquifers and in that sense how they help in quenching the thirst of the city.

This also brought us to these fundamental questions:

- What is biodiversity?
- What is the link we see between biodiversity and Earth's health?
- What do we need to do to preserve, protect and conserve Earth's millions, if not, billions of life and non-life forms?

**What is biodiversity?**

Biodiversity is the term given to the variety of life on Earth and the symbiotic relationships that have evolved and sustained over eons. Biodiversity also involves a variety of ecosystems - deserts, forests, wetlands, mountains, lakes, rivers, and agricultural landscapes – that dot and adorn the surface of the Earth.

In each of these ecosystems, biotic and abiotic components interact with each other to promote symbiotic harmony. The biodiversity we see today is the outcome of billions of years of evolution; it forms the web of life of which we are an integral part.

**Bengaluru, then and now:**

There was a time when Bangalore was a quiet little town, dotted with lakes and gardens. It was rightly called the 'lake city.' Now it is known as the IT hub of India. This transformation from a lake city to being the 'silicon valley' of India has had dire consequences in terms of biodiversity loss.

IT industry brought with itself the seed of urbanization. With more and more IT companies moving into the city, a lot more people are migrating, seeking better opportunities for themselves and their families. This in turn implies that we need more residential and office spaces. What is a society to do under such circumstances? Convert open spaces, green belts and urban forests to homes, apartments, commercial buildings, supermarkets and malls! With open spaces gone, the biodiversity in and around our city is also vanishing.

The direct effect of this rabid urbanisation is loss of habitat of many a bird, insect and animal. Many animals like the red panda, snow leopard and Asiatic lion have unfortunately found their way into the IUCN (International Union for Conservation of Nature) red list. In Bengaluru, we saw sparrows disappearing right in front of our eyes, though, fortunately, they seemed to have made a comeback. Another example is the chameleon[1], which is may soon find its way into the 'endangered list.'

**Biodiversity and development:**

The loss of habitat due to urbanisation is a direct effect of so-called *development*. When we view development purely from an economic point of view, we tend to evaluate Nature and all her life-forms in terms of their economic worth. We build IT campuses; undertake building of big dams in the hope the economic cost of displacing a habitat is less than the economic gains of building a new

structure. What we tend to ignore in this whole argument of "economics vs ecology" is that when ecological connections are broken, they will have irreplaceable economic loss also, in the long run.

Take for example, the building of the Linganamakki reservoir in Shimoga district; this has caused the extinction of a species of grass called Hubbardia heptaneuron. Extinction of grass will lead to endangerment of insects like crickets, which in turn will affect the food chain of birds, pollination due to birds will decrease, which can certainly result in the endangerment of certain economically useful plants and flowers.

Thus if we ignore ecology, even economics will suffer in the long run! And the fundamental question is:

**Why is it that we don't care for our environment and the biodiversity she supports?**

We humans tend to look at Nature purely from an anthropocentric viewpoint wherein we place ourselves at the centre of the web; this implies that everything Nature has created is for us. This idea of anthropocentrism is not restricted to the industrial era alone. Even earlier, during the Vedic times, our ancestors protected cattle as it was beneficial for their pastoral economy. Cattle formed an important item of *dhaana* (gifts); also one's wealth was deduced by the number of cattle owned by him/her.

These beliefs, though human-centric in nature, nevertheless helped develop a culture/system wherein man was taught to regard all the beings as sacred. Hindus consider the Tulsi sacred and hence conserve it. Tulsi also has medicinal values, apart from its use in religious ceremonies. This is true for neem, amla and other trees. Our ancestors did not leave out the animals either; cows, goats, elephants, peacocks, bull, tiger, lions even the pigs found a place for themselves in the mythological stories. The practitioners of Zoroastrianism conserve vultures, which are an integral part of their cremation rituals.

However, the modern man has moved far away from his roots. He not only considers himself as an "outsider," but also superior to all the other creatures. If he regards himself as so superior and more intelligent than all the other organisms, why hasn't he been able to create a system that is as vast, as diverse, as evolving as an ecosystem and most importantly, where there is no wastage?

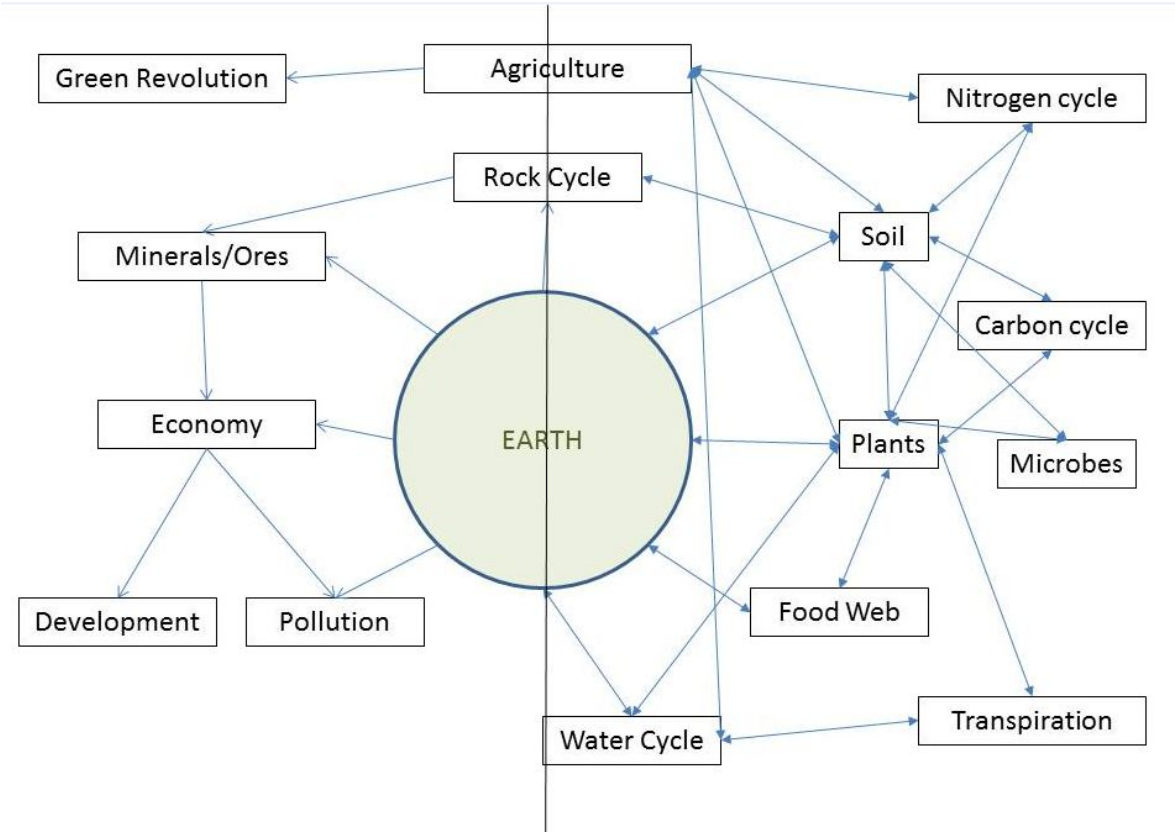
**No-wastage cycle:**

Gaia is the idea of Earth as a self-sustaining, self-regulating and super-living organism. This super organism has evolved systems and processes that are cyclical in nature, such that Earth's limited resources are recycled and reused with no wastage. Mother Earth, in a sense, is the greatest scientist, she is the greatest artist, she is the greatest mathematician, and she is the greatest ecologist!

Take for example, the nitrogen cycle. A special type of soil bacteria (Rhizobium) is found living on the roots of leguminous plants like the beans. This bacterium picks up nitrogen from the soil and converts it into soluble nitrates. These nitrates are used by the host plant as well as other plants sown later into the soil. To complete the cycle some bacteria help in the decomposition of soil nitrates to release nitrogen gas into the atmosphere which again gives rise to absorption by Rhizobium.

Even the water cycle, rock cycle and oxygen – carbon-dioxide cycle are examples of zero-wastage processes in nature.

THE WEB OF GAIA




All processes on the Earth are interlinked as depicted in the above drawing. The nutrient cycles create the basis for life to exist on earth. But for this life to evolve on land, soil is required. This soil is formed by the weathering of rocks. Microbes make nutrients available for plants to grow. Plants also take up moisture from the soil. This moisture is transpired back into the atmosphere, which later condenses into rain. Herbivores eat plants and excrete nitrogenous wastes which increase soil fertility.

We have very briefly talked about the nature of these cyclical processes, but it will give you a glimpse into how these processes are linked, interlinked and interdependent, with so many organisms ceaselessly doing their work!

What would happen when these processes are meddled with? This aspect is shown on the left side of the drawing.

We meddle with the rock cycle so that we can make a quick buck off mining; the food, water, and nitrogen cycles are interfered with so that we can increase the fertility of the soil, increase produce

and increase our profit! We don't want to leave out our forests and rivers either! We meddle with their life cycles too!

This prompted us to ask another question: Have humans "meddled with" his/her immediate environment in a positive way?

**Positive story:**

We didn't have to go very far away to find one such space, our own school! The year 1999 saw the birth of Prakriya, and she moved to her new home in Chikkanayakanahalli in 2000. Back then, Prakriya was just a barren tract of land, full of Eucalyptus trees. Apart from that, there were only four Honge maras, and odd clumps of tall grass. There were no birds and definitely no butterflies. 'Prakriya-scape' has changed a lot since then.

There is now a wide variety of indigenous trees, 108 species of tree to be exact – atti, amla, banyan, honge, bilva, peepal, ball badminton aka shivalinga, nagalingam, silver oak, ashoka, gulmohar, Singapore cherry, basavanapada, jacaranda, rain tree, bottle brush, halvana, sampige to name a few. We also have spaces dedicated to trees/plants:

- We have the Panchavati, which houses the five sacred trees – banyan, bilwa, fig, peepal and amla. We also have Krishna's buttercup and frangipani tree in this area.
- Next we have dhanwantri which is our medicinal herb garden
- We also have our own *Devara kadu* towards the south-east corner of the campus. Here we have Arjuna, neem, jamun, jack fruit, fig, silver oak and other species of trees.
- Around the foot ball field, we have the House trees - the Kadamba tree of the Prithvi house, the Rain tree of the Jal house, the Flame of the forest of the Agni house, the Neem of the Vayu house and the Aakaash mallige of the Aakash house.
- We also have our own organic vegetable garden. No chemical fertilizers are used to grow the plants, with compost being the only manure. Cow dung, which serves as a catalyst in compost-making, is available in-house, by our own cows. We have 8 'naatti' (native) cows!
- We have two man-made ponds, one the *chikka kola* in the Prakriya campus was created by our seniors in 2005. The pond, on any given day is teeming with life – fish, frogs, water snakes, tadpoles, birds, bees and bugs. We also have another pond in the Bhoomi campus.

So, what does the Prakriya story tell us? That in a short span of 15 years, it is possible to revive an ecosystem. With trees came the birds and bugs. The presence of nectar-rich flowers attracts many birds and butterflies. There are about 35 species of birds and 70 species butterflies in our campus. The common crow, crimson rose, orange tip and the common grass yellow are a few examples of butterflies found at Prakriya. Birds like parakeets, sunbirds, kingfishers, Tickell's flycatchers, pariah crows, mynas, magpie robin, coucal, bulbul, and bee-eaters can also be easily spotted.

**How does this biodiversity help us?**

For one thing, it is just the joy of being in nature, listening to the chirping of birds or seeing a frog hopping in the middle of a football game, or watching a snail slowly walk away, or to trace what we perceive to be a 'snake' trail... reinforces this belief that we are sharing this Space called earth with all these creatures.

We can also learn so much from Nature - the interdependence; collaboration, being helpful, ability to see the whole picture rather than just the parts.

The abundance of trees also provides us with clean air to breathe. "One acre of trees annually consumes the amount of carbon dioxide equivalent to that produced by driving an average car for 26,000 miles. That same acre of trees also produces enough oxygen for 18 people to breathe for a year." If these numbers are to be believed, then having about 200 + trees in the campus, provides us with enough oxygen for all of us on any given day. We have also noticed, the temperature within the campus is few degrees lower than the rest of Bengaluru.

We have studied that any place having plenty of frogs signifies the freshness of air in that place. And mind you, we do have a lot of frogs in our campus! Rare frogs like the Sri Lankan painted frog have been found in our school.

Like frogs, chameleons also indicate good health of an environment. They are an indication of water quality, soil quality and whether the insects they prey-on are healthy. Our school ecosystem is an abode to various types of lizards such as Calotus, Peninsular Rock Agama and the Garden lizard.

**What is the way forward?**

Over the years, humans have contributed to in the loss of biodiversity. We, humans have exploited nature enough. It's time for us to change our mindset. The story of our school is a story of hope, what a community of like-minded people can do to revive a barren land. Making a few commitments to the environment around us is all that is required to show that we care; holding on to and living by our commitments will show that we 'walk the talk!'

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# APPENDIX

## Activity # 1: SCHOOL, HOME OBSERVATIONS.

Home observation: 7:00 PM.
*Day 1*: Thin film of dust and cockroaches. There is traffic on the road outside. There was dirt and dust flying into homes.

Home observation: 6:15 PM.
*Day 2*: There is a lizard on the wall. There is also a cobweb but there is no presence of a spider.

Home observation: 8:15 PM.
*Day 3*: The spider has appeared but it is not on the cobweb, it is roaming around. It has brown, long legs.

Home observation: 12:30 PM.
*Day 4*: We can hear the screeching of the crickets from the garden.

Home observation: 7:00 PM.
*Day 5*: Mosquitoes are buzzing around and we see some small, pink flowers.

## SCHOOL OBSERVATION.

DAY 1: THE FIRST OBSERVATION.

There are birds chirping – this bird is brown in colour and has a white underbelly. There are many leaves with holes in them which indicates that insects like caterpillars have eaten them. An army of ants is seen marching towards their hill. There were peculiar sounds coming the bamboo trees that startled us for a second. Near the bamboo trees we spotted a beautiful butterfly. It was jet black with white spots on each wing. We also saw trees like banyan and neem. There was no presence of insects , though. We did see some birds nesting on the banyan tree. As a cold breeze was blowing, we spotted two unique insects. One was a normal mosquito, quite common to us all. But this Mosquito was black and white in colour. It was large for its kind. The second insect we spotted was a golden, green two winged insect. It glistened in the air as the last of the sunrays were disappearing. It was long and slim. As we were heading back, we spotted a bird- it was brown in color. It was quite similar to the one we spotted earlier, but this one had a green underbelly. There were 2 of them. At the very end, we spotted a hole. It appeared to be the hole of a snake or a rabbit as it was quite big.

## DAY 2: NEW DISCOVERIES

The 10th of August. The hole had now been blocked. We spotted a new hole quite close to the old one . It made an alternative entrance to the old hole. It was 6-8 cm in width. There were cracks in the ground around the hole. The hole might be deep. The cracks might have been formed because –

* Either the hole might have been dug with force

* Or the soil was very dry.

A spider web was being formed but the spider wasn't seen, which was puzzling. We were mistaken. The spider was present. We didn't see it because it was very small. It was in the center of the web formation and it was brown in color. We also heard a crow. We spotted a lady bug, too. It was flying about and climbing leaves. It had white spots over a black coat. Honey bees were buzzing around.

**DAY 3: AT A GARDEN CALLED '*Dhanvanthari*.'**

The first thing we spotted at the garden was a small bird which was brown in color. It was making a "KOO- KOO" sound. Some of the leaves were completely bitten off by insects. We spotted a millipede, which was 6-8 cm. in length. The body tapered at the end. A black beetle followed. We also saw a broken snail shell. We did some research and found out that it was a African large snail, which is an invasive species. It had a striped pattern on it. Some of the other things that we observed were –

* White button mushrooms
* a bird the size of a crow.
* A stealthy squirrel running up a tree.
* A green bird – a parakeet.
* A decomposing jackfruit- with a white cottony mass growing on it.
* Cotton pods
* A big, black butterfly the size of a palm. It had white horizontal lines on the lower wings.
* High pitched bird call. It is very short but rhythmic.
* Another decomposing fruit, with a gooey center, and insects all over it.

**Activity # 2LAKE OBSERVATIO: N. : Chikka Kudlu Kere.**

The area of the lake is around 4.5 hectares, which pretty big, if you are moving around it on foot. The storm water from around flows into the lake.

The catchment area is 100 hectares. A catchment area is the area from which rainfall flows into a river, lake, or reservoir. There are many inlets on the southern side allowing for sewage inflow from residential layouts. One outlet on the north eastern side flows over to Haralur lake. The lake is covered in water hyacinth, which signifies ill health of the water body. There is one more inlet on the western side, which is feeding significant quantity to the lake. A manhole has been constructed on the lake bed on the south western corner of the lake. The lake also has an outlet on the north eastern side, which facilitates excess water to evacuate from the lake and further flows to Haralur lake.

source: Earthian participant: Savyasachi.

Above: Chikka Kudlu Kere. The island in the middle is home to many species of birds and insects.

**Activity # 3: THE CARD GAME – "ANIMAL CULT"**

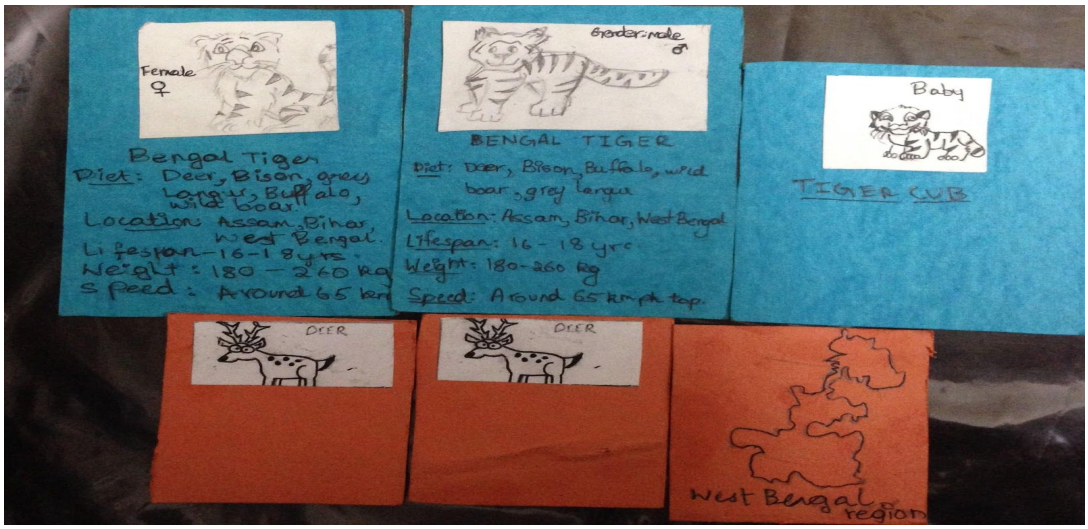
It is a two – four player game. It has 3 types of cards. The animal card, the habitat card and the food card. Under the animal cards, we have male, female and baby cards. We have researched about 10 endangered animals in India, and we incorporated that information into the card. We also drew the animals and we stuck the images on the card. We wrote about endangered animals like the Red Panda, Red Vulture, Snow Leopard, Tigers, Asiatic Lions, Forest Owlets, Butterflies, Black Buck, Great Indian Bustards and arachnids.

MAIN GOAL OF THE GAME: The main goal of the game is to help the endangered animal breed and repopulate its race. You must collect male and female cards of the species first given to you, and then collect food and region cards that are suitable for that species.

HOW TO PLAY:

Shuffle the region and food cards into one deck. Distribute 2 random animal, region and food cards to each player. Shuffle the rest of the animal cards into 1 deck. Shuffle the baby cards and put them together into another deck. Every turn a player draws one card from the food and region and 1 from the animal cards. The player then discards one of the animal and food/ region cards they have. Once a player collects the required cards to complete a set (a complete set consists of a male and female card of the same animal species, 2 compatible food cards and 1 suitable region) they then have to start drawing cards from the baby cards deck, until they get a baby card that is of the same species. Once this is done, the player is declared the winner.

An example of a set:




Observations:

The participants enjoyed the game while learning a lot about the endangered animals of India. This game educated about the state of biodiversity in India and got them thinking as to what the cause could be for the animals to be endangered.

**Activity #4: INTERVIEWS WITH FARMERS AND ACTIVISTS.**

Interviews with a farmer – Name: Lakshman , student at Bhoomi College, around 40 years old.

Q: Do you own a farm? If yes, then where is it?

A: Oh, yes I do! It is actually in Bagalkot, which is in North Karnataka.

Q: What is it like in Bagalkot?

A: Bagalkot is much hotter than Bangalore. The vegetables we grow there are different from the ones grown here. Here, hybrid crops are more commonly grown. Since, the produce is altered genetically, the produce here is fatter. In appearance it looks good, but it is unhealthy.

Q: There must be barely any buildings and a lot of trees back in Bagalkot, right?

A: Oh no boy! The reality is far from that! Nowadays, people want money. To earn money, they cut down forests and cultivate crops instead. Over the past few years, we've lost so much biodiversity

just because of this. But we can still revive the biodiversity that we've lost if we start caring about of the nature around us.

Q: What happens during the occurrence of a drought?

A: The entire lifestyle of the people changes. During droughts, the people buy dogs and donkeys and *marry* them to each other! According to superstition, it brings rains!

Q: Oh that is interesting! Keeping in mind the large water crisis the world is facing, how do you water your plants?

A: Oh, our plants are watered with rain water. Bagalkot is a rain-fed region.

Q: In the age of internet, how do the teenagers like us connect with the farmers and get to know about the produce?

A: You kids should go out grocery shopping with your mothers! That way you might get a basic knowledge of vegetables that farmers grow in different seasons. You will learn whether the produce is safe enough to be consumed, or whether it is genetically modified, and unsafe to eat.

Q: What crops do you grow?

A: I grow millets like fox tail, toor dal and green grams. I know you are salivating right now!

Q: How fertile is the soil in Bagalkot as compared to the soil in Bengaluru?

A: I think soil is a living being and in Bengaluru it is dead. The use of pesticides deteriorates the quality of the soil and kills it. No plants can be grown in the soil. The earthworms go away or die. Bagalkot's soil is just about living. There is still widespread use of pesticides.

Q: Do you use pesticides?

A: No, I do not use pesticides. I use manure and cow urine as fertilizers which works just as well as the chemical fertilizers

Q: Have you observed a decline in biodiversity in Bagalkot?

A: Biodiversity is being wiped out at all places on earth. Not only in Bagalkot,
But in every place in India, people want more money, more profits in business and so, they are clearing forests and growing crops. I want to protect the biodiversity in my vicinity. I plant trees wherever I find an open space.

Earthian participants: Thank you for your time, we appreciate it. You have given us some valuable information, and it will surely help up in our project.

Lakshman sir : My pleasure.

<u>INTERVIEW WITH A FARMER – Name: Aliston, student at Bhoomi College, around 19 years old</u>

Q: Where are you from, Aliston?

A: I am a native of Mangalore.

Q: How is Mangalore different from Bengaluru, keeping in mind biodiversity?

A: Mangalore is a coastal city and thus has more moisture in its air and soil. Mangalore has more animals than Bengaluru because it has a denser tree cover. Fig trees attract animals, and Bangalore can improve its tree cover and attract more animals by planting fig trees.

Q: Now, a question out of the blue. It is about Composting! Can you tell us some facts about the same?

A: The complete process of leaves getting biodegraded takes about 21 days, by turning the mixture every few days. The green leaves and dry leaves should be added in equal ratio. When the composting process starts, the micro-organism present in there is bacteria, but towards the end fungus is detected. Onion peels shouldn't be added because they make the soil acidic.

Q: Oh, that is pretty interesting. Being a Bhoomi student, can you tell us what sort of vegetables are grown in the farms connected to the campus?

A: The vegetables in Bhoomi are grown using natural fertilizers like manure, cow urine. We also mulch the soil, to improve soil fertility. The vegetables are grown for nutrition and they do not look good. Other vegetables ( in which chemical pesticides are used) are plump and shiny and look good on the outside, but these are not nutritious at all. The vegetables served in your school canteen are from our farm, and you are eating really healthy food.

Q: How do you keep pests away?

A: We use method called companion planting, where we put fragrant plants around plants that pests usually attack. This confuses the pests and they are attracted to the fragrant plants instead of the crops.

Earthian participants: Thank you for your time, we appreciate it!

Aliston: Ah, no problem, anytime!

**INTERVIEW WITH A CIVIL ACTIVIST AND AN ENVIRONMENTALIST- K.P. SINGH, Around 50 years old.**

Q: Where are you from, sir?

A: I am from Uttar Pradesh. I moved to Bangalore 18 years back, when I first got my job here. I now live in Rainbow drive, on Sarjapur road.

Q: How is Uttar Pradesh different from Bengaluru and Karnataka as a whole?

A: Uttar Pradesh is densely populated due to the Gangetic plain. Bengaluru and Uttar Pradesh get decent amount of rain. Climatic conditions in Bengaluru allow fruits and vegetables to grow year-round. Uttar Pradesh gets to grow crops, only during a particular season. In the villages of UP, vegetables are grown according to the seasons. For example, they grow apples in winter.

Q: What are your thoughts on importing fruits from other countries?

A: Fruits are imported to India from all over the world. We import kiwis from New Zealand and apples from Washington. Some people, grow kiwi plants in India, which is not good for the soil. It in turn affects our bodies. The overall cost is environmental damage.

Q: What is consumerism and why is it bad?

A: Consumerism means the protection of the interests of the consumers. We should not glorify consumerism. You should not be affected by the advertisements that promote the big, bold and beautiful.

Q: What are some of the bad practices that destroy biodiversity which we can avoid?

A: Riding in a car to going to a place, to where you could've walked is one. Another is cutting down trees to build buildings in the cities, and to grow crops in the rural areas is another.

Q: What are some of the good practices we can follow?

A: Some of the good practices are –

Using whatever space you can find to grow and eat your own vegetables, if you can.

Not buying packaged foods

Not eating outside in restaurants

Not consuming any cold drinks and other such beverages, which cause ground water contamination.

Q: Is religion and politics affecting the decline of biodiversity?

A: I think religion and politics, both are fake. They don't care about the wellbeing of nature, let alone the wellbeing of the people. Politicians and religions create dis- harmony in nature and society. In the

past few years, winning the election is the only priority of the politician. They do not care about anything. He harms the environment in all kinds of ways, when he is in power.

Q: What are your thoughts on the decrease in animal species?

A: The animal species have declined adversely. Only places untouched by humans can have exotic species. Many species of animals and birds prevailed earlier. In India, not many people know about biodiversity, as there is mass illiteracy and poverty. There are more people damaging the environment than there are people protecting it.

Earthian Participants: Thank you so much for giving us the information we needed. Thank you for freeing your time to speak to us.

K.P. SINGH: Oh no problem at all. I had fun answering your questions!

## Activity #5: BIRD OBSERVATION SHEETS

**Bird Observation Sheet**

Name: Class:

| Name of the Bird | Size (S- small, M-medium, L-large) | Beak | | Plumage Colour | | | | | | H-heard/ S-Seen | Date and Time | Preferred Habitat | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Colour | Shape | Back | Head | Breast | neck | wings | vent | | | | |
| Blue Kingfisher | Small | Black | long and narrow | Blue | blue and orange | orange | blue and orange with white patches | blue | black. | seen | 27th sept.1:30 pm | riverbanks, branches above water | ( in |
| Purple Moorhen | medium | pink, with a little of black. | medium sized and stout. | purple and turquoise | white and red | black and blue | grey-blue. | green blue | red | seen. | 27th sept. 1:30 PM | wetlands and swamps | |
| Great Indian Cormorant | medium to large | black with a tinge of yellow | long, and curved at the tip | black | dark grey | brown-black | brown-black | black with little of white | black. | seen | 27th Sept. 1:25 | edge of cliffs and branches hanging over water | ( in |
| Coot | small | white | short and sturdy, narrow. | grey | black | black-grey | black-grey | black with little of white | white | heard and seen | 27th sept. 1:03 | alongside edges of lakes, ditches | s s |
| Indian Pond Heron | medium-large | yellow | long, narrow | brown-yellow | brown-yellow, with white stripes. | brown. | yellow-ish brown | white, brown, black-ish | yellow | seen | 27th sept 1:40 PM | near wetlands and edges of lakes | ( ( |
| Little egret | medium-large | black | long, narrow | white | white. | also white | white, too. | white. | black. | seen | 27th sept. 2:00 | nest in trees or shrubs, reedbeds or bamboo groves. | |
| | | | | | | | | | | | | | |

## Activity # 6: LEAF BIODIVERSITY

**MANGO**- ***Mangifera indica.***

**Characteristics***:*

Venation: Pinnate.
Color: Green, a bit of olive.
Shape: Oblong.
Color of midrib: Brown- olive.
Length: 21 cm.
Breadth: Top: 0.9 cm, Middle: 4.1 cm, bottom: 1 cm,.
Margin: Undulate, wavy margin.
Uses: ~ Rich in vitamin C, B and A.

~ Good for diabetes
~ Helps flush out kidney stones
~ Treats dysentery, hiccups and ear aches.
~ Relief for stomach problems.
~ Treatment for restlessness.
~ Good for respiratory problems.
~ Said to keep away evil spirits.

BADAM- *Prunus dulcius.*

**Characteristics:**

Venation: Pinnate.
Color: Currently, yellow ochre, fresh green.
Color of midrib: Light brown.
Shape: Obovate ( Top is much wider than the bottom, egg shaped.)
Length: 20 cm.
Breadth: Top: 8 cm, bottom : 3.3 cm, and centre: 13.3 cm.
Margin: Entirely undulate, wavy margin.
Uses: ~ Said to cure intestinal parasites.
~ Said to cure liver ailments.
~ Tonic made with young leaves are given to babies if they are faced with digestion problems.
~ Said to cure leprosy and scabies.
~ Can cure skin wounds
~ Used by Siamese fighting fish breeders and helps to condition the water
~ A paste is made to keep in the mouth to stop tooth bleeding.
~ Badam tea or milk lessens the effects of rheumatism.

HONGE- Earlier known as *Pongamia pinnata.* Now it is known as *Milletia pinnata.*

**Characteristics:**

Venation: Pinnate
Color: Dark Green.
Color of midrib: Light green
The leaf has 3 patches of translucent cover as protection. Under it there are black patches and something that looks like eggs.( We found out that it is a disease.)
Length: 8.8 cm.
Breadth: Top: 0.8 cm, centre: 4.9 cm, bottom: 2.6 cm.
Shape: Ovate, inverse of obovate, narrowed at the base.
Margin: Undulate.
Uses: ~ Helps cure heamorrhoids.
~ Relieves worm infestation.
~ Relieves inflammation.
~ Relieves constipation.
~ Good for your skin.
~ Dried leaves used as insect repellant.

INDIAN TULSI- *Ocimum tenuiflorum.* English common name: Holy Basil.

**Characteristics:**

Venation: Reticulate
Color: Light faded green blended with yellow.
Color of midrib: Olive green.
Margin: Crenate- Blunt spikes on the side.
Shape: Deltoid- Narrower at the top and wider at the bottom.\
Measurement: Length: 9.5 cm.
Breadth: top: 12 cm, middle: 32cm bottom: 4 cm.
Uses: ~ It cures fever- consists of germicidal, fungicidal, anti-bacterial and antibiotic properties help cure fever.

~ Beats diabetes

~ Protects the heart- Eugenal in Tulsi keeps cholesterol and B.P under control and thus protecting the heart.

~ Beats stress

~ Dissolves kidney stones

~ Helps quit smoking

~ Keeps skin healthy and glowing.

~ Cures headaches.

AAKASH MALLIGE- *Milingtonia hortensis.* Common name: Indian Cork Tree.

**Characteristics:**

Venation: Pinnate
Color: Yellow, after fading brown.
Margin: Dentate
Shape: Cordate.
Color of midrib: Brown
Measurements:
Length: 5.8 cm.
Breadth: Top: 0.4 cm, middle: 3.1 cm, bottom: 2.1 cm.
Uses: ~ Used as cheap substitutes for cigarettes and tobacco

~ Used as antipyretic, sinusitis and other tonic medicines.

~ Mythology- This is a heavenly tree bought to earth by krishna

HIBISCUS- *Rosa sinesis*
Common name: Dasavala.

**Characteristics:**

Venation: Pinnate
Margin: Serrak ( Detailed curves)
Shape: Deltoid
Color: Green
Color of midrib: Dark green
Measurements:
Length:6.5 cm.

Breadth: Top: 1 cm, middle: 38 cm, bottom: 21 cm.
Uses: ~ Hair conditioner- reduces dandruff
~ Tea- consumed without sugar helps people with kidney problems.
~ Antisolar agent: absorbs UV rays and protects skin.
~ Oil extracts from leaves can help treat wounds.
~ Controls cholesterol levels.

PICTURES OF BIRDS FROM CHIKKA KUDLU KERE

1) 

2) 

3) 

**Picture number 1**: A kingfisher perched by the lake side.
**Picture number 2**: A coot swimming in the water.
**Picture number 3**: A heron in flight, flying low over the surface of the water.

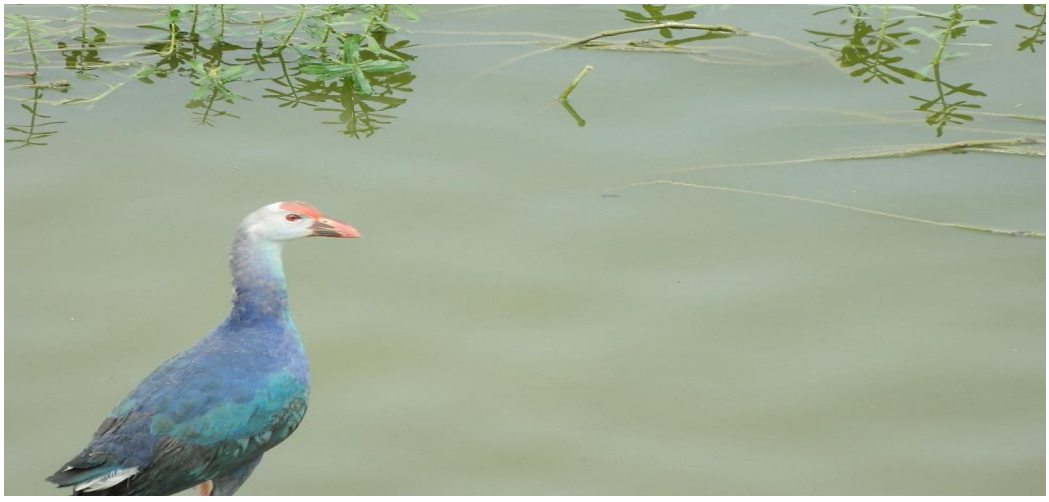
4) 

5) 

6) 

**Picture number 4**: A little egret on the edge of the island.
**Picture number 5**: The purple moorhen as seen from the back.
**Picture number 6**: A pair of Indian Cormorants playing around.

7) 

8) 

9) 

**Picture number 7**: The family of purple moorhen.
**Picture number 8**: The purple moorhen as seen from the side.
**Picture number 9**: The purple moorhen's chick.

10) 

**Picture number 10**: A pond heron perched on a tree.
**Source of images**: Pictures 1-9: Savyasachi Kulkarni, Earthian Participant.
Picture 10: Atharva Mahajan, Earthian Participant.

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***THE END***