



# Jīvavaividhya

An autobiography

By – Kavvya, Charitha, Naren, Vinayak and Dhiyaa

## Acknowledgements

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## Know our school

Prakriya is derived from the Sanskrit word 'Prakruti' meaning nature, the nature within us and around us it also means following nature's wisdom. Prakriya promotes learning based on the philosophy which involves more experiential, activity based learning, more conversations and questioning as well as 'active learning' where children are more involved in their work.

The school is located in Bangalore, Sarjapur road. The campus consists of an environment close to nature. The school is situated in the city and yet it is blessed with fresh air, green rural ambience, a view of a lake and gently undulating land around the campus.

The campus houses over 100 species of trees and a vast innumerable number of shrubs, herbs and weeds and steadily increasing population of birds, insects and other fauna.

Adding to this ambience, the campus also has a pond – Chikkakola, the Panchavati, the Devarkadu and the Honge amphitheatre



Chikkakola, sketch by Dhiyaa Muthukumar



**“The diversity of life forms, so numerous that we have yet to identify most of them, is the greatest wonder of this planet.” - E O Wilson, *Biodiversity*, 1998.**

I am the Honge Mara of Prakriya Green Wisdom School located in Chikkanayakkanahalli in Bengaluru. I am known by different names in different languages- *Pongam*, *Karanja*, *Honge*, *Kanuga*, and *Naktamala*. However, botanists call me *Pongamia pinnata*. Many consider me sacred and yet others believe that cutting down a tree such as me may awaken the wrath of the Goddess. These beliefs don't matter to me. As far as I am concerned, I live by a simple dictum – “In helping others, we help ourselves.”

My seeds provide the very useful Honge oil which can be used as a bio-fuel. It is also affordable and ecologically safe, and could also be called a renewable resource if you humans use it wisely. Different parts of my tree, including the twigs have found a place for themselves in traditional medicine. And my flowers attract a whole bunch of pollinators.

Culturally, you can't separate my life from that of the human because our lives are so inexplicably intertwined.

Anyway, living here in Prakriya, I experience a sense of security; I am loved immensely by the Prakriyans<sup>1</sup>. For decades I have seen children playing and laughing around me. Not just the good times, I have also seen them through tough times. They seek me out when they feel sad. From playful bickering to unpleasant fights between friends to jealous outbursts to solemn circle-times<sup>2</sup> to interesting story-telling sessions and enlivening habbas to complaints about teachers and parents - I have seen it all. I have heard it all.

As you can see, I love these kids. “But what about the birds and bees who regard you their own?” you might ask. I hear you, and here is my answer - the flora and fauna you see here are my family. Be it the scurrying ants or the cawing crows, or the big banyan over there – each one of them mean a lot to me, and I to them. Every organism, no matter how big or small, *matters*. Unlike you humans, who consider the small and the inconspicuous as weak and useless, in Nature, every little creature, even the invisible ones, *matter*.

Creatures as small as earthworms eat the soil and bring nutrients which help us trees grow. This is still the “seen” part of nature. The less celebrated are the behind-the-scenes-guys, the ones you humans call microbes. These are the bacteria who work non-stop, ensuring that the natural cycles continue to flow in rhythm. It is these organisms that decompose organic matter, to create the nutrients that are so essential for the growth of my kin, the plants and trees.

Speaking of plant friends, I recently met this little seed who had migrated from some distant apartment on Sarjapur Road. As he was narrating his story, talking about his “original home,” what stood out for me was the stark difference between Prakriya and the outside world. He talked about how compact and small his last home was. He said that his parents were planted in some pots on the balcony of a big house. He too was destined for a

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<sup>1</sup> This is what the students of Prakriya call themselves.

<sup>2</sup> This is how we resolve conflicts.

cramped life just like his parents; fortunately for him, a gust of wind took him away from his home. He found himself flying with a newfound sense of freedom. I know his story sounds

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heroic next to mine, but his story is nothing compared to the snail he told me about. Apparently, there was a snail that was stuck on a concrete wall for six days, until eventually, a kid came along and flicked it off. Rest in Peace, brave snail.

Honestly, nothing scares me more than the thought of living in a cramped, compact, noisy space, with only a few insects and birds as your extended family of friends. Anyways, coming back to the point, compared to the “original home” of the little seed, we, here in Prakriya live in a humongous campus with unimaginable freedom and security. We have about 100 different species of trees, 70 to 75 species of butterflies, and about 30 to 35 species of birds.

It’s a beautiful campus: you should visit us sometime. We live by a simple code – live and let live. It is what you would call a symbiotic living arrangement: the rain provides us with water; the sun, energy; the earthworms and soil microbes provide us with necessary nutrients, the spiders build their webs around us, the little birds use our branches to build their homes...the list goes on. You see–

– What do you see? You’ve talked too much already, man! Sorry, woman! You need to learn the art of shutting up once in a while. Let me also talk.

Hi! I am the great Singapore cherry tree. I am a proper “Indian” now, but my roots trace back to New Mexico and South America. When I landed in India, it was kind of awkward, or, as you kids say, “Weird,” because none of the other trees knew me. The Neem tree shunned me for a while, and so did the Amla. The only ones that would make an effort to talk to me were the birds. They spread the word that my fruits were tasty and that I am a “cheer(y)ful person”, and before long the insects were flocking to my branches. Life was not easy in the beginning, but I learnt to adapt to the local environment. Soon the trees also accepted me as one of their own. You know what? I think I am the most popular tree of all. ..

–Who said you are the most popular? I’m clearly the most well-liked: don’t you see the number of children sneaking into the garden to taste my fruits? Oh, sorry guys!

I’m Amla and I think I’m the most popular tree in Prakriya. Honge doesn’t like it when Cherry over there and I bicker about this ‘popularity’ business. “In Nature, everything matters,” she says. I agree with her wholeheartedly, but living amidst your children for so long has some of us gets into this comparison mode.

As I was saying, I am popular all over India. I am well known for my medicinal properties. The children in Prakriya love eating my sour, yet tasty fruits; they also love listening to the story of my birth. You want to know the story too? Alright. Here it goes... Legend has it that during the great battle of gods and demons, drops of *amrit*<sup>3</sup> fell on to the Earth. From that drop of *amrit*, grew a great and vibrant tree, which was rightly named Amla by the gods. It is

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<sup>3</sup> It is the divine drink of the Gods which is said to make its drinker immortal.

very interesting to see the children pretend they are immortal after eating my fruits. Maybe they are!

Now I am going to give the mike back to Honge because honestly, she looks like she is going to cry.

–I’m not crying okay? My leaves are transpiring and just for your information, I have the highest transpiration rate of all trees in India! By the way, leaves are an integral part of a tree. They are some of the most complex and diverse parts of a plant. They are as diverse and as innumerable as the stars of the night sky!

The great Peepal tree where the Buddha attained enlightenment, has symmetrical, heart shaped leaves. It is native to our neighbour China, but its roots date back to the Indian subcontinent too.

My sister, the Neem tree over there, has long jagged leaves and you humans have classified them as pinnately compound. Her leaves are bitter, and they are eaten with a bit of jaggery every Ugadi to show that life has both bitter and sweet moments. If you ask me she is the oldest of all trees: she is even mentioned in *Sushruta-Samhita*<sup>4</sup>.

These woody shrubs you see here are the hibiscus plants. They belong to the mallow family and their small, almost-black leaves are non- symmetrical.

You have already met my friend, the Amla tree, who is native to India. Her brown and green leaves have a smooth texture and subdivided veins. Her leaves reduce grey hair and improve memory loss and eye sight. The leaves of my other friend, the Singapore cherry, with his long thin midrib, are often a resting place for various birds.

Prakriya also houses these plants called the crotons; their leaves are colourful and leathery and it is believed the native Indians (of the Americas) used them as hide.

Every leaf, no matter how big or small, helps the organisms in one way or another. The leaves of some plants provide structural support for insects to lay their eggs. Most creatures use them to build their nests, and some such as the fire ants use leaves as walls for their homes. Insects such as the grasshoppers feed on leaves. Without leaves, plants can’t exist; without plants, animals won’t exist; without animals, life won’t exist. Thus leaves can actually be called the *life-givers*.

Even when these leaves are dried and wrinkled, they take part in the cycle of life. In a perfect world, without human intrusion, everything has a role to play; everything goes through a cycle and nothing goes to waste. While we are alive, we provide shade and shelter to many different organisms. Even when we die, we go back to where we belong – to the earth. We add nutrients to the soil. It’s a natural process of the food cycle where bacteria acting on dead organic materials convert them in to nutrients required for sustaining the cycle. Anyways, you humans, in your need to categorise and complicate, call this natural process of waste-recycling as ‘composting’.

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<sup>4</sup> It is an ancient Sanskrit script on medicine and surgery.

There are many benefits to composting. Adding compost to the soil helps the soil retain moisture. It also decreases the need for artificial fertilizers and reduces plant diseases. It is always very interesting to see the organic matter decay and decompose into the soil. It is also very fascinating to see the soil change gradually throughout the process of compost. The organic matter helps the loose and loamy soil retain its moisture.

Speaking of loose, I have a friend who you should meet – she is the Earthworm. Man, she is a ‘loose nut.’ No pun intended.

–“Are you calling me a loose nut again? Sorry, I didn’t realise you have company.”

Hi, I am Ew, the earthworm. Life is all about constantly growing, adapting, learning and helping others to grow as well; this is the main principle that we earthworms follow. We help ourselves and others by retaining the soil moisture. Our excreta, which are rich in nitrogenous matter, are added to the soil as we walk. Unlike you humans, we put even our waste to good use! We earthworms may seem tiny, but remember the age old saying, “All good things come in small packages.” Without us none of you would even be standing here.

–Enough, Ew! My human friend here wants to add his perspectives, too! Come on, Aman, the floor is all yours.

“As I stand here, listening to the earthworm, I am filled with a sense of overwhelming gratitude. Every creature I have seen, every tree I have I met, every bird, and every animal I have encountered, and even those organisms I can’t see work tirelessly to make “life” possible for me. But in our arrogance to know and acquire, we humans, seem to have forgotten how to live. The yawning difference I see between them, the non-human creatures and us, is in terms of living. They live, we strive. They give, we take. They create, we use. They conserve, we waste.

One *aha* moment for me is this idea that “life sustains life.” Without life, the cyclical processes involving various biotic and abiotic components has no meaning. Because of the interplay between these components, life is sustained. Another aspect that stands out is in terms of how we perceive ourselves. Are we part of the web? Are we the centre of the web? Or are we outside the web? The more I think about it, the more I become aware of our ignorance as a race.

I’m not saying that every single one of us is ignorant. Recently I met Girish uncle, who is a writer/organic farmer. Organic farming, according to him, is actually “biodiversity in action.” “Growing a variety of vegetables and fruits is one of the core principles of organic farming,” he said. I later learnt that this diversity also protects the crops from contracting diseases. He shared with me his experiences and this one example he gave enabled me to understand this idea of *symbiotic relationships*: he said that that he grows marigold plants next to his tomato plants. Of the insects that want to eat the tomatoes, some get attracted to the marigolds, while the others get repelled by their fragrance. There were a lot of examples such as this that he shared with us, that further helped me understand the interconnections in nature. He also talked about various concoctions that he prepares. One such concoction is “Panchagavyam,” a powerful insecticide and also a growth stimulant.

A sad aspect about us humans is that we are also uncaring vis-à-vis other humans. I met Chandra Shekhar uncle, a florist who highlighted the fact that he could not grow his own flowers because of the pollution in Bengaluru. His friend, Srikanth (uncle), a vegetable vendor, shared with me the problems he faces: he buys his vegetables from the City Market, and, as his policy is against selling spoiled vegetables, some amount of vegetables is wasted every day. These interactions have enabled me to understand how far we, as a race, have deviated from our roots. After my interaction with all of you, I can now state with conviction that the beauty and majesty of Nature lies in her diversity. The diversity is feasible and sustainable because of the symbiotic relationship that exists between the various components/organisms.

Speaking of symbiotic relationships, I need to share with you my observations of “chikka kula” in our Campus. In 2005, the students of our school partnered with Jerry Martin, a naturalist, to build a pond in the campus. Though a man-made pond, this *kula*<sup>5</sup> is now a thriving ecosystem and supports many organisms. “Honge, I am done talking. You can take over.”

You captured the essence of this space. Thanks, Aman. Originally, this campus had only about 2 or three native species of trees (Honge, I am told); every other tree was a Eucalyptus. Now, we have about 80 species of native trees. All these happened in a matter of a few years - 16 years, to be exact. When compared to the apartment the little sapling talked about earlier, this place is relatively cool because of the abundance of trees. There are creepy-crawlies such as snails, millipedes, caterpillars, and even snakes that live here. Then you have the bees and the butterflies. The ground emanates a smell of fresh sand and dried leaves. The dark green algae and moss that grows on the benches situated below me add a very natural and beautiful aspect to this whole space. There are also hundreds of mosquitoes, and it is quite amusing to see all the children frantically swinging their hands in a vain attempt to swat them away.

There are also huge white spider webs that trap a variety of small organisms. I like the way spider webs shimmer in the morning sunlight. Birds such as mynas, sunbirds, bee-eaters, bulbuls, pariah crows, parakeets and sparrows are also happy residents here. I am told that there is a cowshed somewhere in the Bhoomi campus: I have seen cows taking a walk around the campus on some days. A while ago, my friend Amla was infected with termites; I remember Pushpa aunty injecting her bark with a mix of cow urine and water. As you can see, she is all better now.

As Honge looked around, she could see the trees and plants becoming still, the birds and bees becoming quieter. And she knew that it’s time for her to take a break...

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<sup>5</sup> Kula is a kannada word which means pond.

## Part B

### Introduction - A Long time ago

Since the beginning of time, man has been inspired by Nature. The hunter gatherers depended on the lush forests for their very survival. Our great sages and *rishis* sought out high mountains and/or verdant woods, in search of the eternal truth; their wandering and reflections form the core of the Upanishads. Christ too wandered through the desert wilderness, seeking truth. It is believed that Prophet Muhammad's first revelation took place in a cave called Hira, located on the mountain near Mecca. Buddha attained enlightenment under a Peepal tree, also called the Bodhi tree. So did Mahaveera, he under a sal tree. Not just the trees, our ancestors regarded rivers, the flowing water bodies as sacred. River Ganga is affectionately called 'Ganga ma' by millions of Indians; most of our rivers, Kaveri, Tapi, Narmada, and Brahmaputra find a mention in our puranas. Most of our civilizations were established and flourished on the banks of rivers: Harappa civilization on the banks of river Indus; Mesopotamian, on the banks of rivers Euphrates and Tigris to name a few.

Rivers, forest, mountains also found their rightful place in literature. Kalidasa, the foremost poet of ancient India, has written extensively on Nature. In the English speaking world, we have Robert Frost, Tennyson, Wordsworth, Shelly and Keats. Our own Ruskin Bond draws his inspiration from the beautiful mountainous landscape of the Himalayas.

Nature also supported the pastor-agricultural economies of the bygone eras; in this industrial age, she provides the essential raw material for sustaining our modern life style. Thus we have moved from a time when man regarded Nature as god into a time where he looks at Nature merely as a raw material.

### A Positive Story: the story of Dodda Ambalipura Kere

Though our attitude towards Nature and her innumerable life and non-life forms has changed over the years, she continues to guide and inspire us. Not only that, many are taking initiative to take care of her and her zillion children. Take for example, the Dodda Ambalipura Kerein Bengaluru. It is a thriving ecosystem now, but it was not like that a few years ago. It is a living example of how human participation has helped in reviving an ecosystem! Every New Year's Day, people who live in the vicinity of the lake make it a point to plant at least three to four trees around the lake. This has helped in bringing the "life" back to the ecosystem; not just the trees, we also have birds, bees and human-animals benefitting from the revival of the lake.

### Linkages in a lake and pond ecosystem:

Ecosystems help evolve, establish and sustain linkages and relationships not only between nature and humans but also between various organisms in the web. One good example is the interaction that takes place between humans and animals in the Dodda Ambalipura Kere ecosystem. Humans are helping in the upkeep of the lake, in return the lake provides us with some ecosystem services: lakes help in recharging the underground aquifers; they provide a space for us to relax, reflect and get a sense of oneness; it is directly linked to the micro climate of the areas close to the lake; it is also a willing participant in the water cycle process. The lake attracts many species of birds (crows, parakeets, moorhens, herons, mynas) which in turn helps in keeping the insects (and small creatures such as frogs, fish) population under check; the fish by eating the tadpoles help in keeping the population of frog under control; the frogs and fish ensure the mosquitoes don't multiply rapidly; the birds help in the propagation of seeds; the trees in the periphery of the lake, besides providing homes to the birds, participate in the O<sub>2</sub>-CO<sub>2</sub> cycle and through their transpiration mechanism, partake in the water cycle also. Ducks in the lake feast on the various fish present; their

excreta, rich in nutrients, add to the fertility of the soil in the lake bed. We also saw water snakes, water spiders and other nameless creatures in the lake. The lake, the trees, insects, birds, small creatures, microbes and even humans, in a sense, are living out the various roles required of in an ecosystem; in the process, they have reestablished and strengthened the symbiotic relationship that exist between all of them.

Our conversation with Sandeep uncle who had come to Bhoomi College for a talk, helped us to understand these linkages better. He told us that farmers plant marigold plants next to tomato plants such that some of the insects that come to eat the tomato plants get attracted to the marigold; some insects also get repelled by the fragrance of the marigold. Therefore, understanding these relationships is also beneficial from an economic view point.

We also saw this interdependence reverberating in the pond ecosystem in our school. We saw sunbirds feast on the fruits of the Jamun tree. These birds help in pollination. The leaves of the tree that fall are acted upon by bacteria which help in their decomposition; thus nutrients are put back into the soil without *anyone even noticing it*. We also saw fish lapping up the algae growing on the sides of the pond. Many insects such as water spiders, gliding smoothly across the water, feed on the algae.

In a freshwater ecosystem, the smallest organisms play the most vital role. Bacteria like phytoplankton and Periphyton increase the lake's density and help creatures such as ducks stay afloat. The planktons also serve as a food- source and provide the much needed oxygen. The cellular structure of organisms like these is extremely simple. Despite being such simple organisms, the bacteria and algae are leading primary producers, and help in sustaining life in a freshwater ecosystem.

#### Processes in Nature:

Thus Nature has found a way to sustain life. There are numerous mechanisms that she has developed, that help in maintaining the right conditions for life to sustain. Organisms have evolved keeping in mind their "usefulness" in an ecosystem. Nature knows that her resources are limited, and that her zillion children need the limited resources to sustain themselves. And so, she has developed processes, tested over millions of years, such that nothing is wasted, everything is recycled and most importantly the balance or equilibrium required for life to continue, is maintained.

For life to continue on Earth, it is imperative that we protect and preserve every living organism – the seen and the unseen – on Earth. It is also important that we don't mess with the processes created by Nature. After all we didn't create them, why destroy them?

#### Why biodiversity loss? – The Story of Bellandur lake

One of the very many ways by which humans are interfering with the processes that Nature has so painstakingly and so beautifully developed over the years, is by pollution. An example for this can be again found in Bengaluru, in a lake ecosystem. The Bellandur lake, one the biggest lakes in the area, into which many other smaller lakes drain, can now be put in the "red list" if there is one for lakes.

Things were not bad at all just a few decades ago, residents of Bellandur village say. It was the lifeline for surrounding 18 villages a few decades ago. Residents recall the good times when lake was full and the land next to it fertile. People used to cultivate paddy, grow vegetables like cauliflower and tomatoes in abundance and also do fishing. Apparently, over 400 fishing families were living in this neighborhood. The lake water then was used for irrigation as well as for drinking purpose.<sup>1</sup>

Not anymore! The lake is literally 'frothing'! The reason is simple, Bellandur Lake gets sewage inflow. Why the sewage inflow? This is due to two reasons:

- Improper sewage system due to which untreated sewage water overflows and joins storm water drains, mixes with rain water, which in turn flows to Bellandur Lake via Koramangala and Challaghatta Valley<sup>1</sup>.
- Another reason is due to urbanization. According to an article published in the Bangalore Mirror, if all the 598 apartment complexes located along the Bellandur-Varthur Lake kept their apartments' Sewage Treatment Plants (STPs) operational, the froth forming on Bellandur Lake could have been averted; this according to Karnataka State Pollution Control Board (KSPCB) officials.

So what is the impact of such pollution on a lake ecosystem? For one thing, it disrupts one of the many cyclical processes in nature, for another it contaminates the groundwater table. As we can see, even the livelihood of people who had dependent on fishing had been affected. It has been reported that people in the area are prone to skin rashes and frequent cases of dengue.

While the Dodda Ambalipura Kereis a living example for the positive impact of man helping Nature, the story of Bellandur Lake is a living proof of his apathy and greed; it also speaks volumes about his messed up ideas of "growth and development."

#### Introduction of Invasive species and loss in biodiversity

Besides urbanization and development, another aspect that affects biodiversity is the introduction of invasive species. In our research, what we found out was that such introduction of non-native species of plants/trees cause more damage to the environment than anything else. Organisms endemic to a region have learnt to adapt to the natural environment, nature's cycles apply to them in that their numbers are kept in check because they are part of the food chain/food cycle. With a natural predator readily available, these plants, animals don't 'run wild' and create havoc in an ecosystem. Case in point are the Eucalyptus trees.

It has been proved that Eucalyptus trees cause (underground) water depletion, soil degradation and do not support other living organisms. We observed these trees which are in the vicinity of the school. Not a single bird, not a single organism has made Eucalyptus its home. The same is true for plants like *Lantana camara* and *Parthenium*. These plants look pretty with her bright green leaves and colorful white flowers; but as we observed, not even a cow, not one goat went near these plants. With no natural predators, these plants have overtaken fields, and in the case of the former (lantana), even forests in such places as Bandipur have been affected. When these plants take over the place of native trees/plants, the entire food cycle collapses, which will have dire consequences in the long run.

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1 – [www.bangalore.citizenmatters.in](http://www.bangalore.citizenmatters.in)

Another example that we can give from our own experience is – the giant African snails. We have them aplenty in school, and since they don't have a natural predator they have multiplied rapidly. And according to Pushpa aunty<sup>2</sup>, they pose a serious threat to our vegetable garden and also to other plant and tree species in the campus.

#### **Biodiversity and culture:**

As we researched, interviewed, met people we have come to realize that biodiversity is closely linked to one's culture/beliefs. For example, vultures are very important to the Parsi community. The Parsis offer their dead a 'sky burial' and leave the dead bodies atop a Tower of Silence. Bangalore too has one in Hebbal. The birds of prey, mainly the vultures help dispose of these bodies. The common white rumped vultures ([\*Gyps bengalensis\*](#)) are now an endangered species in India and thus a 3000 year old tradition is in danger of extinction too. In many places all over India, forests have been devoted to deities. The variety we see in our food, clothing, belief systems have evolved in the context of diversity we see in Nature.

When we celebrated the "Food culture of India" through our Creative Kitchen competition in our school, we realized that each region, each state, even each district has its own cuisine depending on the biodiversity of the region! What people eat in Mangalore (coastal, close to Kerala, more fish and coconut-based) is very different from what people eat in Mysore.

Thus in a way, by preserving endemic species/ native species, we would also be protecting our cultural roots. And by protecting our culture, we would be preserving biodiversity too!

### **Conclusion:**

Through this project we have learnt that:

- Biodiversity is important for life to exist on Earth. What is the point of money, ambition, expansion, development if there is no life on Earth?
- Biodiversity needs to be protected no matter what. It needs to be protected not only for its economic value, or for the ecological services it provides; it needs to be protected and preserved for the simple reason that each and every creature has a right to live. Has a right to exist.
- To truly live in contentment and doing our bit to keep our surroundings 'green, living and better' would go a long way in sustaining life on Earth.

## APPENDIX

### Activity 1: Pond-(observations)

Our pond was made by the students of our school. There are many things we can find in and near the pond such as Snails and other insects; many birds, such as the crow; snakes, such as the Russels viper; many fishes, such as the catfish, guppies and mollies are found.

#### Fishes

- Catfish- Catfishes have fleshy thread like filaments growing from the mouth or the snout of the fish, these filaments are called Barbels which resemble the whiskers of a cat, hence they are known as Catfish.
  - Young Catfish primarily feed on aquatic insects such as Dragon fly larvae, Water beetles and Fly larvae. As they become older consume small fish, seeds, aquatic plants, Crawfish and Snails.
- Guppies-They eat brine shrimp, daphnia, bloodworms and mosquito larvae. They'll also eat algae that grow in ponds.

#### Birds

- Myna- Mynas are birds of open areas and maybe seen hunting insects on the ground. The Jungle Myna is easily identified by a tuft of feathers on the forehead and the lack of the yellow patch behind the eye.
- Sunbird- These tiny nectar-feeders are seen in parks and gardens with flowering trees and shrubs. The female are dull olive green above and yellowish on the underside. The brilliant colors of the males are clear only in the good light and at close range.
- Large pied wagtail- A distinctive black and white bird that is seen sitting on or calling from atop water tanks and roof tops. It wags its tail up and down as it walks or runs about catching insects.
- Green bee-eater- Usually seen in small groups, perched on electric wires or fences. This bird can be seen sallying out, capturing insects on the wing and returning to beat the insect on the perch before eating them.
- Black Drongo- A distinctive all black bird with a forked tail. This insectivorous bird is seen in open areas, sometimes accompanying grazing livestock. It is commonly seen in the outskirts of Bangalore.

#### Insects

- Earthworms-We found the earthworm in our composting plant. It was feeding on the organic matter present in the composting plant. It was feeding on the organic matter through its mouth.
- Snails- Snails were present on most of the plants we observed. It has a hard calcareous shell, which it uses for protection. Snails usually feed on fruits, vegetables and soft barks. Some species of snails, such as the wolf snail, are carnivores and feed on other herbivorous snails.

- Butterflies-They are nectar-feeding insects with two pairs of brightly and sometimes, multi-colored wings, which are covered with microscopic scales. We found butterflies mainly next to the pond. There are 75 species of butterflies in Prakriya.
- Ants- We find ants almost everywhere in our school. Some ants, such as the carpenter ant, eat fruits such as the honeydew fruit. Some ants also eat meat.
- Millipedes-Millipedes usually have a lot of feet(20). We found it next to many plants. Millipedes eat decaying wood particles or leaves. If their habitat starts to dry out, they will attack living plants.

Snakes: We did not see any snakes, though we were told the following have been seen in the campus at some time or the other: Rat snakes, Russel's viper, Spectacle cobra

### Activity 2: Bio diversity in Leaves

#### Leaf 1: Parthenium Hysterophorus (shrub)

Structure- long petiole; Symmetrical in shape straight midrib

Colour- light brownish green ( stem ), fern green ( leaf )

Size – 2 to 3 inches long, 1 to 2 inches wide

Texture – soft, matt feel

Is found in our garden

We did not see any creatures on the leaf, except for an occasional ant



#### Leaf 2: Betel

Structure- thin long, hard petiole, straight midrib,  
veins don't bend towards Apex

Colour- dark green

Leaf margin - even and smooth

Shape – cordate, wider near petiole

Is found in our garden, spiders, ants found on the leaf



### Leaf 3: Poaceae (grass- shrub)

Structure- long, thick petiole, not very prominent,  
long and straight main rib, o subdividing veins

Colour- dark green

Size – 0.7cms wide, 9 – 11cms wide

Shape – linear, with pointed ends, narrow and long, symmetrical

Margin – Entire (smooth even margin throughout)

Is found in pretty much all the open spaces in the school

A lady bug was found, we have seen cows eating the grass,

- spider webs are formed



### Leaf 4: Crotons (shrub)

Structure – Long, straight, strong mid rib / petiole

Shape – elliptical shaped (ovalshaped)

Size – 3 inches wide in middle, 3 to 4 inches' long

Leaf Margin – serrated margin, Curved Apex.

Colour – Pink (lightMagenta), and bright green, Pink covers the borders and green in the inner portions, Shade of green remains same, shade of pink varies from dark to light at some place

Texture of leaf – rough, wavy

Found in pots and also in few places near the office

Spiders, ants, eggs of insects(?) were found; spider webs too.



### Leaf 5: Azadirachta Indica (Neem)

Structure – Long, strong, straight midrib / petiole

Size – 1.5 cms wide and 2.5 cms long

Shape – Non-symmetrical,

Lanceolate, Odd pinnate

Leaf Margin - Double serrate

Colour – Dark green, mid rib – yellowish green, dark green  
uniform throughout the leaf.

Texture – slightly rough

Found in various places in the school, in panchavati,

near the sandpit, devara kadu

spiders, birds carry the leaf for making nest, ants also carry the dry leaves

spider webs, birds also eat fruits



Leaf 6: Gooseberry (tree)

Structure – Thin, straight midrib, short petiole,

Colour of veins – light brown

Colour of leaf – yellow and green

Texture – smooth, waxy (like thin leather)

Shape of leaf – elliptical

Leaf margin – smooth throughout

Found in Panchavati, near the football field, devarakadu

Birds, insects, ants, spiders; spider web; birds building nest



Leaf 7: Grevillea Robusta (Silveroak)

Structure – Long, hard petiole

Shape – Linear, thin long needle like leaves with pointed apex

Leaf margin – Smooth and sharp, Lobate

Colour – Blackish brown and patches of grey

Texture – rough, sharp and brittle.

Front towards the panchavati, devara kadu

Many small spider webs, which are

Found in between the incisions of the leaves



Leaf 8: Ficus religiosa (tree)

Structure – long, straight midrib, Long petiole

Dichotonous

Symmetrical, Pointed long apex

Shape – Inverted heart shape

Colour – Dull green Texture –slightly rough

Small dots present on the leaf

Size- 3 inches wide, 3 to 4 inches' long

Near balambika/nursery

Birds, spiders, ants, little worms; eggs, spider webs, building nests



Leaf 9: Muntingia (Singapore cherry tree)

Structure – Long, thin midrib, prominent and visible till apex

Size – 3 inches long, 0.5 to 1 inch wide

Shape – linear, long, pointed at apex

Leaf Margin – double serrate

Texture – smooth

Found near balambika, near the amphitheatre, near the football field

All kinds of birds (sun bird, bee-eaters), spiders, ants, caterpillars,  
Butterflies, spider web, making nest, laying eggs, ants carrying leaves



**Activity 3: Compost – Making Activity:**

- Day 1: First we need to take 3 layers of mud pots and fill them with dried leaves and mud. You can

Also add banana leaves and rotten fruits and vegetables.

- Day 2: you again have to add mud, dried leaves and other organic matter. This process might be repetitive but in the end, it is always worth it. You can also add cow dung.
- Day 3: depending in the type of organic matter you put, the temperature and the pH of your compost will vary. But for the Psarians who are working diligently they measured a temperature of 24. C. And, the pH of the compost turned out to be 9, which lies more on the basic side rather than acidic.
- Day 4, actually 6: as I already said, compost supports a lot of other organisms and not only the plant. Many mushrooms grew around the composting pit and I also spotted a little worm- it was probably an earthworm. Again, writer's column here also- explain economic importance of earthworms.
- Day 7: now the pH test came up to 8. The children observed that the pH of the soil was turning slowly more acidic which is a good thing since most plants prefer their soil to be a tad on the acidic soil except for probably potatoes and such which like very acidic soil- around 5.5 and some desert plants which survive in soil with a pH of 8.

**Activity 4: Interviews**

Questionnaire 1: Organic farmer

Question 1: Why do you feel that eating organic is important?

Question 2: What kind of fertilizers do you use?

Question 3: How do you decide what plants to grow organically?

Question 4: What are the principles of organic farming?

Question 5: What is the role of biodiversity in your profession?

## Questionnaire 2: Florist

Question1: Where do you get your produce from?

Question2: Why don't you grow your own flowers?

Question3: What do you do about the insects that come and trouble the flowers?

Question4: Which flower is sold the most?

## Questionnaire 3: Vegetable vendor

Question1: Where do you get your vegetables from? Why don't you grow them yourself?

Question2: Are your vegetables organic?

Question3: What is the shelf life of your vegetables? How do you preserve them?

Question4: When do most people come to buy your vegetables?

## Activity 5: Activity Card Game

### Contents-

- There are 10 main cards with pictures
- Each main card has 4 sub-cards.
- There are totally 50 cards.

### Rules of the game-

- -The game has to be played between two or more teams
- A team can consist of any number of players. Sub cards are distributed evenly to all teams. All the sub cards of the main cards should be present while playing. Each main card has four sub cards (place, symbiosis, food and species card).
- In the game, there needs to be a judge who keeps check of the points and monitors the game.
- The judge places the main card of his choice at the centre.
- -The teams now start guessing the four sub cards for the placed main card.
- For each right answer, the respective team gets 10 points, and for each wrong answer, the respective team gets 5 points deducted.
- If the teams take help from the judge, they get 5 points deducted.

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- Organic farming-My experiences by Girish Krishnamurthy
- Eternal Bhoomi-Biodiversity, Volume 5, Issue-3, July September, 2014



**“The diversity of life forms, so numerous that we have yet to identify most of them, is the greatest wonder of this planet.’**

**- E O Wilson, *Biodiversity*, 1998.**

**The end**

