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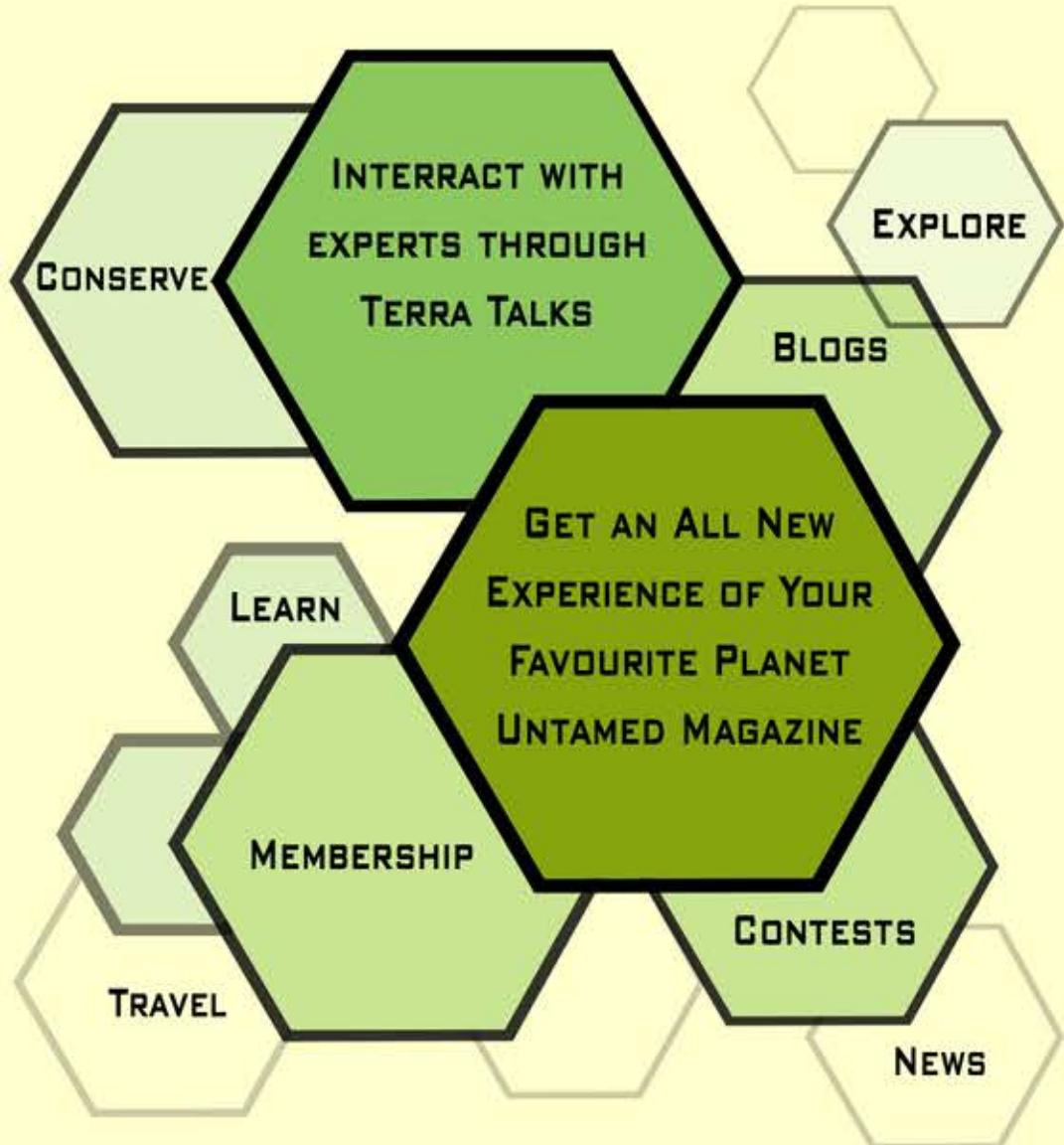
wild, essence to sense

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Human Animal Co-existence



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Human and Animal Co-Existence

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Human & Animal Co-Existence

Our history of interacting with wildlife is deep and complex. Scholars believe that our affinity for wildlife is innate and much of human psychology has been influenced by this affinity. This affinity motivates humans to watch, learn from, and study wildlife. Unfortunately, our history with wildlife also includes darker stories. With expansion of human influence and development across landscapes globally, people increasingly viewed wildlife in antagonistic ways. The benefits of carnivores to ecosystems were not appreciated either; instead, they were vilified as threats to livestock or seen as the embodiment of spiritual evils.

With expansion of cities, suburbs, and exurban areas, humans perceived nature as separate from our “unnatural” systems and constructed landscapes.

Human impact has pushed many wildlife species towards extinction. The usual co-existence strategies are to confine more and more wildlife habitat to smaller reserves, parks or other fenced areas to protect remaining wildlife in that location, and the human settlements as well.

When humans coexist with and do not persecute wildlife, we see vast improvements to ecosystems health, agricultural stability, food security, and the creation of new sustainable economies. Ultimately, coexistence with wildlife is essential for all life, humans and animals alike. To support the holistic health of ecosystems that support humans and all life, evidence-based and ethically consistent practices must promote coexistence rather than conflict.

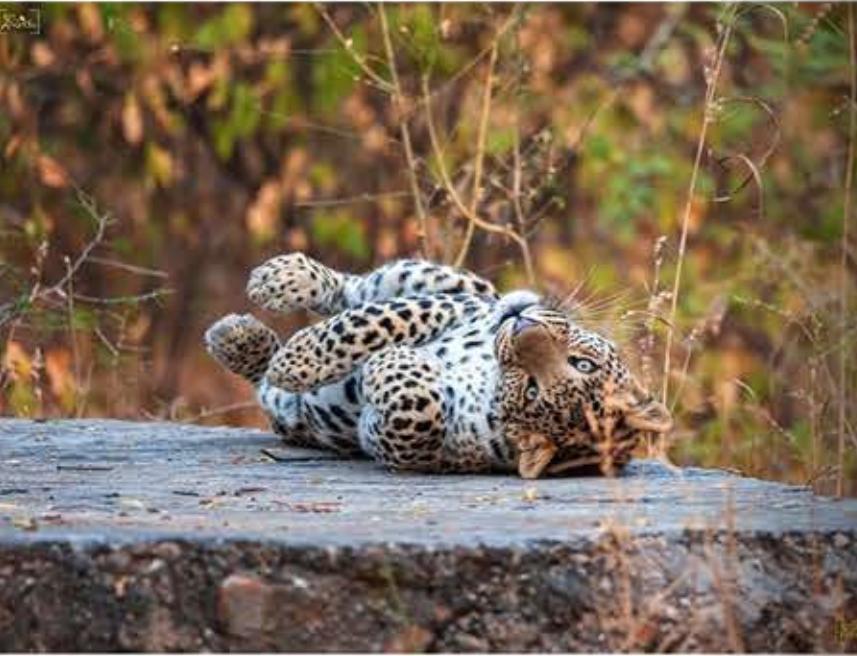
Photo of Fox sitting in backyard of a house in the main London city



Our Sponsor

Mr. Ananda Majumdar

Mr. Ananda is a nature lover. That's his primary identity and his passion is wildlife photography. He has travelled the length and breadth of India and some other parts of the world in his quest to see and photograph wild animals in their natural habitat.



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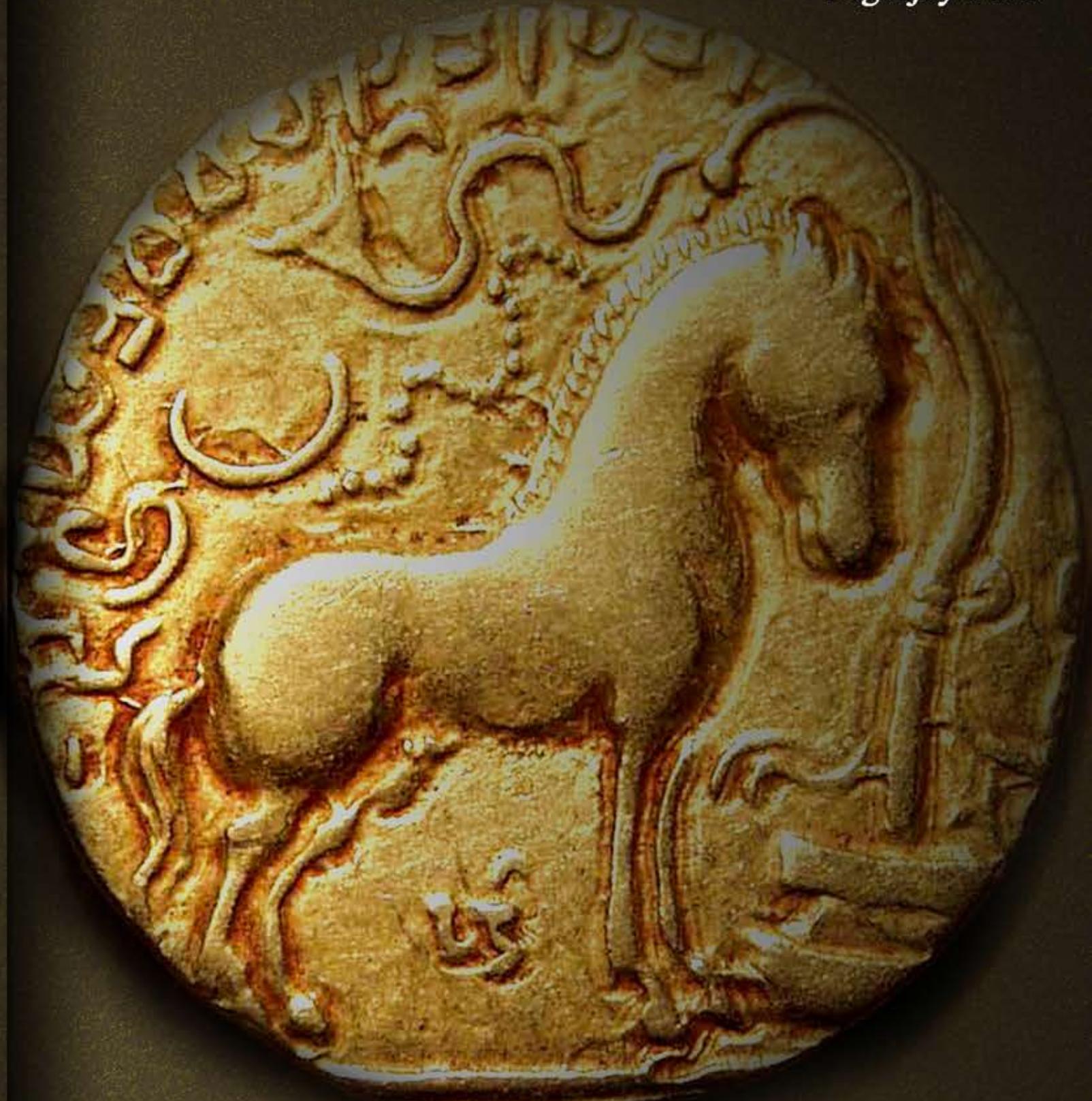
Human Animal Relationship

Through Art & Archeology

- Digvijay Patil

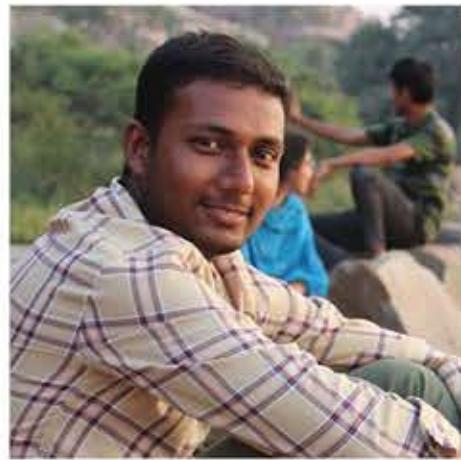


*Gold coin by Samudragupta (335-375 CE)
depicting Ashvamedha, the horse sacrifice.
Source: www.coinindia.com*



Human Animal Relationship

Digvijay Patil



Digvijay Patil holds a masters in Ancient Indian History, Culture & Archaeology and has done Post Graduate Diploma from ASI, Delhi. He has participated in various excavation projects across the country and has done research on 'Phyolith studies in Neolithic - Chalcolithic site in Odisha. He regularly conducts heritage walks and has delivered talks in various institutes on History and Archaeology.

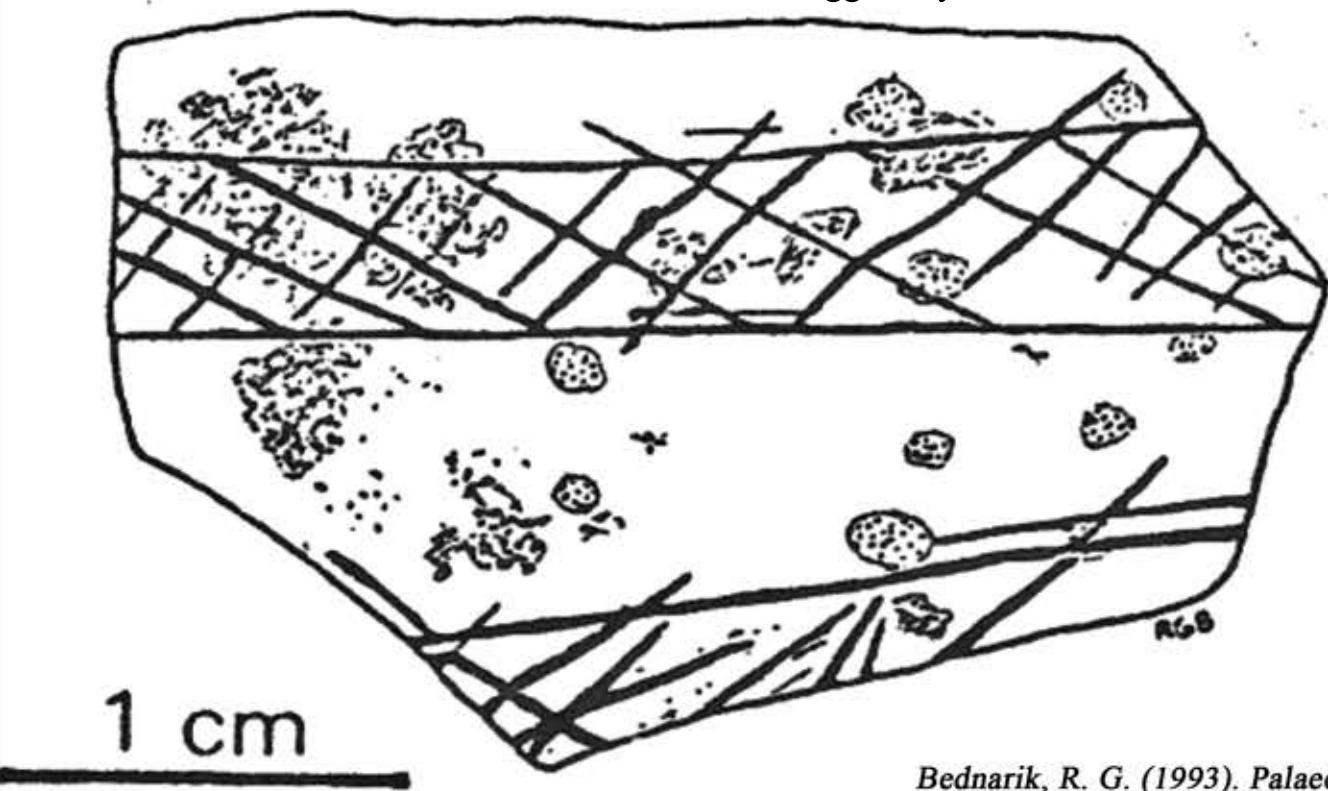
The relationship between humans and animals has never been simple. The Indian subcontinent is blessed with diverse landscapes that range from snow clad mountains to fertile river valleys to harsh deserts, all of which sustain a wide range of biodiversity.

According to our current knowledge, the earliest evidence of human existence on Indian soil was around 1.5 million (15 lakh) years ago. Over the ages, the relationship between humans and other animals has become multifold due to mutual curiosity, fear, competition, cooperation and affection. Along with historians, geologists, palaeontologists and evolutionary biologists, we archaeologists too try to look into the past of human beings. We try to explore and realise some interesting processes and facets of this long time period with the help of material remains, comparisons, analogies and some modern techniques. In the following passages, we shall glance into some moments of long-lasting bonds through the eyes of an Indian archaeology student.

As said earlier, we know about the early hominins of India from stone tools recovered and dated back to around 1.5 million years ago from excavations at Attirampakkam, Tamil Nadu and similar sites. Unfortunately, we significantly lack hominin fossils from these initial times for any dating or comparisons. In this scenario, geological context and multiple fossils of large mammals from the Pleistocene period proved very helpful. Fossil remains of more than 80 species of large mammal vertebrate genera like *Bos* sp., *Bubalus* sp., *Rhinoceros* sp., *Hexaprotodon* sp., *Equus* sp., *Ursus* sp., *Panthera* sp., *Elephas* sp., *Stegodon* sp. and *Sus* sp. can be found all over Indian subcontinent. These species were more different and grand than their modern relatives. Some exceptional sites like Chirki, Maharashtra, Isampur, Karnataka, Hathnora, M.P. and Kurnool caves, Andhra Pradesh yielded faunal fossils and prehistoric stone tools. Many of these animals were probably a part of the human diet and were killed with stone tools.

Such instances and studies helped us understand palaeo-ecology and the prey-predator relationship between the two parties.

As time proceeded, the environment was changing significantly and becoming warmer. Some of these giant species became extinct from Indian lands, due to either climatic changes or overhunting and habitat destruction. However, many adapted and survived in pockets. We know one of the earliest surviving specimens of prehistoric artistic expression from a site of Patne, Maharashtra dated to upper palaeolithic time (25k - 15k years ago). Along with stone tools, archaeologists found a few beads made of ostrich egg shells and a unique piece with some etchings of criss-cross patterns. Interestingly, there are more than 40 sites in India where such ostrich egg shell fragments are reported. Ostriches are not found in India today, but in prehistoric times there were plenty of them here and our ancestors probably found their eggs tasty!



Bednarik, R. G. (1993). *Palaeolithic*

THE ENGRAVED OSTRICH EGGSHELL FRAGMENT FROM PATNE



The painting from Bhimbetka depicts a man carrying a bag full of animals, including some rodents. Some might find it absurd to consider burrowing creatures as part of our regular diet, but communities like Misheras from Uttar Pradesh still continue to hunt rats as they are a dietary staple.

Moving on, we started finding plenty of rock shelters like Bhimbetka, M.P., where humans lived and painted on the surface with ochre, green and white pigments. These paintings, which are of Mesolithic times (c. 15000 to 8000 BCE), depict animals and hunting scenes. They directly open doors into the lives and psyches of the hunter-gatherers of those times. More than thirty odd species of mammals and birds are depicted in action and participating in social activities.. The shapes and colourful patterns on the fur and feathers could have intrigued and inspired our ancestors' artistic sides. One such painting from Bhimbetka depicts a man carrying a bag full of animals, including some rodents. Some might find it absurd to consider burrowing creatures as part of our regular diet, but communities like Misheras from Uttar Pradesh still continue to hunt rats as they are a dietary staple.

Then came the Neolithic phase, in which humans started practicing agriculture and domesticating animal species for various purposes. The earliest evidence of agriculture comes from excavations at Mehargarh, Pakistan and Lahiradewa, U.P.. In the case of animals, it is rightly said that dogs are the oldest and most loyal friend of humans, dating even earlier than the agricultural revolution. Unlike other animals like cattle and sheep, dogs were neither domesticated for products like meat or milk nor used for any laborious work like pulling carts. Instead they were more like companions on the field for hunting, guiding and guarding. Such relationships have become even more intense over time and continue to grow. A memorial stone erected at Atakur, Karnataka in 10th century CE is such an example of the bond of love between man and dog. The inscription depicted on the memorial stone narrates a story of a dog named Kali who died while fighting a wild boar.



A fine depiction of a dog comes on a stone slab excavated from Burzahom, (Kashmir), an early farming site dating back to 3000 BCE. On that slab, a couple is shown hunting a deer and aptly accompanied by a hound.

Similarly, Neolithic cultures of Southern India grew and developed around cattle domestication. The archaeological site of this culture dates back to 3000 BCE and generally consists of thick ash deposits from the repetitive ritualistic burning of cow-dung. Indians consider a bull as Lord Shiva's vehicle and a cow is considered to be a holy mother. Such a divine status for cattle is mainly because of their importance in farming activities and the milk products like butter and ghee that established strong foundations in village economies.

Despite this, even today, there are many communities around India and the world that are lactose intolerant or still refrain from consuming milk and its byproducts.

Moving on, humans also invented the extractions of metals like copper and started engaging actively in highly standardized trade and socio-political systems. Such cultures, including Harappan civilisation and many other regional developments, are known as chalcolithic cultures.

By this time, animals were already part of cultural expression via religion, festivals and arts. The Harappan antiquities of bronze, terracotta, seals and painted ceramics provide many examples for our discussion. For example, the so-called famous Pashupati seal from excavations at Mohenjodaro, Pakistan depicts a seated man with horned headgear on a platform and surrounded by animals like tiger, buffalo and rhino etc. Terracotta figurines & toys from many sites include animals like monkeys, squirrels, peacocks etc.

An interesting piece of potsherd from the port site of Lothal, Gujarat depicts a crow with a pitcher and that is interpreted as probably the earliest form of Indian fables which became popular over the world through collections like Jatakas and Panchatantra etc. in later period. These fables are full of animal characters inspired from man's observation of wildlife and fauna.

A copper coin by Kujula Kadphises (1st cent CE) depicting a bull and a Bactrian double-humped camel
Source: www.coinsindia.com



There is a lot of debate over the remains of the horse from excavations of Harappan sites. But apart from that, it is very certain that since their arrival, horses have retained their importance in Indian society. It is evident from their presence in megalithic burials of around 800 BCE. People who had mastered the technique of iron used to erect monuments in memory of deceased persons. Many of these monuments from Southern India contain burial goods including ceramics, weapons and jewellery alongside the carcass of the deceased. Some of the burials were found with copper jewels specially designed and prepared for horses. Horses were important to rulers because of their speed and stamina. The Vedic literature contains mentions of horses and horse sacrifice. The Ashwamedha sacrifice was a popular practice within rulers of early historical periods as known from some coins, inscriptions as well as some excavations. For example, gold coins issued by King Samudragupta (335-75 CE) depicts highly stylized horses commemorating his successful completion of sacrifice.



Figure 18



Figure 19



Figure 20



Figure 21



Figure 22



Figure 23

Figures 18-23: Horse ornaments from Mahurjhari

By the early historic period animals were already featured as symbols by rulers to denote their might, sovereignty and territory. Emperor Ashoka (262 – 233 BCE) was one such powerful, yet unique ruler in Indian history. In his own personal quest of Dhamma and to teach his kingdom about morals and ethics, he chose very significant animals on pillar capitals raised by him. For example the pillar capital at Sarnath is topped by four magnificent, yet calm lions upon which the wheel of dhamma is resting. The lions that were introduced to Indian lands and art have been associated with royalty since then and now the lion capital by Ashoka is the official symbol of independent India. Besides this, it can be said that Ashoka is the first known king who issued laws for protection of wildlife as part of morals. The royal edicts clearly state regulations on hunting, cattle castration, and wood burning. They also encourage vegetarianism.

Unlike the lion, elephant, bull, tiger or horse, the camel is rarely featured in early Indian art except coins of Kujula Kadphises (1st cent CE). His coins, found in southwest India, depict a double-humped Bactrian camel, probably because of its importance in trade activities that generated prosperity for the king. Later, we rarely see camels associated with anything as important, probably because of its humble appearance and limited use. Interestingly in the 18th century, camel riders of Punjab are said to have inspired Mian Ghulam Nabi Shori to develop a new genre called Tappa in Hindusthani Classical Music. Shori Mian was said to be a poet and a fine musician with great command on taan ornamentations. During his journey in Punjab, he came across songs by camel riders which were well suited for Camels gait, which did justice to his expertise. Along with real animals, human minds of the early historic period fascinated and conjured many composite and imaginary animals. These composite animals were essentially the combinations of fine qualities of different animals seen in nature. They are extensively used as a decorative motif in religious art and architecture at religious monuments at Bharhut M.P., Nagarjunkonda, Andhra Pradesh and Karle, Maharashtra. A composite animal named Hippocampus has been carved in Buddhist caves at Kuda, Maharashtra. During that time, the region and its rulers, the Mahabhojas, were engaged in trade across the ocean with Mediterranean region. The Hippocampus motif, which originated there, shows the influence and significance of such motifs in art studies, as trade is not just the exchange of goods but also the exchange of ideas.

Animals in Indian literature and religion are a vast topic, as we have revered many animals in one way or another.

Apart from well-known and popular deities like Ganesha and Hanuman, there are some other natural phenomena that are also considered sacred in India. Similarly, ammonite fossils of the Cretaceous period that are found in Gandak river of Nepal are worshipped as Shaligram, symbolising Lord Vishnu and his Chakra. Such instances only intrigue me to see the wonderful nature of the human mind, which has been trying to make sense of nature and biodiversity in its own way.



In Goa, Goddess Santeri is worshipped by locals via termite hills. Here, the colony for small insects is made up of mud rising from the surface and is perceived as a symbol of fertility and prosperity.

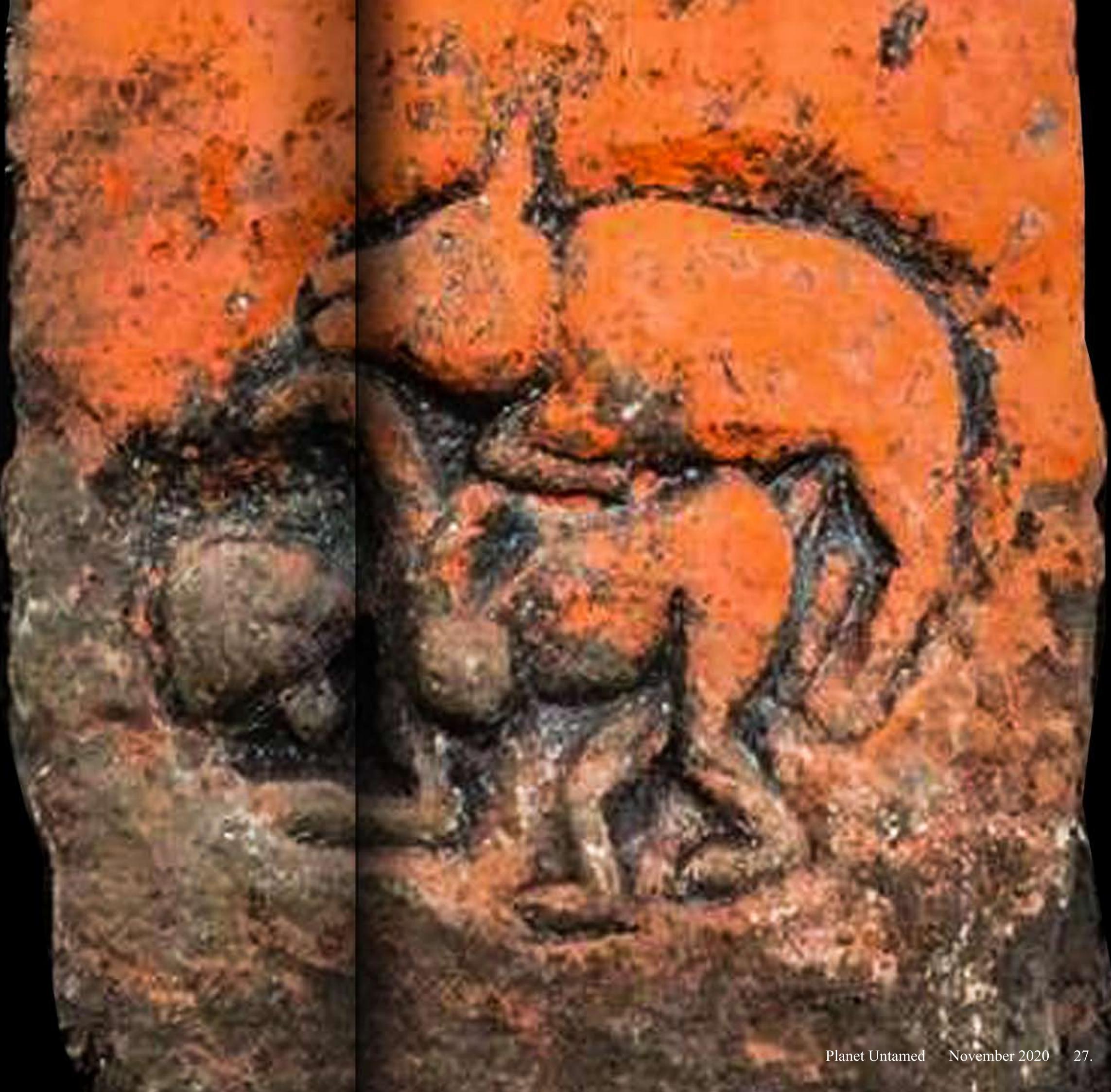
Photo Credits: Rajan Parrikar

I think human beings have often also been hypocritical, because on one hand, people worship natural creatures, but on the other, they engage in recreational hunting, poaching and habitat destruction. Because of government laws and activism, practices like snake-charming, bear dancing, and cock fighting are going out of fashion slowly. Yet, some other challenges are taking shape. Our habits and traditions are deeply rooted in the need for regular introspection.

There are also many traditional ways to maintain balance and harmony with nature. The idea and practices of sacred groves, that are followed by many communities all over the country, is one such example. Sacred groves are pieces of forest dedicated to a particular deity, and there are restrictions on the use of any products from the land. Thus, it ultimately helps to keep a balance with activities in which we interfere with ecosystems and natural laws. Many scholars are trying to preserve and revive such traditions for our better future.

In the medieval period, there was a tradition of erecting Gadhegals or Ass-curse steles. These steles were erected to record donations. They are characterised by a very disturbing imagery of a donkey having sexual intercourse with a woman as a symbolic representation of a curse for the breaker of the laws. Some interpret this as a symbolic warning of epidemics or great danger, as the donkey is considered a vehicle of Shitala devi, a goddess of smallpox and the woman as mother Earth. Currently we are witnessing one such great pandemic, which has originated because of our unwarranted interference with nature. Let us hope we will learn from our earlier mistakes and try to keep the balance and beauty of our planet intact.

Photo Credits: Shiv Darak



DID YOU KNOW ?

- Snow leopards' tails are 80-105cm long, they're thought to aid balance and they also wrap them around themselves for added warmth. Snow leopards' wide, fur-covered feet act as natural snowshoes - helping distribute their weight over soft snow and protecting them from the cold.
- Snow leopards live at high altitudes, usually at elevations of 3,000-4,500m. They prefer steep, broken terrain like cliffs, rocky outcrops and ravines. Having short forelimbs and long hind legs help keep them agile in their steep and rugged environment.
- Unlike other big cats, snow leopards can't roar. Snow leopards have a 'main' call described as a 'piercing yowl' that's so loud it can be heard over the roar of a river.





Spotted Felines & Humans

Towards a better Understanding

- *Mrunal Ghosalkar*

Photo Credits: Ranjeet Jadhav

Spotted Felines & Humans

Mrunal Ghosalkar



Mrunal Ghosalkar has done a master's in Environmental Science from the Institute Science of India, Mumbai. She is working as an educator and is interested in human-wildlife interactions, coexistence, community engagement, and communication. She is a National Geographic Certified Educator and for the last five years, she has been working with people in different rural landscapes of Maharashtra to understand human-wildlife interactions and stakeholder engagements.

Photo of a Leopard in a sugarcane field.

Photo Credits: Mah Forest Dept. & Janta Waghoba

When you hear the word "leopard," you may imagine a magnificent, agile, shy and furry golden big cat with dark spots, known as rosettes. You would probably want to watch them in the wild, their "natural habitat." Many like you may have even called your house cats the leopard's aunt, or "Waghobachi Maushi." For some of us, leopards are wild animals who no longer have enough space in the forest due to habitat loss and insufficient food and water. We may conclude that these simple reasons are why they are coming into our cities. After all, in recent times, leopard sightings have risen in urban areas, resulting in a range of theories and recommendations: "Leopards are not getting enough food in the forest, so they are attacking people," "These leopards should be trapped and sent back to their forests," and "They are very harmful to humans!" People residing in rural areas, on the other hand, say: "Leopards exist in our farms. Many leopards roam in these areas. Their numbers are increasing. These leopards should be trans-located into the forest. They are eating our livestock."

But what do we really know about leopards?



The leopard (*panthera pardus fusca*) belongs to the cat family. It is a highly adaptive species and a secretive animal. Contrary to popular belief, leopards do not need forest cover to survive. They can live in sugarcane fields, tea estates, dry areas and forests - wherever they get shelter, prey, water and space to establish territories. Many leopards are born in tea estates and sugarcane landscapes, their non-forest homes! How could they survive in a forest, when they've never seen one?

Leopard prey ranges from frogs, crabs, rats, and hares to feral animals, dogs and deer. This spotted beast is solitary and highly territorial. They have strong homing instincts. Just like a house cat can find its way back home if you were to leave it elsewhere, leopards do come back to their own territories too. The size of their territory is dependent on the resources available in the area. The fewer the resources, the bigger their territory and vice versa.

Apart from the fact that they can survive in any habitat, leopards are fascinating animals. Each individual leopard has a unique rosette pattern on its fur coat, just like our fingerprints. Based on this, two individual leopards can be distinguished from each other. Their gestation period is three months and they give birth to three to four cubs in a litter. The cubs stay with their mother until they're 1.5 to two years old. After that, the cubs find their own territory. Leopards also have a social structure among themselves. A male cub can go far away from its mother to look for its own territory.

A female cub can stay with her mother and eventually inherit a portion of her territory, along with nearby space. Vacant territory doesn't remain so for long and they can be occupied by other leopards. Once established, they know their territory very well! If we remove an animal from its territory, the problem is never solved - the number of leopards only increases, and the now vacant territory is taken over by other neighbouring leopards. The leopards tend to come back to their original territory, and they can be harmful to humans when they are trans-located from elsewhere into unfamiliar areas.

These occurrences are common in the rural landscape of Maharashtra. It is mostly an agricultural landscape with human dominance. Agriculture and livestock rearing are the main occupations of people here. The soil is very fertile due to the abundance of water. There are green farms as far as the eye can see. The landscape also supports many wild animals like hyenas, jackals, mongoose, jungle cats, rusty spotted cats, civets and leopards, as it provides shelter, water and prey. The prime carnivore in such a landscape is the leopard. It feeds on wild animals as well as livestock and feral animals. This adaptive beast has been living in these rural landscapes for the last few years. People from this landscape have not shared their space with big cats for several generations.



Agriculture is the main occupation of people living in the villages and maintaining a livestock is an important necessity for this occupation

Photo Credits: Julius

They have a natural fear of leopards. Lack of information and understanding may be reasons behind this fear. There can be several types of negative interactions between leopards and people. Leopards can attack livestock and rarely people, farmers sight leopards at night, leopards occasionally fall into wells when chasing prey, leopard cubs are found during sugarcane harvesting periods, and leopards risk being roadkill. There is constant pressure on government agencies to capture these spotted cats and release them back into the forest. On the other hand, in urban areas, leopards have been seen in city areas in search of feral dogs as prey. They have been captured on surveillance cameras in cities, or sighted near public areas, causing the aforementioned fear.

There are some communities like Warali, Mahaveo Koli, Gond, Velip and Thakar in India that worship big cats in the form of ‘Waghoba,’ which represents both tigers and leopards.

Waghoba can take the form of stone, wood or an idol. While the Gaon devi, the village goddess, the Waghoba protects the forest. The people from these communities have shared the landscape with wild animals for several generations. They worship Waghoba on the occasion of ‘Waghbaras’. They believe that worshipping Waghoba will guard their livestock from harm. They know the wild animals’ behaviors and know what precautionary measures are necessary to avoid negative interactions. They also say, “The leopards coming from outside are creating problems for people. Our resident leopards will never create problems.”



Local deity that's worshipped by villagers with a belief that the deity will protect their livestock from 'Waghoba' or leopard.

Photo credits: Julius Gomes

To share information on leopards and safety measures, the Maharashtra Forest Department, WCS-India and Rufford Foundation started a program called ‘Janata Waghoba – A Wise Big Cat’ in 2016 in Junnar (Pune), Sangamner (Ahmednagar), Niphad and Sinnar (Nashik). The aim of the program was to share knowledge on human-leopard interactions and reduce people’s associated fears by increasing their understanding of the animal, thereby minimizing negative interactions. We identified important stakeholders - Forest department, Education Department, media and Revenue Department to reach larger audiences to share the information on traditional knowledge and leopard ecology.

We began with an educational program for 1st to 15th grade students on leopard biology, behavior and precautionary measures. To engage with adults, we created a network of interested young students called Leopard Ambassadors. Their duty was to share learned information with their family members, neighbors and villagers. This was made part of these students’ Environment Science subject curriculum with the help of the Education Department, and they received grade marks for small projects.



Even if there are few human-leopard negative interactions, villagers were very keen to receive information from these students.

“You should give this information on leopards to other families and villages too. We know very little about leopards. This information is actually useful in our daily activities. It is necessary that this information on leopard behavior and precautionary measures reach many people. If the information is disseminated amongst many people, it will help minimize fear of leopards amongst us. You can interact with villagers by gathering them at one place instead of approaching them individually by going to each household. We are happy that young people from our village are a part of a social cause and they are working towards creating awareness,” said the villagers to the ambassadors!



Various training programs and discussions with villagers for people to understand the behaviour of the leopard. Through these workshops people are explained ways to avoid encounters with leopards.

Photos by Omkar Patil

The ambassadors were happy to be a part of social service in terms of creating awareness in their own villages and communities. Based on their experiences, they provided suggestions, including the presence of ambassadors in each village and better informational signage in village squares at common gathering places. Some said, "We were also unaware about leopard behavior and that humans are not its natural prey. Our family members also do not know much about them. So, we would like to inform them of our correct knowledge on leopards."

Some even suggested, "Sometimes humans are killed by leopards, but at the same time, leopards are also getting killed by humans as roadkill."

Young minds are the untapped potential of the community. They are the ideal candidates who understand ground realities better than perhaps any outside institutions. The village headman (Sarpanch), Gram panchayat members, school headmaster and teachers were all actively involved in organizing school educational programs.

With all these initiatives, the Forest Department's front-line staff, with which villagers interact the most, started sharing essential and proper information with people. Workshops were organized for the Forest Department. With help of media personnel, a workshop on the role of media in human-wildlife interactions and addressing such issues was organized. Although it is too short a time period to assess the effects of these initiatives, we hope the students' efforts have laid a strong foundation for a better understanding of the constant interactions people have with leopards. The work will benefit both humans and leopards in the future. It will help change peoples' perspectives towards leopards and eventually minimize the irrational fear towards them.

Understanding and fear are the two sides of the same coin, so we just need to flip the coin in the right direction with the right mindset. Leopards have already learned to live with humans. Now, it is our turn to adapt to living with them. Though it is a very complex process to understand sides, constant conversation and dialogue between all the stakeholders will achieve success in such scenarios.

We also need to include human aspects into our studies on animal ecology to fully understand their interactions and shared spaces. We humans also need to shift our focus from animals to human perspectives, rather than resorting to easy 'solutions' like capture and trans-location, which will become dangerous in the future. We should always think of what WE can do rather than how an animal should behave.

In all these processes, one thing we can observe is that it's never about the animal. We are the ones who are making the situation more and more complicated. We need to accept the wild animals' existence and move towards a happy coexistence.



Young minds are the untapped potential of the community. They are the ideal candidates who understand ground realities better than perhaps any outside institutions. The village headman (Sarpanch), Gram panchayat members, school headmaster and teachers were all actively involved in organizing school educational programs.

Photo credits: Julius Gomes



PHOTOGRAPH BY ANANDA MAJUMDAR

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Arcane Conservancy

Arcane Conservation was born from a thought about understanding and conserving lesser known species of India. At Arcane, we aim to bring research and knowledge-driven conservation, while promoting the sustainable use of natural resources.

We integrate advanced innovative research techniques and wildlife ecology to design conservation projects, which help change ground realities.

Arcane Conservancy aims to create awareness about mitigation techniques, educate people about government policies and wild animal behavior, teach the need for conservation, and explain the importance of the species among the people who share its habitat.

With growing concerns about decreasing forest areas and fragmentation of corridors, wild animals are at risk. This shrinking of forested areas has led to rise in human-wildlife interaction.

Our research team aims to identify critical zones of conservation and conflicts. This has led us to build a network of volunteers and informers in areas to understand the ground realities. We aim to identify gaps in species management, evaluate the frequency of animal sightings near settlements and understand the intensity of conflict in fringe areas.

Smooth Coated Otters enjoying a successful raid from fishermen nets in Anjarle creek
Photo Credits: Dhruv Phadke

Why Otters?

Otters are considered ambassadors of wetland ecosystems, as they are an indicator species and are often the key predators.

India is home to three otter species out of thirteen species that are found in other parts of the world. The three species are:

- *Lutrogale perspicillata* or the smooth-coated otter – Prefers deep streams, rocky areas and sandy areas. Diet mainly consists of fish, but sometimes prefers crustaceans.

- *Lutra lutra* or Eurasian otter – Has a very specific distribution India, and is found in extreme corners of country. Its known distribution is in the Southernmost part and trans-Himalayan belt of India.

- *Aonyx cinereus* or Asian small-clawed otter – As the name suggests, its diet mainly consist of crustaceans like shrimps and crabs. Prefers shallow and rocky streams.

Unlike tigers and leopards, which have stripes and rosettes, otters do not have a distinct skin pattern that helps researchers estimate the population in wild. There is not a technique to count number of individuals unless there is an external marking such as scars or even any skin abnormalities.

According to the IUCN Red List category, the conservation status of the smooth-coated otter (*L. perspicillata*) is “Vulnerable.” *L. perspicillata* is a CITES Appendix listed and a Schedule II species in the 1972 Wildlife Protection Act, which prevents and prohibits any person from hunting, trapping, or trading its products or killing the species.

In Maharashtra, otters have been overlooked and considered a lesser-known species. With growing concerns about forest destruction, wetland shrinking and conversion into developmental areas has pushed otters to the verge of local extinction.

Our Work

Our experts aim to build a bridge between people and the environment by using art and illustrations in interactive way. Using project finding, we aim to develop species-specific management strategies that are provided to relevant policymakers and the Forest Department

Our outreach team aims to create education and awareness materials in regional languages to encourage citizen participation and reduce negative perceptions of locals towards wildlife. Awareness campaigns will be carried out through the active use of social media platforms.

Threats associated to otter population

For otters, the requirement to breed, rest and defecate is vital. Mangrove forests offer a place for otters to carry out these activities. Places like sand banks, soil and leaf litters act as grooming and defecation areas for otters present along riverbanks. Due to the conversion of wetlands into agricultural areas and illegal sand-mining, these areas are shrinking, leaving few areas for otters.

Otter-fisherman conflict: Areas of high fishing activity has led to high otter sightings, indicating that these areas are high-feeding zones that have a positive correlation with otter presence.

According to informal interviews, these food rich zones are prime areas for otter-fisherman conflict. Instances of retaliatory killing have come to light. One person pelted an otter using different means, as his only source of income was harvesting mud crabs and fishing. Such instances are rare, but they help us understand the attitude of small-scale fisherman towards otters.

These are potential otter conservation zones, but measures need to be taken to ensure that fisherman who are dependent on particular zones are provided with alternatives. Otherwise, sustainable methods should be adapted.



Swanand Patil

About the Author: - Swanand R. Patil has a M.Sc. in Wildlife Conservationist from Bharati Vidyapeeth University Institute of Environment Education and Research. He has two years of research experience in smooth-coated otters. He is also the Founder and Director of the Arcane Conservancy. His dissertation is titled “Study of influence of biotic and abiotic components on activity pattern of smooth-coated otters (*Lutrogale perspicillata*) using camera traps in Cauvery River, Karnataka.”



Why Conserve Otters?

When an animal is considered as an ambassador of a landscape, it plays an important role in maintaining the ecosystem. Otters in any landscape feed on old and sometimes diseased fishes, reducing the spread of contamination to other fishes. Otters follow a migratory movement pattern, which can be horizontal or vertical depending upon the habitat in which they are found. This is done to allow fish stock to replenish. Generally this activity pattern is observed for 7-15 days depending upon the territory and landscape.



Prativa Bomzon

Prativa is born and brought up in the hills and hails from Darjeeling. She holds a bachelor's in forestry and a Masters degree in Environmental Sciences from BVIEER. She has keen interest in communities, livelihoods and ecology and has been travelling to places in India and Nepal to explore opportunities of positive integration of forest communities and wildlife. She has been working with Arcane Conservancy as an Outreach Coordinator and taking of reaching out communities, designing awareness material and outreach activities.



SHORT TOED SNAKE EAGLE
-Shweta Patil @curlytales_91

Snake slayer of the grasslands, seen in the dense forest of Pabe Ghats near Pune. It was indeed a memorable sighting.

Short Toed Snake Eagle



LITTLE OWL
-Nathalie Geelen @nathalie.geelen.wildlife

Little Owl in a field of poppies

Instagram Tag to get featured
@planet_untamed

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ZEEBRAS
-Gerry Armstrong @garmstr132

It must be nerves that causes the zebra to drink, while they pluck up the courage to enter the river.
Mara Magic

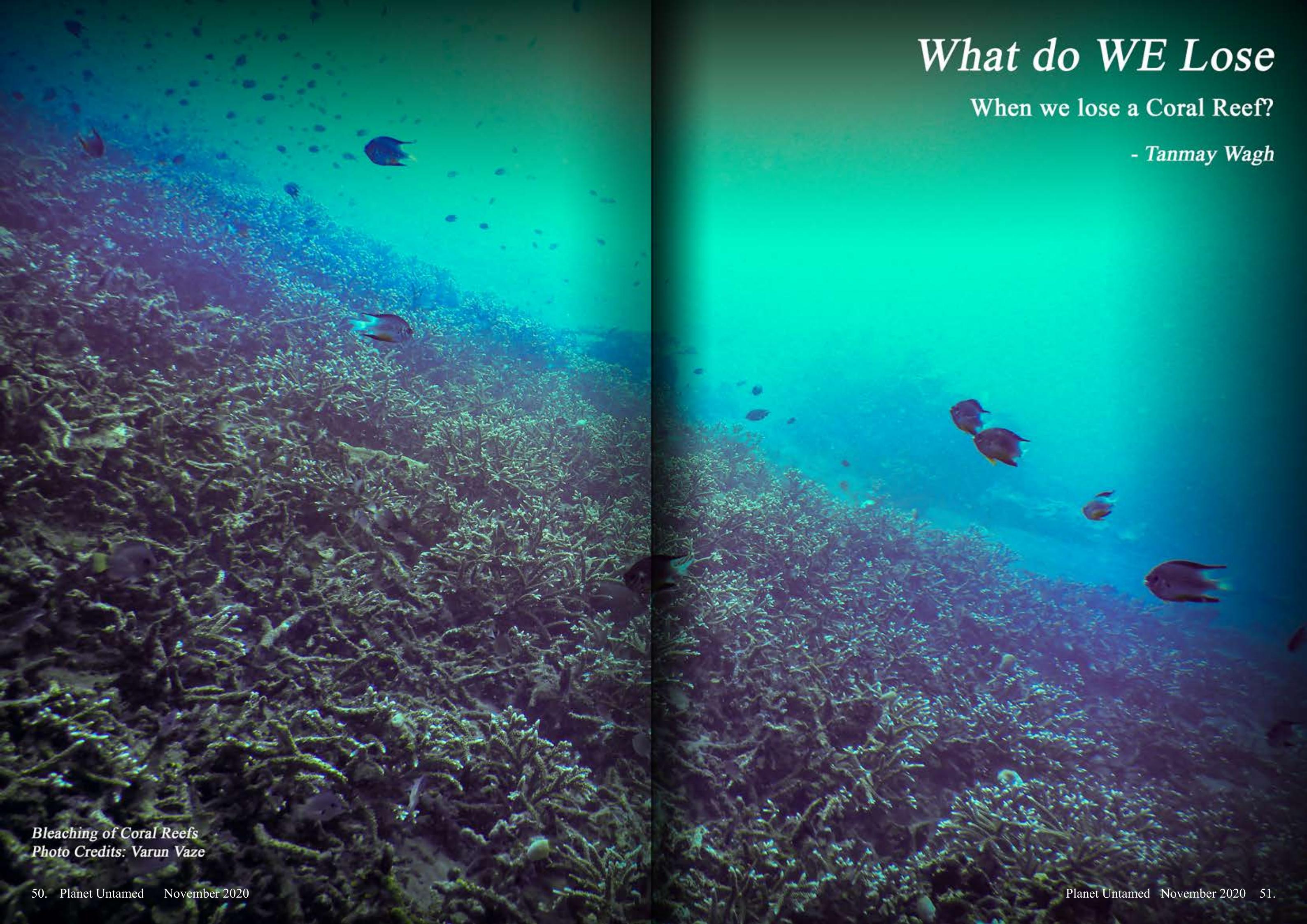


BONNELI'S EAGLE
-Shantanu Ambulgekar @shantanuambulgekar

Bonneli's Eagle in full flight.

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What do WE Lose

When we lose a Coral Reef?

- Tanmay Wagh

Bleaching of Coral Reefs
Photo Credits: Varun Vaze

What do we lose When we lose a coral reef?

Tanmay Wagh



Tanmay is a marine biologist working on coral reef ecosystems in the Andaman and Nicobar Islands. He is currently working on a coral reef ecology and reef fisheries with Dakshin Foundation, Bangalore.

Corals are a natural marvel. They are built on an association between a coral polyp (the smallest independent unit of a coral) and microscopic algae, supported on the base of a calcium carbonate skeleton, an intricate animal-plant-mineral complex. While the coral polyp provides a habitat to the algae (commonly referred to as zooxanthellae) and builds the mineral base, the algae, in turn, plays a role in supplying nutrition to the host coral through photosynthesis. This symbiosis has evolved over millions of years so that neither can survive for too long if the coral-algae association breaks. As the coral grows, newer polyps deposit more and more calcium carbonate around them, eventually forming an entire coral reef. Interestingly, it is the association between these two tiny forms on which the foundation of the world's most diverse ecosystem is built. For one of the smallest ecosystem in terms of area occupied (less than 1% of the ocean floor), coral reefs are home to nearly a quarter of all marine species found in the world. From microscopic bacteria to giant reef sharks and slow-moving sea stars to flying manta rays, they are home to thousands of marine species, a number that is continuously on the rise with newer species discoveries. Therefore, it is captivating to think that over the last few centuries, humans, a primarily terrestrial species, has somehow managed to carve its own space within an already complex marine ecosystem.



Photo Credits: Varun Vaze

A diver clicking pictures of a coral
Photo Credits: Madhumita Kale Vaze



More than just the glitz and glamour

Coastal communities have been harvesting reef resources for more than 5000 years, for purposes ranging from construction and food to jewelry and medicines. Seafood is a primary source of protein for the majority of the people living along tropical coastlines. It supports the nutritional requirements of nearly a billion people worldwide. With globalization and trade, coral reefs now support lives and livelihoods far beyond the traditionally dependent fishing communities. Over time, seafood, which was earlier exclusive to coastal areas, has become truly a global commodity and reef fisheries alone provide livelihoods to around 1.2 billion people. Reef-caught groupers and lobsters are regular fare in European restaurants thousands of miles away from the coast. They are linked by a complex and elaborate chain of fishers, sellers, retailers and agents.

While fish as commodities are in high global demand, the vibrancy and frenzy continuously at play on reefs attract a large number of tourists and nature enthusiasts to reef areas every year. Activities like SCUBA diving and recreational fishing have flourished in recent years and become a lucrative source of income for younger generations of coastal communities. In many parts, even seasoned fishers shift towards tourism-related jobs during the peak tourist season. This dependence on reefs is particularly high in small island systems where the densest clusters of coral reefs are found. In developing island countries like the Republic of Fiji and Indonesia, nearly ninety percent of all new development is centered around coral reef tourism.

However, in most island systems, the importance of coral reefs transcends far beyond economic gains. Reefs, with their complex and undulating structure, form a direct natural barrier against waves and cyclonic surges by reducing wave energy and height, thereby preventing water from entering inland. Islands, which don't have wide coastlines, depend on natural systems like coral reefs and mangroves for protection from these surges. Many experts believe that the earthquake and subsequent tsunami that hit the Andaman and Nicobar Islands in 2004 caused considerably less damage to life and property because of these natural barriers.

Healthy coral reefs not only support coastal livelihoods, but also sustain survival of coastal communities in regions that continue to be threatened by rising demands for rapid development.

*Coral reefs support fish and various other life forms.
Photo Credits: Varun Vaze*

An ecosystem under threat

Despite complex interactions and a seemingly sturdy structure, coral reefs are one of the most fragile ecosystems, vulnerable to the devastating impacts of climate change. Their balance and survival is dependent on a narrow range of temperature and light availability often found only in clear waters surrounding tropical islands. As seawater temperatures rise beyond these thresholds and sediment load from coastal runoff and development grows, the zooxanthellae, which provide nutrition to the coral, leave their host, leaving behind a 'bleached' coral reef. While bleaching is a natural phenomenon across geological timescales, the frequency of global bleaching events has increased multifold in recent years due to increasing carbon emissions and incessant coastal development.

Unless the environmental conditions stabilize, a bleached coral is unlikely to survive for too long. It soon gets covered by algae (different from the symbiotic zooxanthellae), the complex structure and the colours slowly disappear, the dependent animals eventually vanish and a once vibrant reef becomes a graveyard of slime that is home to a select few opportunistic species. A dead reef neither provides coastal protection nor supports fisheries and tourism. It can be a deadly blow to the survival and sustenance of the dependent coastal population.

As development and exploitation trump conservation and sustainability, we are faced with a situation where coral reefs are sandwiched between human-induced climatic disturbances and more direct anthropogenic stresses like overfishing, effluent discharge and unplanned development.

Coral reefs in the Anthropocene, which have overcome past bleaching events, are not only faced with reduced chances of survival and recovery but are increasingly being pushed towards being completely wiped out. Worrying projections estimate that we have already lost 40% of all coral cover and are destined to lose another seventy percent by 2030 unless there are immediate interventions at various scales of governance.



A large patch of degraded coral reef
Photo Credits: Varun Vaze

Finding the best of both worlds

As reefs continue to degrade and demands continue to rise, scientists and policymakers actively seek the best solutions. Finding a balance between healthy reefs, and reefs which sustain the growing demands is tricky. We can't have healthy reefs at the cost of economies and livelihoods, and we certainly can't continue to exploit at present rates. Management of complex systems, where humans closely interact with the environment, is easier said than done. Human aspirations tend to gravitate towards high short term gains over long term stability which leads to unplanned coastal development and overfishing. This trend is confounded by the belief that the sea is an endless source of resources, ceaseless exploitation by powerful capitalist lobbies, and denial of the long-term impacts of our actions. However, finding the best of both worlds, a balance between extraction and conservation is necessary, more so for sensitive yet high-value ecosystems like coral reefs.

While global efforts to control emissions slowly take shape, it is through intervention at local scales where the impacts of climate change can be effectively mitigated. Efficient and sustainable resource management allows reefs and other natural systems to be better placed to buffer the ongoing threat of climate change. This added time can increase the longevity and survival of reefs that have shown a remarkable recovery from disturbances in the past. Newer approaches to fisheries and tourism management involve the integration of ecology, ecosystem services, developmental needs and livelihoods, such that neither element is affected because of imbalances in the other. These ecosystem-based approaches are dynamic and are often modelled depending on the state of the ecosystem, and draw principles from various traditional systems of resources management.

Interestingly, the long history of resource management is widespread in several reef-dependent places. For centuries, the islanders of Hawaii have managed reef resources to ensure sustainable and long-term benefits. Closer to home, in the Nicobar Islands, villages within themselves have developed measures to manage reef fisheries through seasonal closures, temporal closures, tenure rights and fishing gear restrictions. Compliance is ensured by having a set of taboos and spiritual stories in place, in combination with varying degrees of punishment to the defaulters. Despite not having a strong "scientific" basis, these areas have historically housed healthier corals and high numbers of fish as compared to reefs where indiscriminate fishing and development is a commonplace. Some studies speculate that the reefs in these locally managed areas have a higher chance of sustaining the impacts of climate change and recovering, post catastrophic disturbances like the tsunamis.

Striving to achieve balance is vital, now more than ever, because beyond the money and glamour, coral reefs form an integral part of the social fabric of millions of coastal communities across the world. They remain entwined in everyday activities, from recreation and cultures to rituals and festivities.

They are sites where a fisher hooks his first fish, an old fisher scrapes off oysters for a meal, and a young explorer first experiences the tranquil underwater world. When we lose a coral reef, we don't just lose vacation spots and economies - we lose one of the few remaining strings that have still kept us linked to the natural world.



A Hawksbill Turtle wandering through a coral reef
Photo credits: Varun Vaze

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(Mohan Upadhye)

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