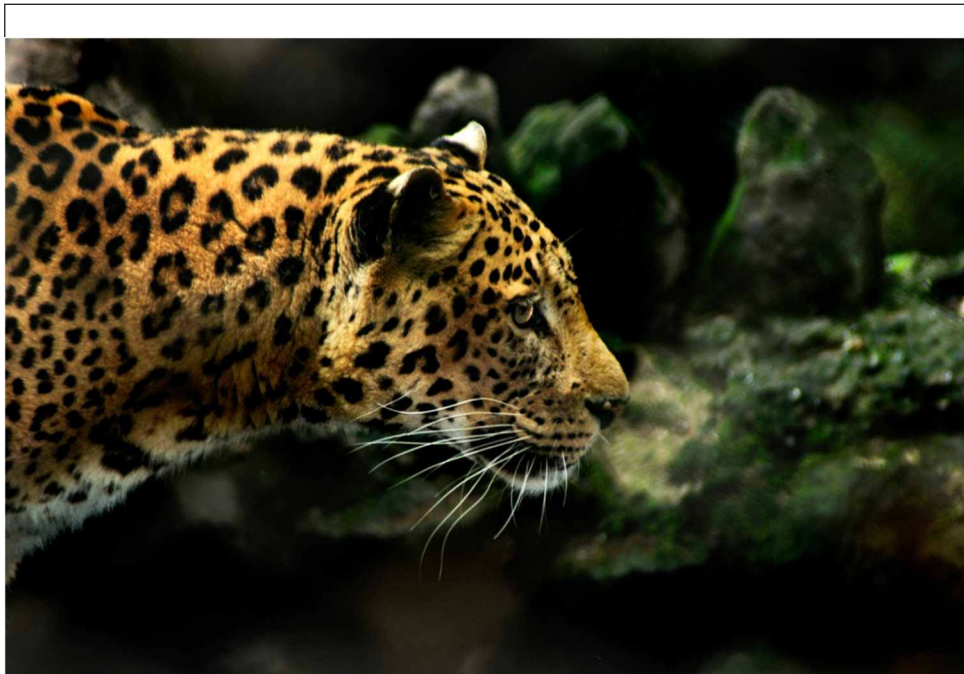


KAMAND VALLEY MONOGRAPHS
VOLUME II



From Leopards to Lizards:
A Brief Introduction to The
Permanent Residents of Kamand





Kamand Valley Monographs

Volume Two

**FROM LEOPARDS TO LIZARDS:
A BRIEF INTRODUCTION TO THE PERMANENT
RESIDENTS OF KAMAND**

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Kamand Valley Monographs

General Preface to the Series

Established 2009, the Indian Institute of Technology Mandi is one of the youngest entrants to the IIT League. Notably, it is the first Indian Institute of Technology to be located in the Himalayan region. Seldom is a remote mountain valley prime choice of locale for setting up a premier technological institute, going as it does against the conventional strategy of a city-based location clustered around other, equally significant educational institutions. The Kamand Valley, rich in bio-diversity, is located amidst steep, rugged mountains, tree-lined hills and terraced slopes, hamlets and homesteads, flanked by snow fed streams – all held together in delicate balance by a fragile ecosystem. Thus, the very locale confers a two-fold responsibility on the IIT Mandi. For one, it needs to bridge geographic distances and engage in constant dialogue with its educational partners at home and abroad; for another, it needs to resist academic insularity and forge a vibrant relationship with the immediate neighbourhood.

Indeed, it is in the spirit of seeking to explore and to comprehend the neighbourhood in all its expressions—social, political, economical, cultural and ecological—that the Kamand Valley Monographs have been commissioned. As a publication initiative of the Indian Institute of Technology Mandi, these monographs are designed to promote an understanding in particular of the ecology, topography, rural habitat and lifestyles, rural practices, flora and fauna, local medical practices, and the like. Public expectations of a premier engineering institution like the IIT Mandi, would point obviously to likely technological solutions to a range of issues affecting daily life in the mountains. Even if they are not of Himalayan proportions, issues like connectivity, health care, water conservation, agricultural techniques and the like call for attention. However, prudence dictates that acute understanding of local life in its entire amplitude will have to precede any change. Any attempt on the part of the IIT Mandi to make inroads into improving the quality of rural life through technological or institutional interventions, has to be backed by meaningful civic engagements. This series emphasizes,

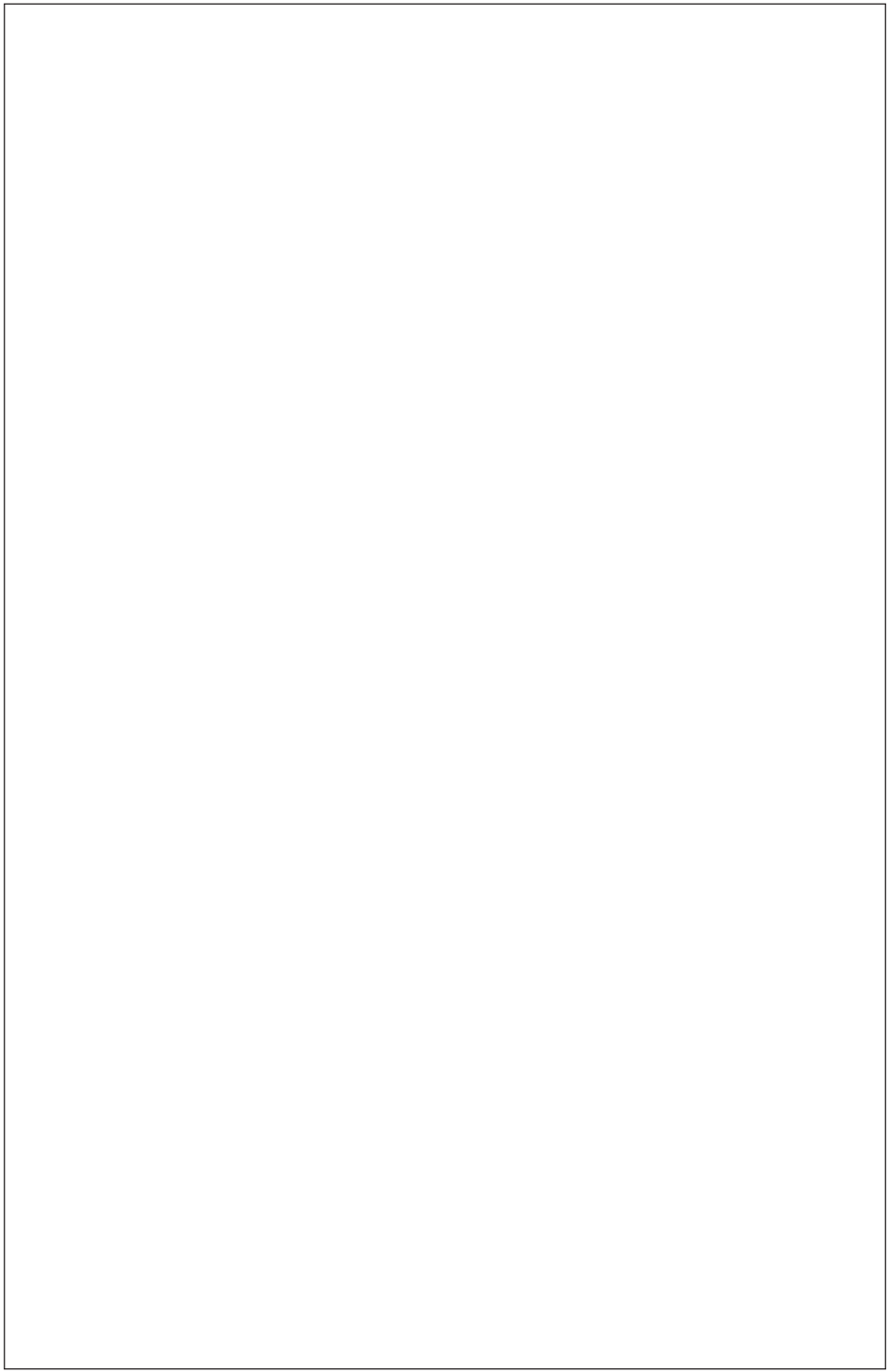
therefore, the nature of the understanding that ought to precede any change. It is meant for the reader at large as well as the professional scientist and technologist. There is little doubt that the earnest academic engaged creatively with the world around him or her in the strict universal sense, will also respond to the challenges posed by the immediate surroundings and go beyond the narrow confines of academic disciplines.

The privileged location of the IIT Mandi in an area of undisputed ecological wealth thus holds great potential for its scholarly community. Remarkably, there is the unique prospect of living in close proximity to the local populace and of gaining deep insights into its enduring legacy of eco-friendly existence, informed as it is by concerns of sustainability and conservation of nature. Such insights prompt us to showcase, as it were, this scenic region of Himachal in all its splendour to visitors from the rest of the country and from around the world.

Admittedly, these considerations have played a significant part in the planning of this publication project, the Kamand Valley Monographs. In calling upon subject experts to visit and to explore the Kamand Campus and its neighbourhood, the idea has been to enlist their help in illuminating both the potential of the Institution in its present location as well as to address the need to prepare a road map for the future. This series of publications complement various other initiatives of the IIT Mandi such as the establishment of a Botanical Garden in its Kamand Campus.

In the main, the monographs seek to trace the history and political economy of the Kamand Valley, changes in this region over the ages as well as in the last half a century; they also attempt to delineate the diversity of flora and fauna, and further, to present a clear guide for the future. Underlying such endeavour is the firm conviction that the IIT Mandi from its very inception should have a sense of its place in the history of this region of Himachal Pradesh as well as a blueprint indicating the direction and scope of its future development and expansion. Taken in this spirit, the Kamand Valley Monographs, therefore, are as much of a chronicle as a compass.

-The Editors



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1. Introduction

On 23 June 2014, UNESCO recognized the area just east of Gushaini in Himachal, known as the Great Himalayan National Park, as a Natural World Heritage Site for the large number of different species of animals and plants that live there. The Great Himalayan National Park is home to 386 different animal species and 832 varieties of plants.

As a crow flies, Gushaini is only about 60 km from Kamand. The area around Kamand has not been included in the park, but here, too, we have a great wealth of animals, birds, and plants. In many parts of the world, people have destroyed the land, polluted the water and killed off so many animals that thousands of animal species are facing extinction each year. There is a great deal of debate about how many species are facing extinction and how abnormal this is. Scientists at WWF estimate that 10,000 species are going extinct every year now and that this rate is 1000 to 10,000 times the natural rate of extinction.

Chasing their own visions of man-made wealth and glory, humans down the centuries have turned great areas of glorious forests and endless grasslands into deserts and barren wastelands. To be fair, they have also created magnificent fields of grain, beautiful orchards and exciting cities. But when they overreach the possibilities of the land, they have destroyed the balance in the environment. The water supply dries up. Fuel becomes scarce. The people emigrate in search of land which can support them.

This pattern was followed for centuries. We hear of it in ancient India with the disappearance of the river Saraswati and the towns of the early Indus Valley civilization. The disappearance of the Indus Valley civilization was probably also influenced by tectonic activity in the catchment areas in the Himalayas and by a prolonged drought of one hundred years.

Crores of people have fled drought, famine, war, etc. in search of better homes. This phenomenon led to the growing populations of these mountains as successive waves of people settled this area to escape marauding armies. Even today we hear of lakhs of people fleeing wars and political repression. Others emigrate in search of employment and better lives.

The problem today is that humans have expanded to cover almost all the arable land on the earth. Governments have become very strict about immigration. We need to find better ways to live in harmony with the local environment and local wildlife, and with each other, of course.

Today tourists from Europe, America and Australia flock to India to enjoy watching wild animals in their natural settings. We are privileged to live here. We can enjoy the crystal clear streams, the clean air, and the ever changing flocks of birds which pass through this valley. As we are living together, we can also learn about the wildlife. We are very fortunate to be able to do this. As cities grow and forests and wild lands shrink, very few people have this chance.

Some of you may be frightened by the thought of meeting wild animals. Unfortunately, the science and nature television channels have discovered that many viewers prefer excitement to information. With more viewers, they hope to persuade sponsors that they will sell more deodorant, Maggi noodles or whatever else they advertise. Hence, more strictly informative programs on nature have been largely replaced by more entertaining programs such as *Dangerous Encounters*, *World's Wildest Encounters*, *I Shouldn't be Alive*, *World's Deadliest Killers*, *Ultimate Predators*, *Man vs. Wild*, etc. Films have followed the same route with many popular films about humans fending off deadly attacks. If your main experience outside the city is through television and films, you start to think that the natural world is full of huge animals out to kill and maim. The less dramatic truth is that most animals are mainly engaged in finding food, but not humans to eat! But that story does not sell toothpaste, so it has lost out.

As you live here you will learn that the animals are not trying to harm us. The fact is that we are not in competition with the wild animals. Most of the people injured and killed by wild animals in India today are villagers who are cutting grass or collecting firewood. Others are keeping animals near their homes, and predators are attracted by the easy prey. As we at IIT do not cut grass, collect firewood or keep stock near our homes, we are much safer. The main thing to remember is that there are animals in our surroundings and so if you decide to roam the hills off the roads and trails, exercise caution.

We do not have any animals here who are man-eaters. In fact the

record is very much the other way. This area has been home to animals for millions of years. There used to be tigers, lions, cheetahs, deer, wild sheep and goats and many other animals that have now vanished. As more humans settled in the area, they killed the animals for food and to protect their livestock and crops.

The challenge for us is to find ways to enjoy modern lives while at the same time protecting the land we live in and the plants and animals we share it with. As we are not tilling the fields, raising animals or hunting, we need not compete with or fear the animals in the area. With a little care we can find ways to share our campus with the wild animals and birds.

If we are respectful of their needs, they will not harm us. Most people on the earth today can learn about wild animals only from television shows, the internet or visits to the zoo. We are extremely lucky that we can learn about the wild animals all around us every day.

As you come to know the animals and birds better, you will also see how they share the resources here. We see the campus mainly as the almost flat land with our buildings and residences. Actually the campus is much bigger and three dimensional. It includes the earth beneath the surface and the air above. Many animals and birds are like us and are mainly terrestrial. But other animals, like mice, worms and some snakes, are fossorial, living under the ground. Others are aquatic or arboreal. Griffons, ravens, eagles, swiftlets, swallows and bats live mainly aerial lives.

On the ground our campus measures more than 500 acres. But when you realize that our campus includes the hills, trees and the air above and the ground below, you see that we really have a lot of space to share. We must think about ways that we can share this space with the animals and birds. We need to allow them to pursue their lives and work to ensure that we do not attract them to our spaces and then kill them when they accept our invitation.

Many animals quite willingly adapt to our changes in their environment. The very first day that the cross beams were put on the first buildings under construction, mynas were perching on the cross beams by evening. A small jungle cat took up residence in our house while it was being constructed. Many animals have learned that we throw out a great deal of food which they enjoy eating.

We will need to make a few adjustments to allow the animals to stay in their home territory. Now that we have this beautiful campus in Himachal which produces such delicious fruits, it is very tempting to plant some fruit trees in our gardens. However, this will attract the monkeys, especially, to our houses. If we want to have fruit trees, it would be better to develop an orchard away from the residences and hostels.

We also need to think about how not to attract the local leopard into our campus. The leopard in this area is mainly trying to find enough food. Half of the year the leopard will be up in the high mountains where the sheep and goats go to their summer pastures. In the winter, the leopard may follow the sheep and goats to their winter pastures in the villages. It will be hungry and looking for food. So it is important that we do not tie our dogs outside at night, and we should not encourage the stray dogs to stay near our residences, canteens and messes. This will attract the leopard into our campus.

This book will introduce you to some of the wildlife on our campus. Once you know the animals and understand a little of how they see you, you can enjoy sharing Kamand valley with them, and they can teach you a great deal.

2. Wild Cats in Kamand

Everyone seems to be worrying about leopards, so we will start with them, and then we will look at the other two species of wild cats that we sometimes see or hear on campus. These two smaller cats are the caracal and jungle cat.

Cats are nocturnal. During the day you might be lucky to catch sight of a caracal or jungle cat. You will probably never see a leopard except if you spot one in the headlights of a vehicle.

The scientific name for cats is *felid*. Cats range greatly in size. The largest cat is the Bengal tiger. A male tiger weighs as much as 230 kg (Menon 2009: 84). A male African lion sometimes weighs 190 kg. The leopard found in Himachal is much smaller than tigers and African lions. The largest adult male leopards in Himachal weigh only 68 kg (Menon 2009: 87).

Cats are predators and carnivores. They eat mainly the meat of freshly killed animals. Their prey ranges from beetles, mice and lizards to deer and cows.

Cats in general rely mainly on sight and sound when hunting. Cats have very good eyesight, and their large upright ears can swivel in all directions to catch the sounds of prey. They usually prefer to hide and surprise their prey. Only the cheetah, which is the fastest mammal on earth, uses its great speed to capture its prey.

Cats are mammals. After a gestation period of two to three months, the female gives birth to one to four live kittens or cubs. The young are born blind and helpless. Their eyes open after ten days. Their mother starts to bring them meat after three weeks. They start hunting at the age of three to six months.

The cubs stay with the mother for a year or two and then find their own territory. Almost half of the cubs die in their first year. The cats who survive may live as long as fifteen years.

LEOPARD

Panthera pardus fusca

नेंदुआ गुलदर

The animal that many of you are most worried about is the leopard. Kamand is part of the home range of only one leopard. Leopards live and hunt alone. They guard their territories fiercely. There can only be one male leopard in an area. He will not allow any other male leopard to enter his territory.

The male and female are together very briefly for mating. Sometimes a female leopard will share part of a male's territory, but they do not form a family unit or hunt together. Also, the cubs will stay with their mother for a year until they are old enough to hunt on their own. You never find large groups of leopards together, like the lion prides in Africa that you have seen on television.

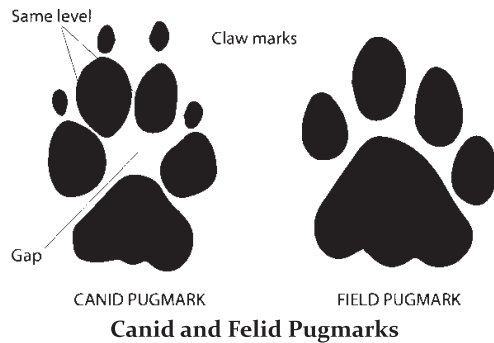
You have certainly heard tales of leopards on our campus. Most of these are just that – tales. One problem is that our fears and hopes influence what we think we see. We tend to think that our eyes see what is actually there. Actually there is a lot of interplay between our eyes and our brains. Your brain will quickly “photoshop” what you see based on your expectations.

You can test out this phenomenon easily. One day decide that this is the day that you will see a snake. You have to really work at it, so that you set out really planning to see a snake. If you have convinced yourself, you will see snakes at every turn. You will actually see lots of snakes. Your eyes will tell you that fallen twigs, vines, cracks in the dirt, etc. are all snakes. Only when you check carefully later will you see that they are all quite dead objects and not snakes at all.

This problem of our brain seeing what we expect to see causes many hunting accidents. A hunter sets out determined that this time he is definitely going to shoot his first moose, bear or whatever, and when something moves, he sees that moose, and he shoots. Sadly he soon discovers that his moose was really his good friend Joe wearing a red safety vest and not looking at all like a moose.

This phenomenon makes people in Kamand see leopards. They worry about leopards. They fear leopards. And when something moves

in the dark, they see leopards. Whatever it is disappears before they have a chance to realize that it was really a jackal, a dog, or perhaps just their imagination telling them that they see what they expect to see.



Canid and Felid Pugmarks

We have checked some leopard sightings and never found a leopard track on the south campus. All the construction activity here means that we have really good surfaces for recording tracks. Both thick dust and mud are super for preserving paw prints which are also called pugmarks. Below is a drawing of a dog's pugmark (canid) compared to that of a cat (felid).

One really important difference is that a leopard retracts its claws when walking, while a dog cannot. Thus in a good dog paw print you can see small holes made by its claws in front of the pad marks. Another difference to look for is in the general shape of the print and the position of the pads. A dog's two front pads are almost level. In a leopard's paw the second pad is clearly in front. There is also a large hollow in the centre of the dog's paw prints.



Leopard Pugmark

On the next page is a good photo of a leopard's pugmark:

In this area the leopard prefers to stay in the higher hills most of the year. In the summer many goats and sheep graze on the higher, grassy hills. Old, sick, young and lost sheep and goats become easy prey for a leopard.

Leopards are very adaptable in their eating habits. They will eat

any animal that they can catch from dung beetles to small buffalos. A leopard can live off the meat of a medium sized animal like a deer, sheep or goat for several days, but he would need to spend many hours hunting to catch a lot of dung beetles and frogs to feel well fed.

On our campus there are no large wild animals like deer, wild sheep or goats for a leopard to eat. In this area a leopard occasionally attacks a cow or buffalo. More often it kills a young or injured sheep or goat. Dog is its preferred food. It will also kill a monkey, but those are hard to catch. It usually attacks a cow or buffalo that is tied up and much easier to kill than a monkey leaping through the branches of the trees.

Leopards do especially like to kill and eat pet dogs. A recent study in Himachal found that almost half of the diet of leopards in Himachal is dog. This is because dogs are often tied outside and easy to catch.

All this means that unless we start supplying pet dogs to the leopard, it has to survive mainly on quite small animals like mice, frogs, toads, insects and birds. That is why the leopards in this area require large territories. In Himachal, the foresters have found that a male leopard will normally have a territory of 48 square km. That would be all the hills and valleys between Kamand, Kataula and Navalay. You will probably never see a leopard here and definitely do not need to fear crowds of leopards prowling the campus.

So what is a leopard?

The leopard is the smallest of the four big cats. The other three are the tiger, lion and jaguar. Those big cats do not live in Kamand. The leopard has lived in Asia at least 6.3 million years. It used to be found throughout Asia and Africa all the way from Siberia in the north eastern part of Russia to the southern tip of Africa. Now leopards live mainly in the southern part of Africa, south of the Sahara desert. There are small isolated communities of leopards in India, Sri Lanka, Indochina, Malaysia, Indonesia and China.

In Himachal there are two species of leopards. The snow leopard is a handsome, large smoky-grey cat. Its black or dark grey rosettes have lighter centres. Snow leopards live only at high altitudes above 3,000 m. In Himachal they live mainly in Spiti.

Here we have the common leopard. Its back is usually tawny with black rosettes. The rosettes have darker golden centres. Its stomach is white with black spots. Some leopards are totally black. Those leopards are also called black panthers.



Snow Leopard

People used to think that leopards were part lion and part panther. The name leopard comes from the Greek names for those animals, *leon* for lion and *pardos* for panther. Actually, many panthers are really leopards with much darker fur so that the background and the spots look solid black.

The call of a leopard sounds like someone sawing wood. It is, appropriately, called sawing. You may hear a leopard calling at night when he is looking for a mate. A leopard also grunts, roars, growls and meows.

A leopard is long with short strong legs. It can jump 9 m high. It can jump into a tree even with a heavy animal held in its jaws. It often stores any uneaten meat in trees and also sleeps in trees. Unlike most other big animals, a leopard climbs down a tree face first.

In Himachal an adult leopard is about 1.5 m long and 0.5 m high at the shoulder. It has a long tail that is almost as long as its body. The female leopard is smaller than the male. A female leopard weighs less than 40 kg. A male weighs 50 to 68 kg.

Leopard cubs are born blind and helpless. They stay hidden in their den for three months. The mother leopard searches for safe dens. She prefers closed places like caves or abandoned huts. Approach abandoned buildings with care. A leopard or other animal may have chosen it as a safe home. Do not simply run in. First look around the entry for signs of animals, make some noise to warn any animal who does not want to meet you that you are there, smell to see if you can detect animal smells, and enter cautiously.

A leopard in the wild may live to be fifteen years old. In Himachal many are killed by farmers to protect their livestock. Poachers kill many others to sell the handsome coat.



Leopard

With just a little care, we can share our campus with a leopard. After all, leopards have been living here for more than six million years, and we just started setting up our campus in 2012. A recent study of leopards in or near human habitation has found that leopards can and do live very near and in human villages and towns although the human inhabitants are totally unaware of their presence.

My dog and I have come close to leopards twice, both times in Mandi in the forest above Mandav. Both times the dog sensed the leopard and helped me see it. The leopard sensed us at about the same time and immediately stole away.

When it attacks larger animals like sheep or goats, the leopard attacks at the throat and strangles the animal. This is one way to tell if an animal has been killed by a leopard. If you come across a dead animal look to see if it was bitten at the throat. Usually it will have died for some other reason. A leopard does not leave its kill lying about. It kills for food, not for fun.

Occasionally leopards do attack people. There are two main reasons. Most often a mother leopard attacks a person who has found her cubs. Move off immediately if you come across a young leopard. Sometimes an old and injured leopard attacks a human because it is too slow and weak to catch other animals.

If we are a little careful, we can adapt to share our campus with a leopard. If we do not tempt it by tying out delicious pet dogs, the leopard will keep very much to itself. If we are very lucky we may sometimes catch a quick glimpse of the leopard, probably at night in the headlights of a vehicle. Other times we may hear it or see its pugmarks. It is quite exciting to come across a big pugmark left by a leopard. You know that somewhere nearby, this magnificent cat is going about its business as we go about ours on the campus. It is a big campus. We can share it.

CARACAL

Caracal caracal

स्याहगोश

There is another small wild cat which you are more likely to see than a leopard. It is about half the size of a leopard. This cat is called the caracal. Its name probably comes from the Turkish words *kara* and *kulak* meaning black ears.

If you see a caracal you might first mistake it for a domestic cat. The caracal is only slightly larger than a large pet cat, but the caracals here are golden, which is an unusual colour for domestic cats, and the caracals have short bushy tails. They also have large, upright, tufted ears. The caracal is very shy and will most likely run as soon as it sees or hears you.



Caracals

The caracal is a long, slender cat. It is about 0.5 m long and less than 0.5 m high at the shoulder. It can be golden brown, grey, black or occasionally a dark red. It is found in Asia and Africa. The dark red colour is more common in South Africa where the cat is called *rooikat* or red cat. The eyes of a caracal look different from those of pet cats because the pupils are round and contract into circles, not slits. The caracal has a black spot above each eye, and there is a black tear stripe from the inner corner of each eye to the bottom of the nose. Their ears have more than twenty muscles that turn the ears in all directions to find prey when the caracal is hunting at night time. In India caracals were sometimes used by hunters to locate prey.

It hunts mainly rabbits and rodents. It is also good at catching birds. The caracal is very muscular. It is an excellent climber and jumper. It can even leap to catch flying birds.

The caracal is an unusual cat as it barks like a dog in warning. It also makes more cat-like noises. It can growl, hiss, purr and meow.

JUNGLE CAT

Felis chaus

जंगली बिल्ली

Another cat which is common here is simply called wild cat or jungle cat. It looks very much like a pet cat, and like a pet cat it enjoys sunning itself on cold days and sometimes hunts during the day. We are more likely to see this cat than the other cats that are mainly nocturnal.

The jungle cat is common throughout Asia. It is also found in Egypt. Although it is called jungle cat it does not really like rain forests or jungles. It prefers savannas, dry tropical forests and reed beds along rivers. It likes areas with tall grass where it can hide.



Jungle Cat

The jungle cat is a grizzled golden brown with brown and grey. It has two black stripes around the tops of its front legs and black tear stripes running from its eyes to its nose. Like the caracal, it has tufted ears, but its ears and tufts are much smaller than the caracal's. It also has a short tail that is just long enough to reach the ground. The tail has a black tip with black stripes above it. An adult jungle cat is just over 0.5 m long. It is about 36 cm tall.

The jungle cat steals up to its prey and suddenly pounces. It is very smart. It easily outsmarts jackals and dogs that chase it. It can run fast, but it does not usually run after an animal which has escaped. It hunts mice, frogs, birds, hares and snakes. It sometimes dives to catch fish, though it does not really like to swim. It can even kill animals larger than itself including peacocks and small wild pigs. It does not attack people, though it may scratch if it is cornered and trying to escape.

3. Dogs in Kamand – Wild and Working

Dogs are known as canids. In Kamand there are a variety of dogs. Some are truly wild. These include jackals and foxes. Others are half domesticated. They are used for herding and guarding. They are mainly bhutias, Tibetan mastiffs and varieties of these breeds mixed with other dogs. Finally there are some true pet dogs.

There is some confusion about naming jackals and foxes in Kamand. Jackals are frequently found on our campus. They are commonly called both lomri and gidar. Lomri is properly fox and gidar is jackal, but the two names are confused. This is probably because both animals are small and shy. Both the jackal and the fox are about 60 cm long and 40 cm high at the shoulder.

They also have very similar heads. Most pet dogs and wolves have pointed faces with long snouts. Their faces are shaped like triangles with points at the two ears and the nose. The jackal and fox have wider cheeks and shorter noses so that the shape is more like a diamond. The top point is between the ears, the side points at the cheeks and the bottom point at the nose.

If you only get a quick glimpse of an animal, it can be difficult to decide whether it was a fox or a jackal. The main differences are in colour and the length of the tail. The jackal is similar in colour to an Alsatian dog. It is golden mixed with black and brown. Its tail is short and bushy, reaching only half way to the ground. The fox is rusty orange-brown with some grey on its throat, chest and legs. Its tail is almost as long as its body and has a white tip.

Another difference is that jackals generally hunt in pairs or larger groups. A fox generally hunts alone.

Dogs are omnivores. They hunt, they scavenge, and they will eat almost anything from garbage and carrion to fresh meat.

Dogs have a very strong sense of smell, but their eyesight is often quite poor. This poor vision is why a dog will approach you. Unless it is growling and has raised the hair on its back, it is not planning to attack. It is merely trying to get closer so that it can smell and identify you.

Dogs are mainly interested in other dogs, monkeys and cats. They are also very adaptable and creatures of habit. They are now used to

a number of people walking around our campus. If a dog comes near you, the best thing to do is to carry on walking. The dogs are used to that and accept it. If you look closely, you will see that the dog is not even looking at you. If you stand still or start jumping and screaming that will only attract the dog's attention. If a dog does seem to be challenging you, the best thing to do is to make yourself as big as possible, act fearless, stand tall, spread your arms, and shake a stick or pretend to throw a stone. It also helps to remember not to show your teeth, since the dog interprets it as a sign of aggression.

When hunting, dogs rely mainly on scent and sound. They are colour blind and see mainly movement. Cats hunt by sight. We discovered this when we made the mistake of trying to introduce a new cat to the household while our cat was raising kittens. This was a bad idea. The mother cat did not trust another cat so near its kittens, and the dog accepted the cat it had grown up with but not the new cat. The new cat was smarter than us and stayed hidden. The old cat spent hours stalking about peering into all nooks and crannies, but she never found the new cat. The dog whipped in once when the door was opened, put its nose to the floor, and followed the scent to the new cat in about ten seconds.

Unlike most of the cats found in this area, the dogs are social animals. They mate for life, and both mother and father feed and care for the young. Young jackals are called pups, and young foxes are kits. There may be any number from two to twelve young.

Dogs usually stay with their family group until they are ready to mate and start their own family. Sometimes, one or more grown females may stay with their parental family.

The pups or kits are born blind and deaf. The eyes open after eight to twelve days, and the ears stand just after that. The mother nurses the young for about two months, though by about six weeks the young start to eat food brought home and regurgitated.

INDIAN JACKAL
Canis aureus indicus
गीदड़

The jackal is about the same size as a pug dog but is longer and thinner. The adult jackal is about 40 cm high. It weighs only 7 to 10 kg. Jackals make dens in caves, deserted huts, or under bushes. They usually only come out from their dens between dusk and dawn unless it is very hot.

They are very shy. If you meet a jackal, curiosity may hold it still while it figures out what you are. Then it will run away.

Jackals hunt small birds, rodents, young lambs, goat kids and fox kits, and insects. Some enjoy fruit such as jujube and vegetables. They also eat carrion.



Indian Jackal

Further south in India a lone jackal sometimes attaches itself to a tiger or group of tigers. The tigers tolerate the jackal and allow it to eat what is left of the animals that they kill. In the Kamand area, only the leopard is a bigger hunter than the jackal. A leopard usually carries its kill up into a tree out of reach of jackals. And so, in this area jackals mainly hunt smaller animals and forage for other food.

Jackals are generally not harmful to people. They may occasionally kill chickens or a young kid or lamb, but they do not attack people.

RED FOX
Vulpes vulpes
लोमड़ी

The wily fox of folklore is one of the most successful hunters on earth. It originally evolved about three million years ago. Now the fox is found everywhere in the Northern Hemisphere from the Arctic circle to North Africa, Central America and southern Asia. It was also introduced in Australia. In other words, the fox is found on almost all the land areas of earth except for South America and southern Africa.

The fox found in this area is the red fox. It is a small animal, only about 60 cm long. The smallest adults weigh only 2 kg. Bigger males weigh 4 kg. The fur varies in colour. Often the front is reddish brown and the hind legs and tail are grey. The tail is long and very bushy with a white tip.



Red Fox

Foxes catch live animals, especially rodents, for food. They also eat carrion left by bigger hunters. Sometimes they pair up with a bear and eat the remains of the animals killed by the bear.

BHUTIA

Many of the dogs on campus are bhutias or mixes with bhutias. Bhutias are large dogs. They were originally bred as shepherds by people of the Bhutia tribe on the Tibetan plateau. When some of the Bhutia people moved south, they brought their dogs with them. The dogs are now common in the Himalayas from Darjeeling and Sikkim west to Kashmir.



Bhutia

Bhutia dogs are big black animals, similar in size and build to labrador dogs. Most bhutias have white or golden brown dots just above their eyes. They have light coloured stomachs and short, bushy tails.

If you look around you will see that bhutias mate easily with other dogs. Around Kamand we have a number of dogs that show mixtures of bhutia and street dogs or Tibetan mastiffs.

Bhutias were raised to guard sheep on the high Tibetan plateau with freezing, windy winters. They are well suited to the job as they grow a very thick inner coat of fur in the winter. This winter coat gives them a strange look as the weather warms when they start to shed and end up with clumps of fur sticking out all over their bodies and tails.

Bhutias accompany the sheep as guard dogs. Some herders put a metal shield or a thick wool necklace on their dogs' necks at night to protect them from the leopards who usually attack the throat. Generally bhutias have not been trained to herd sheep at their master's command. When the sheep, goats, cows and buffalo move up the mountains in the spring and back down in the autumn, you will see bhutias lazing along behind.

Bhutias have a natural desire to walk along with people. Often on hikes and treks, we have been joined for a day or two by a bhutia. The dog will trot happily along with us, accepting biscuits or other treats if offered, but not begging. Generally they see themselves more as guarding people crossing their territory. One bhutia coming along with us had a hard time when a couple of people in our group turned back to take another photo, and the rest of the group continued on. The poor dog ran frantically between the two groups while he could and only really relaxed when we were all back together again. Even on campus you will notice that bhutias and even dogs with only bhutia grandparents or other distant relatives trot along happily beside walkers and joggers.

Although bhutias often mate with other dogs, their family life is more like that of jackals than of pet dogs. Bhutias often mate for life, and both the father and the mother work together to feed and care for their puppies. Sometimes there are other dogs included in the family pack and sharing babysitting and food hunting chores. As with people, the extra members are often sisters of the parents or grown females who stay on with their mothers longer than usual. Male puppies usually leave the family group before they are one year old.

TIBETAN MASTIFF

Another dog that you often see on campus is the Tibetan mastiff. This is a very large black and brown dog with a big, square head. While they do come from Tibet and the northern Himalayas, they are not really mastiffs. They were given that name by Europeans visiting the Himalayas because of their big size.

Like the bhutias, the Tibetan mastiffs are well suited to the cold winters in the Himalayas. They grow a thick inner coat of fur in the winter.

Their tail is not so well adapted to the climate. It is very long, thin

and not very furry. Most shepherds cut the tails of puppies. Otherwise there is danger that the tail will freeze on winter nights. The flesh will die and become infected. If not treated quickly, gangrene will set in, and the animal will die. In the Darjeeling area we found that many people also cut off most of the dogs' ears for the same reason.

Tibetan mastiffs also naturally walk along with people crossing their territory. They are very big dogs and fiercely protective of what they think is theirs. It is best to be cautious near them.



Tibetan Mastiff-puppy

4. Rodents

Rodents are very common mammals found everywhere on earth except in Antarctica. Almost forty per cent of all mammal species are rodents. Rodents have two pairs of teeth, one pair in their upper jaw and one in their lower jaw, which never stop growing. These teeth are especially strong and useful for gnawing just about anything.

In Kamand we have small mice, and rats, and one very large rodent – the porcupine. The porcupine comes out only at night and will never bother you.

However, small rodents are another matter. They have been considered pests by most people for a long time. They have three major problems: one, they eat the same food as humans; two, they multiply very quickly; and three, they carry diseases and spread them to humans.

In addition, they have been extremely destructive to local plant and animal species in places like New Zealand where they were introduced more recently.

Farmers hate rodents because they eat both crops and fodder. And all people struggle with rodents because they eat almost everything that we eat and help themselves to anything that is not securely locked away in metal or glass containers.

Rats are believed to have carried the fleas that brought the bubonic plague to Europe in the 14th century. The resulting epidemic killed an estimated twenty-five million people which was one third of the population in Europe at that time.

Rodents also carry and spread other diseases.

A recent study by Professor Nils Christian Stenseth of the University of Oslo has added the great Asian gerbil to the list of suspects behind the spread of the plague to Europe in 1347. That year Central Asia, home to the great Asian gerbil, had a particularly wet spring and warm summer. These conditions led to a great increase in the number of great Asian gerbils in central Asia along the silk route. At that time the silk route was a very busy trade route. Traders and their accompanying animals carried the plague fleas back to Europe with their merchandise. Professor Stenseth's research explains why the plague reached Europe in

1347 and then in well separated waves later. As the great Asian gerbils do not live in Europe, the black rats and their fleas probably still helped the spread of the disease after it reached Europe.

Clearly you do not want to share your space with rodents. In fact, it was the problem with rodents that led to people keeping cats and dogs as pets. In Egypt cats were even worshipped as gods for their ability to keep the rodent population under control.

Rats and mice will happily share your house and food and can become real pests. Mice and rats can produce young every six weeks or so and often produce twelve babies, and so you can quickly be overrun if you are not careful.

The important thing is not to send out invitations to them. Keep all food in closed steel or glass containers. Do not eat in your bedroom. If you munch on snacks in bed, you may discover that you are sharing your bed with a mouse attracted by the smell of food.

My daughter enjoyed eating midnight snacks in the warmth and comfort of her bed on cold winter nights. She hid snacks in her cupboard with her clothes until one morning when she went to grab a sweater, and instead she grabbed a handful of tiny, naked, pink baby mice. The mother had made a lovely nest by pulling yarn from several of my daughter's favourite sweaters. She was finally convinced to enjoy snacks in the kitchen or at the table.

BLACK RAT

Rattus rattus

बड़ा चूहा

Black rats are rather unimaginatively properly known as *rattus rattus*. In English they are known as house, ship, Alexandrine, and old world rats. Their many names show how well they have adapted to living with people. They originally lived in Asia. They spread to Europe by



Black Rat

100 AD. As their common name, ship rat, indicates they were always found on ships and spread around the world with the earliest European explorers.

Although they are properly called black rats, they come in a range of colours and are often more a greyish brown. Their bodies are about 14 to 20 cm long, and their tails are as long as or longer than their bodies. They weigh up to 350 gm.

They are very good climbers and can climb up and down drain spouts. They prefer to nest in higher places, and so you cannot escape them by shifting to the higher floors. They enjoy foraging around on roofs. You may hear them running about on your roof at night. They are mainly nocturnal.

They eat just about anything. In the field they eat birds and insects as well as worms and grubs. They also eat seeds, nuts and fungus. They enjoy fruits and any grain or meal. They seem to particularly enjoy chewing on rubber. If you find that your electric cords have been chewed, it is probably time to invest in a rat trap.

Black rats live in large social groups with one male, his mates and their offspring. A female rat often produces three to five litters each year. Each litter has five to ten young. The young are born blind and hairless, but they mature quickly. They are weaned after just twenty days.

LITTLE INDIAN FIELD MOUSE

Mus booduga

चूहा

Unfortunately, the so called field mouse is also happy to explore our houses. It is quite small, only about 6 cm long, and its tail is about as long as its body. Its back is light brown and its stomach is white. It has a tiny, pointed pink nose and large, upright ears.



Little Indian Field Mouse

Mice dig tunnels and burrows in the ground. They are nocturnal and come out to forage at night. Mice cannot see well but have very good senses of smell and hearing which help them locate food and escape predators. They enjoy nibbling fruit and grains, and near people have adapted to eat all kinds of food crumbs and scraps.

Cats, dogs, snakes and birds of prey all eat mice. One study of wolves who were thought to be ferocious predators preying on ranch sheep and cattle, found that they actually survived mainly on mice (Mowat: 1983). However, mice breed very rapidly and keep ahead of their predators. They have adapted to almost all environments. Today they are one of the most successful mammals on earth.

Mice can start to reproduce at the age of fifty days. The pinkies are born after twenty days, and the mother can immediately mate again. A single mother can produce fourteen litters in a year. Each litter has ten to twelve pinkies. That means that a single mother can produce one hundred and fifty pinkies in a year. You can figure out how many mice can descend from a single mother in a year.

At birth the pinkies are 2 cm long and weigh less than 1 gm. They are pink and hairless, hence their name. Their eyes and ears are closed, but they have perfect tiny little paws with sharp, but hair-like claws. At this stage, they do not need to see, but they do need to be able to hold on to their mother and find her teats. They mature quickly and set out on their own after only twenty-one days.

INDIAN CRESTED PORCUPINE

Hystrix indica

साही

The porcupine is a very large rodent. You probably know bandicoots which can be as big as house cats, but the porcupine is at least three times bigger and heavier. A porcupine measures almost 1 m from the tip of



Indian Crested Porcupine

its nose to the end of its tail and often weighs almost 20 kg. Of the wild mammals in the Kamand valley, only the leopard is bigger.

The porcupine has very sharp quills covering its back and tail. The quills on the tail are short and hollow. They rattle when the porcupine shakes its tail. On its shoulders and back it has both long thin quills and shorter, thicker quills. The long quills can be as long as 40 cm. The quills are banded white and black or brown near the body. The long quills have long white tips about half the length of the quills.

If another animal approaches a porcupine, it rattles its tail to warn the animal to keep away. Most animals learn quickly that this is a good idea. If the animal continues to pester the porcupine, the pest will soon find one or more of the long quills from the back or shoulders of the porcupine in its paw or nose. This is enough to make most animals give up the hunt. If an animal keeps pestering the porcupine, the porcupine backs up and the short, broad but very sharp quills on its back pierce the attacker.

You can watch videos on the internet of porcupines fighting, seriously wounding and even killing leopards and even lions. In Man-eaters of Kumaon, Jim Corbett, who was famous in India for hunting and killing tigers that became man-eaters, found that most of those tigers had resorted to killing people after they were wounded by porcupines, and they could no longer capture other animals. Other than people, porcupines are the main animals that kill leopards in this area.

Indian porcupines are very adaptable. They live throughout South Asia and west to the Mediterranean. They are found in mountains, tropical and sub-tropical grasslands, scrublands and forests.

The porcupine has a thick body with very short but strong legs and long claws. The short legs give it a low centre of gravity and make it very difficult to upset a porcupine and attack its unprotected stomach. The legs and claws are used to build tunnels and burrows.

Porcupines are nocturnal. They sleep underground during the day and come out at night to forage. They are mainly vegetarian, eating fruits, grains and roots. They also chew bones but do not generally eat meat. The bones supply the calcium that they need to grow quills.

Somehow these prickly creatures manage to mate and produce

two or three young once or twice a year. They live in small family groups but usually search for food alone.

As porcupines live underground and come out only at night, we very seldom see them. If you watch the ground you may sometimes find a porcupine quill. If some animal attacks a porcupine you will find the place littered with thirty or forty quills of all sizes

5. Shrews

Another animal that is found in Kamand is the shrew. It looks very much like a mouse, but the shrew belongs to its own family called soricidae. Shrews are not rodents and are mainly helpful to people. They are insectivores that need to eat a large number of insects to survive. They do not reproduce quickly. And they do not spread diseases to humans. The main problem with shrews is that they have a bad smell. Also, many people do not like to see tiny animals scuttling about in their houses.

ASIAN HOUSE SHREW

Suncus murinus

छँदर

The Asian house shrew is also called the grey musk shrew because of its odour and the money shrew because it makes a noise that sounds like rattling coins. This sound is also reproduced in its Hindi name.



House Shrews

Although it is the largest shrew, it is tiny. Its body measures only 6 to 10 cm. It has a short stubby tail. It weighs about 50 to 100 gm. It is greyish brown with a long, very flexible snout which can poke into any tiny hole or crack in search of insects that it prefers to eat. It has sharp, pointed teeth that help it to pierce the hard exoskeleton of the insects. It has tiny, weak eyes and relies much more on hearing and smell to explore its surroundings.

Its main defence against predators is its musk or scent. Shrews have special glands which produce and give off the strong scent which smells rather like a skunk. The musk also causes any animal which catches the shrew to salivate heavily. If you have a pet dog or cat and find it suddenly drooling heavily, it has probably made the mistake of catching a shrew. There is no danger to the hunter, but the experience is so unpleasant that few animals care to repeat the experience.

The musk is such an effective deterrent to predators, that shrews usually mate only twice a year, and the mother bears only one to eight

young. So while a female mouse may produce more than a hundred young in a year, a female shrew produces only two to sixteen.

The young stay with the mother for an entire year. One unique characteristic of the shrew is that it forms a caravan with its young. When the mother moves about, one young shrew will grab hold of her fur with its teeth and the other young will grab hold of the sibling in front so that they all move about like one long caravan or train. The hold of the young is so strong that you can lift the mother with all her young attached.

6. Civets

There are at least two different civets on campus. They are the small and the large Indian civets. They are members of the viverridae family. There is one other member of the viverridae family that might be found in this area. Fortunately, we have not yet seen a Himalayan palm civet, and the villagers say that they do not live in this area. It gives off a strong odor like a skunk, so we would most likely smell it if it were in the area. More viverridae live in the northeast part of India, in Assam and Sikkim. These are called the spotted Lansang and the Binturong.

Civets are nocturnal and omnivorous. They sleep alone in burrows or in small rock caves during the day. At night they hunt alone for small rats and mice, birds, snakes, fruits, roots and insects.

Like cats, they retract their claws when they are walking. They use the claws to fight and climb. However, they prefer to sleep in burrows and to hunt mainly on the ground.

Female civets give birth to two to five kittens. The mother cares for them alone for about four months.

SMALL INDIAN CIVET

Viverricula indica

कस्तूरी

If you catch a glimpse of a small Indian civet running to hide at night, you might at first think that it is a cat. It is much the same size as a house cat, but a little longer with shorter legs. It has a very distinctive tail with eight to ten dark rings which makes it easy to identify.



Small Indian Civet

The small Indian civet lives throughout Indian except in Jammu

and Kashmir, in the higher mountains, and on the deserts. It is found from Pakistan, throughout Southeast Asia and southern China. It also lives on the islands of Sri Lanka, Malagasy and Indonesia.

The small Indian civet is brownish grey or yellowish brown with rows of dark spots from neck to tail. It has a long dark stripe on its neck from each ear to its shoulders. It is about 45 to 60 cm long and weighs about 3 kg.

LARGE INDIAN CIVET

Viverra zibetha

खाततस

While the small Indian civet might remind you of a cat, the large Indian civet looks more like a dog. It is about the size of a medium sized dog, but a bit stouter with shorter legs. Like a dog, it prefers to run on the ground, although the civet can also climb trees.

The large Indian civet is divided into four or five subspecies. It is found in Himachal and in northeastern India. It also lives in Nepal and Bhutan. Its range continues further east into Bangladesh and Myanmar, the Malay Peninsula and Singapore, Southeast Asia and southern China.

Despite this fairly large range, its numbers are decreasing and the species is considered near threatened by the International Union for Conservation of Nature. It has been heavily hunted for its meat. Now it is protected in most of the countries where it is found.



Large Indian Civet

The large Indian civet is about 80 cm long. It weighs 8 to 9 kg. Its fur is mottled grey with a black crest down the centre of the back. It has black bars on its white neck. It also has white fur along its lower jaw to its black nose. Its head and face looks very much like a dog.

Its tail does not have the distinctive ringed look of the small civet's tail. The tail of the large civet has broad black bands. It sometimes

has only three broad bands separated by thin strips of grey. The tail is about 50 cm long.

Large Indian civets are solitary and nocturnal. They usually spend the day in burrows dug by other animals and abandoned. They hunt alone at night for small animals and occasionally eat fruit or roots.

7. Other Small Carnivorous Mammals

There are three other small predatory mammals in the Kamand area. They are the grey mongoose, the yellow-throated marten and the small Indian civet. These animals look very similar, but they belong to three different families of mammals. The mongoose belongs to the herpestid family. The marten is a mustelid. And the civet is a viverrid. The mustelid family includes otters, badgers and weasels. If you are lucky you may find a honey badger, an otter or a yellow-bellied weasel in this area, but I have not seen them or heard of someone else seeing them. Here are photos of these animals. Please tell me if you find them.



Honey Badger



Eurasian Otter



Yellow-bellied Weasel

INDIAN GREY MONGOOSE

Herpestes edwardsi

जेवला

The Indian grey mongoose is an animal that many of us know. It is found throughout India as well as in Pakistan, Nepal and Sri Lanka. Its range extends to Saudi Arabia in the west and China in the east, but it is most common in South Asia.



Indian Grey Mongoose

This animal is famous because it can kill snakes and even cobras. It can do this because it is so quick and agile. It keeps quickly attacking

the snake and leaping out of the way until it is able bite just behind the head. The mongoose has specialized acetylcholine receptors which protect it from snake venom. It is also protected by its unusually thick fur.

The thick mongoose fur protects the mongoose from snake bites, but it attracts human hunters. The fur is used to make paintbrushes. In India, many mongooses are trapped for their fur.

Although it is called the grey mongoose, the fur on its back is actually grey mixed with gold or yellow. Its underside is lighter, but its feet are dark. It has some reddish colouring on its face and a dark red tip to its tail.

An adult mongoose is about 1 m long. Its body measures about 0.5 m and its long, bushy tail is also 0.5 m long. It is very slender and weighs just 1 to 2 kg.

One reason that many of us know the mongoose is that it is active during the day. The mongoose is very inquisitive but cautious. It is curious to check out new things that it finds. Mongooses are sometimes kept as pets. Although famous for its ability to kill snakes, a mongoose actually usually eats small animals found in the ground or under rocks and brush. It eats mice, lizards, slugs, worms, scorpions and insects. It also eats bird eggs and baby birds.

Mongooses have very good vision and a keen sense of smell. Unusually, mongooses can see colour. A mongoose hunts by sniffing and turning over rocks to find hidden insects and worms. When hunting underground, the mongoose closes its outer ears to keep dirt and dust out.

A mongoose lives alone in a burrow in the ground or a thicket. The female mongoose usually gives birth to a litter of two to five babies. The little mongooses are great fun to watch as they chase each other about through drains and over walls.

YELLOW-THROATED MARTEN

Martes flavigula

गरान

We have yellow-throated martens on campus, but they are shy and hard to see. I have seen them about 2 km from the mess on the south campus

near the waterfall, and on the hill across from the stable that is between north and south campuses.

The yellow-throated marten is about the same size and shape as a grey mongoose. It is long and low to the ground with a long, bushy tail. It is very handsome. It has a dark brown



Yellow-throated Marten

or black head, feet and tail, but most of its body is a bright golden yellow. An adult is about 50 cm long and weighs 3 to 4 kg.

Martens are very good climbers and quickly scramble up dry waterfalls and other steep cliffs. They are also good at climbing trees, and running on flat ground. They sleep in hollows of trees or small caves in cliffs. They are active both day and night. They usually hunt in pairs for small rats and mice, birds, lizards and fruits and seeds. Unusually, they prefer fruit to meat.

Yellow-throated martens probably take one mate for life. The males compete for mates. One unusual thing about these martens is that there is a period of almost nine months between mating and birth. This is very long for such small animals. Probably the egg is fertilised several months after mating.

The female gives birth to two to five kits. Both parents share in raising the kits.

8. Wild Boar

INDIAN BOAR

Sus scrofa

जंगली सूअर

Wild boar are found throughout India except north of the Himalayas. They are extremely intelligent and adaptable. Boars first appeared on earth in the early Pleistocene era about two million years ago. Boars are very fierce fighters and appear in many myths across Asia and Europe. They appear in Vedic stories in various forms. In the Puranas the boar is portrayed as an avatar of Vishnu.



Indian Boar

Today they are found throughout Europe and Asia and across North Africa. They have also been introduced or escaped from cages and established themselves in the Americas and Australia. They are the ancestors of domestic pigs. They can interbreed and produce piglets.

Their intelligence has helped them to survive so long. Unfortunately for them, they are both very tasty and destructive to agricultural fields. Boars enjoy eating roots, tubers and bulbs and digs deeply with its snout to find them. They frequently damage fields of potatoes, maize and melons.

The Indian boar is brown. The males have black manes running from their foreheads to just in front of their hips. Boars have very strong shoulders and relatively thin, short legs. Boars range in size from 1 to 0.5 m in length and weigh 90 to 100 kg.

The head is almost one third the size of the body and the neck is very strong. The snout ends a hard disc made of cartilage like a hoof. With these features, the boar is a very strong digger. It can dig into frozen ground and can upturn rocks weighing 50 kg.

The female boars live in family groups named sounders. The males are generally solitary. They join sounders only to mate. The female

builds a lair with sticks, grass and leaves. Four to six piglets are born after four and a half months gestation. They are light brown with pale stripes. They weigh a little less than 1 kg. The piglets stay with their mother for about a year. Then males move off on their own. Females often stay with their mother's sounder for life.

Boars are omnivores and will eat pretty much anything. They are disliked by farmers for their love of roots and tubers. They will also eat nuts, berries and seeds; leaves, bark, and shoots; earthworms, insects, fish, rodents, bird eggs, lizards, snakes, frogs and carrion.

They are very serious fighters. When disturbed they charge. You should not go near them or frighten them. They are very persistent fighters and do not back off once they have been aroused.

However, their number in this area is very limited. Only one hiker mentioned seeing signs of digging by boars when he was hiking in the hills beyond campus. The important thing for us is not to attract them to campus by leaving garbage lying about.

9. Primates

RHESUS MACAQUE

Macaca mulatta

बंदर

The only monkey in this area is the Rhesus macaque. Those of you who have lived in northern India or visited friends, relatives or temples in northern India are probably already familiar with this macaque. In many towns, and especially near many temples and markets, they have become a real pest. They



Rhesus Macaque

have learned that it is much easier to steal food and treats from people than to roam for miles in the forest in search of things to eat.

Here we are fortunate that the macaques in the area are still very much wild. They have not yet learned how easy it is to get food from people, though they are already catching on. They still roam about the forest in search of their food. The challenge for us is to try to keep the monkeys near us wild and not attract them to join us on campus. Again, the best way to do this is to keep food safely stored and to dispose of garbage in closed containers. Also, we should not plant trees like walnut and fruit trees near our residences. These trees will attract macaques.

The rhesus macaque is brown or grey in colour. Its face is pink and hairless. Its rump is also hairless and pink. Its tail is only about 20 cm long and is used mainly for balance. Adult macaques are about 50 cm long and weigh 6 to 8 kg.

Rhesus macaques are arboreal. They roam about in the tree tops visiting the trees with ripe fruit. They eat the fruit, bark and roots of trees. I have been impressed at how they always show up at the two walnut trees in our garden just when the walnuts are ripe. They also eat a great variety of other plants and cereals. Occasionally, they eat termites, grasshoppers, ants and beetles.

Rhesus macaques live in large groups. Often there are about

twenty macaques led by the strongest male. Sometimes they move in groups including as many as two hundred members.

Within the group, the macaques have very definite ranks. Interestingly, the ranking system is different for males and females. At the head of all are the dominant males who are the oldest and most experienced. Their mates are also the dominant females, but below them the younger females often have higher rank than the middle aged females who are now less fit and produce fewer babies.

The young macaques stay with their mothers and older sisters. The older males chase the young males out of their groups when they are about four or five. The females stay with their mothers all their lives.

Macaques communicate with expressions and gestures as well as by voice. One important expression is baring the teeth, which is a sign of inferiority. When confronted with an aggressive macaque, it is better to keep your mouth closed.

Macaques have become a major nuisance in Himachal towns and countryside. Seldom does a week pass without some news report on monkeys attacking women or destroying crops in Himachal. For now our monkeys are very much wild, going about their business while we go about ours. We need to plan garbage disposal and planting carefully so that we do not invite the macaques onto our campus and live to regret it.

10. Hares

INDIAN HARE *Lepus nigricollis* खरगोश

Hares and rabbits are called lagomorphs. In Kamand we occasionally see the Indian hare. As they are the biggest wild animals in the area easily available for jackals, foxes, and leopards, and they also tasty to humans; there are few of them, and they are very shy.



Indian Hare

The scientific name for this hare means black necked rabbit, because this hare has a dark collar of fur on its neck. Otherwise this hare is reddish brown on its back with black hair sprinkled throughout. Its stomach is lighter coloured. The mixed colouring on its back provides very good camouflage as the animal freezes against the ground when frightened. The hare is very difficult to see against the mix of soil, dead grass and leaves.

The adult hare is almost 0.5 m long. It weighs only 2 to 3 kg. Like all hares, these hares have long ears and very long back feet.

Indian hares are solitary. They come together only for breeding. The males compete to mate with the largest number of females. The males box each other with both their forepaws and their hind paws. One to eight babies, called leverets, are born after about forty-five days. They are very well formed when born. They are covered with fur and can open their eyes and see.

The young have very little scent and freeze when they sense danger. The adults sometimes freeze and sometimes leap away. With their strong, long back legs they can move very fast.

11. Deer

INDIAN MUNTJAC *Muntiacus muntjak* काकड़

There is one other small deer that you might see here, the Indian muntjac. It is also called the barking deer because its call sounds very much like a dog barking. Muntjacs are common in Mandi on the hill above Mandav. The locals say that there are no muntjacs in this area, but two American visitors thought that they saw two muntjacs just across the river from Kamand.



Indian Muntjac

The Indian muntjac is a very pretty little deer. It is a dark chestnut brown. An adult muntjac is about 55 cm tall at the shoulder and about 70 cm long. The males have small antlers about 15 cm long and slightly curved. The antlers sprout from tall bony knobs covered with fur called burrs. The females have small bony knobs covered with fur where the males have their antlers.

Muntjacs eat young leaves, tree bark, grass and fallen fruit. Sometimes they also eat small rodents and eggs. They are nocturnal. Muntjacs live alone or in pairs. The female first mates when one year old. She generally gives birth to one baby after a gestation of two hundred days. The new born muntjac weighs only 0.5 kg. It stays with its mother for six months then sets out to its own territory.

12. Cattle in Kamand

STRAY CATTLE AND WATER BUFFALOES

The IIT campus used to be a centre for animal husbandry housing many horses and cows, and so it is not strange that many cattle still wander about what they think of as their home. Buffaloes we see mainly in winter, and large groups pass by on their way to mountain pastures in the spring and on



Himalayan Water Buffalo

their way down the mountains after the first snow in autumn. These animals are not wild animals, but still it is important to treat them with respect.

The cattle on campus are mainly cows who give little or no milk and little bulls. Cows take a lot of work. You will see women carrying large loads of cut branches back for their cattle. Sometimes the women walk as far as 6 km each way to collect food for their cattle. This work is worthwhile for cows which produce milk that they mainly process into paneer or ghee and can sell. However, it is a lot of effort for a dry cow. Dry cows and small bulls are often let loose to look after themselves.

These cows are still basically domestic animals. They will move off if slapped on the rump or beaten with a stick. The main thing to remember is not to frighten them with a loud noise such as a fire cracker close to them. The sudden loud noise might cause them to panic and run into you not to hurt you, but because they are so frightened that they cannot see.

The water buffaloes we find here look frightening mainly because they are so big. Many of them have some white hair on their foreheads. Some have blue eyes which look a bit spooky, because we are mainly used to brown eyed animals. However, these animals are extremely gentle.

Once I was coming back from Kamand village on my scooter when I rounded the bend and found a stream of about 70 buffaloes

headed towards me. This sight was a bit worrisome, because even with my scooter, I was still a lot smaller than the big beasts headed towards me. I thought about turning around, but did not really have the time. However, I need not have worried. When the stream of buffaloes reached me it simply parted to pass on both sides.

With buffaloes as with cattle the main thing to remember is not to frighten them. They have no idea at all of harming you, but if frightened they could run over you or push you over the edge of the road or trail, simply because the only thought in their heads is to escape the danger. So again, do not make any loud noises near them, and if you meet them on a road or trail with a sharp drop to one side, stay on the other side so that they do not push you off.

13. Bats

चमगादड़

Finally, before we leave mammals, we will look briefly at bats. Bats are the only animals that can truly fly. There are a few other species such as the so called flying squirrel which have flaps of skin between their bodies and arms and can glide, but only bats really fly.



Fulvous Fruit Bat



Brown Long Eared Bat



Greater False Vampire Bat

Bats are unusual for other reasons, too. For instance, most prefer to sleep while hanging upside down. They usually spend their days hanging in caves, empty buildings, or sometimes from tree branches. Also, bats are nocturnal and find their way around in the dark by echolocation. They make high squeaks or clicks that bounce back off obstacles. Bats have various adaptations to their ears and noses which allow them to capture the echoes. Whales and dolphins have developed a similar system to help them navigate underwater.

There are bats from eight different families in India. Most of the bats eat insects. A few eat fruit, and the false vampire bats are carnivorous. They eat birds, rodents and small reptiles. Altogether, there are more than one hundred species of bats in India. Some live only in a few individual caves. Others are found throughout India and much of southern Asia.

Unfortunately, because bats are nocturnal, I have not been able to identify them. So, here I will introduce a few of the bats which may live in this valley. Some of you can work at identifying which bats we find here.

With bats, we complete our study of mammals in Kamand. We find more mammals and birds here than reptiles and amphibians because mammals and birds can deal better with the cold winter. They are warm blooded, and they have warm coverings of fur or feathers. However, there are a few other animals which manage to survive here, and we will now look at them.

14. Snakes

Snakes are the most populous group of reptiles here, and there are not very many of them. Only two venomous snakes are found in this area. They are the Russell's viper and the common krait.

One hard thing with snakes is that it is very difficult for people not familiar with them to tell them apart. Listen to this description of the Indian rat snake from *Snakes of India: The Field Guide*: "The Indian rat snake varies greatly in color. Pale yellow, olive brown, gray or black. Body lightly or strongly marked."

Can you imagine reading something similar about tigers? "Tigers may be mainly orange, yellow, grey or green. Some have stripes. . ." We are very used to identifying animals and birds by size and colour. We expect a tiger to be orange with black stripes and a leopard to be golden brown with black rosettes.

In snakes, size varies with age, and colour varies with the surroundings. Snakes are also missing useful features like short, thick tails, or pointed ears that make identification easier. And, of course, snakes are not man-eaters. If they sense us approaching, their goal is to hide, and so they do not give us much opportunity to study them.

To identify snakes, you have to look closely. You need to notice things such as whether the head is wider than the rest of the body and the shape, texture and arrangement of the scales. Of course, many of us are frightened to get that close to a snake.

Even those of you who do not want to get close to snakes, should learn to identify the venomous snakes in the area. As there are only two venomous snakes in the area, learning to identify those two snakes is not difficult. It is helpful that the

Russell's viper is brown and the common krait is black. Most of the non-venomous snakes are other colours – green, green with black checks and glossy metallic bronze. One short easy rule to remember is to avoid snakes that are brown or black. That way you will avoid the two poisonous snakes in the area.

Before we look at the individual snakes found in this area, we will look briefly at snakes in general. They are really quite fascinating animals.

At present there are about 280 different species of snakes found in India. Some of these snakes live entirely underground. Others live in or near water. Some live in trees and appear to be able to fly. Actually they thin and widen their bodies so that their bodies work like parachutes and slow their descent. Most are terrestrial and nocturnal.

Snakes are cold-blooded, and so they have a hard time with the long cold winter here. I'm sure that many of you can sympathise with them. As snakes do not have sweaters and jackets or handy electric heaters, they become dormant in winter. Unlike bears and squirrels and other animals which hibernate or sleep through the winters, snakes actually remain awake but go through a period of very low activity. They pass the winter in burrows or tunnels in the ground, under piles of rocks or inside fallen tree trunks. We are most apt to see snakes in October to early November when they are slowing down and searching for place to overwinter, and in March when they are emerging from their holes but still sluggish from months of inactivity.

Smell is the most important sense for snakes. They sample the air around them through their forked tongues. They are constantly testing the air, ground, and water they encounter to detect the scent of prey or predators. The forked tongue helps them figure out which direction to move.

Snakes also are very sensitive to vibrations in the air and ground. This sense helps them to detect the approach of animals.

The vision of snakes is quite poor. Some snakes that pass their entire lives underground are blind. Other snakes have weak vision which mainly distinguishes light and dark and detects movement. If you spot a snake some distance away from you, the best thing to do is to remain absolutely still. The snake cannot see you or feel vibrations from movement and will go off about its business.

A few snakes have infrared detectors in their snouts. These detectors can sense the heat given off by bodies near them. In Kamand the Indian rock python has these detectors.

The skin of snakes is covered in scales. Even the eyelids of snakes are transparent scales that are always closed. The body scales can be smooth, have ridges called keels, or feel grainy. Many snakes have special scales on their bellies which are better for gripping surfaces.

Snakes scales are not separate like fish scales. Snake scales are extensions of the outer layer of skin. Snakes feel very smooth to the touch. In fact, before people realised that too many snakes were being killed, snake skin was very popular for fancy shoes and bags.

Snakes moult or shed the outer layer of their skin. A young snake may shed four times a year. An older snake sheds only once a year. The moulting replaces worn or damaged skin and rids them of parasites. Before moulting the snake stops eating and moves to a safe hiding place. Its skin becomes dull. Its eyes turn cloudy or blue. After a few days, the inner surface of the old skin turns liquid, and the snake wriggles out. The old skin peels backward from head to tail in one piece. The snake emerges like a foot from a sock with a bright new skin.

The movement of snakes is fascinating to watch. The main way they move on the ground is called lateral undulation. In this form of movement the body of the snake moves in waves that push off from rocks, twigs or other irregularities giving points to push against. The outside parts of the waves push against the object and back. So the waves on the right are pushing right and back, and the waves on the left are pushing left and back. The obstacles pushes back in the opposite direction. When you are swimming and you push back against the wall of the swimming pool, you will be pushed forward in the water by the wall. The same thing happens with the snake. Waves on the right are pushed left and forward, and waves on the left are pushed right and forward. The pushes left and right cancel out, and the snake moves forward. The wave speed is the same as the speed of the snake so that every point on the body of the snake follows the same path as the point ahead of it. Thus, a snake can move through close vegetation or other small openings.

A snake must move differently when there is not wide enough space for lateral movement. In concertina movement, the snake anchors it back and extends its front. Then it anchors its front and pulls the back forward. This form of movement is useful in narrow tunnels.

For secret movement, the snake lifts its belly scales and pulls them forward and then pulls the body over them. This form of movement is called rectilinear progression. It is used by pythons, boas and vipers when they are stalking an animal. The movement is very hard to see, and the prey is not alerted to the danger.

Finally, in open spaces with few objects to push against, such as on mud flats or sand dunes, snakes move by sidewinding. In sidewinding the snake lifts all the parts of its body which are slanting in the same direction. The head and all parts of the body with the same slant as the head portion are lifted and moved forward. There is a good video presentation of sidewinding in the Wikipedia article “Sidewinding”.

Snakes are carnivorous. They eat lizards, frogs, other snakes, small mammals, birds, fish, snails and insects. Snakes cannot bite and tear their food apart. They swallow their prey whole. Their jaws have flexible lower jaws and extra joints which allow them to open their mouths very wide to swallow whole animals. Then they must rest while the body digests the food.

Most species of snakes lay eggs and abandon them. However, pythons coil around their nests and remain until the eggs hatch. Other snakes hold the fertilised eggs inside their bodies and give birth to live young. The Russell's viper found in Kamand incubate the eggs in their bodies until they hatch. This viper bears three to sixty live young in April or May. Young snakes have to survive on their own whether they hatch from an egg in a nest or in the mother's body or are born live.

HIMALAYAN MOUNTAIN KEELBACK

Amphiesma platyceps

The keelback snakes get their names from the ridge, similar to the keel on a boat, that is found on each scale on their back. The keeled scales make their backs feel rough. On their undersides they have smooth scales.



Himalayan Mountain Keelback

The Himalayan Mountain keelback is only weakly keeled. It lives in the Himalayas from Pakistan through Kashmir, Himachal and Uttaranchal to Nepal, Tibet

and Bhutan and the Khasi Hills in North east India to China. It is found from 1000 m to 3,600 m elevation.

It is a small, harmless snake that varies greatly in colour and markings. The maximum length for an adult is 94 cm. The colour varies through shades of grey and brown on the back. It usually has small black spots and sometimes has series of small white lines running along the edges of many of its scales. The belly is generally light coloured, but it may have darker patches especially near the tail.

This snake is found in forests and near small villages and fields. It is active in the evening. It eats fish, frogs, frog eggs, tadpoles, snakes and snake eggs and small mammals.

The Himalayan mountain keelback is a very gentle snake. It may play dead if handled. Very little is known about its habits other than that the female lays eggs.

CHECKERED KEELBACK SNAKE

Xenochropis piscator

पानीवाला सॉप

The checkered keelback snake is the most common snake in India. As its Hindi name indicates, it always lives near water, though it is not at all particular about what water it is. These snakes can even survive in sewage water and are commonly found in many cities and towns in India. In Kamand they are found along our two rivers.



Checkered Keelback Snake

These snakes are not venomous. However, they are very alert and will attack to defend themselves. If they are surprised, they will try to escape, but if cornered they will bite. When threatened, a checkered keelback snake flattens its neck and looks like a cobra.

The adult snake is usually about 1 m long, though they occasionally grow as long as 2 m. On the back they are olive green yellow, brown, grey or black with a pattern of black checks. On the stomach they are light cream coloured.

Checkered keelback snakes eat mainly fish, toads and frogs. They may also eat small mammals, lizards and other snakes.

The breeding season starts at the end of winter and the female lays up to ninety eggs. You are most likely to see the young snakes in late June or early July.

GREEN KEELBACK

Macropisthodon plumbicolor

The green keelback snake is another very common non-venomous snake. They are found throughout India except along the East coast and in the extreme northwest. They are also common in Pakistan, Bangladesh and Sri Lanka.



Green Keelback

As its name suggests the green keelback has green scales on its back which have sharp ridges. The green varies from very bright to dull or yellowish green. The stomach is a pale grey or white.

Green keelbacks have large black eyes with round pupils. Their heads are slightly wider than their bodies. Their tongues are black at the tip and pinkish near the mouth.

Young green keelbacks often have black bands which usually disappear on the adult snakes. The adult snakes are generally about 55 cm long, although some may be almost 1 m in length.

These snakes live in grass, gardens or low vegetation in moist surroundings. In Kamand they are found near the rivers. They are nocturnal. Toads are their favourite food.

The females lay seven to sixteen eggs in the spring and the young hatch in the summer. The hatchlings are about 7 cm long. The females

probably first lay eggs after they are two years old.

These snakes are usually gentle. When they are frightened, they mimic a cobra and flatten their necks. They seldom bite.

INDIAN OR COMMON RAT SNAKE

Ptyas mucosus

एकम

The Indian rat snake is another common, harmless snake found in this area. As I mentioned in the introduction to the snake chapter, this snake comes in a variety of colours and markings. The one that I saw was a glossy, dark bronze, metallic colour. This snake is common throughout southern and southeastern Asia.



Indian or Common Rat Snake

The rat snake can look like a cobra, a banded racer, and a king cobra. However, none of these snakes is found in Kamand.

The head of the rat snake is broader than the neck. Its eyes are big and black with round pupils and black rims. The adults can reach 2 m in length, but are very fast, active hunters.

These snakes are diurnal. They hunt both on the ground and in trees. They eat lizards, frogs and toads, birds and small mammals. Unusually, these snakes prefer to crush their prey against the ground with their body weight.

Once a year the female lays six to fourteen eggs which hatch in about a month. The female stays coiled around the eggs until the hatch. The young are already 35 to 45 cm long when they hatch. The young females lay their first eggs when they are three years old.

Indian rat snakes usually escape quickly. If it feels threatened and trapped, the rat snake inflates its neck and moans or growls. It will also strike out, but its bite is not venomous.

INDIAN ROCK PYTHON

Python molurus molurus

अजगर

The Indian rock python is sometimes called simply the Indian python or the black-tailed python. This python is found throughout India and in Pakistan, Nepal, Bhutan, Bangladesh and Sri Lanka. It is quite adaptable and lives in mangrove forests, scrub jungle, rainforests and grassland. In this valley it lives mainly near the rivers.



Young Indian Rock Python

The rock python is a big, slow-moving snake. The adults measure up to 3 m in length and are relatively much thicker than other snakes. These large snakes need a big territory both for hunting and for hiding.

This python is dirty yellow-brown on the back and off-white on the belly. The back has large brown splotches of irregular shapes that are outlined in black.

Unfortunately, for this largely peaceful snake, it is similar to the Russell's viper which is a venomous snake. The major difference is that the Russell's viper has very regular markings which are symmetrical and either oval with pointed ends or round. The splotches on the python are very irregular in shape and are not symmetrical. Another difference is that the python has large scales on the top of its head. Whereas the viper has small scales, and the scales on the viper are keeled. However, it is not really a good idea to walk up to a live snake and examine the scales on its head. It is best to remember to avoid a brown snake with regular, symmetrical markings.

The rock pythons have two pits at the snout tip. These pits sense heat. They help the snake to locate its prey which are mainly warm-blooded mammals.

Another unusual feature of these snakes is that they have two tiny limbs like claws on the belly near the beginning of the tail. These

limbs are more developed in the male and used for mating. The tiny limbs are all that remain of the four limbs of the ancestors of snakes.

Indian pythons eat a variety of mammals including jackals, civets, rodents, fruit bats, birds, deer and wild boar. They approach these animals stealthily, moving in a straight line. They are also good at climbing trees in search of birds and bats. The python grabs its prey with its jaws and throws one or two coils of its body around the prey. It constricts the prey until it dies of suffocation as its ribs are crushed, and its lungs collapse.

Pythons breed in the winter. The female lays eight to one hundred eggs and coils herself around the eggs to incubate them until they hatch about two months later. The mother keeps a higher temperature than normal during this brooding period and shivers to maintain a constant temperature.

As soon as the young hatch, the mother leaves them to their own devices. The young snakes measure 50 to 75 cm when they hatch and are capable of looking after themselves. They mature slowly and first breed when they are five years old.

RUSSELL'S VIPER

Daboia russelii

कौड़ियाला

As mentioned above the Russell's viper resembles the Indian rock python. The most immediately obvious difference is that the Russell's viper has symmetrical markings which are round or oval with pointed tips. Sometimes the spots appear to join to form a chain. The viper



Russell's Viper

is a fat snake. It looks rough because its scales have strong keels. The background colour of the viper is brown and the markings are brown outlined in black and then white. The belly is white. When adult, Russell's vipers measure 1 m in length.

The viper's head is triangular and much broader at the base than the neck. It has very large nostrils on top of its snout. Its eyes are golden brown with a vertical black pupil.

The viper eats mainly bandicoots, gerbils, voles, rats and mice.

The female viper carries the fertilised eggs inside her for more than six months. The young are usually born in June or July. Often one mother will produce thirty to forty young each year. The young are about 23 cm long at birth. They mature in about three years.

These vipers are basically very slow moving animals. They only strike if irritated.

Usually, a Russell's viper limits its reaction to hissing in annoyance. It has a very loud hiss very like that made by a pressure cooker. If that does not work the viper hurls itself forward to strike. The victim feels intense stinging or burning pain. The bite is seldom fatal, but the victim should be taken to hospital immediately.

COMMON KRAIT

Bungarus caeruleus

करैत

Until recently kraits were not found in Himachal. Unfortunately, with global warming, kraits are now responsible for sixty percent of the venomous snake bites in the state. Krait venom is very strong. Anyone bitten by a krait needs to be taken to hospital immediately. Anti-venom serum is available for krait venom.



Common Krait

Fortunately the krait is easy to identify and is quite different from the non-venomous snakes in this area. The krait is often glossy black with a blue sheen. Some kraits are a duller bluish grey or dark brownish black. They have narrow white bands, often in pairs on the back part of their bodies. Usually there are no bands on the front part of their bodies.

The belly is glossy or dull white. Adults are usually about 1 m long.

Another identifying feature of the krait is that the centre scale on the back is large and six-sided. However, if you see a black snake, you should not go close enough to see the size of the scales unless you are sure that the snake is dead.

Most snake bites in Himachal occur when villagers are cutting grass or leaves or gathering fire wood. Kraits are mainly active at night. During the day they rest in rock piles or piles of rubble. You need to be careful if you are exploring a rock pile. And stay on the roads when you are outside at night.

Kraits live in fields, scrub jungles and near buildings. They are often found in or near water. Their main food is snakes, including other kraits. Occasionally they also eat frogs, lizards and small mammals.

Kraits mate soon after they emerge from their winter dormancy. The female lays six to fifteen eggs that hatch after two months. The female stays with the eggs until they hatch. The young are 25 to 30 cm long when they hatch.

15. Lizards

Lizards are also cold blooded reptiles and have the same problem as snakes with the local climate. A few hardy sorts survive here by hiding and spending the winter in an inactive state. Northern house geckos come into our houses in summer.

Common garden lizards appear in our garden as the weather warms up. Brooke's gecko lives in the forests. Higher up on the rocky mountains above the trees, we find the Kashmir agama.

NORTHERN HOUSE GECKO *Hemidactylus flaviviridis Ruppell* छिपकली

The lizards that most of us know best are the house geckos. In Kamand, geckos are not so common, but one or two survive the winter and wander into our buildings from time to time.



Northern House Gecko

The northern house gecko is a flat brownish grey lizard with small bumps scattered all over its back. Its toes are spread far apart almost describing a half circle.

Geckos are nocturnal and territorial. They claim an area for themselves and chase away any other geckos that enter that space. They are insectivores.

In our area, geckos find a good hiding place and spend the winter in very slow animation. They mate as soon as they come out from hiding in March or April. The female lays two eggs in a crack or small hole. The eggs hatch thirty-five to fifty-five days later. The hatchlings are fully grown after three to four months and find mates the following spring.

BROOKE'S GECKO *Hemidactylus brookii*

Another gecko that you might see outside is the Brooke's gecko, named for the British adventurer, James Brooke. This gecko is very

similar to the northern house gecko, though its colouring is darker. Its back is brown or grey with brown spots. Its stomach is whitish.

It lives on trees and stones, under rocks and on buildings. At night it makes a loud chuck-chuck-chuck call.



Brooke's Gecko

COMMON GARDEN LIZARD

Calotes versicolor (Daudin)

छगलछगल

The common garden lizard appears outside in the spring. It is easy to miss because it stands very still and blends in with the surroundings. It is basically a dull brown or grey. The versicolor in its name means that it is able to change its colour to match the colour of its surroundings.



Brown Garden Lizard



Grey Garden Lizard

The garden lizard has a very long tail, often more than twice as long as the body. Its body can be as long as 14 cm with a 35 cm long tail. It has a crest of pointed scales running all the way down its back from the neck to the base of the tail.

The common garden lizard lives in many different settings across South Asia. It is found from Iran through Pakistan and Afghanistan, throughout India, in Sri Lanka, Bangladesh, Bhutan, Thailand,

Cambodia and China. It lives in deserts and rain forests and everything in between and is found from sea level to 2000 m above sea level in the mountains.

This lizard is active during the day. It mainly an insectivore, but the larger ones sometimes eat small birds, frogs or other small animals. Like the other cold blooded reptiles, it has to find a hiding place and hide through the winter months.



Male Common Garden Lizard

These lizards mate from June to August. During the breeding season the male's head and shoulders turn bright red. This is why one popular name for these lizards is bloodsucker. They look like they are covered in blood, although they actually do not suck blood. The males climb onto a branch above their territory, do press ups and bob their heads both to attract females and to warn other males to stay away.

The female digs a small hole and carefully buries eleven to twenty-three eggs. She tamps down the soil so that her nest is not easy to find. The eggs have soft shells that grow bigger as needed. They hatch after thirty-seven to forty-seven days. The hatchlings are about 7 cm long. They are fully mature after nine months to one year.

KASHMIR AGAMA

Laudakia tuberculata

The Kashmir agama is common in the western Himalayas. It is a medium sized lizard, about 10 cm long with a 15 cm tail. It is usually slightly bluish or greenish grey with black or yellowish speckles down its back.

This lizard likes the higher, rocky mountains. It is found from The mountains of Afghanistan



Kashmir Agama

and Pakistan through the western Himalayas in India and Nepal to the Tibetan plateau. In our area you find it on the higher, rocky hills above the campus.

It lives in holes and cracks in the stones. It eats mainly insects including ants, butterflies, and crickets. It also eats tender shoots, leaves, flowers and buds, and seeds. It can be very destructive if it makes its way to your garden.

The Kashmir agama is active during the day. It enjoys sitting in the sun on rocks. This lizard blends in with the rocks, and so it is difficult to see when it is sitting still.

In winter it mainly hides at a very low activity level in a crack or hole, but it may come out to sun itself on warm sunny days.

These lizards breed in May, June, and July. The males fight for their territories and mates. They may also bite you if they feel threatened. They have no venom, but their bites are painful. It is best not to disturb these lizards.

The females lay about eight eggs in cracks or holes in the rocks. The young emerge after about a month.

HIMALAYAN GROUND SKINK

Asymblepharus ladacensis himalayanus

Skinks are small lizards with long bodies and practically no necks. The body is flattened with a broad back and stomach and narrow sides. Most skinks live on the ground. They are insectivores.

The Himalayan ground skink is a small shy lizard that likes to hide under leaf mould in damp places. It is found in Western Nepal, Himachal, Punjab, Kashmir, Pakistan and Turkmenistan.

The Himalayan ground skink is only about 12 cm long. It has shiny, smooth scales. It is mainly brown on its back with two long vertical black stripes running the whole length of its body and tail.



Himalayan Ground Skink

Skinks are territorial. They guard their nests until the eggs hatch.
The female generally lays ten to thirty eggs

16. Toads and Frogs

Toads and frogs are both amphibians. They live part of their lives in water and part on land. Actually as far as zoologists are concerned toads and frogs are not two distinct groups but animals who look quite similar and belong to a variety of different families. All the animals in these families are cold-blooded. That means that in this area they are active mainly in summer.

According to the popular distinction, toads like to live near water, but return to the water only to breed or lay their eggs. Toads have shorter hind legs, and many are happier walking than jumping. Toads also have warts on their backs.

Frogs have smooth skin and long hind legs. They are excellent jumpers. Some have mainly left the ponds and rivers to live in bushes and trees. Others live most of their lives in the water.

COMMON INDIAN TOAD

Duttaphrynus melanostictus

There seems to be some division among scientists about the proper Latin name for this family of toads. Some books and websites refer to them as *Duttaphrynus*.

Others call this family *Bufo*. Two members of this family are found in the Kamand area: *Duttaphrynus melanostictus*, known as the common Indian toad and



Common Indian Toad

Duttaphrynus stomaticus Lutken, known as the marbled toad.

We find the common Indian toad outside our front door during the summer. This toad likes to rest in a cool place during the day and come out to hunt insects at night. As insects are attracted to lights at night, you often find these toads under lights, as outside our door at night. You can also find them under street lights.

As these toads are insectivores, we are very happy to have him on duty at our door on summer nights when hordes of insects gather there.

The common Indian toad lives up to its name. It is both the most common amphibian in India, and the one most frequently seen.

This toad adjusts easily to live in many different places. It has only a few requirements. It needs a cool place to hide in the daytime, insects to eat and a little water in which to lay its eggs. It has found these requirements all over India and the Orient and in Malaysia. As the female may lay as many as one thousand eggs, these toads have multiplied and settled into a whole range of different climates and habitats.

Indian common toads are basically grey on their backs, although the colour ranges from brownish to reddish grey. Their stomachs are mainly white. The skin on their legs is covered with bumps which are generally coloured black. Down the middle of their backs they have two rows of black bumps.

The males compete for mates. The winner climbs on the female's back, and the female enters some bit of still water. She lays eggs that are embedded in a clear string. The string of eggs may catch on some plants in the water or lie along the bottom of the pond or stream. As mentioned above, she may lay as many as one thousand eggs at a go.

The black tadpoles hatch in about four days. They usually feed at the edge of the water on algae, but may also eat dead toads or other dead animals that they find at the edge of the water. With time, the tadpoles grow legs and their tails shortened. One day they are tiny toads. At this time they measure only 1 cm from snout to the end of their back.

As soon as they have metamorphosed, they leave the water and set out for new homes. Often they travel in large groups. Several thousand young toads were seen migrating near Kalol in Gujarat. Many young toads get eaten during this period. Toads are the preferred food of many snakes and other animals even though they have a gland just behind their ears called a parotid gland that secretes bufotoxin which tastes foul and can kill an animal that eats a toad. Dogs often die after eating toads, but snakes are able to survive.

In fact snakes are not really poisonous, as poison is something that kills if it is eaten or drunk. Properly snakes are called venomous

because they inject venom into their prey. However, a snake that has eaten a toad can be poisonous if you eat it.

MARBLED TOAD

Duttaphrynus stomaticus

The marbled toad looks very similar to the common toad. You will have to look closely to decide which toad you are looking at. The common toad has black ridges behind its eyes which the marbled toad does not have. The marbled toad has



Marbled Toad

short webs between its toes and the second toe is distinctly longer than the other. Usually the marbled toad also has smoother skin. It is called the marbled toad because it has dark patches called marbling on its back.

The habits of the marbled toad are very like those of the common Indian toad. They are nocturnal and insectivorous. They breed in the summer, and in this area they hide and rest through the winter. The tadpoles of the marbled toad are black but can be distinguished by the shiny silver spots on their bodies.

ORNATE MICROHYLID

Microhyla ornata

The microhylid frogs are named for their small heads. The ornate microhylid is also called the ornate narrow-mouthed frog or toad and the ornamented pygmy frog. It is found in a large area including almost all of India except for the high Himalayas, Nepal, Sri Lanka, Bangladesh, southeast Asia and



Ornate Microhylid

south China. It adapts to its situation, living in rain forests as well as deserts and up to 1,500 m high in the mountains. In hot and dry areas it hides in a cool spot through the hottest part of the year.

The Ornate Microhylid is very small. An adult male measures only 2.5 cm from its snout to the end of its body. The female is slightly larger measuring up to 2.8 cm. This frog is yellowish or golden brown with a darker brown somewhat arrow-shaped marking down the centre of its back. The arrow point rests between its eyes. It is narrowest at the neck, broader at the shoulders and broadest at the hips. It also has some splotchy bars of dark brown across its legs. Its skin is only slightly bumpy. Its hind legs are long, and the heels meet when the legs are folded behind the body.

This frog usually stays hidden under grass or leaf litter. It eats mainly ants. It is active only at night except during the rainy season.

The ornate microhylid breeds in ponds and rainwater pools. The male finds a suitable pool or pond and calls for a female to join him. He has a very loud voice for such a tiny animal. For people it is hard to locate the source of the sound, but the female microhylids come hopping.

The female lays about two hundred transparent eggs. The tadpoles are also transparent and have diamond-shaped gold marks on their heads. The head and body of the tadpole are twice as long as the tail. There is a tiny flagellum at the end of the tail. The tadpoles are microphagous. The tiny flagellum vibrates rapidly when the tadpole is feeding to hold the tadpole in place. The young are just under 1 cm long when they metamorphose.

17. Birds

Kamand is a very popular place for birds to visit. We have several species of birds who live with us throughout the year – mynahs, bulbuls, kingfishers, jungle fowl, woodpeckers, owls, peacocks, fish eagles and griffons. Many others pass through this valley on their way north or south or from greater heights to lower heights. You just get used to seeing wagtails or swiflets or Asian paradise flycatchers everywhere you look and one day they disappear to be replaced by other species.

I would love to describe all the birds who share our valley with us, but I do not have enough data yet. Here I will merely introduce two of my favourite birds.

You can help gather information about the many other birds that visit us. Note down when you first see a particular bird. Then keep a record each day that you see it. That way we can start to make a calendar of when some birds visit our valley.

HIMALAYAN GRIFFON

Gyps himalayensis

गीटर

Look high above the river valleys and you will see birds circling near the hill tops. These birds look rather small from down here, but they are actually some of the biggest birds in the Himalayas. They are called Himalayan griffons. Climb to the top of a hill and you will be impressed by the huge size of these birds. Their wings measure 3 m from tip to tip. Their body measures more than 1 m from top of the head to end of the tail.

If you happen to see one sitting down it might remind you of a turkey. The adult griffon has a pale, almost white, body with yellow bill and feet. When seen from below, as it usually is, the long black tips on the wing feathers contrast with the pale body and upper wing. Young griffons are mainly brown and have an unusual lighter brown ruff around the bottom of their necks.

These griffons live only in the Himalayas, the Pamirs, Kazakhstan and on the Tibetan plateau. They live entirely on the meat

of dead animals. If they come upon the body of a dead animal several griffons will attack the corpse with a lot of jostling and screeching.

The griffons builds their nests on ledges or cliffs. Often several pairs will nest close to each

other. They will return to the same nest for many years. They repair the rough nest of sticks in the first months of the year. The female then lays a single egg. Both parents incubate the egg for almost two months, and the young griffon stays with its parents for six or seven months.



Himalayan Griffon

ASIAN PARADISE FLYCATCHER

Terpsiphone paradise

The male Asian paradise flycatcher is particularly lovely to watch. It is a very pure white from its neck to the end of its long tail, and it has an easily recognised swooping flight. The paradise flycatcher arrives in the spring and looks lovely swooping in front of the bright, green news leaves. The head of the male is black and crested.

The young and the female Asian paradise flycatchers share only the black head of the male. Their backs are rusty brown and their crests are smaller. Their stomachs are greyish white. They look very much like bulbuls.

The Asian paradise flycatchers like living near humans.

It can be seen on campus all spring and summer.

These birds build small cup shaped nests of grasses and fibres. The parents cover the outside of the nest with spider webs. The female lays three to five pale, creamy pink eggs that are splotched with brown. Both parents care for the young, but the mother does a greater share of the work.

On the next page are photos of some of the other birds that visit this valley.



Asian Paradise Flycatchers



18. Conclusion

The natural surroundings of Kamand are beautiful and unique. They make an ideal counterfoil to the study of engineering and science. After hours of lecture or slogging at the computer, it is very refreshing to step out and enjoy the natural world around us. Often a break is just what is needed to solve the problem you have been worrying over all day.

When you have more time, explore further afield. One of the amazing features of Himachal is that the entire ecology can change in an instant as you turn a corner or climb a few hundred feet. In winter it is very marked as you move from snow covered hillsides to fields with bright green wheat ripening in the sun just by turning from a north facing slope to a west facing slope. The difference is also clear if you explore the small road that goes off along the ridge from Katindi. We can actually see that road from parts of our campus, but the birds there are quite different from those on campus.

Too soon you will probably find yourself caught in one of the big cities and longing for an escape. Make the most of your opportunity to become familiar with the natural beauty of the surroundings. As you explore the campus you will learn more of the traits and habits of the animals who share it with us, and you will come to understand that we can also share it with them.

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