# Exemplar: Migration

## How do birds travel across borders and remember their routes?

Birds migrate from one place to another traveling long distances for hundreds and thousands of kilometers. During such migrations, birds move to warmer places where there is more food. It is estimated that approximately 40% of the world's birds migrate. The population of birds can be affected in different ways during its migration. For example, there could be rampant killing and hunting of the birds in certain places for economic reasons or there could be destruction of the habitats for developmental or other purposes.

Since migration of birds can take place between different countries it is a challenge to ensure that they are conserved across their range—in their breeding habitat, along its migration route where it temporarily rests, and in their wintering habitat. That is why international agreements such as the Convention for the Conservation of Migratory Animals have been put in place so that there is cooperation between different countries to conserve birds throughout its migratory route.

### Linkage to SDGs

While none of the 17 SDGs has migration of birds as a main theme, the relationship between the SDGs and the importance of migration of Amur Falcon are evident. See the diagram for which SDGs can be linked with the migration of the Amur Falcon.


As we learn about migration of the Amur Falcon, we will be able to address some of the concerns of SDGs as mentioned above. We shall see in this exemplar how migration of Amur Falcon is linked with the means of livelihood community people and how the population of Amur Falcon can be affected.

## Handprint CARE Pedagogy

Teachers using the Handprint CARE pedagogy could facilitate learning among students by taking them through experience sharing to inquire about the issues to critically think about what can be done and then taking actions.


## Quadrant 1
## Start up Stories & Sharing Experiences

**Did you know?**

**About Amur falcon**

Amur falcon (*Falco amurensis*) is one of the prettiest and the smallest of the falcons. This amazing bird is just about the size of a pigeon and weighs only 100-180 grams. But this very size and lightness of their body helps them in flying. The Amur falcon breeds in east Asia from the Transbaikalia, Amurland, northern parts of Mongolia, parts of North Korea.

This bird is an insectivorous animal, which means that its diet consists mainly of insects, such as locusts, flying termites, grasshoppers, dragonflies, beetles and other winged insects.

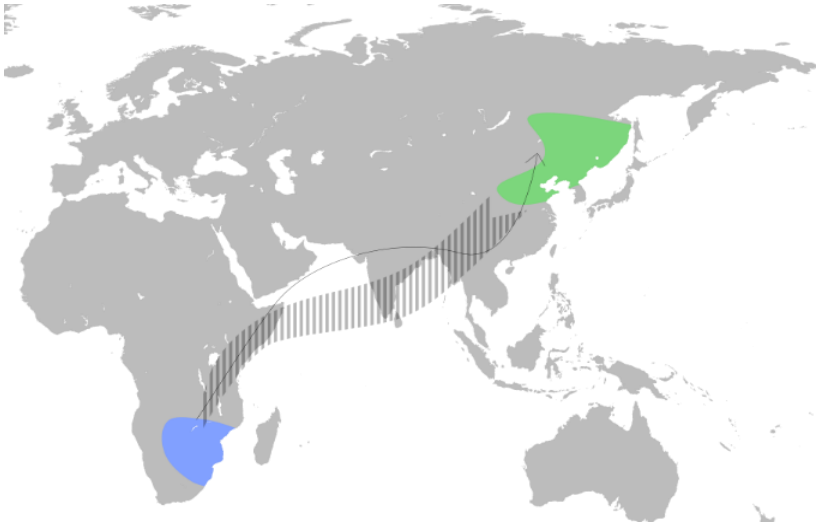
The Amur falcon plays a very important and unique role compared to other birds of prey. Due to their insectivorous diet, they are responsible for consuming 2.5 billion termites every year in South Africa.


Photo credit: Ramki Sreenivasan

They are voracious feeders and a single Amur could eat up to 200 termites in an hour. These termites are agricultural pests capable of ruining the entire crop. Millions of termites fly out of their nests and spread across the nation during the rainy season. Because of this, scientists believe that if the number of Amur falcons reaching South Africa reduces, it will adversely affect the crops in South Africa. Scientists believe that if 1, 30, 000 Amur falcons did not reach South Africa, almost three tons of termites (2893 kg) would not be eaten which will then go on to breed.

## Story 1: Migration of Amur Falcon

The beautiful Amur flies an astonishing 22, 000 km every migration, all the way from its breeding grounds in south-eastern Siberia, Mongolia and Northern China to its wintering area in Southern Africa and back.



These birds of prey seem to enjoy company and are usually found in flocks. It's a spectacular sight to see tens of thousands congregate at their roosting sites in Africa.

However, it prefers to nest in small colonies in its breeding grounds in May and June.

Till as late as 2008, the details of the migration of the Amur falcon were not entirely—How far did it fly in a day? Where did it rest? Which countries did it cross? How long did it take? And countless more questions.


It was initially difficult to use radio collars or satellite tracking devices due to the large and heavy size of the device or the device needed constant monitoring and battery power. As per ethical guidelines they had to find birds strong enough to carry these transmitters. In 2009-10 scientists finally managed to design one which weighed just 5 g. But even for that they had to find birds which weigh at least 160 g.

After a good search, a beautiful healthy adult female Amur falcon was found and she was tagged AF97633. Subsequently, they carefully satellite tagged 10 adult birds and released them. Within days they charted the first ever Amur falcon migration from South Africa to their breeding grounds in Mongolia during which they flew north through Mozambique, Tanzania, then Somalia. The birds then changed course and started heading north-east over open sea in the Indian Ocean where they flew non-stop for two days.


Source: http://e-pao.net/GP.asp?src=8..060519.may19

One of the tagged Amur stopped only five days later in Burma. Their journey ended 14,560 km away in Mongolia, where the Amur falcons paired and bred.

Other highlights of this tagging were that they took 14, 500 km each trip as they journey from Mongolia to South Africa. It takes them just about a month. Another amazing discovery has been that these birds fly at night as well, making them the only raptors that migrate at night. But brings in new questions of how do they navigate without the sun?

Since then, several Amur falcons have been satellite-tagged in different places in Manipur and Nagaland. For example, Longleng, named after a Nagaland district, a female falcon Tamenglong named after a district in Manipur, and a male falcon Manipur which is a state in the northeast. However, all the satellite-tagged falcons don't provide data for as long as they lost connection or they are dead. The migratory route of the Amur falcons in general are: On their south bound journey they travel from Mongolia to Mandalay-East (Burma), Nagaland, Manipur, Assam, Nagpur, Bombay, across the Indian Ocean, through Somalia, East Africa, Central Africa, Zimbabwe and finally settles near Newcastle in South Africa. On her northbound journey, it travels mostly across land through these countries: South Africa, Botswana, Zambia/Angola, Sudan, Saudi Arabia, Kuwait, Kazakhstan, Russia.



A huge chunk of its population comes through Nagaland as they take their trip from its breeding ground to its wintering place where they rest and feed at the Doyang reservoir before they can take on another spell of flight over the Indian ocean.

This long-distance flying, they are going to undertake requires more than 10 times the amount usually required for flying. However, there were very unfortunate practices happening for years. Since the falcons were enormous in number, it was easy for villagers to hunt them in thousands. It was estimated that over 12, 000 - 14, 000 Amur falcons were killed every year in Nagaland.


Scientists believe that if 1, 30, 000 Amur falcons did not reach South Africa, almost three tons of termites (2893 kg) would not be eaten which would then go on to breed.

Coincidentally, by the time when Amur falcon was slaughtered in Nagaland, India had just finished participating in a high-profile United Nations Summit on Conventions on Biological Diversity (CBD), reaffirming its commitments being a signatory to the International Convention on Migratory Species (CMS) at Hyderabad in October, 2012.

Following this, conservation initiatives have been taken up both in Manipur and Nagaland by the Bombay Natural History Society (BNHS), Indian Bird Conservation Network (IBCN) in association with the local NGO's, community people and the respective state governments.

However, it was not an easy switch for the villagers to give up hunting and promote conservation of Amur. They had to pay a price by losing their good source of income, for some, it was a major source of their income and they had to part with their means of sustaining their families. In order to compensate for this, alternative sources of income are being worked out through different strategies such as eco-tourism.

Although they are willing to continue with the conservation practices, some villagers said if the alternative source of income is not sufficient to meet the needs of their families, they might get back to their earlier profession of killing Amur and selling them.

In Nagaland, conservation efforts under the 'Friends of the Amur Falcon' campaign were undertaken successfully in Pangti and Sungro villages in Wokha district and there were no more reports of killing along the Doyang reservoir. Students were also involved at the eco-club levels. They learn about Amur through various activities after which they are identified as 'Amur Ambassadors'.

**Did you know?**

In Manipur, the Amur falcon comes to the banks of the Barak River in Tamenglong district every year. The falcon (known locally as Akhuaipuna,) was in ancient times considered God's messenger of good year and bountiful harvest for the Zeliangrong people inhabiting the place. Dailong village in Tamenglong district spearheaded the campaign in Manipur for the conservation of Amur falcon.


## Story 2: Migration of Birds *(Mexico)*

During the fall, millions of birds begin a journey from southern Canada and the United States in search of warmer areas of the entire American continent. During this journey, between four and five million birds of prey, aquatic birds, among others, can be observed between the months of August and November in the State of Veracruz, Mexico. The warm temperatures make the birds pass relatively close to the ground, so it is easily identifiable to see the millions of birds that pass on their journey to warmer areas where they can spend the coldest months of the year. Pronatura Veracruz, an NGO in Mexico, has been in charge of developing a bird monitoring programme, environmental education and habitat restoration programmes, so that birds have the necessary conditions for their passage through Veracruz territory and that the following years go by again.

To celebrate this magnificent natural event, Pronatura organizes the 'bird festival' in collaboration with local communities every year where visitors and local inhabitants can interact to learn more about bird migration and celebrate this wonderful show that nature gives us.

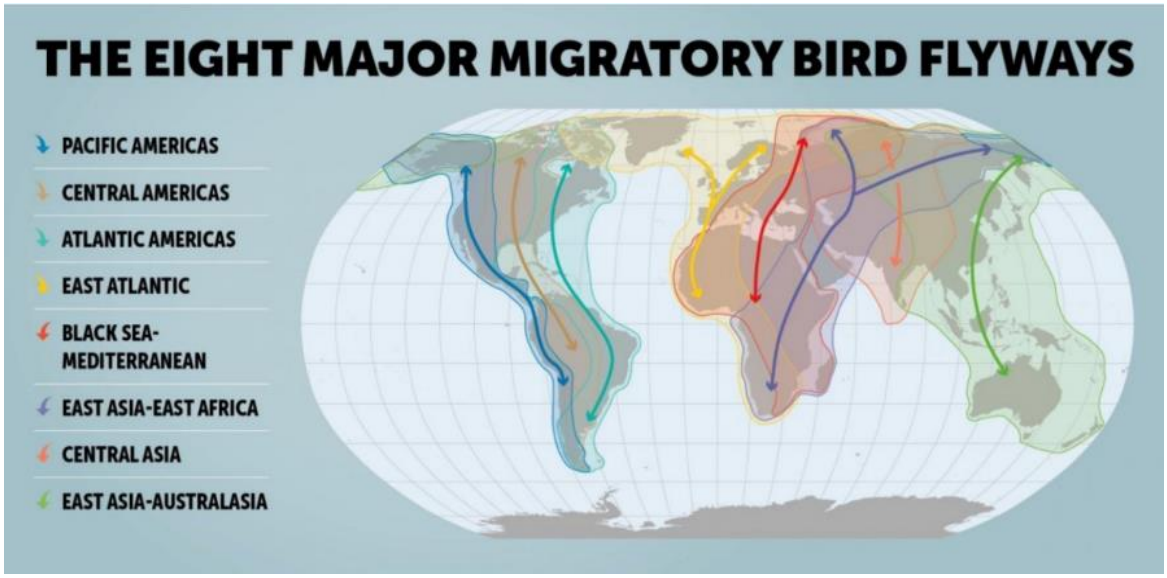
## Quadrant 2
## Inquiry & Deepening Knowledge

*Eco Puzzle Activity 1:* **All About Migration**

Identify topics or scientific concepts which are included in the curriculum, for example, why do birds' migration, what happens during migration, importance of migration, etc.

**Did you know?**

**What are migration routes?**
During migration, birds don't choose their paths at random. They follow set routes. Such routes include suitable habitats where they can stop to rest and refuel along the way. While many different species may share broadly similarly routes, migratory routes have been loosely split into eight major flyways.




Source: https://www.birdlife.org/worldwide/programmes/migratory-birds

**Let us find out**
Students may be engaged to find out the migration of any bird (other than Amur), insects or other animals. They may draw a rough sketch of the migratory route. They may also find out the importance of such. migration. For this, they may search relevant information from the internet or speak to experts in the area.

*Eco Puzzle Activity 2:* **Explore Patterns of CARE**

Students can cut the boxes provided in the Eco-Puzzle sheet and arrange the boxes. They should arrange in such a manner to show interdependence as shown in the Cycle of Life picture.

**Observation of migratory birds**
If students live in a place where migratory birds come to roost or breed, they may go to such a place at least for a few times and observe the behaviour of the birds, where and how they live, what they eat, etc.

**A survey of migratory birds**
Students may be asked to conduct a survey on migratory birds. They can talk to their elders/ bird watchers/ scientists in their locality to find out the following:

1. Are there any migratory birds visiting their state?
2. In which place do they come?
3. In which time of the year, they visit?
4. Why do they come to such places and time?

**Role play**
Students may enact any of the following in the form of a role play:

1. Migration of Amur or any other animal
2. Characteristic features of Amur
3. Amur in different countries

## Quadrant 3
## Review, Analysis & Critical Thinking

*Eco Puzzle Activity 3:* **Conservation and protection of Amur**

**How do young migratory birds fly?**
Students may be asked to find out from different sources how the young ones of migratory birds fly for such a long distance.

**Traditional hunting and sustainability**
Students may be asked to find out about hunting of Amur or other migratory birds prevalent in the past and the relation between traditional hunting and sustainability.

**Killing of birds in different countries**
Students may be asked to find out why some birds are killed in different countries and write short stories about those. For example, in Mexico, owls are hunted since they are considered to be a witch.

## Quadrant 4
# Handprint Actions for Change

**Discussion and Action**
Students may be asked to make a poster to spread awareness about protection of migratory birds.

Students may be asked to discuss in groups and come up with the strategies and policies for conservation of migratory birds. Students may be encouraged to make a bird house outside your house and keep some water and seeds so that hungry and thirsty birds can come and feed and take rest.

**Further Reading:** https://ecosystemsinthesky.com/the-amur-falcon

**Video resources:**

The Hardest Challenge : Amur Falcons in Nagaland,Doyang Valley (BBC Video, English, Duration: 3.20 mts)
https://www.youtube.com/watch?v=uzKjttzZOKU

Amur Falcons and their Nagaland halt (Case study, English, 4 mts)
https://www.youtube.com/watch?v=YJHtNGM5vVE

*Eco-Puzzle Sheet*