

Spoon-billed Sandpiper Teaching Kit

for school teachers and education leaders



Published by



香港觀鳥會
HONG KONG BIRD WATCHING SOCIETY



公益財団法人
日本野鳥の会
Wild Bird Society of Japan

Supported by



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 CRITICAL ECOSYSTEM
PARTNERSHIP FUND

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The background of the entire page is a stylized illustration of a coastal wetland. In the foreground, there is a body of water with small white ripples. The middle ground shows a dark brown mudflat with several small, light blue ponds. In the background, there are green, rounded mountains under a light blue sky. Various birds are scattered throughout the scene: a black and white bird on the left, a brown and white bird on the right, a dark bird in flight on the right, and a white bird on the bottom right.

Foreword

According to the United Nations, about 40% of the world's population lives in coastal areas. When the human population increases, the pressure to the coastal ecosystems increases. Intertidal mudflats are one of the most vulnerable ecosystems in the world. The rate of habitat loss of intertidal mudflats is particularly worrying in Asia. Thousands of waterbirds and wetland-dependent species rely on this important habitat. Many of them even migrate thousands of kilometers every year to complete their life cycles. The loss of wetland habitats is threatening the lives of these waterbirds.

One of these threatened species is the Critically Endangered Spoon-billed Sandpiper, endemic to the East Asian-Australasian Flyway. Because of concerns for the possible extinction of this small bird a Spoon-billed Sandpiper Task Force was launched under the East Asian-Australasian Flyway Partnership. We are using the Spoon-billed Sandpiper as a flagship species, because taking action for this bird will also benefit the other birds that use the flyway and its habitats.

While conservation actions are carried out by government agencies and non-government organizations, awareness by the public is also very important. An effective way of raising awareness is through environmental education. Educating young people about nature is an essential tool for long-term conservation. It can guide them to be in touch with nature, appreciate the beauty, learn about the nature and then join us to take conservation actions.

I am happy to see the publication of the "Spoon-billed Sandpiper Teaching Kit- for school teachers and education leaders. The kit starts with information of wetlands and goes deeper for students to learn about Spoon-billed Sandpiper. It also provides various indoor and outdoor activities and teaching materials for teachers and educators to design their lesson. I believe this is a useful tool for developing understanding of the importance of conserving nature and, in particular, the actions required to ensure the future survival of the Spoon-billed Sandpiper and the other birds that use the habitats of the flyway.



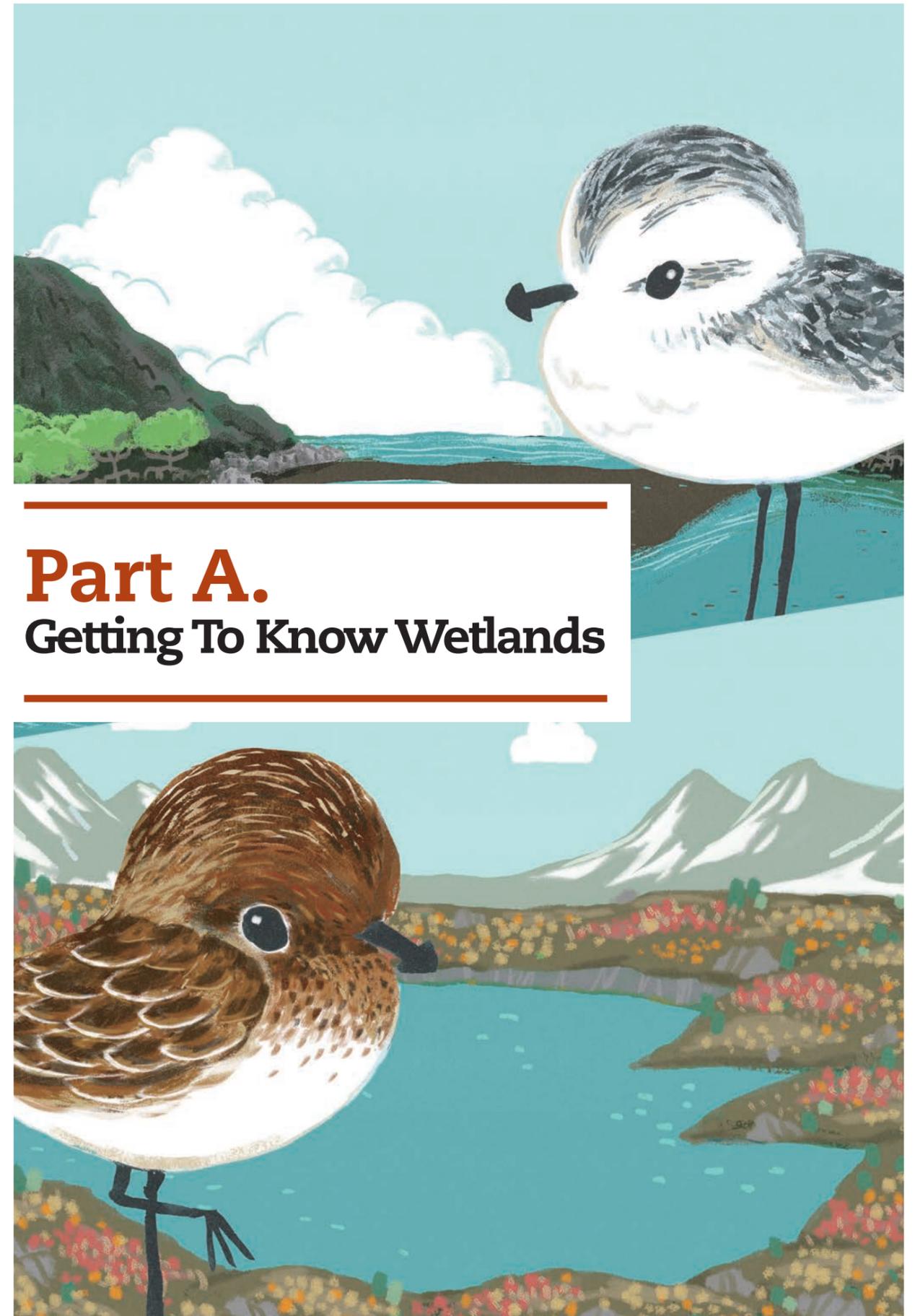
Dr. Evgeny Syroyechkovsky
Chairman of East Asian-Australasian Flyway Partnership
Spoon-billed Sandpiper Task Force

Preface

Water is one of the most important resources of our planet. It is as vital for our lives as the air we breathe. Without water, you and other people cannot survive. Without water, the amazing variety of life on planet Earth cannot survive. Yet water is something that is often taken for granted, we do not do enough to conserve this important resource. Water is stored in wetlands and in this chapter we will explore the types of wetlands, their importance for people and wildlife, and the threats to their conservation. We shall focus on coastal wetlands that are so essential for the survival of Spoon-billed Sandpiper and many other species of birds and wildlife.

How to use this teaching kit

This teaching kit aims to provide information on wetlands and the living creatures in it, using a critically endangered species along the East Asian-Australasian Flyway. The target audience is for children in primary schools. Part A of the teaching kit is general information about wetlands, and basic information about the ecology of wetlands. Part B focuses on stories and information of Spoon-billed Sandpiper, an iconic species in wetlands. It includes a story of a real Spoon-billed Sandpiper. Children can also read and understand the story on their own. We understand that sometimes it is not easy for teachers to bring students out of classrooms to learn about nature, so in Part C, there are suggestions for children to understand wetlands and nature through interesting indoor or outdoor games and activities in relation to the previous sessions. You can print out the materials in the appendix or project them on a screen to carry out your activities.



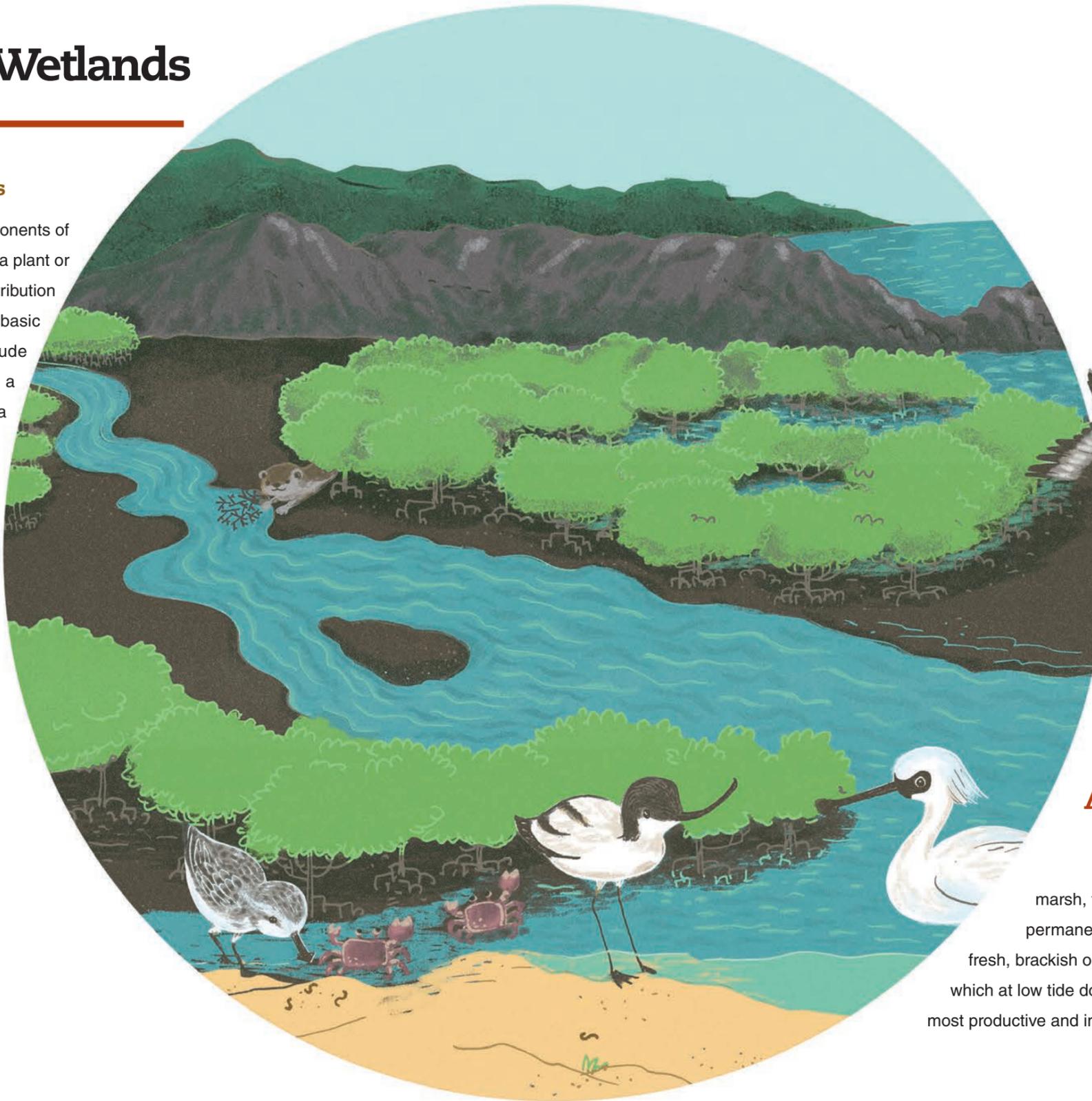
Part A. Getting To Know Wetlands

Part A.

Getting to Know Wetlands

Concept of Ecosystems and Habitats

Ecosystems and habitats are two different components of ecology. A habitat is the natural environment for a plant or animal and it can be used to determine the distribution of a particular species. A habitat provides the basic needs for a species. An ecosystem can include several different habitats providing homes for a variety of wildlife. To use a human analogy – a house or home may be where a person lives (habitat), the person's house or home may be part of a village or city (ecosystem). Wetlands are usually ecosystems composed of different habitats. At least one habitat has water within a wetland ecosystem.



A1. What are Wetlands?

Wetlands are places where lands and water meet.

Ramsar Convention defined wetland as "areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres". These are some of the most productive and important ecosystems on Earth that provide a huge variety of food for people and wildlife.

1.1 Types of Wetland

It is simpler to begin by classifying three main types of wetland:

1. Marine and coastal wetlands, 2. Inland wetlands, 3. Wetlands made by people.

1.1 Coastal and Marine Wetlands

These are very important wetlands where the land meets the sea. Examples include:

Coastal Wetlands

They are wetlands located within coastal watersheds. The sea covers these habitats twice a day due to the tidal effect of the moon, and this regular rhythm of coverage by the sea and exposure to dry air is what contributes to the large amount of life found in the mud and marshes.

They include sand or rocky shores, estuarine lakes and lagoons, coastal floodplain forest, dune swamps, mudflats, coastal lakes, coastal floodplains, mangrove and saltmarsh swamps.

▼ Rocky Shore

▼ Sandy Shore



Mudflats

Mudflats are coastal wetland habitats created by deposition of sediment in low energy coastal environments, particularly estuaries and other sheltered areas. The sediment consists of mainly silt and clay with high organic contents.

These organic contents in the mud support high biodiversity. This is the habitat that Spoon-billed Sandpiper and many other shorebirds use during non-breeding seasons. Coastal mudflats are some of the richest habitats in the world.

▼ Mudflat

▼ Estuaries



Mangroves ▲

Mangroves are a group of trees and shrubs adapted to life in coastal saline or brackish water in the tropics and subtropics. Mangrove is one of the ecosystems that supports the highest biodiversity in the world. The partially submerged roots of mangrove trees trap sediment and help to prevent it from being washed out to sea and can provide nurseries for fish to sustain the foodchains that benefit people and wildlife.

Marine Wetlands ▼

Marine Wetlands are saltwater wetlands exposed to waves, currents and tides in an oceanic setting. They include coral reefs, and aquatic subtidal beds with sea grass and kelps.

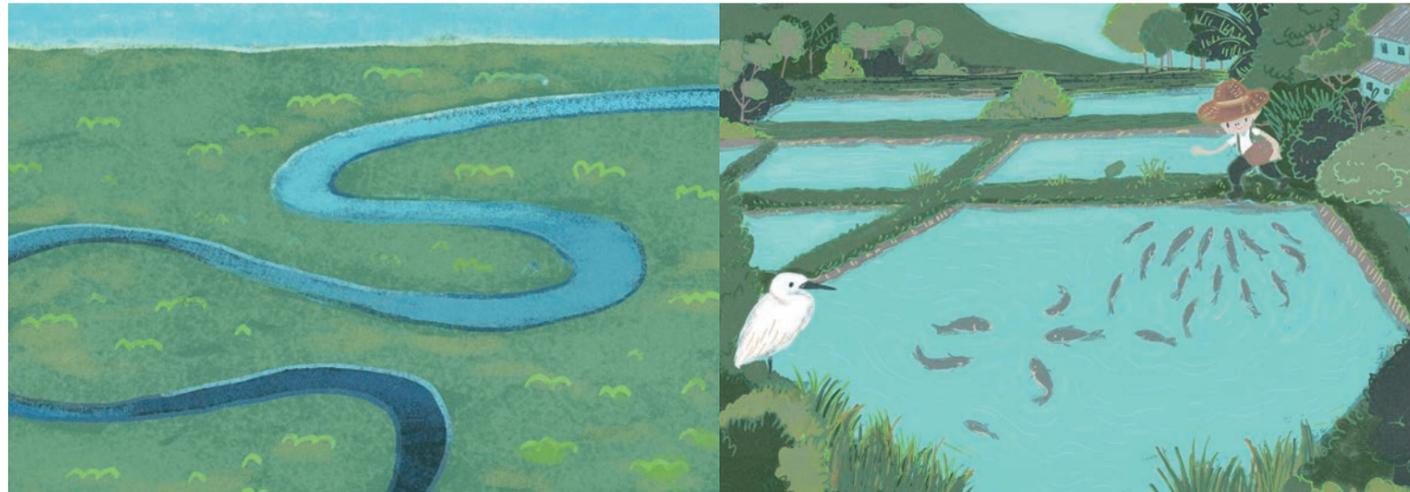


1.2 Inland Wetlands

Inland wetlands, or non-tidal wetlands, are most common on floodplains along rivers and streams (riparian wetlands). Some of these wetlands are seasonal (they are dry in one or more seasons every year), or may be wet only periodically. Some examples are:

Rivers and Streams ►

These can be either permanent or seasonal dependent on the amount of rainfall. Some rivers flow through floodplains, which are seasonal areas where the river water overflows onto adjacent land. They are an important resource for people and can provide food, materials, transport and energy.



Lakes ◀

Lakes are a large body of water (larger and deeper than a pond) within a land mass and is separate from the ocean. It can be freshwater or saline. Lakes are usually permanent areas although the water levels can fluctuate.



Marshes and Swamps, Bog ►

Marshes and swamps form in wet depressions in the landscape or alongside lakes or slow-flowing rivers. The water is colonised by specially adapted plants such as phragmites and water lilies that provide food and shelter for many different types of animals. Bogs are waterlogged peatlands found in depressions in the landscape or in old lake basins. Most of the water in a bog may have come from rainfall. Most of the plants found in a bog have evolved to survive in the acidic conditions that are low in nutrients. Bogs are an important store of carbon, and so they help to reduce the effects of climate change.



1.3 Wetlands Made by People

People make wetlands so that they can use the water stored in them. Examples include:

Fishponds ◀

Ponds are created to farm fish, shrimps or other aquatic food for aquacultural purposes. These artificial ponds are usually built near water bodies or by the coast. They provide temporarily habitat and high-tide roosting sites for shorebirds.

Saltpans and Salinas ►

These are a shallow and flat expanses of ground covered with sea water in which the water evaporates to leave a deposit of salt.



Water Storage Areas ◀

These include reservoirs where water is stored to be used for drinking, bathing, industry and farming. Some reservoirs can be useful for wildlife such as wintering wildfowl.

A2. Importance of Wetlands

There are tremendous values of wetland that people have taken for granted. Wetlands provide important water-related ecosystem services. These ecosystem services also provide a range of benefits to the lives of human and wildlife. For example:

1 Water Storage and Ground Water Recharge

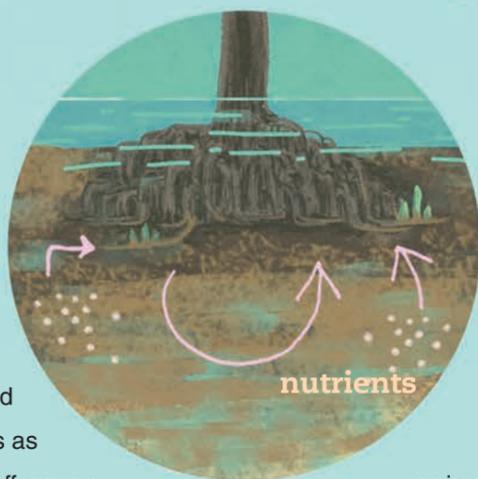
Wetlands help maintain the level of water table. Muddy soil holds more water than sand. Vegetation also aids water storage. For streams, lakes and reservoirs, wetlands contribute to streamflow maintenance.

2 Water Purification

Wetlands are like the Earth's filters, cleaning up water in a number of ways. Pollutants such as heavy metals and toxins are trapped in the sediments of the wetlands in runoffs like rain or storm water. Nitrogen compounds were taken up by wetland plants and transformed into less harmful forms.

3 Flood Protection and Shoreline Stabilization

The world's 50% population living in coastal regions are at risk from catastrophic flooding such as hurricanes, cyclones and tsunamis. Wetlands acts as frontline defense and buffer zone to mitigate such natural hazards. Wetlands also help protect the shoreline soils from the erosive forces of waves and currents by binding the soils with the wetland vegetation roots systems.



4 Sediment & Nutrient Retention and Export

Wetland ecosystem is crucial for natural cycling of sediments and nutrients in the environment, the plants in wetlands take up and store nutrients from water and soil. The nutrients are then released back to the environment when the plants die. Wetlands can serve as carbon sink too.

8 Climate Control

Wetlands are important for mitigation of hazards of climate change. They can serve as buffers and shelters against sea level rises, storm surges, floods and droughts (which can all be the consequences of climate change). Wetlands, such as peat swamps and mangroves, are also effective carbon sinks, which help absorb extra carbon dioxide (important component of greenhouse gases which drive climate change) from the atmosphere, and store carbon in the soil and vegetation.

6 Human Living and Food Supply

Wetlands directly support a large percentage of the world's population. Over 50% of the world's population live within 3km of a wetland. Wetlands are an important source of food, such as fisheries and agriculture products to us. In addition, wetlands yield materials for building houses, fibers and dyes for textiles, medicines from plants of wetlands. Water is also a good medium for transportation.

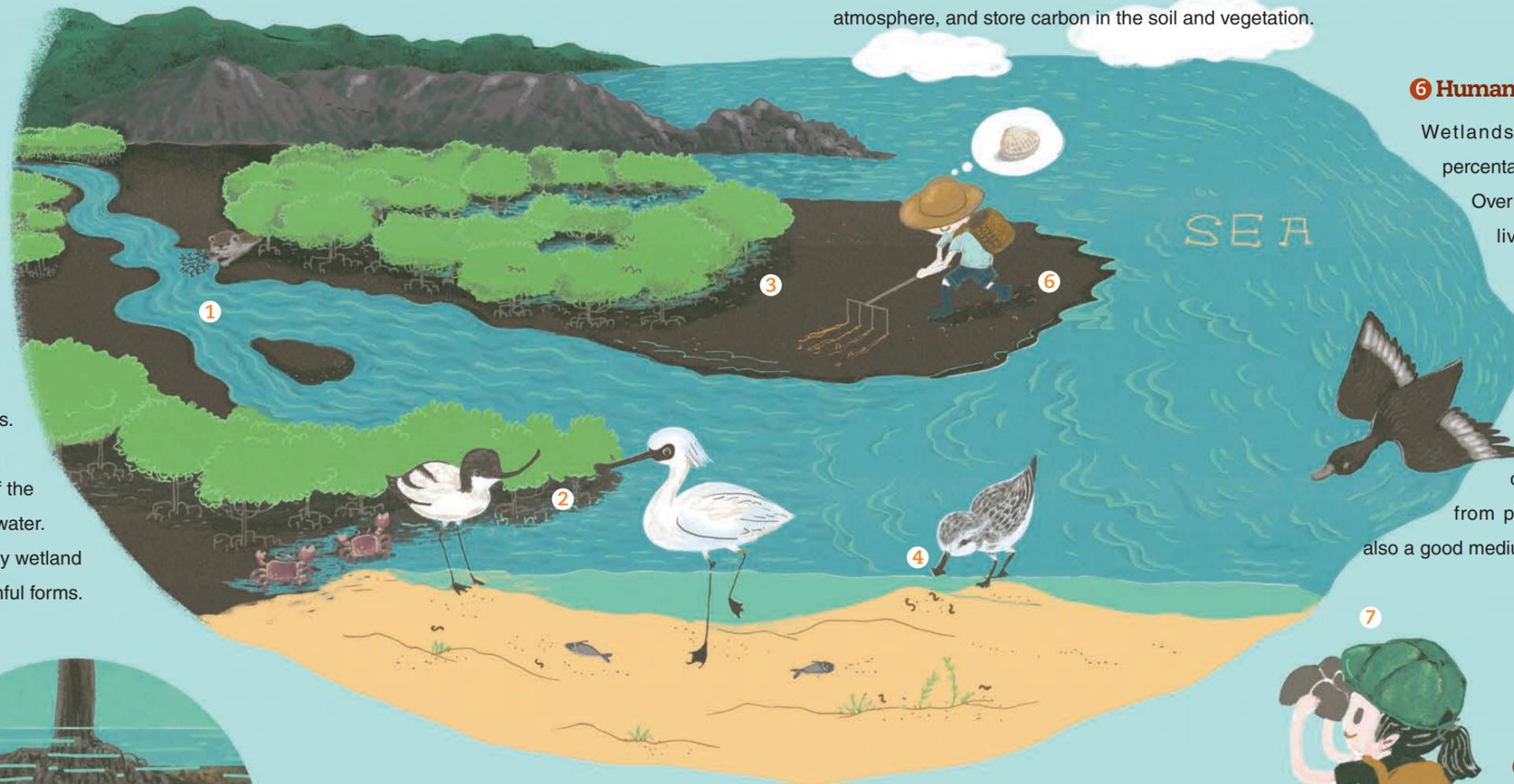
7 Recreational, Historical and Cultural Values

Human civilizations associate with wetlands, thus wetlands are of high historical, cultural, religious value to the history of human development. Wetlands also support various recreational activities such as bird watching, photography, and water sports such as canoeing, water skiing and diving.

5 Vital Habitat

It is estimated that freshwater wetlands support more than 40% of all the world's species, including 12% of all animal species. Many of them can only live in wetland habitats.

In an intertidal mudflat a lot of the animals are hidden in the mud beneath our feet, and these benthic organisms provide food for waterbirds.



A3. Life in Wetlands

3.1 Different Types of Life Forms

Birds



▲ Great Egret



▲ Chinese Pond Heron



▲ Black-faced Spoonbill



▲ Common Kingfisher



▲ Black-headed Gull



▲ Little Grebe



▲ Northern Pintail



▲ Wood Sandpiper



▲ Common Sandpiper



▲ Collared Crow



▲ Little Ringed Plover



▼ White-breasted Waterhen



▲ Pied Avocet



▲ Great Cormorant



▲ Osprey

Other Vertebrates



▲ Mudskipper



▲ Mongoose



▲ Common Carp



▲ Grey Mullet



▲ Common Tilapia



▲ Asian Common Toad



▲ Chinese Bullfrog



▲ Brown Tree Frog



▲ Gunthers Frog

Others



▲ Dragonfly



▲ Damselfly



▲ Fiddler-Crab



▲ Bivalve



▲ Snail



▲ Plankton



▲ Innkeeper Worm



▲ Algae



▲ Mangrove

3.2 Food Chain and Food Web



SUN

PLANT
PRODUCER

SHRIMP
1st CONSUMER

SHOREBIRDS
2nd CONSUMER

RAPTOR
TOP PREDATOR

Food Chain

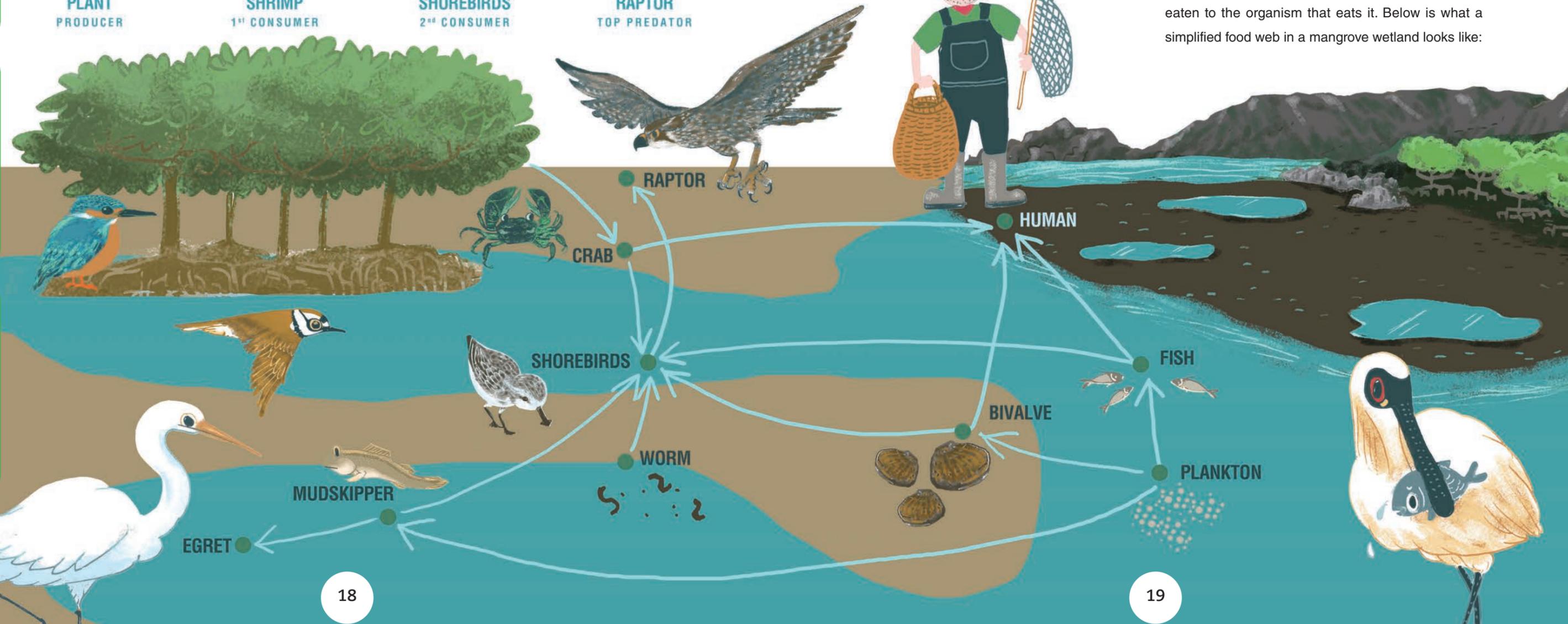
It is a unidirectional path showing how food energy moves from one organism to another in a given environment. Food energy moves along the food chain when one organism eats another which is below it in the food chain. The concept is illustrated as below:

The energy and nutrients flow like this: The Sun passes energy to algae (producer) which make use of sunlight to produce energy. Then the algae were eaten by a shrimp (primary consumer), which was then eaten by a shorebird (secondary consumer). Each of the organism occupied a trophic level. There is some energy loss along the food chain.

One important trophic level is the decomposer. They are relying on dead organic matters or waste products, some examples are fungi, earthworm and crab that break down the dead matters into smaller pieces and debris. They are critical in an ecosystem as they help release nutrients to be recycled and used by primary producers.

Food Web

In real life the situation is more complicated, which can be illustrated by a food web. It shows different but interconnected food chains in an ecosystem to illustrate consumption relationships. An organism (living creature) can eat or being eaten by another. Arrows in the food web point from an organism being eaten to the organism that eats it. Below is what a simplified food web in a mangrove wetland looks like:



3.3 Adaptation of Life in Intertidal Mudflats - Mangrove Plants

Mangroves grow in inter-tidal mudflats, they may be covered by tidal water during high tide period. The soil is soft, saline and low in oxygen. The mangroves also face the risk of being washed away by tides due to the unstable substratum. Therefore, mangroves evolved to adapt to such harsh and dynamic environment with soft and low oxygen soil and varying salinity.

1. Cope with Salinity

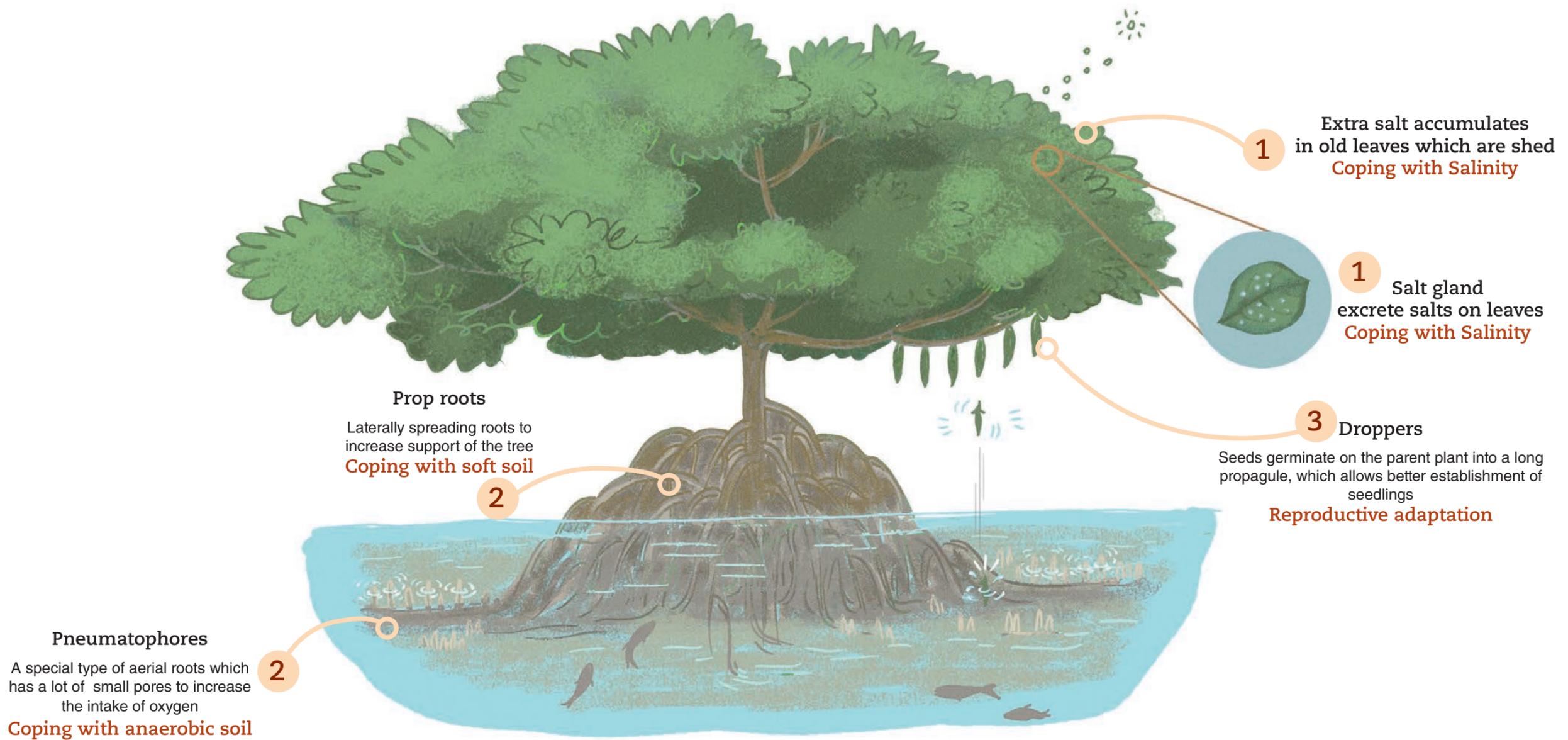
This is mainly carried out by leaves. Salt glands can be found in leaves of some mangrove species, which excrete the absorbed salts. Some may have salt accumulate in old leaves which will be shed. This way helps to regulate the salt concentration inside the mangroves.

2. Coping with Soft Soil with Low Oxygen

Aerial roots are roots that are above ground and exposed to air. This is to cope with soft soil and low oxygen level. Prop roots are laterally spread and not deep in soil, which allows stability of a mangrove to grow in soft soil. While Pneumatophores (Erect Aerial Roots) allows oxygen to transfer in the anaerobic (low oxygen) soil.

3. Reproductive Adaptation

Many mangrove species are viviparous (embryo developed inside the body of the parent). The seed retains in the parent plant until it germinates into a long propagule. After that it will drop from its parent plant and when it is in touch with soil, it will rapidly grow. The seedling can then better adapt to the harsh inter-tidal mudflat environment.



3.4 Adaptation of life in Intertidal Mudflats - Birds

In Asia, there are over 500 species of waterbirds and wetland-dependent bird species relying on wetlands for a living. Many of them are migratory species. They fly to the breeding grounds and move on to their wintering ground after breeding every year. The main flyway they travel is called the East Asian-Australasian Flyway.

1. Colour

Many shorebirds change the colour of their plumage between breeding and non-breeding seasons. During breeding season, they have bright coloured plumage in order to attract mates. While in non-breeding season, they change to dull colours (e.g. brown, grey) which provide camouflage that helps them hide in the background.

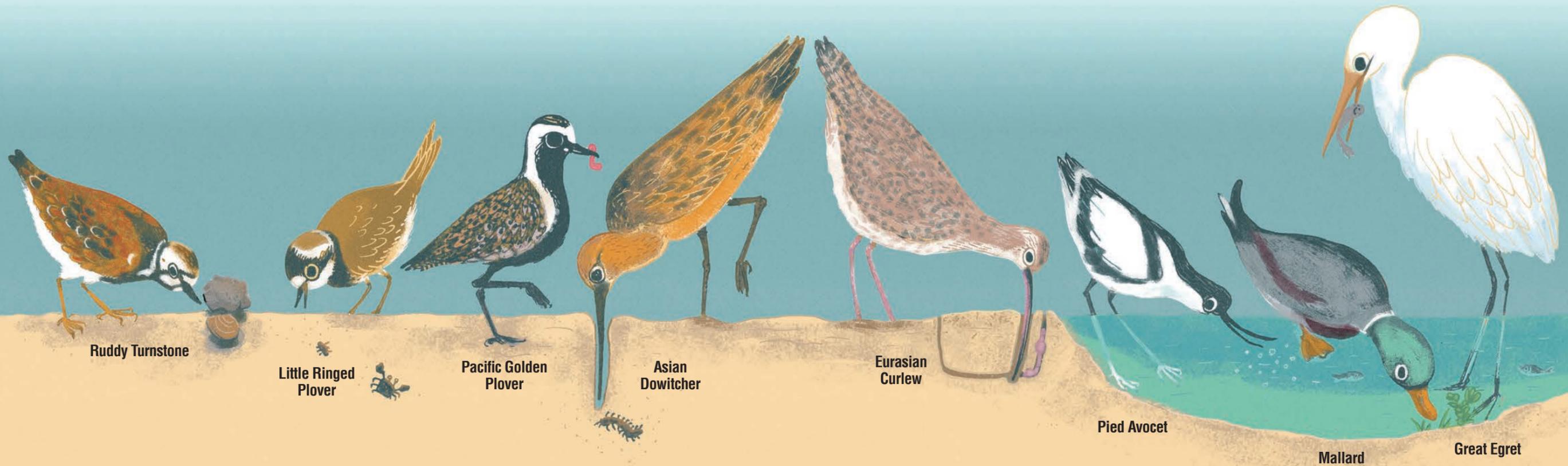
2. Shape of Beak

Various species of shorebirds forage in different ways. Some probe the mud, some peck or skim food from the water. The beaks of birds are adapted to feed in specific ways and on specific types of food. Shorebirds have different lengths of beaks with some species able to feed in the mud while others

with shorter beaks feed on the surface of the mud. The food in the mud enables shorebirds to put on fat which then gives them energy to fly long distances during their migration. Look below for what type of food each bird feeds on?

3. Body

Shorebirds usually have long wings compared to their body sizes, as many of them migrates. They usually have short tails so they will not get wet when staying in shallow water. Their legs are often long, allowing them to wade through water or mud without getting their bodies wet. Their long toes provide stability when walking on soft mud.



Many animals are hidden in the mud of intertidal mudflats. So, even though it looks like an empty desert, it is full of life. They supports lives like these waterbirds which have to migrate long distance between their breeding and non-breeding grounds.

Publication information

Publisher: The Hong Kong Bird Watching Society

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Date of Publish: September, 2018.

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About Hong Kong Bird Watching Society -- HKBWS is a local civil society organization established in 1957, aiming at promoting appreciation, research and conservation of birds and natural environment of Hong Kong and within the region. It was recognized as an approved charitable institution of a public character in 2002. In 2013, HKBWS became the partner of BirdLife International.

About Wild Bird Society of Japan (WBSJ) -- WBSJ is a conservation NGO and BirdLife partner in Japan founded in 1934. WBSJ has over 50,000 members and donors, and 89 chapters throughout Japan. Its purpose is to protect birds and their habitat, to encourage more people to enjoy bird watching, and to carry on research concerning the status and habitat of birds.

Acknowledgement

The completion of the teaching kit is impossible without help from different people. We would like to give our special thanks to colleagues and friends from different non-government organizations (NGOs) from different places, especially partners along the migratory route of Spoon-billed Sandpiper, including Spoon-billed Sandpiper Task Force under East Asian-Australasian Flyway Partnership, Wildfowl & Wetlands Trust (WWT), Birds Russia, Nanjing Normal University, British Trust for Ornithology (BTO), Royal Society for the Protection of Birds (RSPB), Ramsar Network Japan (RNJ), Spoon-billed Sandpiper in China (Spoon-billed SandpipersC), Biodiversity And Nature Conservation Association (BANCA), Bangladesh Spoon-billed Sandpiper Conservation Project (BSCP), Zhanjiang Bird Watching Society, as well as Cornell lab of Ornithology.

We are grateful to have supports from many people who contributed to this teaching kit: Dr. Evgeny Syroechkovskiy, Dr. Christoph Zöckler, Dr. Baz Hughes, Ms. Rebecca Lee, Dr. Nigel Clark, Minoru Kashiwagi, Sayam U. Chowdhury, Pyaephyo Aung, Ayuwat Jearwattanakanok, Jonathan Martinez, Jing Li, Ziyu Yang, Janice Lo, Gerrit Vyn, Jessica Wong, Karly Lau, George Jor, Yee Lai and Alvin Hui.



Part B. About Spoon-billed Sandpiper



Part B.

About Spoon-billed Sandpiper

B1. Information of Spoon-billed Sandpiper



Spoon-billed Sandpiper in non-breeding plumage © Gerrit Vyn/Cornell

1.1 Taxonomy of Spoon-billed Sandpiper

Kingdom: Animalia
Phylum: Chordata
Class: Aves
Order: Charadriiformes
Family: Scolopacidae
Scientific name: *Calidris pygmaea*

1.2 Features of Spoon-billed Sandpiper

Appearance:

A palm-sized (15cm/6 inch) wader with an unique spoon-shaped bill, but it is a bit difficult to see from the side view of the beak. Dark streaks on its cap and back of the neck. During the breeding season, the bird is reddish brown, particularly on the head. Dark spots on the breast extending toward belly. While in non-breeding plumage, the bird turns to greyish brown. On its head, the throat, forehead and cheek are white, with greyish brown eye-line. The chicks of Spoon-billed Sandpiper have perfect camouflage to the breeding habitat. Their bodies are yellowish brown with white and black spots.



Spoon-billed Sandpiper in breeding plumage © Gerrit Vyn/Cornell



Spoon-billed Sandpiper chicks © Pavel Tomkovich

1.3 Distribution Map of Spoon-billed Sandpiper

When seasons change birds migrate. Spoon-billed Sandpiper can only be found in the East Asian-Australasian Flyway. This flyway virtually illustrates the migratory routes of many waterbird species, which from breeding grounds in northern Asia and Alaska to non-breeding grounds in Southeast Asia and Australasia.



Map of Spoon-billed Sandpiper distribution

Breeding Range

The Spoon-billed Sandpiper breeds near the Arctic in far northeastern Russia along the Bering Sea coast of the Chukotka Peninsula and southwards to the Kamchatka Peninsula. The breeding range of the bird has shrunk a lot from their historical breeding range. The bird has disappeared from Belaya Spit, formerly the largest core breeding area for this species.

Winter Range and Migration

Spoon-billed Sandpipers migrate down the western Pacific coast through Russia, Japan, North Korea and South Korea, Northern China, and Vietnam before reaching their main wintering grounds in coastal wetlands in South China, Thailand, Myanmar and Bangladesh. They rely heavily on Yellow Sea intertidal areas as stop-over sites during their migration. There are rare records of the bird wintering in India and Sri Lanka. Their migratory route is over 8000km!

1.4 Habitat of Spoon-billed Sandpiper

Spoon-billed Sandpiper has specialized breeding habitats. They only breed in lagoon spits which have crowberry-lichen vegetation or dwarf birch and willow sedges. Their breeding sites are mainly within 5 km from the coast and very close to estuary or mudflat habitats where they feed. They are very site-faithful to the breeding site (i.e. returning to the same place every year). For wintering ground, Spoon-billed Sandpiper relies on intertidal mudflat with higher sand content with thin layer of mud on top. The bird usually stays in outer reaches of river estuaries and outer islands, sometimes occupies artificial wetlands such as saltpans, where there is shallow water.



Non-breeding habitat © Gerrit Vyn/Cornell



Breeding habitat © Sayam Chowdhury



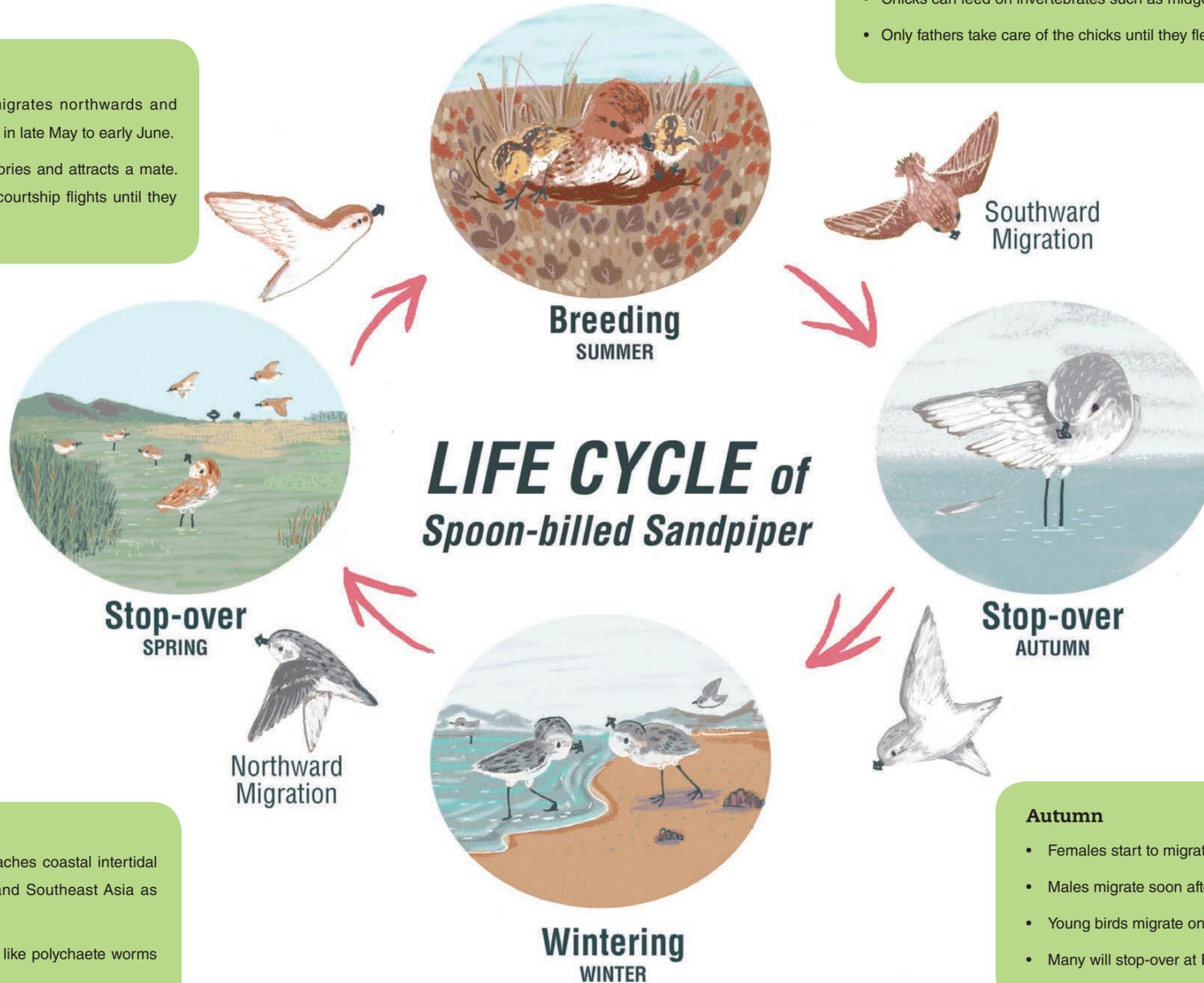
1.5 Food of Spoon-billed Sandpiper

On the breeding grounds, Spoon-billed Sandpipers feed on invertebrates such as mosquitoes and flies, occasionally plant seeds or small berries. These food sources are most abundant during summer time. In wintering grounds and during migration, due to the different habitat, they use their specialized bill to probe and feed on different food sources — a variety of marine invertebrates including worms and shrimps.

1.6 Life Cycle of Spoon-billed Sandpiper

Spring

- Spoon-billed Sandpiper migrates northwards and arrive on the breeding ground in late May to early June.
- The male defends the territories and attracts a mate. The couple would perform courtship flights until they pair up.



Summer

- Spoon-billed Sandpiper makes nest on tundra, and female lays a clutch of 4 eggs.
- Both parents incubate the eggs and the chicks hatch in 19-23 days.
- Chicks can feed on invertebrates such as midges, mosquitoes, and fly on their own
- Only fathers take care of the chicks until they fledge.

Winter

- Spoon-billed Sandpiper reaches coastal intertidal mudflats of South China and Southeast Asia as wintering grounds
- They feed on invertebrates like polychaete worms and shrimp.

Autumn

- Females start to migrate south once the chicks hatch
- Males migrate soon after the young are about to fledge
- Young birds migrate on their own a few weeks later
- Many will stop-over at Rudong, China for moulting

B2. Story of "Spoon-billed Sandpiper 05"



To safeguard this critically endangered bird, the Spoon-billed Sandpiper conservation breeding programme was launched in 2011, and Spoon-billed Sandpiper "Light Green 05(L)" (label on the leg flag) is one of the birds included in the programme. Here is the true story of this little bird.

2.1 Profile of Spoon-billed Sandpiper "Light Green 05 (L)"



© Kanit Kanikul at Khok Kham

Gender	Female
Year of flagging	2013
Mate	Light green 10 (L) since 2014
Total number of sons and daughters	21
Recorded sites visited	Breeding - Meinypil'gyno, Chukotka, Russia Stop-over - Tiaozini, Dongtai County, Jiangsu Province, China Wintering - Khok Kham, Samut Sakhon Province, Thailand

The information of Light green 05 (L) is from the The Spoon-billed Sandpiper Individual Re-sightings Database (Spoon-billed Sandpipers-IDB) which is maintained by the Wildfowl & Wetlands Trust (WWT) and Birds Russia on behalf of the Spoon-billed Sandpiper Task Force



I was born on a tundra in the northeast Russian.
There are lots of food, and my father taught us how to get food and how to fly.

My father also told us to fly away from home when winter comes. It is because our home will be covered by snow and there will be no food.

Oh! It is so tiring after flying for a few days!! I have to eat and gain back some energy!

Ah! I see my friends in the mudflat below!



While we stay at the stop-over site, we change some feathers so that we can fly better when we head to the next stop.

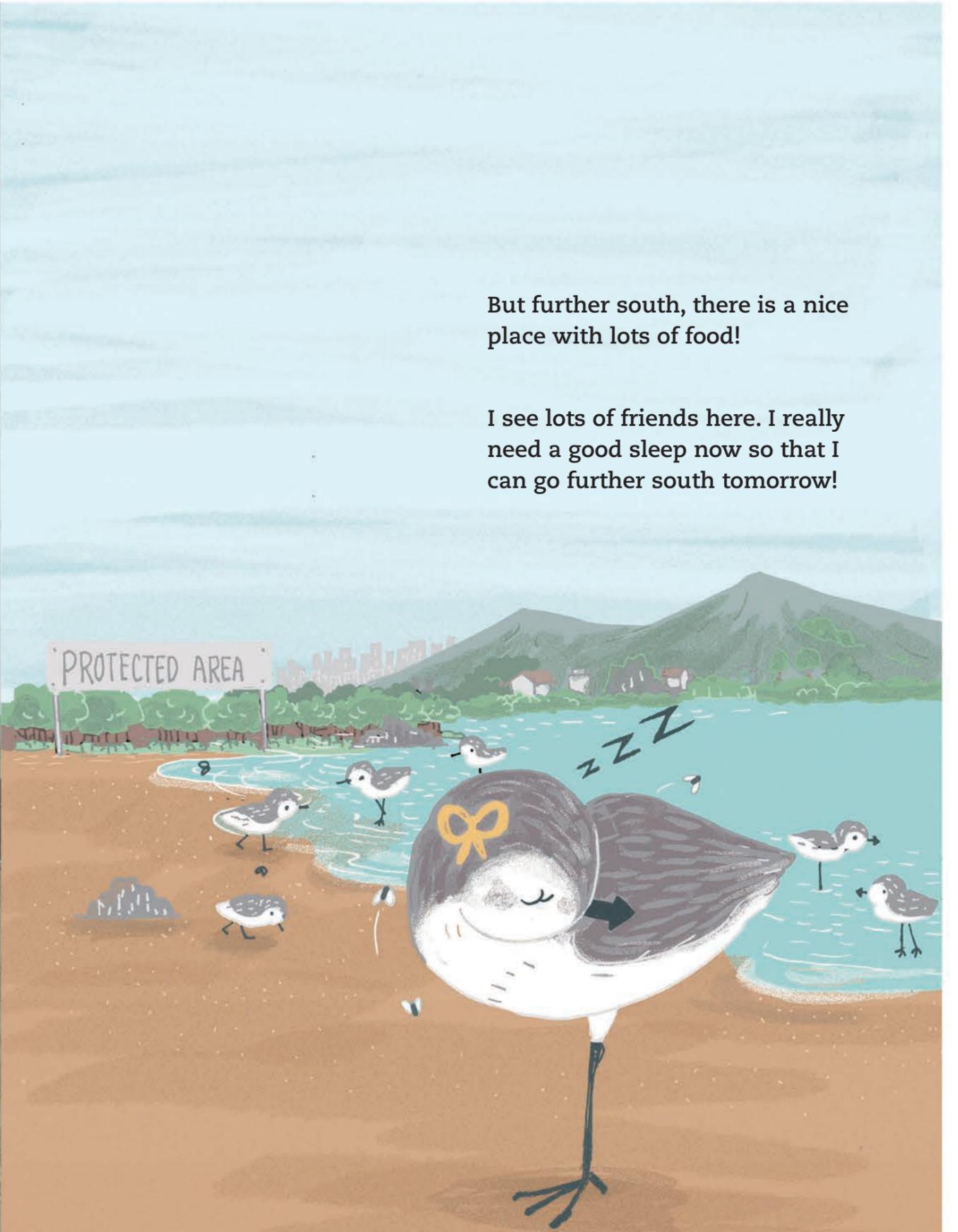
Though we cannot fly well at this moment, we eat a lot to gain energy!



The journey is long, I really want to rest...

But this site is horrible!!

The water is black because of the factory nearby, and there is grass covering the mud, I have no place to stand and nothing to eat...



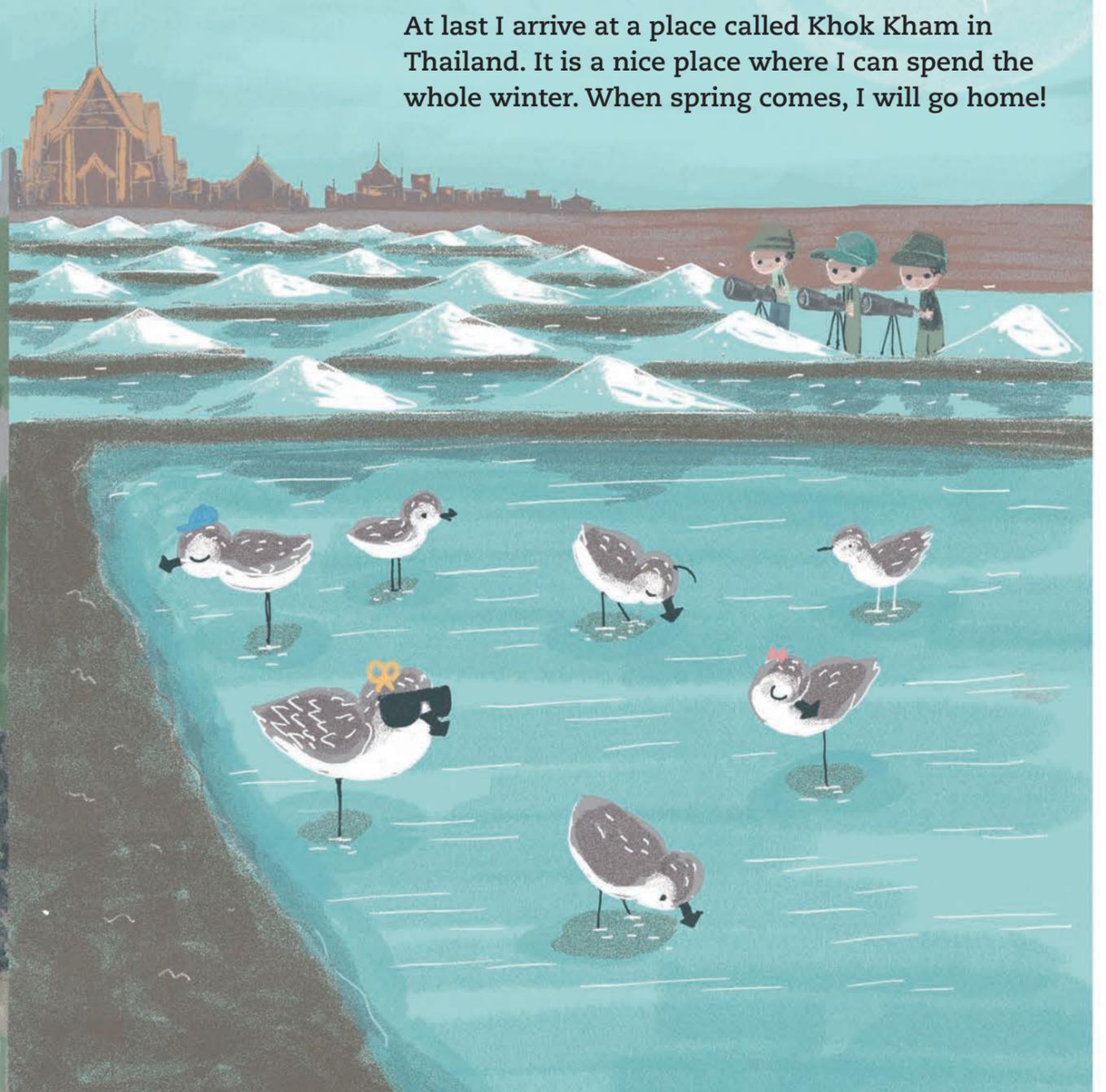
But further south, there is a nice place with lots of food!

I see lots of friends here. I really need a good sleep now so that I can go further south tomorrow!

When I fly above, I see nets on the mudflat and friends are hanging on them! I don't dare to stop here!!

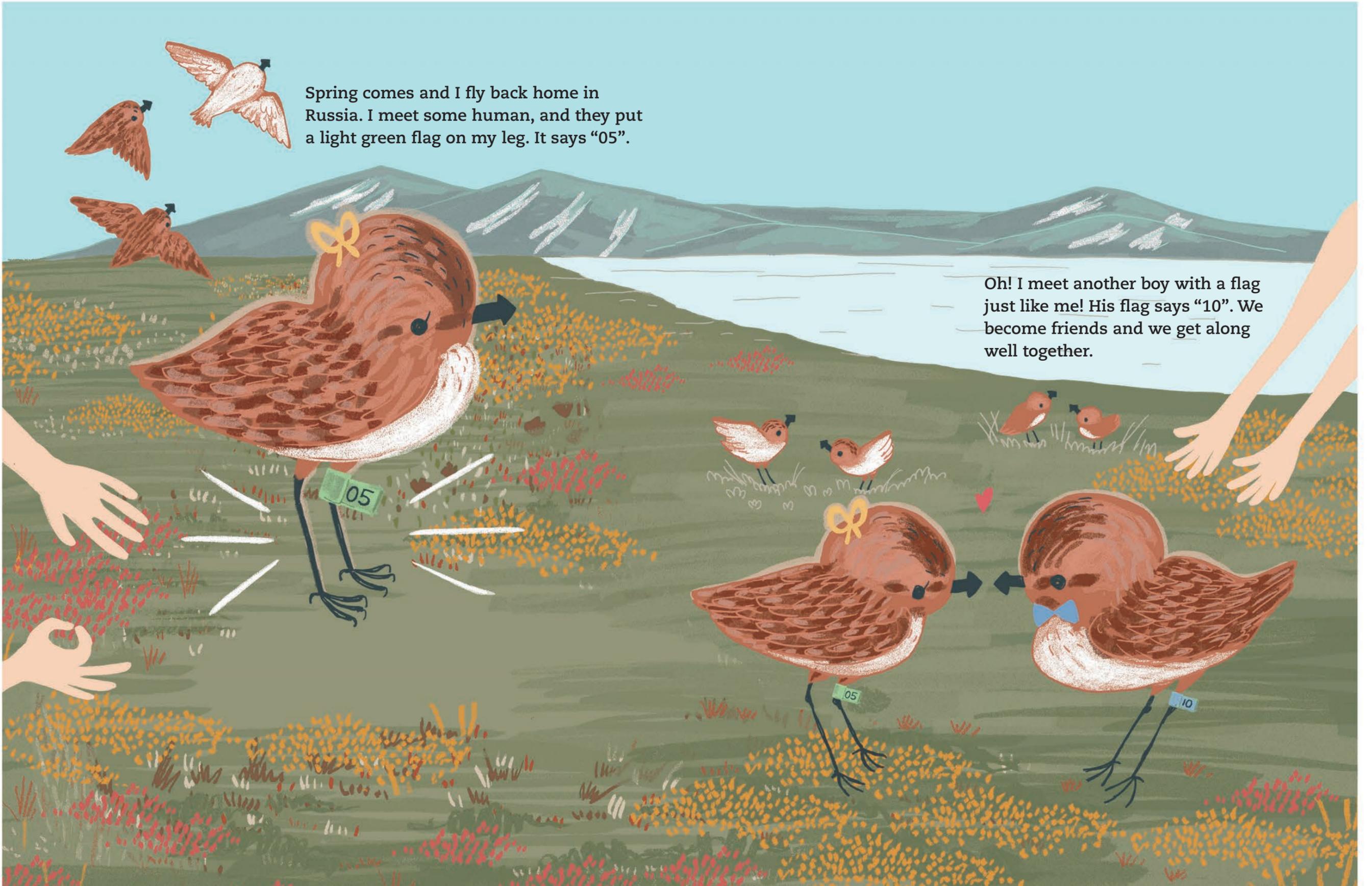


At last I arrive at a place called Khok Kham in Thailand. It is a nice place where I can spend the whole winter. When spring comes, I will go home!



Spring comes and I fly back home in Russia. I meet some human, and they put a light green flag on my leg. It says "05".

Oh! I meet another boy with a flag just like me! His flag says "10". We become friends and we get along well together.



B3. Threats and Conservation

Threats faced by Spoon-billed Sandpiper

The world population of Spoon-billed Sandpiper in 2009/2010 is 360-600 individuals in total, in which 120-200 pairs of breeding adults. The bird was listed as Critically Endangered (CR) by the IUCN in 2008. There are two main threats faced by Spoon-billed Sandpiper: 1. Habitat loss and degradation; 2. Hunting

Status of Spoon-billed Sandpiper on the IUCN Red List

2008	Critically Endangered (CR)
2004	Endangered (EN)
1994	Vulnerable (VU)
1988	Threatened (T)

1. Habitat loss and degradation

Spoon-billed Sandpiper is a long-distance migrant. It needs a lot of energy to complete the 8000km. They rely on the food supply at their stop-over sites to restore energy during migration. The stop-over sites in the Yellow Sea are especially important. However, many of the intertidal wetlands in this region have been lost due to the large-scale reclamation in China and Republic of Korea. For example, the largest seawall in the world in Saemangeum of Republic of Korea destroyed one of the most important sites for waterbirds along this flyway.

In addition, there is an invasive cordgrass *Spartina alterniflora* found in the stop-over sites, mainly in China. This invasive cordgrass grows quickly on intertidal mudflats and thus rapidly covering the open mudflat where shorebirds feed and roost. Shorebirds prefer bare mudflats and seldom feed in the vegetation on the mudflat. The invasive cordgrass is not suitable for shorebirds so they cannot use that habitat.



© Zhang Ming



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2. Hunting

Hunting is another threat to Spoon-billed Sandpiper mainly occurring on their wintering grounds. The birds mainly winter in Myanmar, Bangladesh and South China. However, these are also the places where illegal hunting is prevalent. The hunters catch shorebirds and unfortunately Spoon-billed Sandpipers are sometimes caught and killed. Since the world population of Spoon-billed Sandpipers is very low, even just a small number of the species lost will lead to a great percentage decline in the whole population and draw the species closer to extinction.

Sources: IUCN Red List of Threatened Species: <http://www.iucnredlist.org>

Videos of behaviour of Spoon-billed Sandpiper, produced by Cornell Lab of Ornithology:

The Cornell Lab of Ornithology

Breeding Season	https://www.youtube.com/watch?v=zYsQ1GRllvc
Foraging	https://www.youtube.com/watch?v=H26Tl7e3KeU
Courtship	https://www.youtube.com/watch?v=1NeRF1edFT0
Hatch	https://www.youtube.com/watch?v=f0Mmd70n36w
Birds of the Yellow-Sea	https://www.youtube.com/watch?v=N74zn7bCpq8

B4. Conservation Actions for Spoon-billed Sandpiper in Different Places



Manfred-Hermesen-Stiftung
für Natur und Umwelt

1. Coordinating a network of Spoon-billed Sandpiper conservation activities along the flyway – Spoon-billed Sandpiper Task Force

Since 1996, Dr Christoph Zöckler, the coordinator of Spoon-billed Sandpiper Task Force (SBS TF), has travelled with Dr. Evgeny Syroechkovskiy, the chairman of SBS TF, in the Russian Arctic almost every summer. In 2000 they discovered that the breeding grounds of Spoon-billed Sandpiper in Chukotka were in trouble. Some areas were vacant or almost deserted by the species. They raised the alarm of the decline of Spoon-billed Sandpiper but it was several years before the international conservation community noticed our pleas for help and began supporting our activities. In 2004 they established the Spoon-billed Sandpiper Recovery Team with members from Russia, Japan India and Bangladesh. The group grew and in 2010 became the SBS Task Force of the EAAFP. When in 2003, none of the ringed young birds returned after two years, they realised that the problems of this rare wader



Dr Christoph Zöckler

might also occur along the flyway. Over the past 15 years the group established a network of like-minded people and organisations in all flyway regions that are devoted to the conservation of this charismatic species. The Manfred-Hermesen-Foundation (MHS) was the first donor who supported the surveys on the wintering grounds and continued to support the work of Spoon-billed Sandpiper TF. At present MHS is financing coordination work for the Task Force activities and its fundraising, as well as supporting activities to tackle various conservation problems along the flyway.

To learn more:

<https://eaaflyway.net/project/spoon-billed-sandpiper-task-force/>



2. Conservation breeding programme by Wildfowl & Wetlands Trust (WWT)

In response to the dramatic population decline observed in the 2000s, a conservation breeding programme of Spoon-billed Sandpipers was started in 2011 to safeguard the species in captivity while threats in the wild could be addressed. In 2011 and 2012, a captive population of the bird was established at WWT's Slimbridge headquarters, using eggs collected from the breeding grounds around Meinypil'gyno in Chukotka, Russia. The flock is housed in specially-designed biosecure aviaries at WWT Slimbridge in the UK. In 2014, the birds displayed breeding behaviours for the first time. And in 2016, eggs were laid! Unfortunately, only two chicks hatched and both died within days. After eight years of hard work, in 2018 the team eventually raised the first chick to fledge. In line with this work, a headstarting programme for Spoon-billed Sandpipers has been underway since 2012, involving collecting eggs from incubating birds in the wild, hatching and hand-raising the chicks in captivity to fledging age,



and releasing the birds back into the wild. This work proves with artificial incubation and a brief period in captivity, it could be possible to increase the number of fledgelings produced by pairs at Meinypil'gyno by approximately five-fold and thus increase the survival rate of the bird.

To learn more:

<https://www.saving-spoon-billed-sandpiper.com/cons-breeding-news/>



credit: Jonathan Martinez

3. Flagging and Tagging Spoon-billed Sandpiper

The Spoon-billed Sandpiper satellite tagging work is a collaboration between Birds Russia, Nanjing Normal University, British Trust for Ornithology (BTO), Royal Society for the Protection of Birds (RSPB) and WWT, with assistance from the Spoon-billed Sandpiper Task Force of the East Asian-Australasian Flyway partnership. In 2012 the team realised that there is a need to know more about individual Spoon-billed Sandpipers lives, such as how long they live, where they go and whether they return to the same area at the same time every year. At the time the team was just starting the headstarting program (See WWT's work) so they had an opportunity to

get species individuals without leading predators to their nests (as they were taking the eggs to rear artificially). Every year since then the team has marked adults and chicks found on the breeding grounds with leg flags so the team can follow their lives. They hoped that these bird could be seen away from the breeding grounds. To our surprise, over half of the adult birds survived are seen in the breeding grounds each year and they are very faithful to their wintering site. However, a large part of their migratory route remained unknown. So, when the small satellite transmitters were available, the team successfully got some of the first transmitters. After

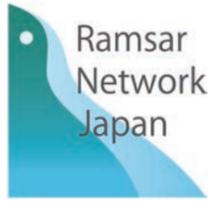
making sure it is safe to apply these transmitters onto the Spoon-billed Sandpiper, the team tagged these transmitters onto three Spoon-billed Sandpiper in Jiangsu, China. Two birds migrated to wintering sites in southern China and the team immediately asked local birdwatchers to visit the sites. The local birdwatchers were distraught because there were so many illegal nets for catching birds. The authorities were alerted and within a day all the nets were removed and they never appeared again (See HKBWS's work). The third SBS made a 2,400km journey to the gulf of Mottama in Myanmar, which is known to be the most important wintering site for

the species (See BANCA's work). The success of the flagging and tagging of Spoon-billed Sandpipers has enabled us to understand more about the life cycle of these incredible birds and focus our conservation efforts in the most important places and hopefully save the species from extinction.

To learn more:

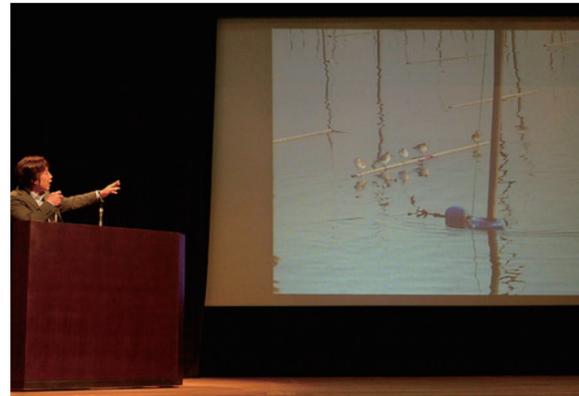
<https://www.saving-spoon-billed-sandpiper.com/category/satellite-tracking/>

<https://www.saving-spoon-billed-sandpiper.com/category/sightings/>



4. Conservation of Shorebird Sites in Kyushu, Japan

Since the beginning of this century, Ramsar Network Japan (RNJ) and partners have contributed towards the conservation of Spoon-billed Sandpiper in many ways from Japan: by supporting surveys in breeding and non-breeding sites, surveys in Myanmar in cooperation with local organizations and people, sending members to Spoon-billed Sandpipers Task Force. But there were not many CEPA activities for Spoon-billed Sandpipers conservation in Japan. However, some conservationists were concerned about the significant decline of Spoon-billed Sandpipers and other shorebirds so RNJ carried out a three-year project from 2015. The project is for raising public awareness and linking people interested in shorebirds. It is organised by an umbrella project, Shorebird Stepping Stones (SSS), a group/organisation working for shorebird conservation and Ramsar Network Japan (RNJ). The team invited Spoon-billed Sandpipers TF members from non-breeding sites in Myanmar and



Mr. Tanaka, fisherman explains roosting dunlins on NORI seaweed culturing bar

Bangladesh and from breeding site in Russia to Spoon-billed Sandpipers/Shorebird sites in Kyushu area to help survey. The team also organized talks which impressed the people and helped to bring attention to the serious plight of the shorebirds since there was no information about how the species live in other sites, and how serious the situation is. It was also a good chance to contact with local fishermen in the sites and to cooperate with the local government on participating in Flyway Site Network.



5. Spoon-billed Sandpiper in China (SBSC)

SBSC is a non-profit organisation dedicated to the conservation of shorebirds on the Yellow Sea mudflats, the most crucial staging sites for species such as the Critically Endangered Spoon-billed Sandpiper and Endangered Nordmann's Greenshank. To achieve the goal of protecting shorebirds and their precious habitats, SBSC runs a wide range of activities including: conducting regular waterbird surveys to monitor bird distribution and population dynamics, communicating, cooperating and collaborating with local and international conservation communities to jointly protect migratory shorebirds, publishing scientific papers in national and international journals, running birdwatching tours and nature observation activities to introduce general public to the unique marine culture of Yellow Sea, organising talks and other educational activities to improve conservation awareness of local communities (e.g. schools, fishermen,



companies), as well as influencing attitudes and decisions of conservation policymakers through the above mentioned activities. Since shorebirds and local fishermen rely on the very same mudflats for food and livelihood, SBSC organised a fishermen's workshop last year to introduce the idea of responsible aquaculture. The organisation will continue to work on this topic in the coming years, hoping to achieve a lasting harmony between birds, fish farms, shellfish farms and people.



6. Tackling illegal hunting in South China through capacity building and environmental education for Spoon-billed Sandpiper – The Hong Kong Bird Watching Society (HKBWS)

HKBWS started to work on conservation of Spoon-billed Sandpiper in 2011. Capacity building and awareness raising are two essential elements for sustaining long-term conservation efforts. Therefore, HKBWS initiated a series of educational activities such as mobilizing over 500 children from 12 areas and 8 countries along Spoon-billed Sandpiper's migratory route to create a short animation in 2013. In 2015, HKBWS initiated a postcards exchange programme to spread the message of conserving Spoon-billed Sandpiper and other waterbirds along the flyway. On the other hand, HKBWS realized there is a knowledge gap of distribution of Spoon-billed Sandpiper in South China. After conducting a preliminary survey along the South China coast, the survey team found a wintering ground of Spoon-billed Sandpiper, but at the same time, they noticed illegal hunting as the biggest threat to birds there. Since 2014, HKBWS has recruited local volunteers and helped to set up a local conservation group and provide training to the local volunteers to build up capacity on bird monitoring and environmental



Volunteers helping to remove the invasive Spartina cordgrass

education. In addition, building networks and collaboration with government authorities enhanced efficiency of law enforcement. When more people join the team, more conservation work can be done. Now the threat of illegal hunting is much reduced.

Animation "Journey of Spoon-billed Sandpiper": <http://www.youtube.com/watch?v=INu1Z5xHeWQ>



7. Biodiversity And Nature Conservation Association (BANCA) helped to establish local conservation group and Ramsar Site in Myanmar

BANCA started conservation of Spoon-billed Sandpiper in Myanmar since 2008. The team noticed that Gulf of Mottama (GOM) and Nanthar Island are critical wintering ground for Spoon-billed Sandpiper and other migratory birds. On average, 50% of the global population of Spoon-billed Sandpiper are wintering in GOM every year. Continuous surveys have identified that the major threat to shorebirds at both sites is hunting by local people. Therefore, BANCA team carried out immediate action with a socio-economic approach to the local community and hunters to tackle the problem. BANCA provided alternative livelihoods (Boats, fishing gears, engines livestock and grocery) for 15 bird hunters who rely on bird hunting income. To ensure effective conservation for Spoon-billed Sandpiper, BANCA leads to the establishment of a Local Conservation Group (LCG) in GOM. Ex-hunters took the role as leaders of the

LCG team, with the members of active village head, fishers and community. The LCG team patrol in the neighboring areas of the villages, report to BANCA and authorities in case of hunting issues. This work was successful. Moreover, with advocacy efforts from BANCA since 2012, the Central Government declared part of the Gulf of Mottama as a Ramsar Site in 2017.





8. Tackling illegal hunting by Bangladesh Spoon-billed Sandpiper Conservation Project (BSCP)

BSCP conducts research and promotes conservation of shorebirds in Bangladesh with a special focus on Spoon-billed Sandpiper. Bangladesh has one of the largest wintering grounds for the bird. The project has been working in an organized manner along the coast of Bangladesh especially on Sonadia Island since 2009. While working on Sonadia Island, the BSCP team encountered shorebird hunting. Since 2010, surveys have been conducted to identify hunters and alternative livelihood options for them. BSCP finally signed conservation agreements with 25 active shorebird hunters of the island between October and December 2011. Alternative livelihood options taken up include seed and fertilizers for watermelon cultivation, fishing boat, net, livestock, grocery and tailoring shops. Among these alternatives, the watermelon cultivation was the most successful one. Ex-hunters who cultivated watermelons have earned almost double the amount they used to make



by trapping birds. In 2016 a total of 46 villagers and 17 ex-hunters were individually interviewed in and around Sonadia. All the respondents said there is no more hunting in the area. Apart from this, BSCP continued to look for new sites, and it discovered a new wintering ground of Spoon-billed Sandpiper around Sandwip, Chittagong, which may support up to 100 Spoon-billed Sandpipers.



9. Restoring salt pans and promoting ecotourism for conservation by Bird Conservation Society of Thailand (BCST)

BCST has been closely monitoring Spoon-billed Sandpipers in Thailand since 1995. The Gulf of Thailand is one of the most important, and probably the most accessible wintering ground of Spoon-billed Sandpiper. Each winter, approximately 10 birds are recorded from several sites around the gulf, most notably Khok Kham and Pak Thale-Laem Phak Bia Flyway Network Sites of East Asian-Australasian Flyway. In order to conserve shorebirds and their habitat, BCST works closely with Thai government agencies, international organizations and local communities to promote tourism as a powerful incentive to conserve shorebird wintering areas. BCST's main working sites consist of the two most important wintering grounds for many globally threatened shorebird species, which are Khok Kham salt pans in Samut Sakhon province and Pak Thale in Phetchaburi province. Main activities at both sites



include conducting regular shorebirds monitoring, particularly for the Spoon-billed Sandpiper, involving local communities in conservation actions, promoting the importance of the sites among local and national audiences and monitor risks to the sites and shorebirds. In 2017, BCST began to work with government in a project to restore old salt pans and turn them into a rich and secure habitat for migratory shorebirds at Pak Thale.

To learn more:
<https://www.bcst.or.th/>

Publication information

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Date of Publish: September, 2018.

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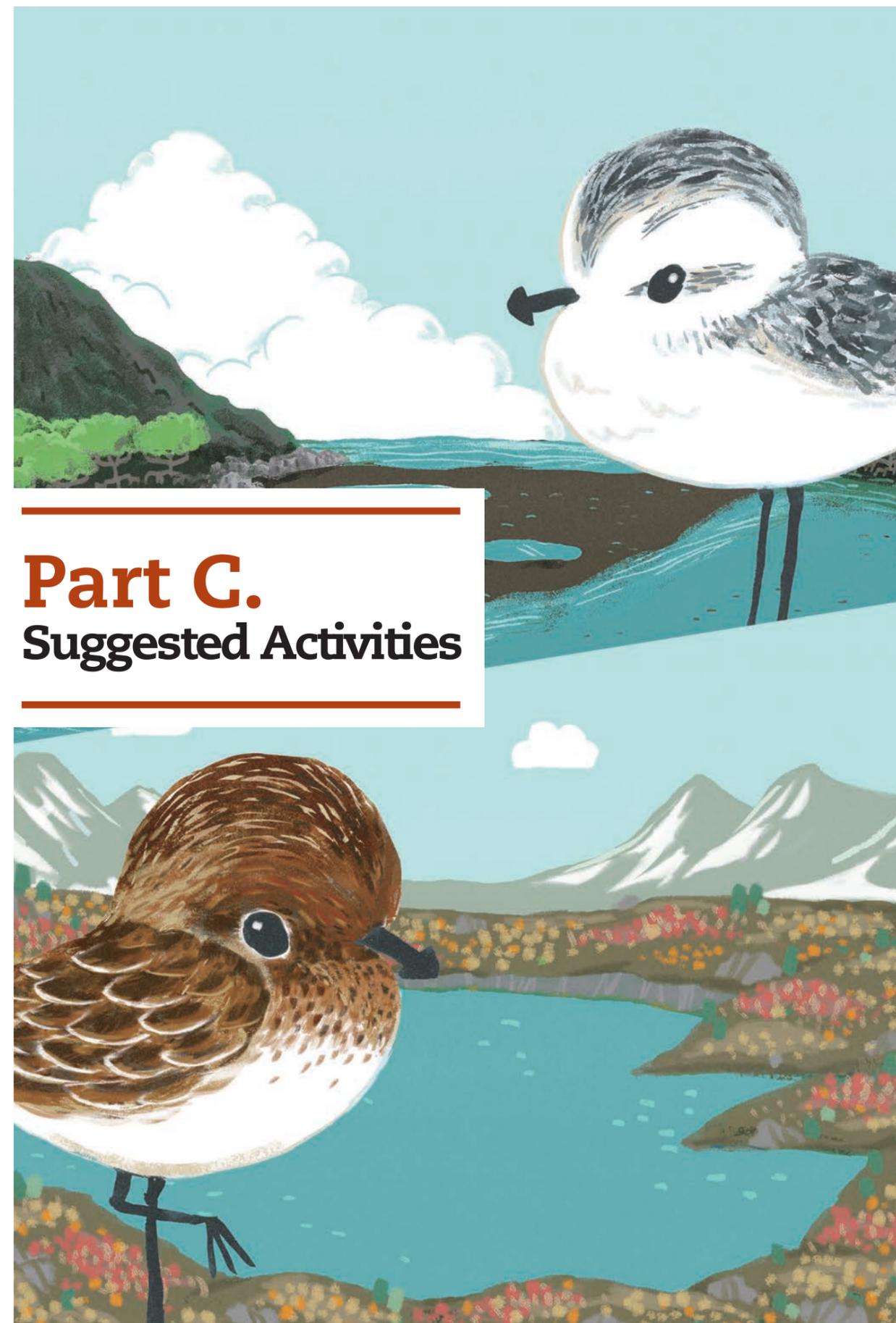
About Hong Kong Bird Watching Society -- HKBWS is a local civil society organization established in 1957, aiming at promoting appreciation, research and conservation of birds and natural environment of Hong Kong and within the region. It was recognized as an approved charitable institution of a public character in 2002. In 2013, HKBWS became the partner of BirdLife International.

About Wild Bird Society of Japan (WBSJ) -- WBSJ is a conservation NGO and BirdLife partner in Japan founded in 1934. WBSJ has over 50,000 members and donors, and 89 chapters throughout Japan. Its purpose is to protect birds and their habitat, to encourage more people to enjoy bird watching, and to carry on research concerning the status and habitat of birds.

Acknowledgement

The completion of the teaching kit is impossible without help from different people. We would like to give our special thanks to colleagues and friends from different non-government organizations (NGOs) from different places, especially partners along the migratory route of Spoon-billed Sandpiper, including Spoon-billed Sandpiper Task Force under East Asian-Australasian Flyway Partnership, Wildfowl & Wetlands Trust (WWT), Birds Russia, Nanjing Normal University, British Trust for Ornithology (BTO), Royal Society for the Protection of Birds (RSPB), Ramsar Network Japan (RNJ), Spoon-billed Sandpiper in China (Spoon-billed SandpipersC), Biodiversity And Nature Conservation Association (BANCA), Bangladesh Spoon-billed Sandpiper Conservation Project (BSCP), Zhanjiang Bird Watching Society, as well as Cornell lab of Ornithology.

We are grateful to have supports from many people who contributed to this teaching kit: Dr. Evgeny Syroechkovskiy, Dr. Christoph Zöckler, Dr. Baz Hughes, Ms. Rebecca Lee, Dr. Nigel Clark, Minoru Kashiwagi, Sayam U. Chowdhury, Pyaephyo Aung, Ayuwat Jearwattanakanok, Jonathan Martinez, Jing Li, Ziyu Yang, Janice Lo, Gerrit Vyn, Jessica Wong, Karly Lau, George Jor, Yee Lai and Alvin Hui.



Part C. Suggested Activities

Part C. Suggested Activities

	Name of Activites	Age	Indoor / Outdoor
Activity 1	Nature Hunt	Over 5	
Activity 2	Going to the Wetland (Map of Life in Mudflat)	Over 10	
Activity 3	Wetland Game (The Importance of Wetlands)	Over 5	
Activity 4	Food Chain Game (Paper, Stone and Scissors)	Over 6	
Activity 5	Food Chain Game	Over 6	
Activity 6	Game of Energy Flow	Over 6	
Activity 7	Food Web Worksheet	Over 10	
Activity 8	The Wader Beak Race	Over 6	
Activity 9	Food Adaptation Observation	Over 10	
Activity 10	Predator-Prey Game (Safety in Numbers).	Over 5	
Activity 11	Colour of Spoon-billed Sandpiper	Over 5	
Activity 12	Journey of Spoon-billed Sandpiper ("Sugoroku" board game)	Over 10	
Activity 13	Story Telling Paper Flips (Make your own story of Spoon-billed Sandpiper)	Over 10	
Activity 14	Discussion Worksheet	Over 10	

Activity 1. Nature Hunt



Learning Objectives	Encourage observation in nature by the kids, there are diverse creatures living in wetland
Target Age	Over 5
Indoor / Outdoor	Outdoor / Indoor
Resources	Printed worksheet (P.74), pencils
Time required	an hour to half day
Organization	Whole class, working individually
The Activities	<ol style="list-style-type: none"> 1. Each kid was delivered a printed worksheet and a pencil 2. The whole class go outside the classroom to a wetland 3. The kids have to tick the box(es) of what they saw during the walk in the wetland 4. When they finished the work, let children compare each sheet and share the findings. Let children know that there are many creatures living in mudflat.

Teaching tips:

This game is mainly designed for outdoor activity to wetlands, but if outdoor activity is restricted, teachers can print the photos out (or find their own pictures) and place it in an indoor area or within the allowed area to carry out this game.

Activity 2. Going to the Wetlands Map of Life in the Mudflat



Learning Objectives	Learning there are diverse creatures living in the mudflat, and understand that the mudflat is important habitat for all of them.
Target Age	Over 10
Indoor / Outdoor	Outdoor
Resources	Pencils, Pens, Coloured pencils, Large paper and board, Digital Cameras, Printer
Time required	2 hours
Organisation	Whole class /group activity
The Activity	<ol style="list-style-type: none"> 1. Divide children into small groups. 3 to 5 children per group is a preferable size. 2. Provide a digital camera per group. * If it is difficult to prepare cameras for each group, provide small cards and let children draw the pictures of creatures instead of taking the photos. 3. Observe nature in the mudflat. Let children take photos when they find creatures. 4. After observation, go back to class and draw a map of the mudflat on large paper. 5. Print the photos of any creatures they took in the mudflat. 6. Put the photos/pictures the map showing where they found the creatures. 7. When they have completed the map, ask children what kind of creatures they took photos of and where the creatures were found. 8. Let children know that there are many creatures living in the mudflat and how these creatures interact with each other and our lives.

Teaching tips:

- This activity can work as group for kids to go out to the field, observe and record what they see, it can be modified according to the situation allowed, e.g. map of a urban park.
- If cameras are not available, use paper cards and let kids to draw what they see.
- It can be integrated with Science lessons

Activity 3. Wetland Game The Importance of Wetlands



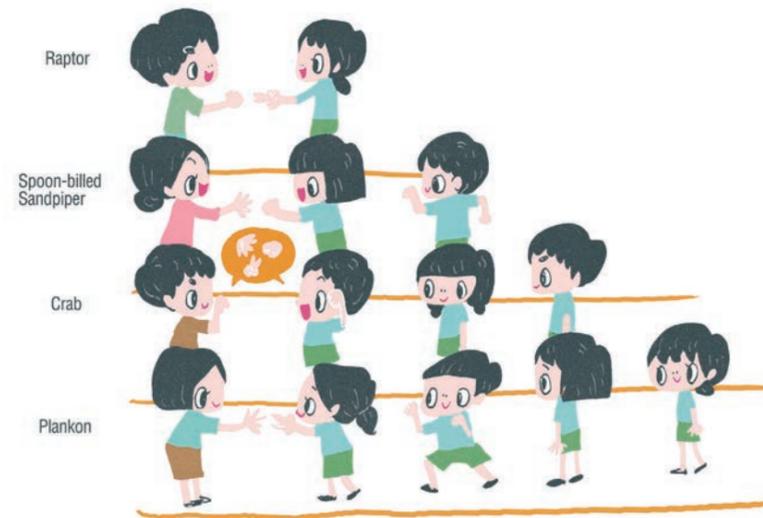
Learning Objectives	Learn the importance of wetlands to waterbirds. When wetlands are damaged or disappear, waterbirds relying on these wetlands will die. The game also suggests different threats which cause wetland loss and deterioration.
Target Age	Over 5
Indoor / Outdoor	Outdoor (preferable) / indoor
Resources	Hula hoops or ropes (4 – 5, depending on group size and space) as wetlands
Time required	2 hours
Organisation	Whole class /group activity
The Activity	<ol style="list-style-type: none"> 1. Deliver name cards of the waterbirds to children 2. Ask all children to stay in the "wetlands" 3. When the leader says "Fly", all waterbirds have to move from one wetland to another. <p>During next time, the leader will say the "threats" to wetlands and remove one of the "wetlands"</p> <ol style="list-style-type: none"> 4. Waterbirds that cannot land inside a "wetland" will die 5. When there is only one piece of "wetland" left, the waterbirds can only fly back to the same place.

Teaching tips:

- In this game, each kid acts as a "migratory bird" (can be waterbird or landbird), each Hula hoop or rope circle serves as a piece of "wetland" or "forest". The "animal" and the "habitat" can change according to the purpose of the game, they can be
- At the end of the game, the teachers should ask the kids again to recall all the threats they, as a bird, has encountered.
- For "threats" to wetlands and birds, refer to pg. 44-45

Activity 4. Food Chain Game

Paper, Stone and Scissors



Learning Objectives	Learning the basic concepts of food chain
Target Age	Over 6
Indoor / Outdoor	Indoor
Resources	N.A.
Time required	10 - 20 mins
Organization	Whole class activity
The Activity	<ol style="list-style-type: none"> 1. Introduce the 4 typical creatures introduced above "Planktons", "Crabs", "Spoon-billed Sandpipers", and "Raptors" to demonstrate a simple food chain on a wetland 2. At the beginning of the game, all children are acting "Planktons". 3. Play "Paper, Stone and Scissors" game and winners will be "Crabs". 4. Winners act like Crabs 5. Play "Paper, Stone and Scissors" game and winners "Crabs" will be "Spoon-billed Sandpipers". 6. Winners act like Spoon-billed Sandpipers. Loser will go back to be "Planktons". 7. Play "Paper, Stone and Scissors" game and winner "Sandpipers" will be "Raptors". 8. Loser "Spoon-billed Sandpipers" will be "Crabs", loser "Crabs" will be "Planktons". 9. Continue the game for 5 min. Play the part of each creature during the game. 10. At the end of the game, children have played the part of 4 creatures, "Planktons", "Crabs", "Spoon-billed Sandpipers" and "Raptors". Divide the children into 4 creature groups, keep playing the part of each creature. 11. After the game, explain that the plankton is eaten by the crab; the crab is eaten by the sandpiper; the sandpiper is eaten by the raptor, and if planktons disappear, crabs cannot live. If crabs disappear, sandpipers cannot live. All the creatures are connected by predator and prey relationship, including humans.

Teaching tips:

- Teachers need to firstly introduce there are different creatures in a habitat, so that the kids knows the creatures before the game (Use Activities 1 &2)
- Plankton: very small creature, move quickly in the water
- Crab: Eat plankton and small creatures using its claws.
- Spoon-billed Sandpiper: walking on the mudflat detecting crabs and small creatures, using its spoon shaped bill.
- Raptor: Flying over the sky look for food. They catch small birds.
- Food chain is complicated, and we will be affected if one of the living creatures is missing. Everything is connected.
- The teacher can give more details of each layer of the food chain after the game.

Activity 5. Food Chain Game



Learning Objectives	Learning food chain and relationship of each trophic level along the food chain
Target Age	Over 6
Indoor / Outdoor	Indoor
Time required	10 mins
Organization	Whole class activity
Resources	<p>Printed worksheet (P. 76-77). Laminated cards of the 4 creatures.</p> <ul style="list-style-type: none"> • Planktons: very small creature, move quickly in the ocean • Crabs: Eat planktons and small creatures using a pair of scissor-like claws. They usually move sideways. • Spoon-billed Sandpipers: walk on the mudflat looking for crabs and small creatures, using their spoonbills. • Peregrine falcon: a raptor: soars in the sky looking for food. They catch small birds.
The Activity	<ol style="list-style-type: none"> 1. Introduce 4 typical creatures in the worksheet to children, "Planktons", "Crabs", "Spoon-billed Sandpipers", and "Raptors", kids act like each creature as described above. 2. Ask 4 children to be volunteers and to stand facing the wall 3. Place the food chain cards randomly on the back of the volunteers (with string or plastic tape) 4. The volunteers has to line up in order of the food chain without talking to each other or knowing the assigned card on their own back (They can look at the cards on the others' back and move the person) 5. Then the volunteers have to guess which part they are in the food chain and stand in order according to the food chain.

Teaching tips:

- Teachers need to firstly introduce there are different creatures in a habitat, so that the kids knows the creatures before the game
- After the game, the plankton is eaten by the crab; the crab is eaten by the sandpiper; the sandpiper is eaten by the raptor, and if planktons disappear, crabs cannot live. If crabs disappear, sandpipers cannot live. All the creatures are connected by predator and prey relationship, including humans.
- Food chain is complicated, and we will be affected if one of them is missing.
- The teacher can give more details of each layer of the food chain after the game.

Activity 6. Game of Energy Flow



Learning Objectives	Demonstrate how energy flows along the food chain and the consequences of disturbing the food chain
Target Age	Over 6
Indoor / Outdoor	Outdoor
Resources	2 buckets/group For each team: 1 plastic cup with one small hole each, 1 cup with 2 small holes each, 1 cup with 3 small holes each, number of holes increase with more players Water (to fill one bucket for each group)
Time required	20-30min
Organisation	Whole class activity in teams
The Activity	<ol style="list-style-type: none"> 5 children in a group and line up. Each child deliver a paper cup (the first child takes a cup with one hole. The second child takes a cup with 2 holes, and so on). Each child represents a player in the food chain It is a competition for more water transferred to the bucket within the given time In front of the first child is a bucket with water, and one empty bucket behind the last child of the line. When the game starts, deliver water by the paper cup from the first child to the last and the last child pours the water into the empty bucket and then return the paper cup to the first child to repeat the process. The game can be modified with situation, e.g. what if pesticide is employed to kill the plant-eating insects? What if illegal hunting is carried out? Discuss with the children the consequences of losing a player in the chain

Teaching tips:

- The first bucket filled with water represents the sun
Water means energy
- The cups with holes makes energy loss, representing energy loss along the trophic cascade.
- Be aware that some children may use their fingers to block the hole
- The teacher can add incidents to affect the food chain. E.g. pesticide applied, some insects will die and be removed from the food chain, which will then be affected; birds being trapped, raptors died as well.

Activity 7. Food Web Worksheet



Learning Objectives	Learning food chain and ecosystem in the intertidal mudflat
Target Age	Over 10
Indoor / Outdoor	Indoor / Outdoor
Resources	Printed worksheet (P. 78), 2 Pencils
Time required	30-45min
Organisation	Whole class activity, working individually.
The Activity	<ol style="list-style-type: none"> Provide general information of wildlife in the mudflat. Observe wildlife in the mudflat with children. Provide the copy of worksheet (P.78) for each kid. Let the children check the worksheet and note the predator-prey relationships.

Teaching tips:

- There is not just one answer. Considering the relationship of each creature in the ecosystem and finding several answers is a key point of in this programme.

Activity 8. The Wader Beak Race

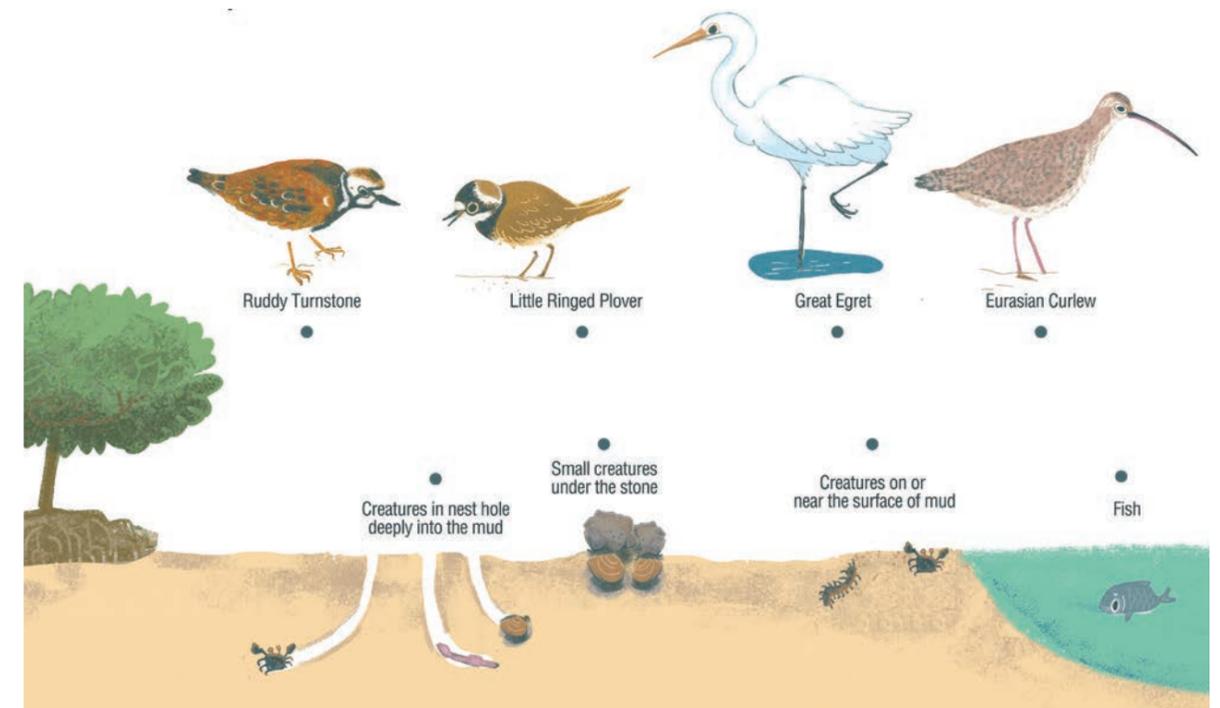


Learning Objectives	Learning that different beak sizes and shapes are adapted for feeding in wetlands, and to prevent competition between species.
Target Age	Over 6
Indoor / Outdoor	Indoor / Outdoor
Organisation	whole class activity, in teams
Resources	6 buckets (adjustable depending on the number of groups) artificial "worms" 6 worms for each group Paper bird beaks for each group (one long and one short). The length of the long beak should be longer than the height of the bucket (so that the "worm can be hooked on the beak from the bottom of the bucket)
Time required	30min
The Activity	<ol style="list-style-type: none"> Children are divided into groups of equal numbers per group, each group given one long paper beak and one short paper beak. First set-up: let the worms be placed on the bucket which is turned upside down. The buckets are placed about 5m away from the starting point of the children. The children line up and take turns to use the short paper beak to take one worm. Finish in 2 mins. See which group takes the highest number of worms. Return the worms to the buckets. Second set-up: Have worms placed at the bottom of the bucket (not turned upside down). The children line up and take turns to use the long paper beak to take one worm. Finish in 2 mins. See which group takes the highest number of worms. Third set-up: now repeat the second set-up for placing the buckets and worms, but all the teams change to use the short paper beaks.

Teaching tips:

Discuss with the children the difficulties of taking the worms with different shapes of beaks: which is the easiest? Why can't the bird with short beaks take the food in the third set-up? Do you think the bird with long and short beaks will compete for the same food in the wild?

Activity 9. Food Adaptation Observation



Learning Objectives	Learn about the unique features of birds for adaptation and how the beaks of different birds relate to the type of food they eat
Target Age	Over 10
Indoor / Outdoor	Indoor / Outdoor
Resources	Binoculars, Telescopes, Pencils, Worksheet(P.80), Can use video for indoor activity
Time required	45min
Organisation	Whole class activity, working individually.
The Activity	<ol style="list-style-type: none"> Most shorebirds are uniquely adapted to living in open tidal land which provides an abundant source of invertebrate for their food. Provide general information of shorebird including Spoon-billed Sandpipers. Watch shorebirds at mudflats using binocular or telescope, observe their beaks and what they eat, how they catch the food. Use the video clip of Cornell Lab of Ornithology if unable to do outdoor observation: https://www.youtube.com/watch?v=56eU3KLIKZo Provide the copy of worksheet(p.80). Let children choose which food they think the bird is best adapted to eat. <ul style="list-style-type: none"> Plovers have short stout beaks. They find food on the surface of mud by their eyes and pick them up. Curlews have long curved beaks. They can catch food deep in the mud. Turnstones feed between rocks, picking out food from cracks or under stones. Great Egrets catch fish by spearing with their long sharp beaks.

Teaching tips:

Let children consider why birds have different beaks. Explain that birds avoid direct competition in between each species that is why they have different beak to catch different foods.

Activity 10. Predator-Prey Game

Safety in Numbers

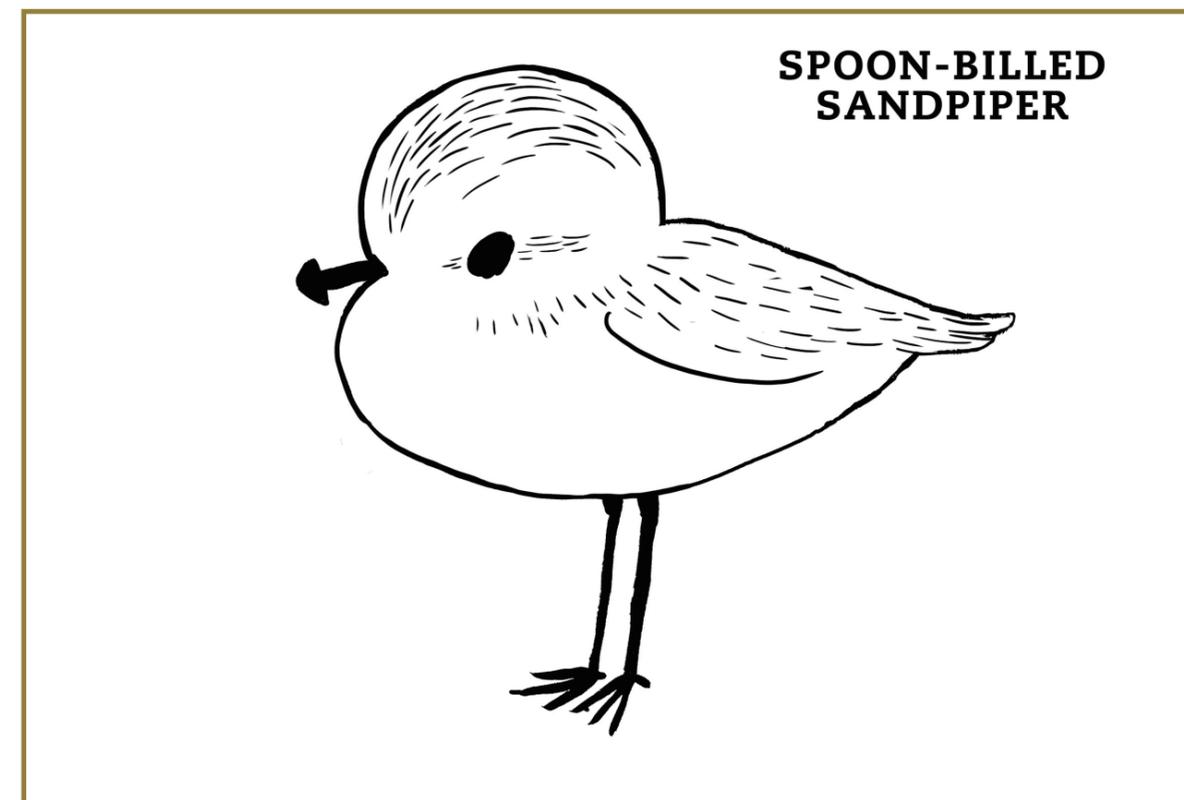


Learning Objectives	To learn the relationship between predators and preys and why waterbirds like to stay in a flock
Target Age	Over 5
Indoor / Outdoor	Outdoor
Resources	4-5 tennis-size balls (ideally three the same colour and one different)
Time required	30 min
Organisation	Whole class activity
The Activity	<ol style="list-style-type: none"> All children stand and form a circle, they represent trees. A ball representing a bird is passed to one of the "trees". When they heard the organizer says "Fly", the child holding the ball has to throw the ball towards another "tree". The ball cannot be passed to an adjacent tree next to the previous tree. In the second round, ask one of the children to act as a raptor. The raptor has to try to catch the "bird" in the air before it lands on a tree. If the bird was caught by the raptor, the "tree" that passes out the bird is lost and change to be another raptor. The child who originally played the raptor now changes to take the place of the "tree". In the third round, add a few more balls of the same colour to increase excitement of the game. At the last round, add one ball of a different colour to the group.

Teaching tips:

- What is the difference of the behavior of the bird when the raptor is present?
- What are the benefits to the birds in a flock?
- What is the strategy of the raptor to hunt in a flock of birds?
- Link this to the children's real life observation.

Activity 11. Colour of Spoon-billed Sandpiper



Learning Objectives	Observe the appearance of Spoon-billed Sandpipers, size and characteristics, colour at different stages and seasons.
Target Age	Over 5
Indoor / Outdoor	Indoor
Resources	Worksheet (P.75), Coloured pencils, Spoon-billed Sandpipers videos (P.45)
Time required	30 min
Organisation	Individual activity
The Activity	<ol style="list-style-type: none"> Provide general information of Spoon-billed Sandpipers, colour, size, characteristics, habit, using the Story of Spoon-billed Sandpipers on Part B. Provide a copy of uncoloured Spoon-billed Sandpipers picture(P.75) for each children. Paint the sheet using color pencils or any painting materials.
Extension activity	Let children draw their own Spoon-billed Sandpiper.

Teaching tips:

The teacher can show them the non-breeding and breeding plumage differences as well as the different habitats of Spoon-billed Sandpiper during the breeding and non-breeding seasons.

Activity 12. Journey of Spoon-billed Sandpiper "Sugoroku" board game



Learning Objectives	Learning about the life cycle and threats of Spoon-billed Sandpiper
Target Age	Over 10
Indoor / Outdoor	Indoor
Resources	Large papers, Pens, Coloured pencils, Markers, Sugoroku Material (P.82-83)
Time Required	3 hours
Organisation	whole class activity
What is Sugoroku?	<p>Sugoroku is one of the Japanese traditional board game. It has a winding track made up of cells on the board. See example on P.82.</p> <p>Approximately 5 players can play at the same time. The players take turns to roll dice and move their pieces according to the number shown on the top of the dice. The player who first reaches the Goal (Finish) first is the winner.</p>
The Activity	<ol style="list-style-type: none"> Provide general information of Spoon-billed Sandpiper using the story of Spoon-billed Sandpiper on Part B. Talk about their life, food, habitat and migration, and what are the threats to Spoon-billed Sandpiper are. Let children consider the story of Spoon-billed Sandpiper, write the basic story in a simple language and divide the text into scenes. Make the original Sugoroku board game of journey of Spoon-billed Sandpiper, following the story. <ul style="list-style-type: none"> Draw a winding track with cells on a large piece of paper. Write down "START" and "GOAL" on the first and the last cell. Write down the text and picture describing the scene in each cell, from hatched(START) to return to the breeding site(GOAL). Consider what are the essential needs of Spoon-billed Sandpiper and what are the threats to Spoon-billed Sandpiper are, and apply special rules into some cells. For example, <ul style="list-style-type: none"> *Nice mudflat with lots of food. Move 3 cells forward. *Caught by nets on the mudflat. Back to Start. *Flying over sea uses up most of the bird's energy resources. Stop one turn. <ul style="list-style-type: none"> Design the board with drawings using coloured pencils, markers, and any painting materials.

Activity 13. Storytelling Paper Flips Make Your Own Story of Spoon-billed Sandpiper



Learning Objectives	Learning about the life and threats of Spoon-billed Sandpipers, making story-telling flips to promotes conservation message of Spoon-billed Sandpipers to the audience.
Target Age	Over 10
Indoor / Outdoor	Indoor
Resources	Pencils, Pens, Coloured pencils, 20-30 thick white papers (size: 30cm x 40cm), worksheet 1& 2 (P.84-85)
Time Required	3 hours
Organisation	whole class activity
The Activity	<ol style="list-style-type: none"> Provide general information of Spoon-billed Sandpipers: colour, size, characteristics, habit, using the Story of Spoon-billed Sandpipers on Part B. Talk about their life, food, habitat and migration, and what are the threats of Spoon-billed Sandpipers are. This activity can be carried out in Language lessons or Art lessons Let children consider the story of Spoon-billed Sandpipers, and encourage them to tell people about Spoon-billed Sandpipers. Make the story telling paper flips with children. <ul style="list-style-type: none"> Consider the theme(main message), outline of the story, and characters using sheet1. Divide the story roughly scene by scene, using sheet2. (* Total number of scenes is depending on the story, but approx. 15 to 20 scenes are suitable for the class. If the story is too long and divided into too many scenes, it will takes more than 3 hours.) Consider the pictures which explain each scene. Draw the draft pictures and text, narration and each characters' line on sheet2. When they have completed sheet2, draw the pictures on white paper flips following the draft pictures on sheet2. Paint the pictures using coloured pencils or any painting materials. Write the text, narration and characters' line on the backside of paper flips. Play the the story-telling paper flips to the audience. Tell the Spoon-billed Sandpipers story showing the picture flips they made, and promote the conservation message of Spoon-billed Sandpipers.

Activity 14. Discussion Worksheet

What can the school group do to help Spoon-billed Sandpiper and other wetland birds?

Learning Objectives	To initiate ideas of what we can do for Spoon-billed Sandpipers and our environment
Target Age	Over 10
Indoor / Outdoor	Indoor
Resources	Pencils, Worksheet (P.75)
Time required	60 mins
Organisation	Whole class/ group activity
The Activity	<ol style="list-style-type: none"> 1. Provide general information of Spoon-billed Sandpipers using the Story of Spoon-billed Sandpipers on Part B. Let the students understand the life of Spoon-billed Sandpipers, their food and migration in the class. 2. Provide the worksheet (P.86) to each children. 3. Following the worksheet, <ul style="list-style-type: none"> • Talk about the essential needs of Spoon-billed Sandpipers. • Let children consider whether Spoon-billed Sandpipers can get their essential needs as mentioned above from the environment in your region or not. • Talk about the most significant threats shorebirds are facing today. • Discuss what can the children and school do to help protect conserve wetlands and the wildlife there.
Extension activity	Let children change each worksheet into a large poster (wall newspaper) and give presentation to other group.

Teaching tips:

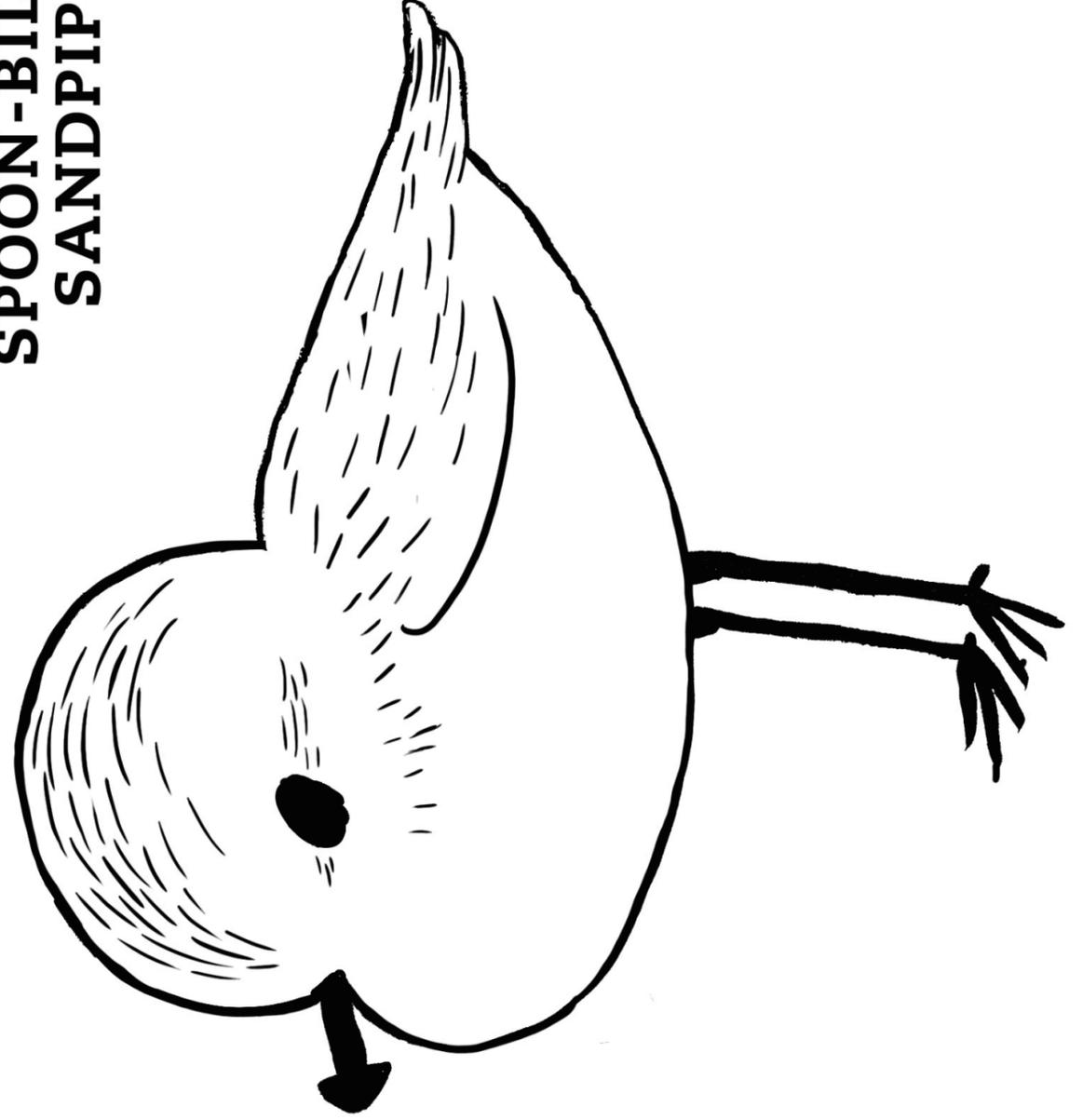
There are no standard answers to the discussion questions. Teachers can encourage more discussion based on the answers from the students.

Appendix

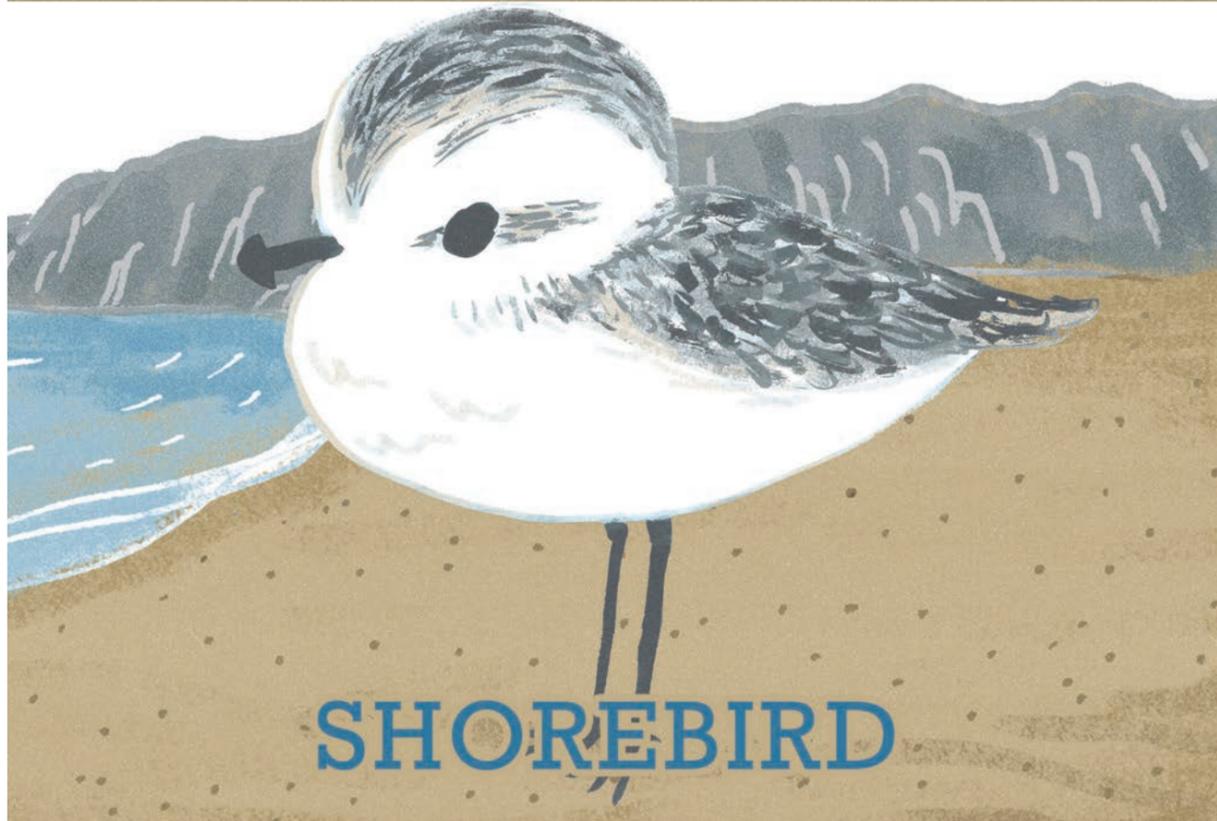
Worksheets and Materials of Part C.



SPOON-BILLED SANDPIPER



Activity 5. Food Chain Game Materials



Part A.
Getting to Know Wetlands

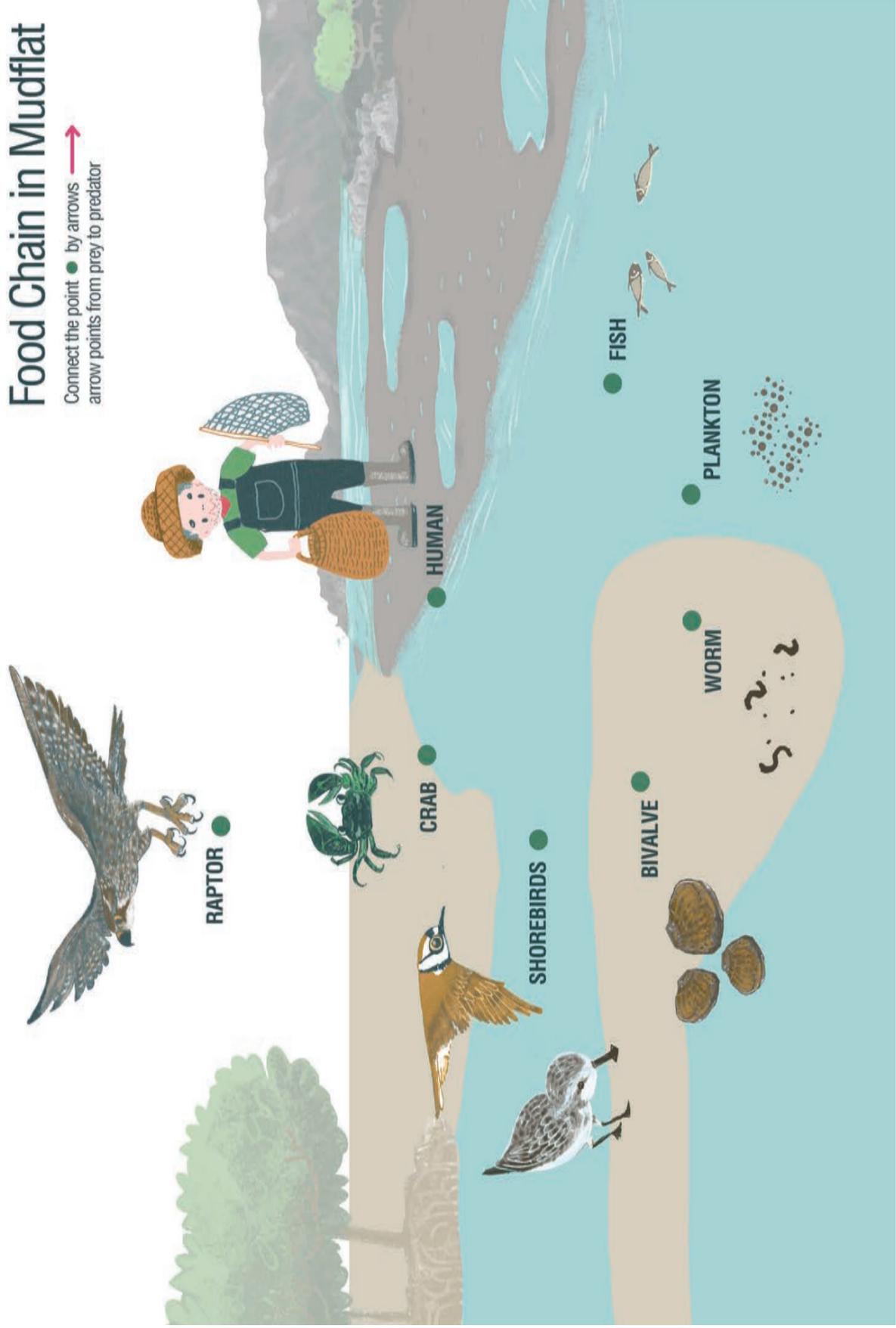
Part B. About
Spoon-billed Sandpiper

Part C. Activities

Appendix

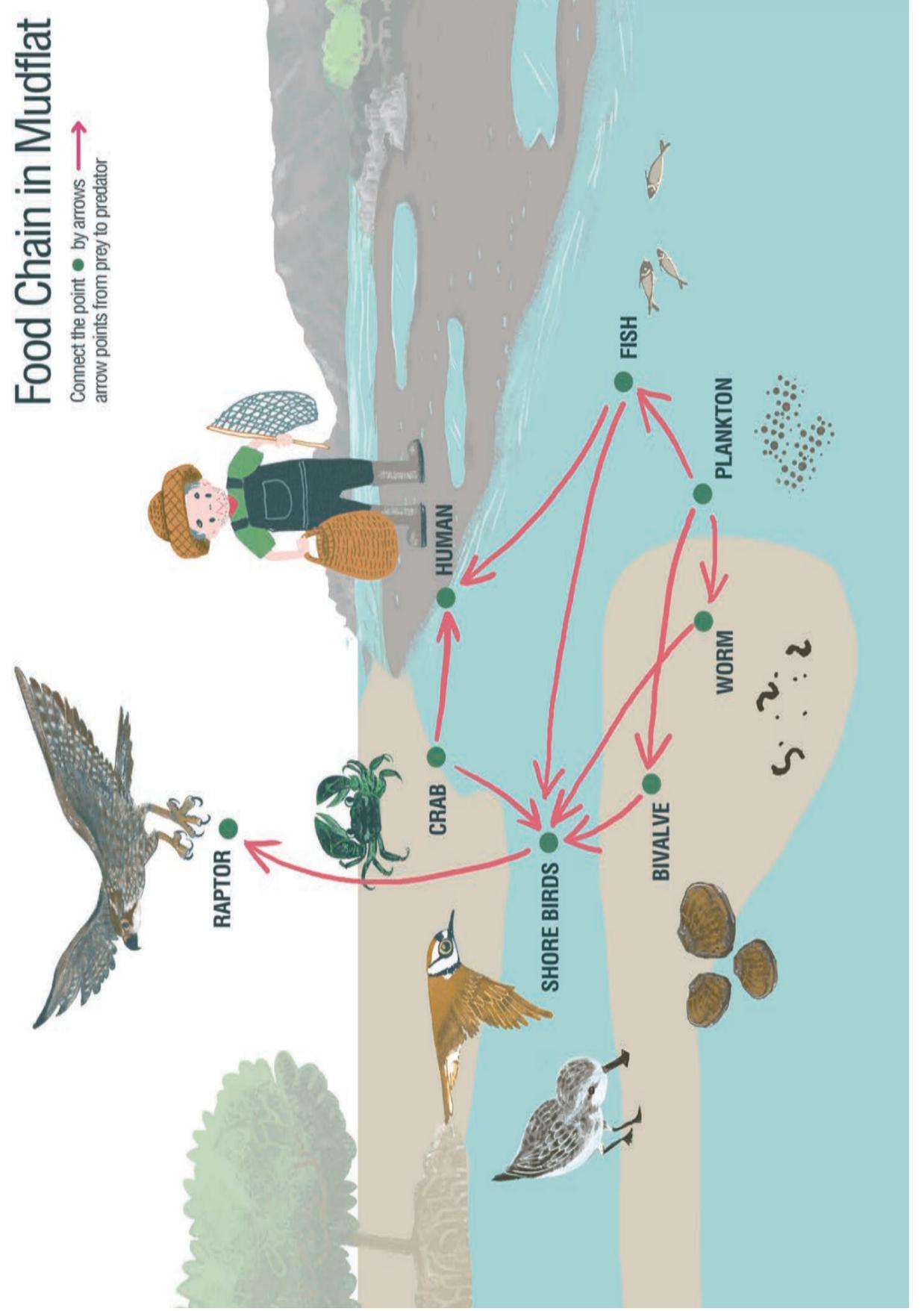
Food Chain in Mudflat

Connect the point ● by arrows →
arrow points from prey to predator

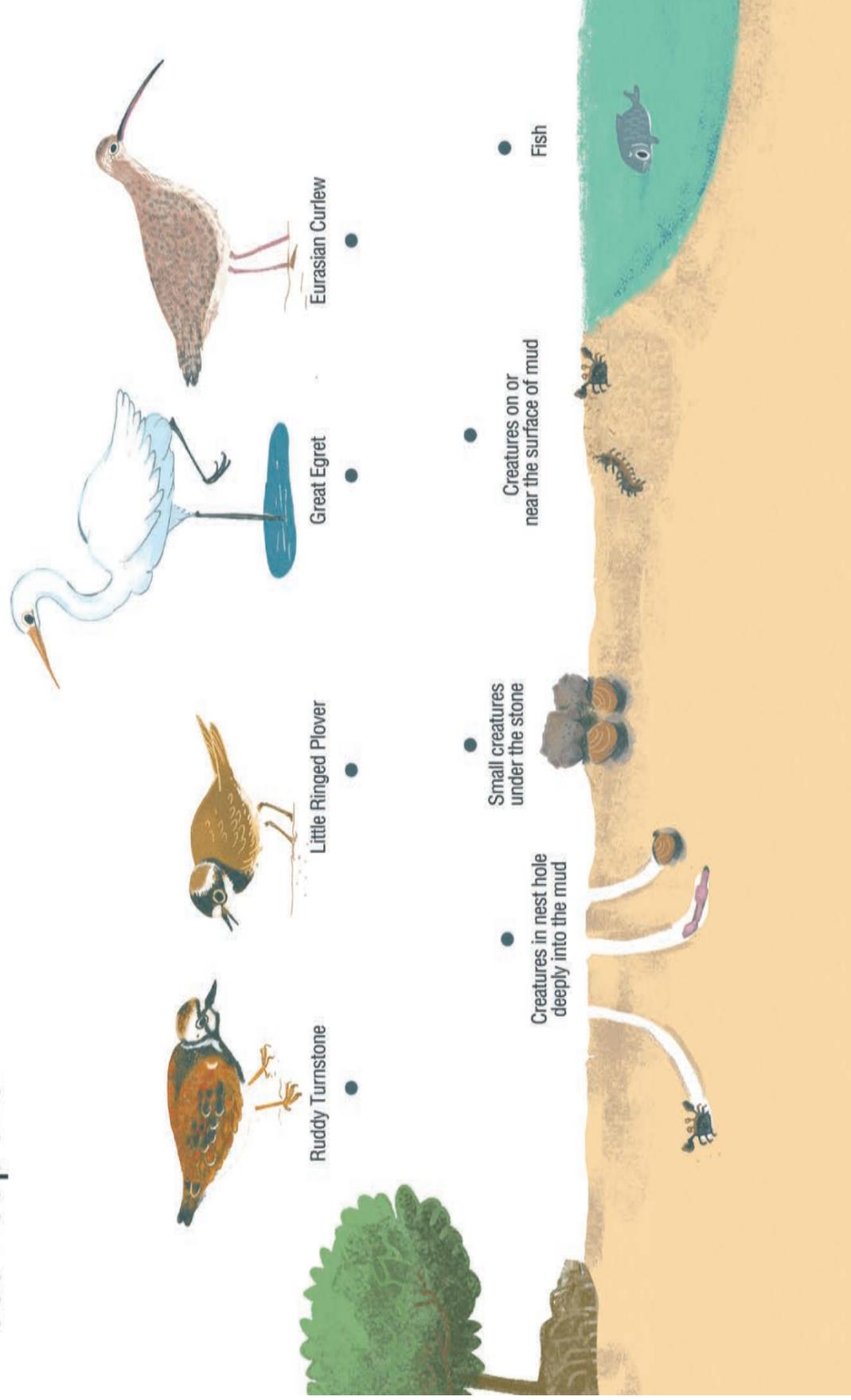


Food Chain in Mudflat

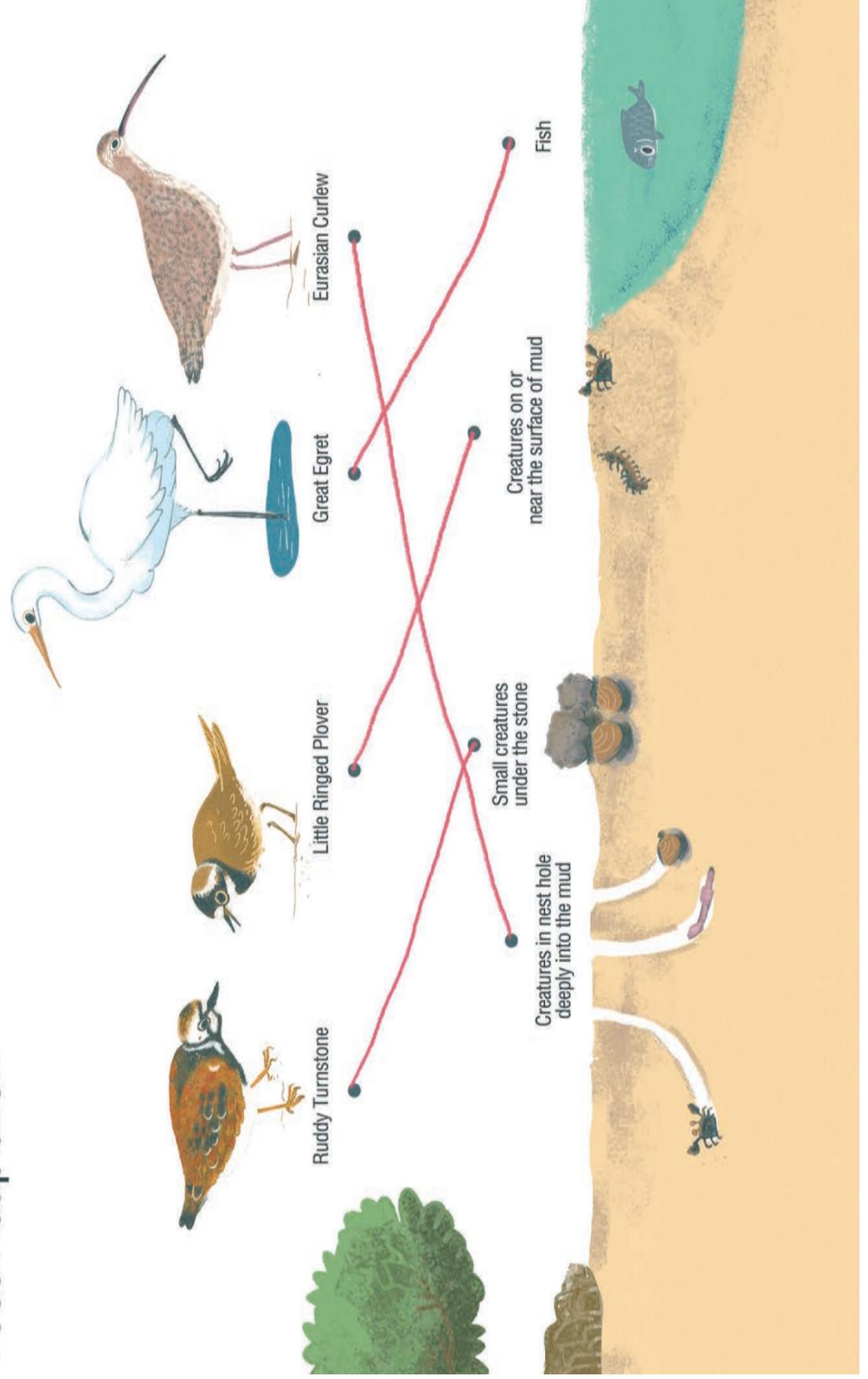
Connect the point ● by arrows →
arrow points from prey to predator



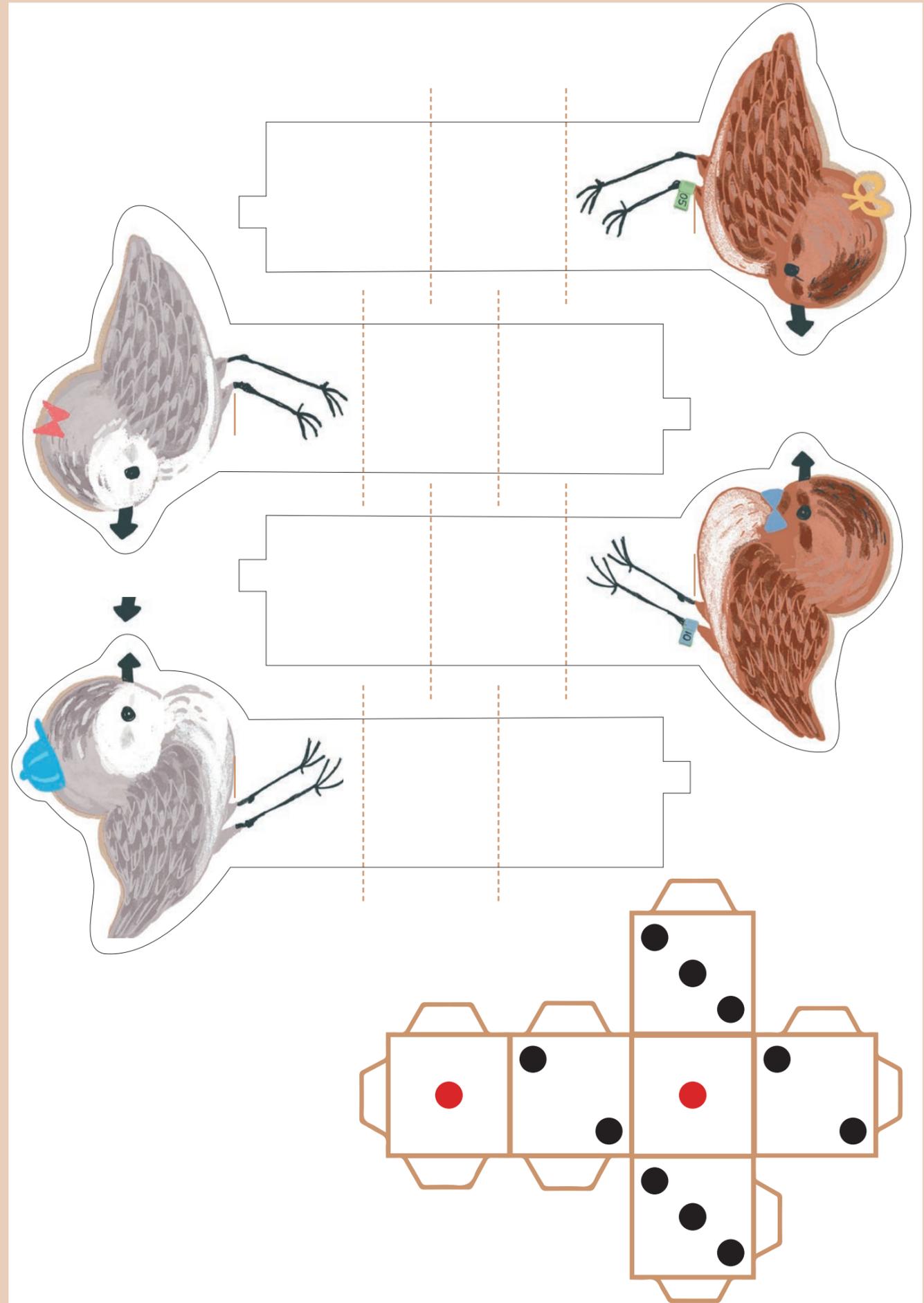
Food Adaptation



Food Adaptation



Activity 12. Spoon-billed Sandpiper Life "Sugoroku" Material



Part A. Getting to Know Wetlands

Part B. About Spoon-billed Sandpiper

Part C. Activities

Appendix

Activity 13. Storytelling Paper Flips Wheetsheet 1

Consider the Story of Spoon-billed Sandpiper's Life

The name of class/group The name of students:
The theme of the story: *Write down the most important message you want to tell to the audience through the story.
Title of the Story Outline of the story Introduction Story line Ending
Characters and their name <input type="checkbox"/> Spoon-billed sandpiper (name: _____) <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>

Activity 13. Storytelling Paper Flips Wheetsheet 2

Title of the story (_____) group (_____)

Picture	Text (narrations and lines)
No. <input type="checkbox"/>	

Activity 14. Discussion Worksheet

What can school groups do to help Spoon-billed Sandpiper and other wetland birds?

What can we do for the Spoon-billed Sandpiper?
What are our daily necessities? What are the essential things for us?
What are the essential needs of Spoon-billed Sandpipers?
Can Spoon-billed Sandpipers get the essential needs mentioned above in the habitat in your region?
What is the most significant threat to Spoon-billed Sandpipers in your country?
What can we do for Spoon-billed Sandpipers and other wetland wildlife?

Publication information

Publisher: The Hong Kong Bird Watching Society
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Date of Publish: September, 2018.

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About Hong Kong Bird Watching Society -- HKBWS is a local civil society organization established in 1957, aiming at promoting appreciation, research and conservation of birds and natural environment of Hong Kong and within the region. It was recognized as an approved charitable institution of a public character in 2002. In 2013, HKBWS became the partner of BirdLife International.

About Wild Bird Society of Japan (WBSJ) -- WBSJ is a conservation NGO and BirdLife partner in Japan founded in 1934. WBSJ has over 50,000 members and donors, and 89 chapters throughout Japan. Its purpose is to protect birds and their habitat, to encourage more people to enjoy bird watching, and to carry on research concerning the status and habitat of birds.

Acknowledgement

The completion of the teaching kit is impossible without help from different people. We would like to give our special thanks to colleagues and friends from different non-government organizations (NGOs) from different places, especially partners along the migratory route of Spoon-billed Sandpiper, including Spoon-billed Sandpiper Task Force under East Asian-Australasian Flyway Partnership, Wildfowl & Wetlands Trust (WWT), Birds Russia, Nanjing Normal University, British Trust for Ornithology (BTO), Royal Society for the Protection of Birds (RSPB), Ramsar Network Japan (RNJ), Spoon-billed Sandpiper in China (Spoon-billed SandpipersC), Biodiversity And Nature Conservation Association (BANCA), Bangladesh Spoon-billed Sandpiper Conservation Project (BSCP), Zhanjiang Bird Watching Society, as well as Cornell lab of Ornithology.

We are grateful to have supports from many people who contributed to this teaching kit: Dr. Evgeny Syroechkovskiy, Dr. Christoph Zöckler, Dr. Baz Hughes, Ms. Rebecca Lee, Dr. Nigel Clark, Minoru Kashiwagi, Sayam U. Chowdhury, Pyaephyo Aung, Ayuwat Jearwattanakanok, Jonathan Martinez, Jing Li, Ziyong Yang, Janice Lo, Gerrit Vyn, Jessica Wong, Karly Lau, George Jor, Yee Lai and Alvin Hui.

Spoon-billed Sandpiper Teaching Kit

for school teachers and education leaders



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