



Transboundary Conservation

2022 RISD Landscape Architecture Department
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CROSS BORDER CONSERVATION
-China - North Korea Border

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MLA Landscape Architecture, RISD

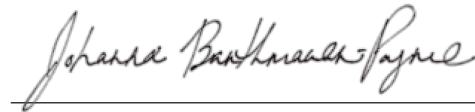
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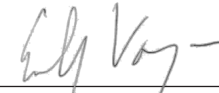
A thesis submitted in partial fulfillment of the requirements for the Master of Landscape Architecture Degree in the Department of Landscape Architecture of the Rhode Island School of Design, Providence, Rhode Island.

By Ziyu Zhou
2022/05/28

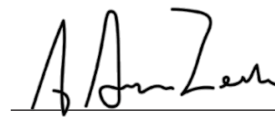
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Introduction



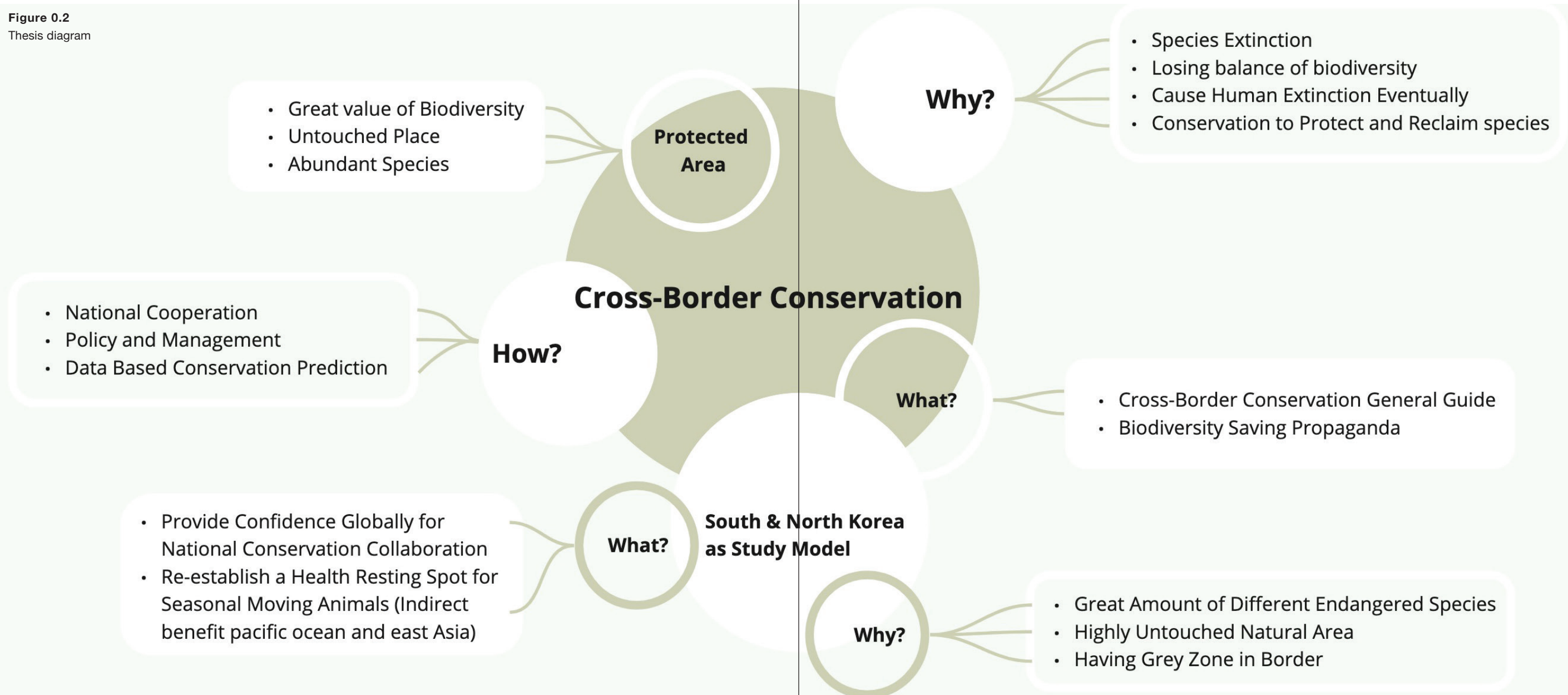
Figure 0.1
Collage of nature in the future
(If we do not start the conservation
of species from today, then many
of the species would only live in
our memories)

ABSTRACT

Earth today faces an accelerated species extinction problem because of human presence, which is 1,000 to 10,000 times higher than the natural extinction rates. Over 27.8% of species are threatened (IUCN). An increased extinction rate will cause the ecosystem to lose its balance and break the shield for most species, including human beings. (Wilson, 2017) Conservation is one of the most important methods to save species; conserving in

transboundary areas will increase efficiency. These areas are untouched and protected, forming a new biodiversity paradise. The Transboundary conservation project would benefit the ecology aspect and social, cultural, and political. This thesis will use one of the most endangered species on earth, the crane, as the target species to design a conservation project along the China and North Korea border.

Figure 0.2
Thesis diagram



LEXICON

Transboundary: having effect or moving across borders.

Conservation: focused on protecting extinct species and maintaining and restoring habitats

Wetland: habitat consisting of marshes, swamps and saturated land

DPRK: democratic people of republic korea

Monogamy: married or with one person at one time

Border: separating land politically and geographically

Border: edge or boundary of living habitat
Common: ancient mode of both protecting and managing the wilds of self-governing region

Biodiversity: biological diversity in an environments as indicated by numbers of different species

Extinction: the process of species, group of plants or animals became extinct

International cooperation: process of policy coordination by states and other entities

Ecosystem: the community of species function as a unit one time

Union: a state of harmony or agreement (also in politically)

Peace: no wars, freedom of disturbance

Longevity: long life

Fairyland: an imagined place, utopia

Thriving: prosper and flourish of a country or species

Committed love: monogamy and long lasted marriage

Mid-point: buffer area between A to B

CHAPTER



The Importance of Species Conservation

- Introduction
- Species Extinction
- Wetland Disappear
- Study of Crane



Figure 1.1
Collage of half earth and half urbanization.
Human and other species live in harmony.

Understanding the potential value that border areas could bring to nature and world conservation would be one of the goals of this project.

Since these areas are protected by a border army and left untouched for many years, it has already become a paradise for different species. These two sides' protection from countries would also block the invading species and illegal poachers for species that live in this area. This precious nature foundation would also make the conservation in cross-border areas more effective than in other places and bring back biodiversity.

Transboundary conservation projects would bring benefits from the ecological aspect and other three aspects: social, political, and culture. Using conservation as the access point from the ecological aspect to improve neighboring countries' economic development and reputation in the international council. (IUCN,2021)

INTRODUCTION

This thesis project is mining the method of the proper way to maximize the conservation in the future. Nowadays, species are extinctions at high speed, which will eventually cause human extinction in the end. (Wilson, 2017) National cooperation would be one of the best solutions to "save half of the earth," which produces more habitat for different species.

In 2021
Assessed Species: **134,425**
Threatened: **37,480**
Over **27.8%** are threatened

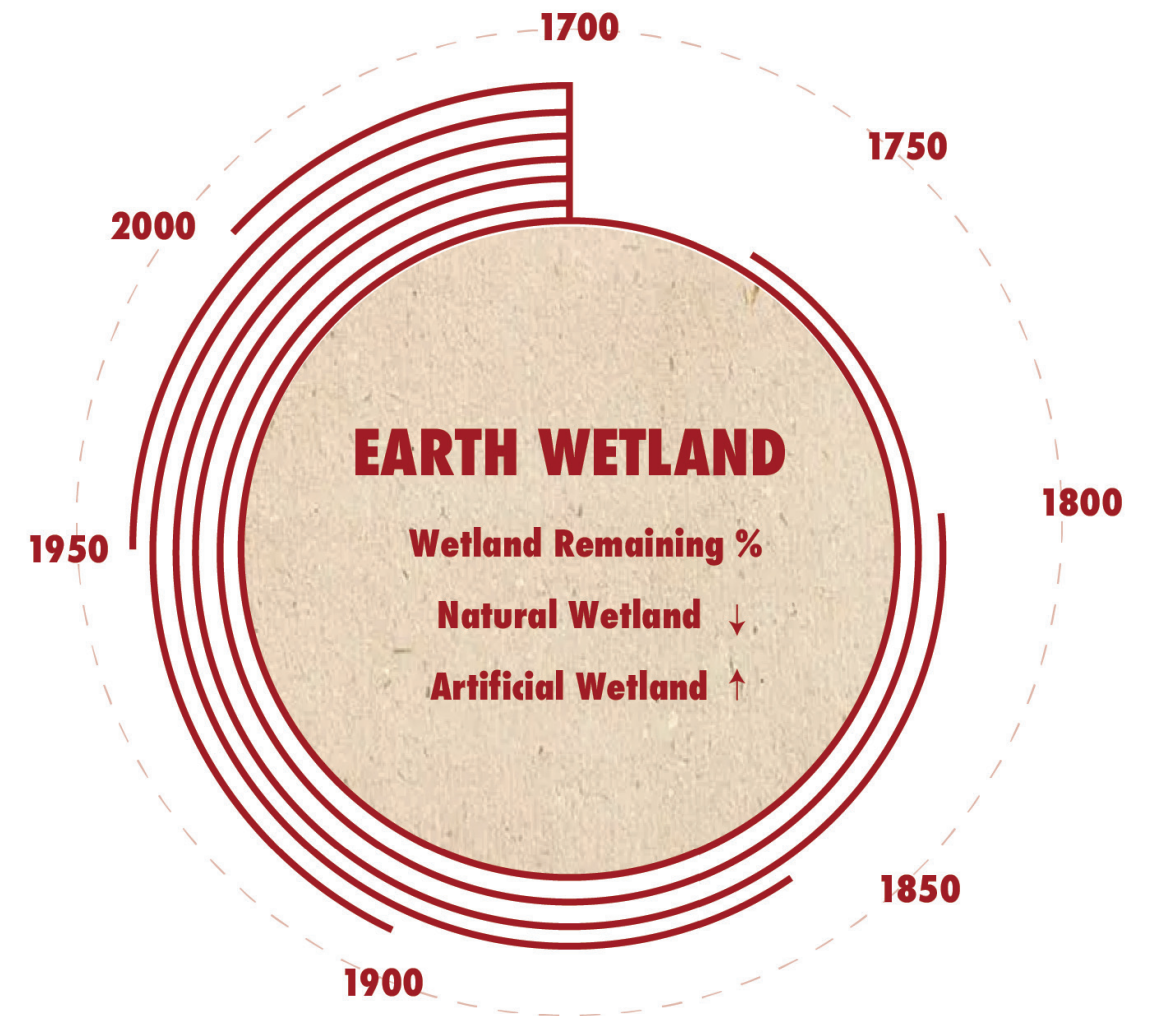


Figure 1.2
Wetland Remaining

Today's extinction rate (disturbed by human development), estimated by experts to be between **1,000** and **10,000** times **higher** than the natural extinction rate.*

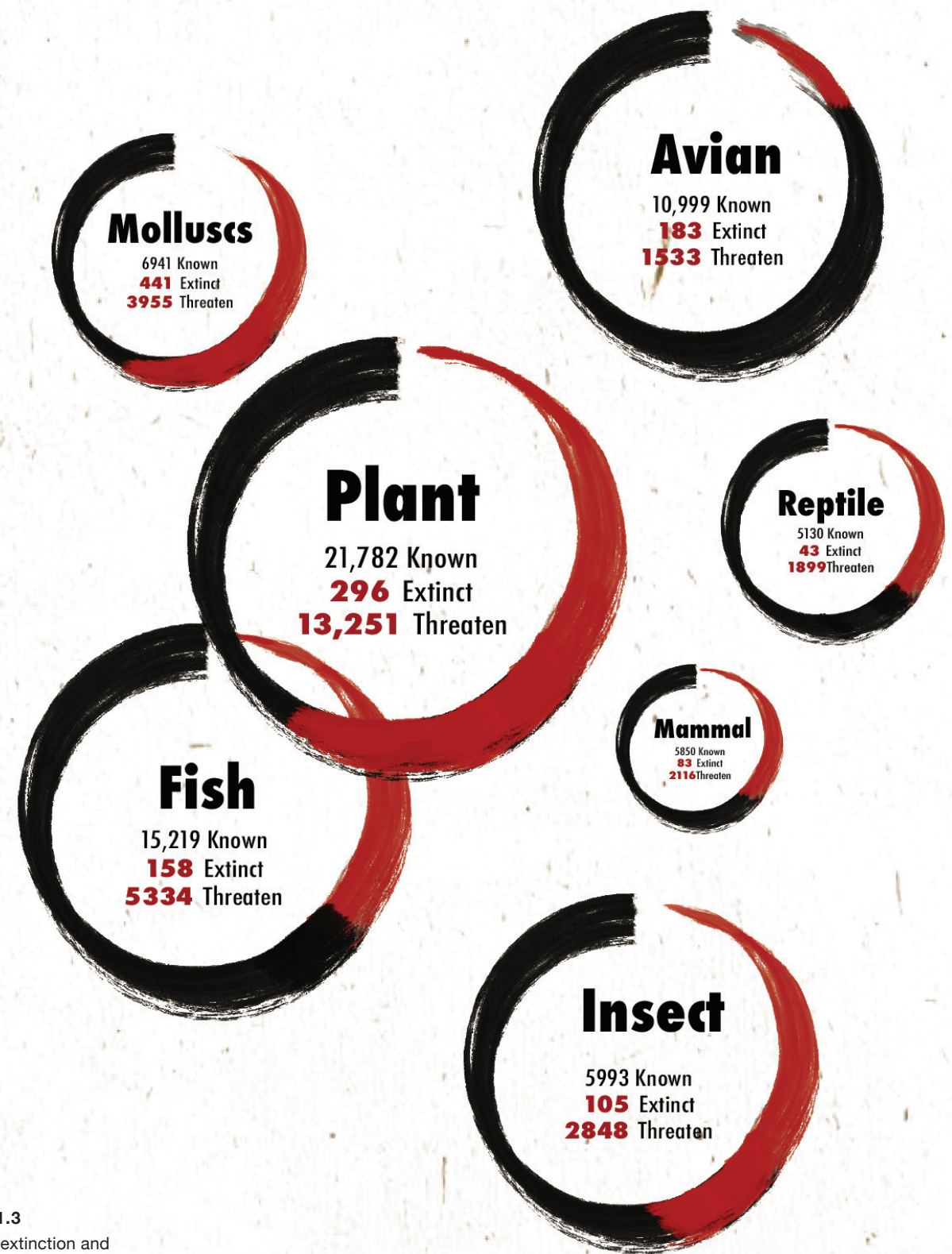
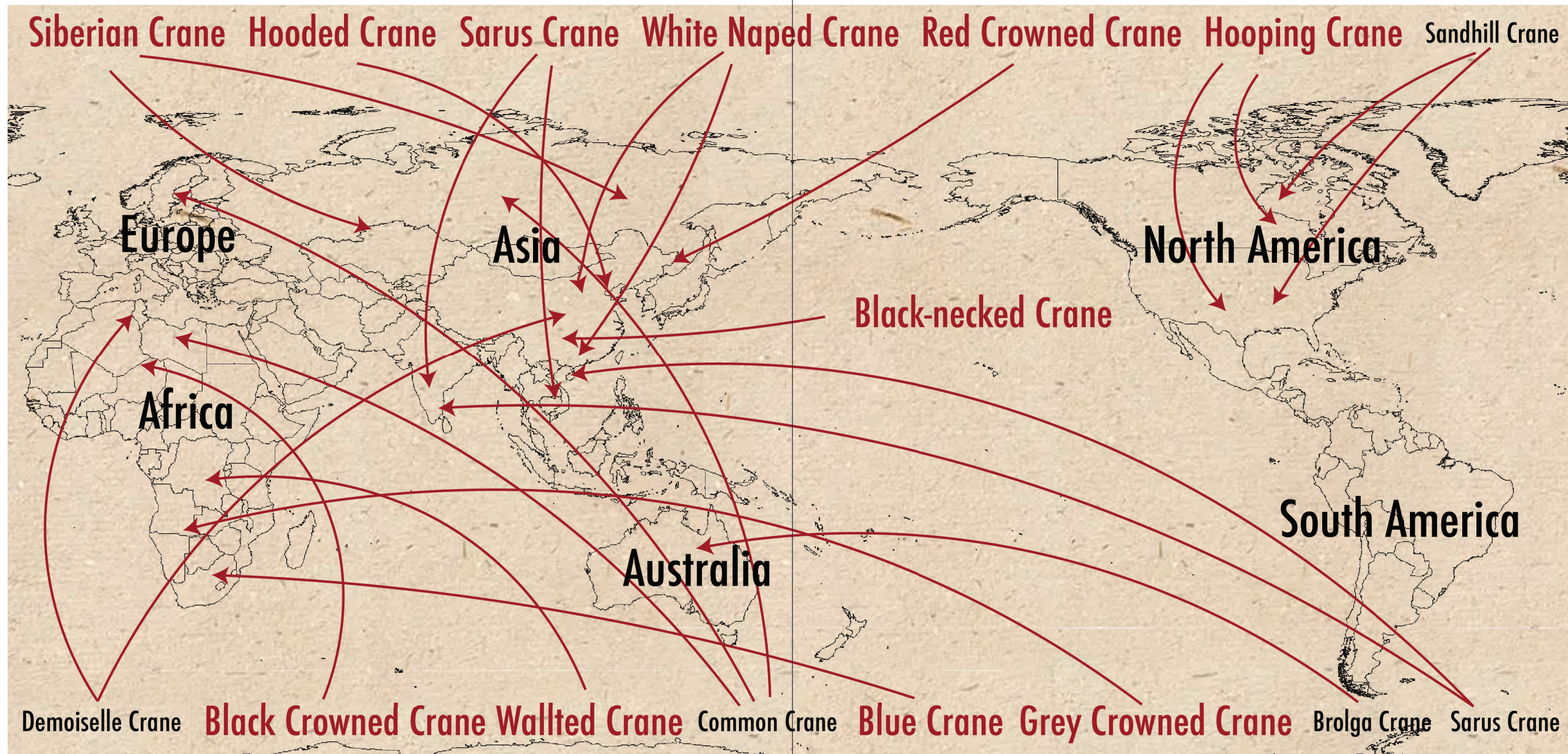


Figure 1.3
Species extinction and threatening

Currently, wetland loss is three times forest loss. Over a third of natural wetlands have been lost globally since 1970, a rate of decline which is three times that of global forest loss over the same period. From the 18th century until today, only 10% ~ 20% of wetland remains, and 40%~ 50% of the forest remains. According to IUCN, 81% of inland species depend on wetland habitat, and 36% of marine species depend on the coastal wetland. Human disturbance of climate change, agricultural development, and industrial pollution are the main reasons for wetland loss. Deconstruction of wetland directly threatened over half of the earth's species. Through IUCN's annual species assessment, until 2021, over 27.8% of species are threatened. The plant is the major threatened species where over 50% of species are endangered. Mollusks and insects are also at risk, which threatens all wildlife who depend on these species as a source of food. Their loss would cause a chain reaction of more species disappearing.



CRANES' DISTRIBUTION

There are 15 species of cranes distributed globally. Nine of these crane species live in Asia: Siberian Cranes, Hooded Crane, Sarus Crane, White Naped Crane, Red-Crowned Crane, Black-necked Crane, Common Crane, Demoiselle Crane, Sarus Crane.

Six crane species live in Africa: Demoiselle Crane, Black Crowned Crane, Wattled Crane, Common Crane, Blue Crane, and Gray Crowned Crane. Two crane species in North America are Hooping Crane and Sandhill Crane. Common cranes live in Europe.

The Brolga crane is the only crane species that lives in Australia. The endangered ratio of cranes is eleven out of fifteen. Only four crane species are under normal status. Although South America has many wetlands, the temperature and weather there are not suitable for cranes.

Figure 1.4
Cranes' distribution map:
Red bolded text is endangered species



Figure 1.5:
Fortune symbol with crane in Chinese culture



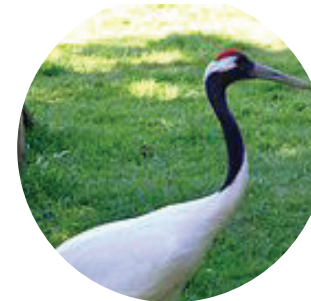
Black-necked Crane
Grus nigricollis

Figure 1.6



Hooded Crane
Grus monacha

Figure 1.7



Red Crowned Crane
Grus japonensis

Figure 1.8



Siberian Crane
Grus leucogeranus

Figure 1.9



White Naped Crane
Antigone vipio

Figure 1.10

FIVE ENDANGERED SPECIES IN ASIA

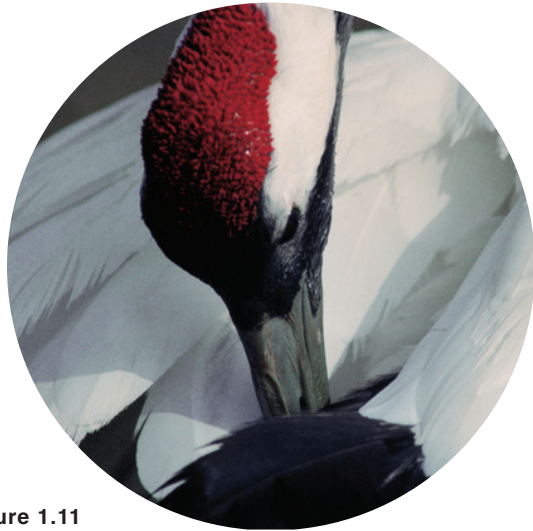


Figure 1.11

RED CROWNED CRANE
Grus japonensis

Population: 2,800 -3,430
Top speed: 64km/h
Weight: 4.8kg - 10.5kg
Heigh: 150-158cm
Life span: 30-70Yrs
Mating behavior: monogamy
Reproduction season: spring
Baby carrying: 2 eggs
Independent age: 9 months
Incubate date: 29-34 days



Figure 1.12

HOODED CRANE
Grus monacha

Population: 14,500 - 16,000
Top speed: 64km/h
Weight: 3.7kg - 4.8kg
Heigh: 92-97cm
Life span: 25-30Yrs
Mating behavior: monogamy
Reproduction season: spring
Baby carrying: 2 eggs
Independent age: 2-4 months
Incubate date: 29-34 days



Figure 1.13

WHITE NAPED CRANE
Antigone vipio

Population: >9,600
Top speed: 64km/h
Weight: 6.5kg
Heigh: 130cm
Life span: 40-50Yrs
Mating behavior: monogamy
Reproduction season: spring
Baby carrying: 2 eggs
Independent age: 2-4 months
Incubate date: 29-34 days



Figure 1.14
Crane's habitat

FOCUSED SPECIES

These three species will be the focused species in the project. They are Red-Crowned Cranes, Hooded Cranes, and White Naped Cranes. They would all fly over the China and North Korea border on their migration route. Crane lives in marshes, grassland, shoreline, and other wetland habitats. This is because their food is a wetland-dependent species. These three crane species prefer to live in cold places.



Figure 1.15

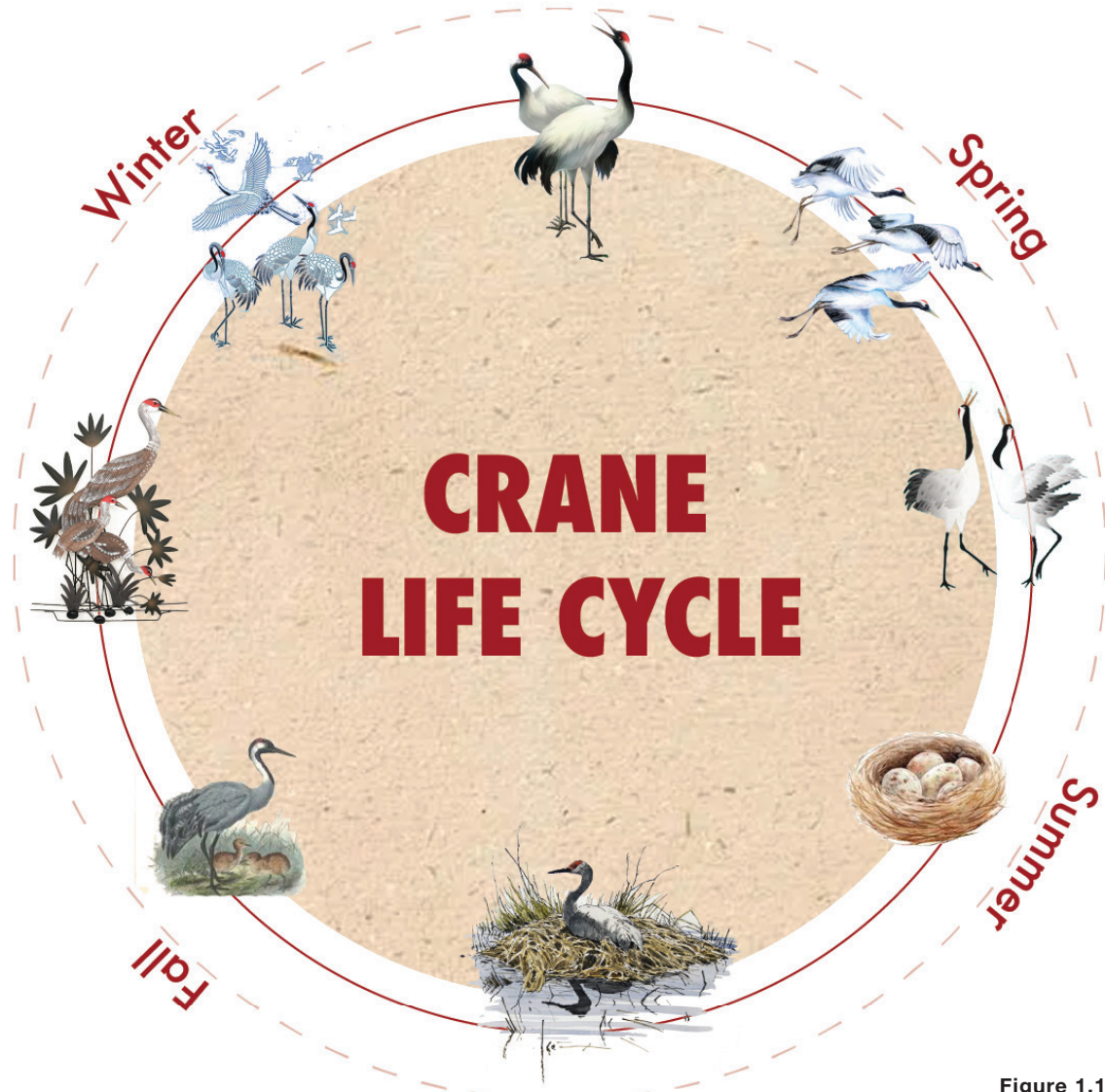


Figure 1.16
Cranes' life cycle

Crane is a migratory species. They start their migration around February and reach their breeding range around April (from south to north basin). When they arrive, they will begin breeding. Cranes are monogamy, with parents incubating their eggs together. The family spent four months in the north basin for juveniles to grow. After they molt, they will fly back to the winter range (south) around September. This migration usually takes three months.

The fast family will arrive in the winter range around mid-November. They spend two to three months in the south and wait for juveniles to be total feathered. A new round of migration will start.

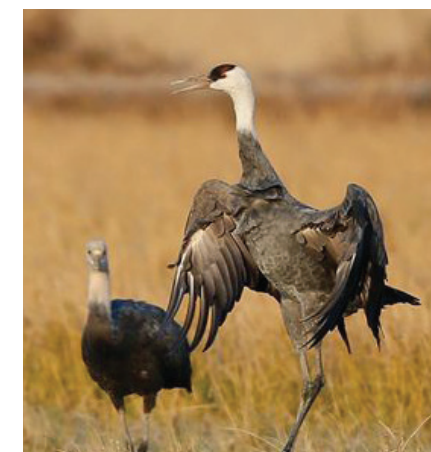


Figure 1.17-1.20
Crane's habitat in different life time period.

Top-level Consumers
(carnivorous animals)

Meat Consumers
(carnivorous animals)

Primary Consumers
(herbivorous animals)

Producers
(plants)

Decomposer
(soil organisms)

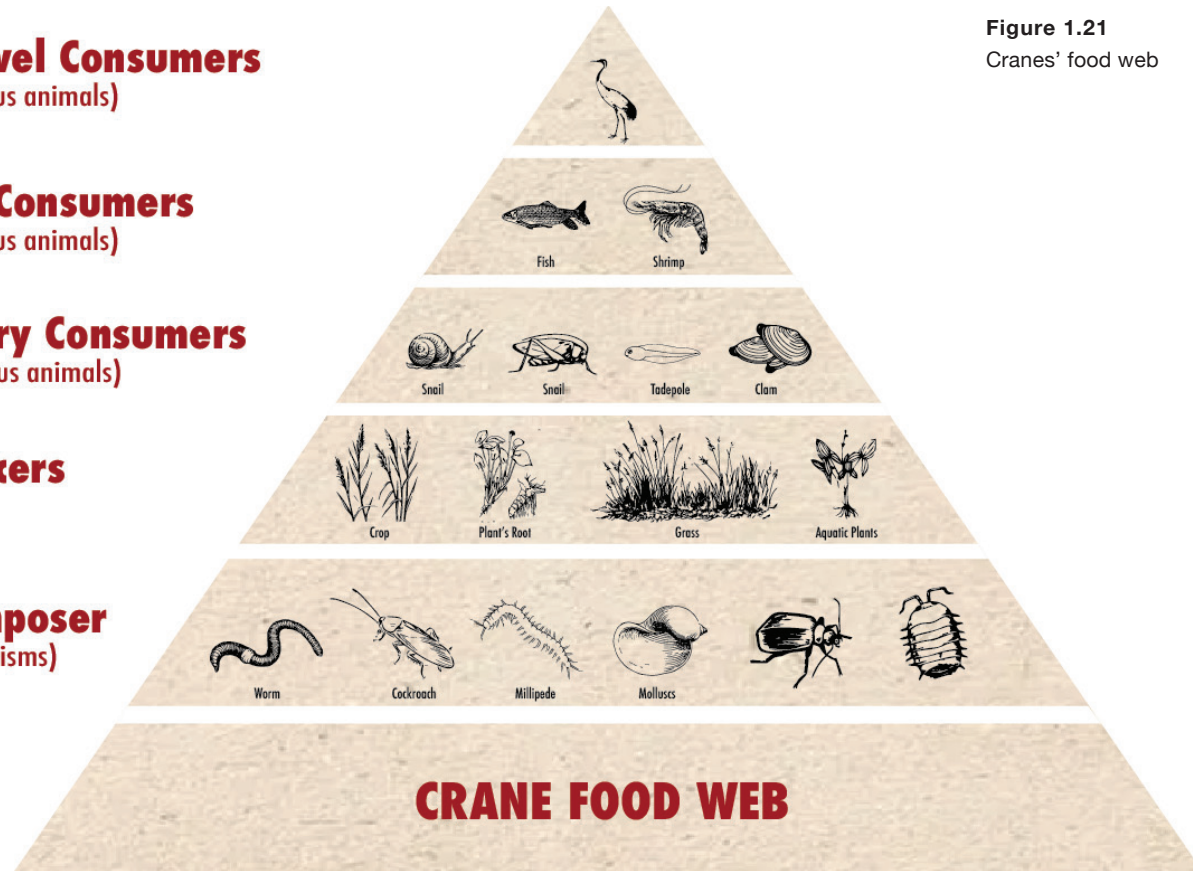


Figure 1.21
Cranes' food web

CRANES' FOOD WEB

Crane's food web is fundamentally wetland-dependent. Wetland habitat deconstruction is the main reason cause crane extinction. Some big-shaped cranes would find food in agricultural fields during wintertime, like Red-Crowned Cranes. However, small-sized species are hard to survive during winter while the wetland loses. They still need to take care of juveniles during winter since some species are not fully feathered in winter.



Figure 1.22
Japanese traditional crane drawing

CRANES' CULTURAL SYMBOLISM

Through Chinese, Japanese, Korean traditional art pieces we can find out that crane has same symbolism in these cultures. In these cultures, cranes always paint with pine trees which represent **longevity**; paint above clouds which represents **fairyland**; paint with health environment which presents **peace** and **thriving**; always paint cranes in couple which represents **committed love**.



Figure 1.23
Chinese traditional crane drawing

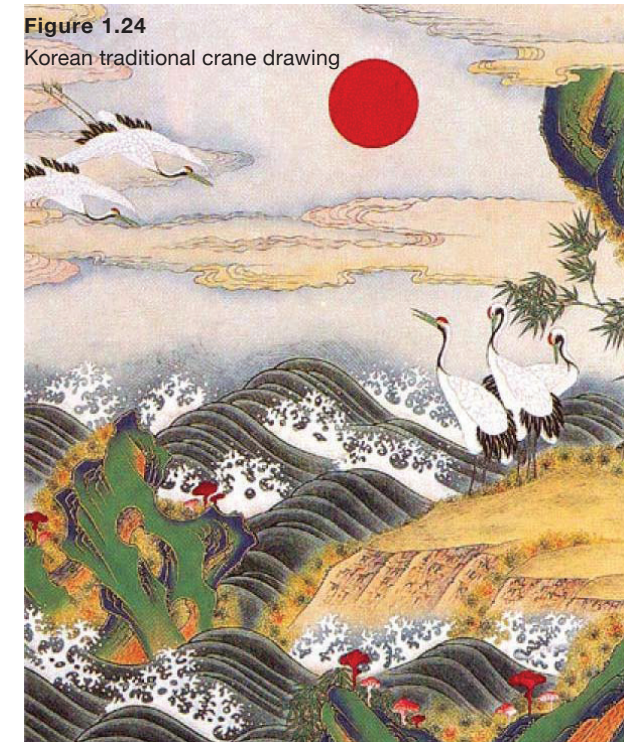


Figure 1.24
Korean traditional crane drawing



CHAPTER

Transboundary Conservation Project Methodology

- Zhalong Nature Reserve
- Liaoning Nature Reserve
- Peace Arch Park
- East Asia Six Countries' Crane Conservation

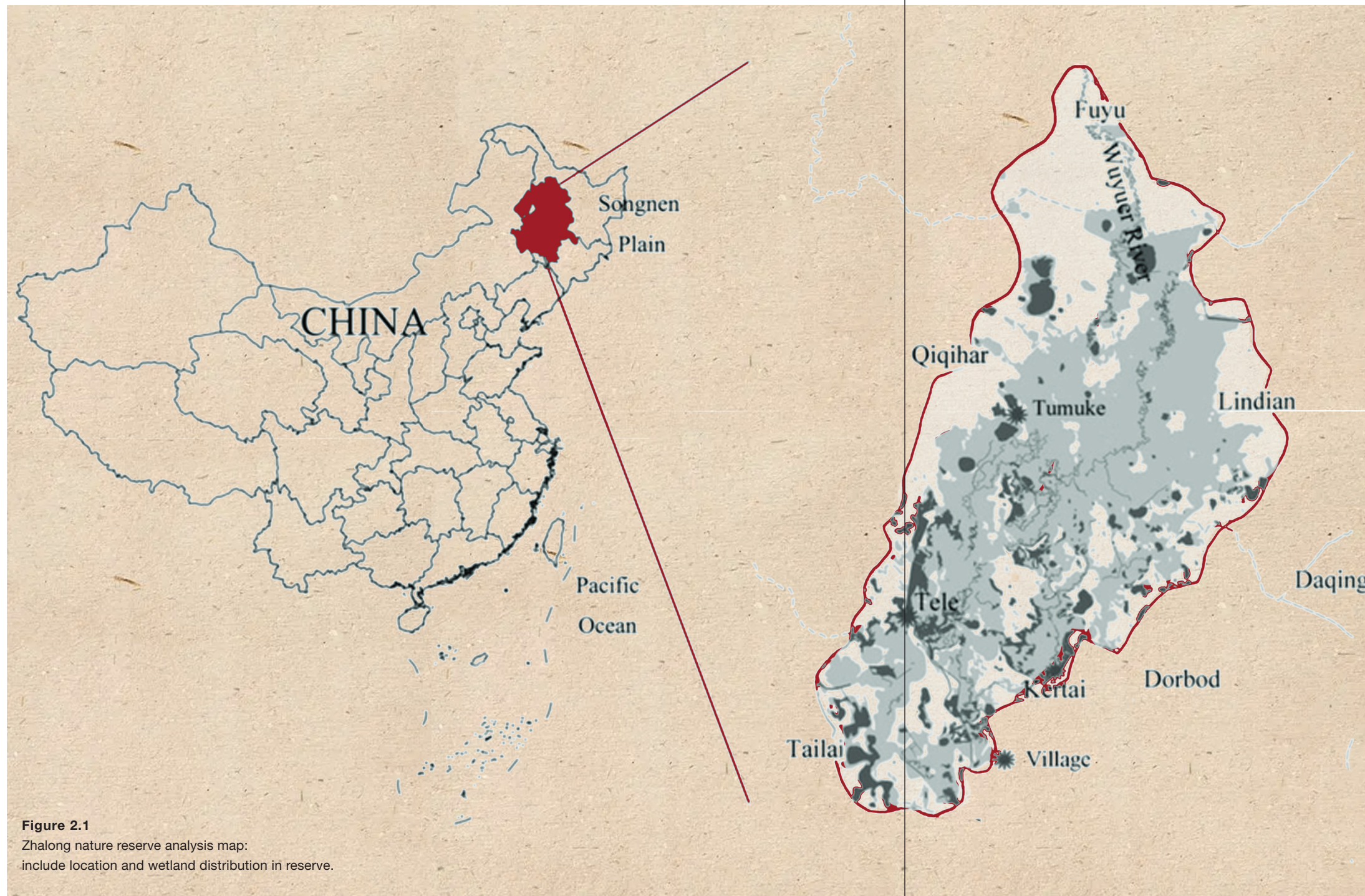


Figure 2.1
 Zhalong nature reserve analysis map:
 include location and wetland distribution in reserve.

**ZHALONG NATURE RESERVE,
 QIQIHAER, HEILONGJIANG
 PROVINCE, CHINA**

Main Conservation Species: Cranes

Total Area: 210,000 hectares

Topology: Wetland

Number of Cranes: Around 2000

Number of Crane Species: 6 (Grus leucogeranus, Grus japonensis, Grus monacha, Grus vipio, Grus grus, Grus virgo)

Geographical

Zhalong Nature Reserve is located at 124°00'-124°30' east longitude and 46°55'-47°35' north latitude. It is located in the oak forest grassland area outside the Songnen Plain in Northeast China, spanning the second district and four counties. Temperate continental monsoon climate.

Zhalong Wetland is a large permanent weakly alkaline freshwater swamp area formed by the loss of its channel and overflowing of the Wuyuer River, a tributary of the Nenjiang River. It consists of many small shallow lakes and vast meadows and grasslands. The maximum water depth of the swamp is 0.75 meters, and the maximum water depth of the lake is 5 meters.



Figure 2.2
Conserved crane family in Zhalong Nature Reserve

Cranes

Zhalong Nature Reserve is famous for its Crane Village: Among all the 15 species of cranes in the world, there are 9 species in China, and there are 6 species here.

About 300 red-crowned cranes come here to inhabit and multiply from April to May each year. Reed marshes and Carex tatou are the main habitats of red-crowned cranes. The number of white cranes is close to 1,000. After staying here, they will continue to move north to Russia. Migratory resting bird. Qiqihar is also known as the “Crane City”.

There are nearly 300 wild breeding populations and 430 artificially bred semi-random populations

Biodiversity Conservation

There are more than 260 species of birds in 48 families in the reserve, and more than 120 species of waterfowl, which account for more than half of China. There are 35 species of national key protected birds. In addition to the famous cranes, there are swan, great bustard, white spoonbill, falcon and other rare birds. Here, the breeding number of wild economic birds reaches more than 100,000 per year.

There are also 9 families and 46 species of fishes, 277 species of insects, more than 260 species

Outcomes

This case study indicate three important guide lines for doing cranes conservation. First, local conservation policy and regulation should be revised in province level or at least city level. Strict the punishment of reserve deconstruction and endangered species poachers. Secondly, choose a focused conserve species to conserve its surrounding habitat and related species. Thirdly, to attract more wild cranes to live in this reserve, conservationist can artificial breed some focused cranes. These artificial breed cranes could also provide tourists a chance to observe them closer. Last but not least, educate the importance of wetland to tourists.



Figure 2.3:Conserved crane group in Zhalong Nature Reserve

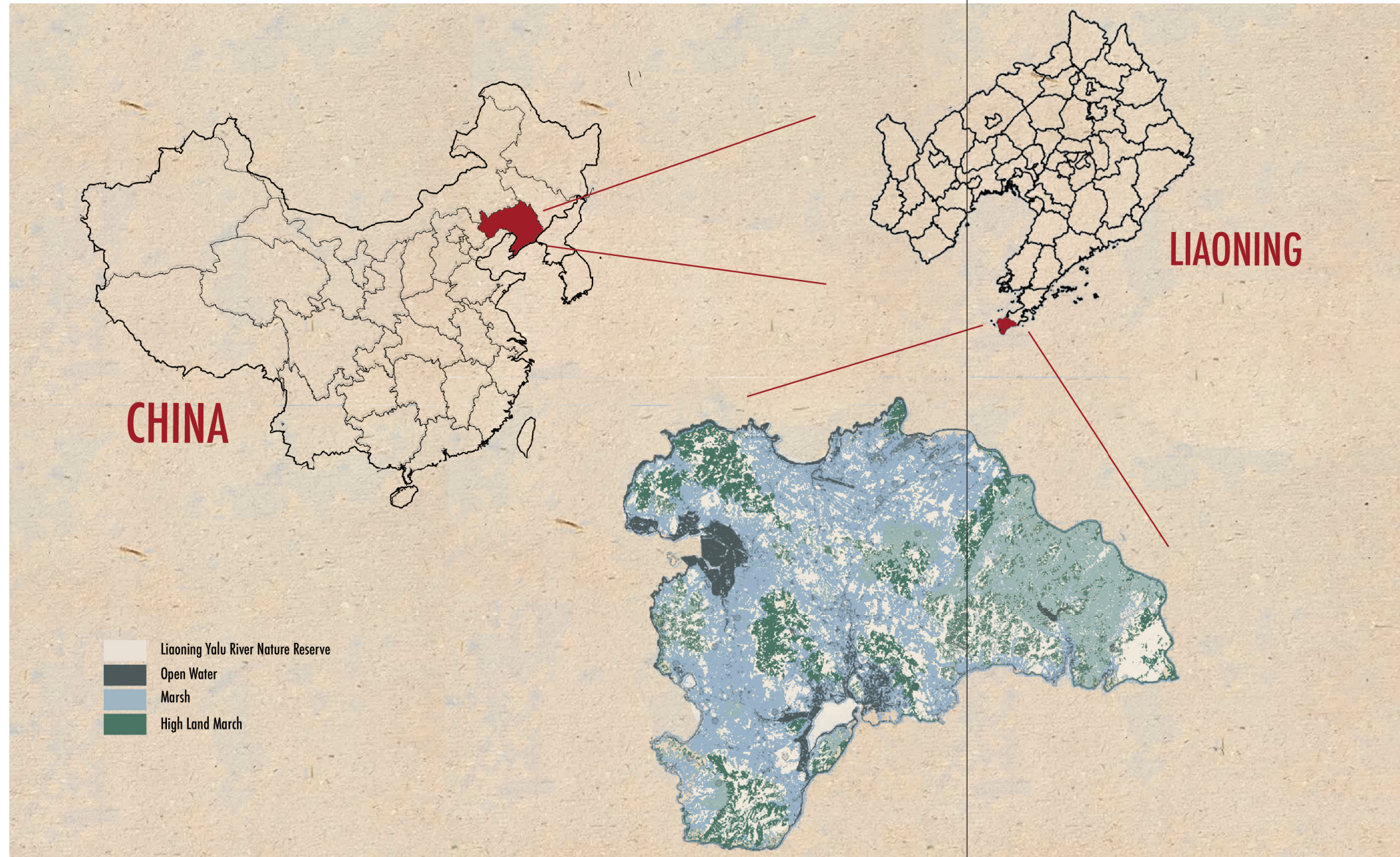


Figure 2.4
Liaoning Yalu river estuary nature reserve analysis map:
include location and wetland distribution in reserve.

**LIAONING YALU RIVER
ESTUARY NATURE RESERVE,
DANDONG, LIAONING**

Main Conservation Species: Migrating
shore birds

Topology: Wetland

Number of birds: 250,000

Number of Water Bird Species: 24

Biodiversity Conservation

There are more than 50 species of shorebirds are supported in the region and estimated 250,000 shorebirds arrive here on northern migration. These 50 species include a lot of red listed species by IUCN. It also support around 24 species of water birds. It is identified as “Important Bird Area.”

Geographical

Liaoning Yalu river estuary nature reserve is along the shoreline of estuary of Yalu river and Yellow sea.

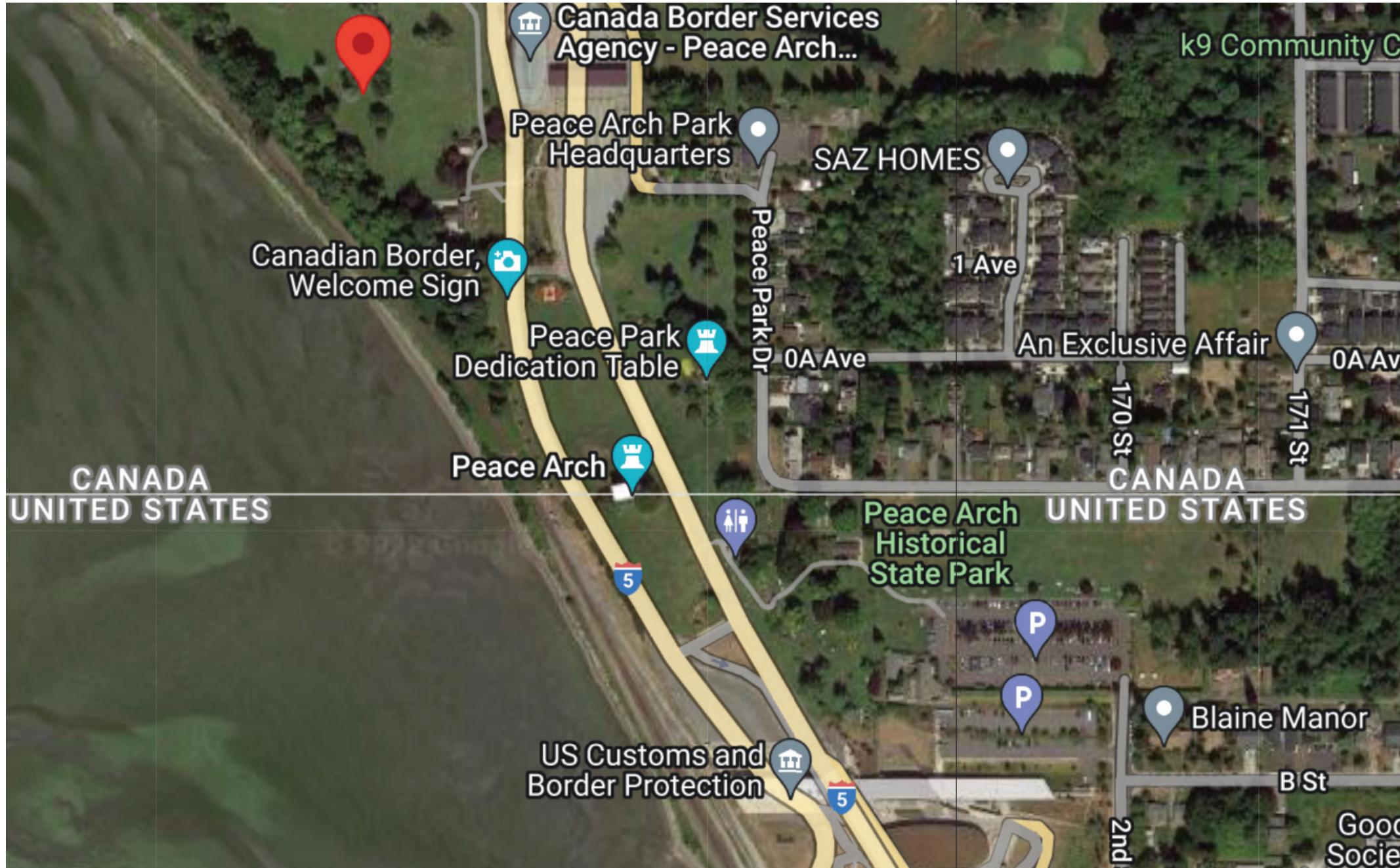


Outcomes

Yalu estuary nature reserve is using a great geographic location as one of strategy to conserve one area for multiple migration birds. The great biodiversity also create a healthy ecosystem in the habitat. People and conserving species is designed to kept a great distance for protection purpose. Tourism have a chance to observe birds

while they ware walking along the shoreline. This birds observation shoreline has also became a landmark in the city which attract thousands and thousands people each year to Donggang. This tourism development also strengthened local economic growth.

Figure 2.5: Wetland birds flying back at Liaoning Yalu river estuary during sunrise by Queyueguashutong.



**PEACE ARCH PARK,
BLAINE, WASHINGTON, UNITED STATES & SURREY, BRITISH COLUMBIA, CANADA**

Constructed: 1921

Total Area: 42 acres

Management: North by British Columbia Ministry of Environment and South by Washington State Parks and Recreation Commission

Border Crossing: Peace Arch Border Crossing (also known as the Douglas Border Crossing)

Geographical

Peace Arch Park is an international park consisting of Peace Arch Historical State Park in the United States and Peace Arch Provincial Park in Canada. Reaches Semiahmoo Bay of the Salish Sea on the continent's Pacific Coast where Highway 99 in British Columbia and Interstate 5 in Washington State meet. The park's north portion (Canada side) is about 22 acres and the south portion (United States side) is about 20 acres.

Figure 2.6
Geographic location of peace arch.

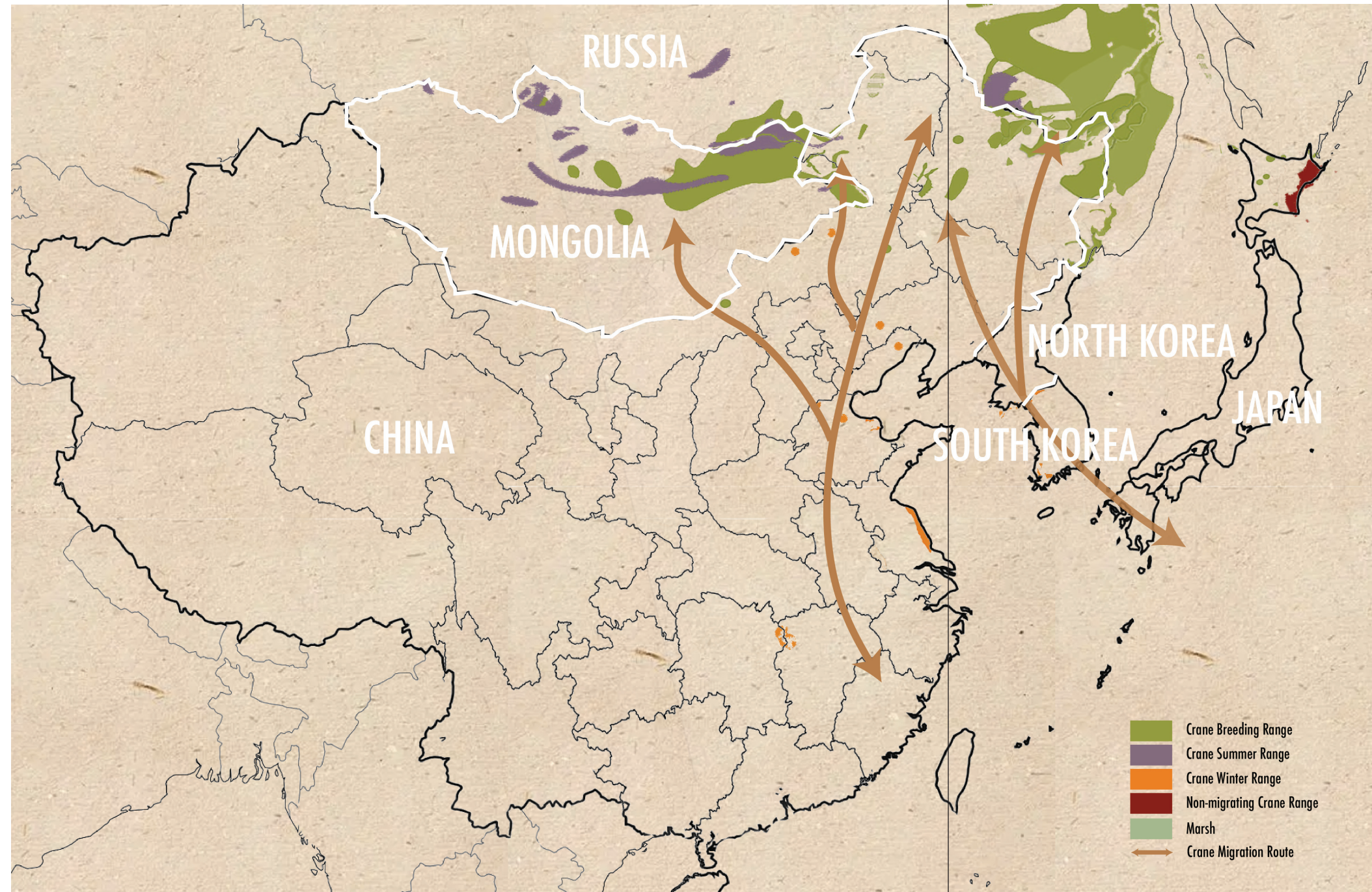


Outcomes

As the reunion grey zone on the United States and Canada border, Peace Arch provides chances for separate families to reunite on site. As long as people stay in the park, they do not need any VISA or travel permit to visit their friends or family. A peace park would also help ecologists to conserve the historical park on both sides since there

is no borderline drawn in nature. A peace park would benefit neighboring countries from a social aspect and on a political and ecological level.

Figure 2.7:
Peace arch shoot from Canada side that people waiting to clear pass the border.



EAST ASIA SIX COUNTRIES' CRANE EASY FLYWAY, EAST ASIA

Established: 2019

Total Area: 11.09 million mi²

Management: China, Mongolia, Russia, North Korea, South Korea, Japan

Focused Species: Siberian Crane, Red-Crowned Crane, Black-Necked Crane, Hooded Crane, White-Naped Crane, Sarus Crane, Eurasian Crane, Demoiselle Crane, Sandhill Crane.

Program:

2020 was designated as the Year of the Cranes at the International Workshop of Crane Conservation in East Asia convened in Beijing in October 2019. The campaign aims to raise awareness of crane conservation and was convened by EAAFP Partner, International Crane Foundation (ICF). The campaign aimed nine species that lived in East Asia. Some of the species are critically endangered like Siberian Crane and Red-Crowned Crane.

Figure 2.8
East Asia six countries crane easy flyway conservation and crane's habitat distribution in east Asia.

Figure 2.9:
Poster of Year of Crane 2020.

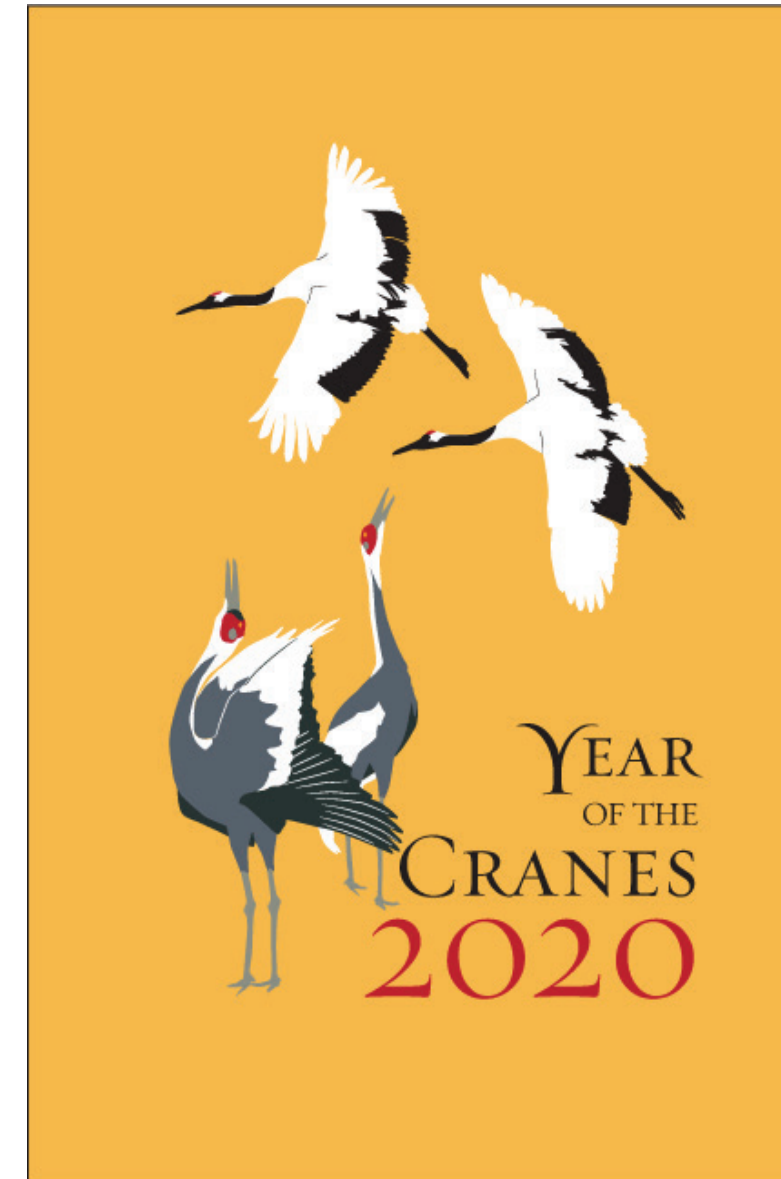


Figure 2.10:
Poster of Year of Crane 2020.

Outcomes

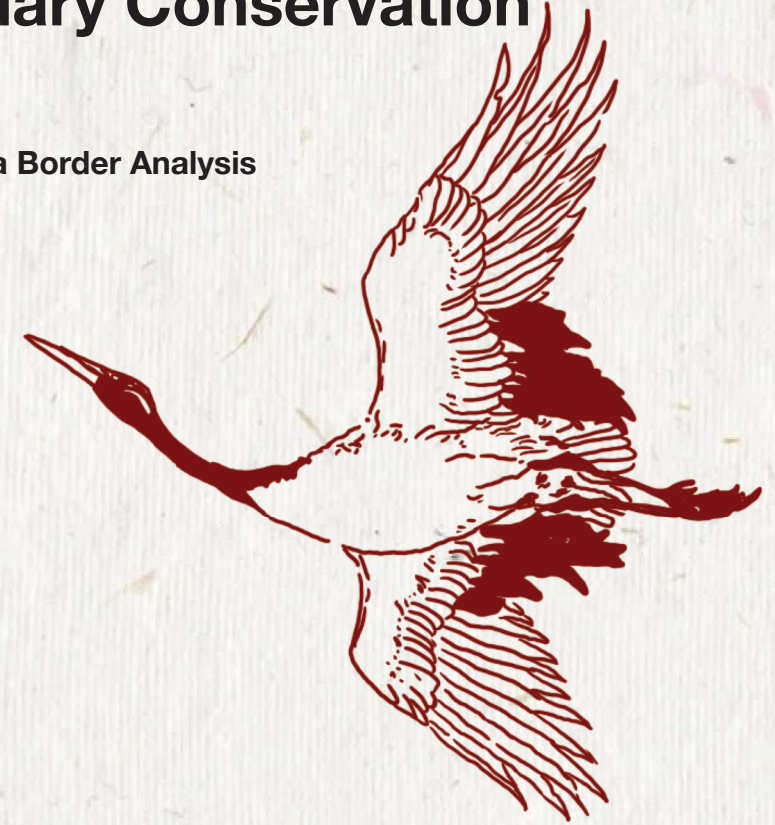
Biologists in six countries start with the crane's migration route track. The conservation of cranes does not only require professional help from conservationists or biologists. This program also needs help from citizens in different countries. The foundation would ask farmers that live along cranes' migration

route to help with counting crane's population each year. Conserving other species is always a duty for each human being on earth.



Transboundary Conservation Benefits

- China & North Korea Border Analysis
- Site Analysis
- Design
- Conclusion



CHAPTER

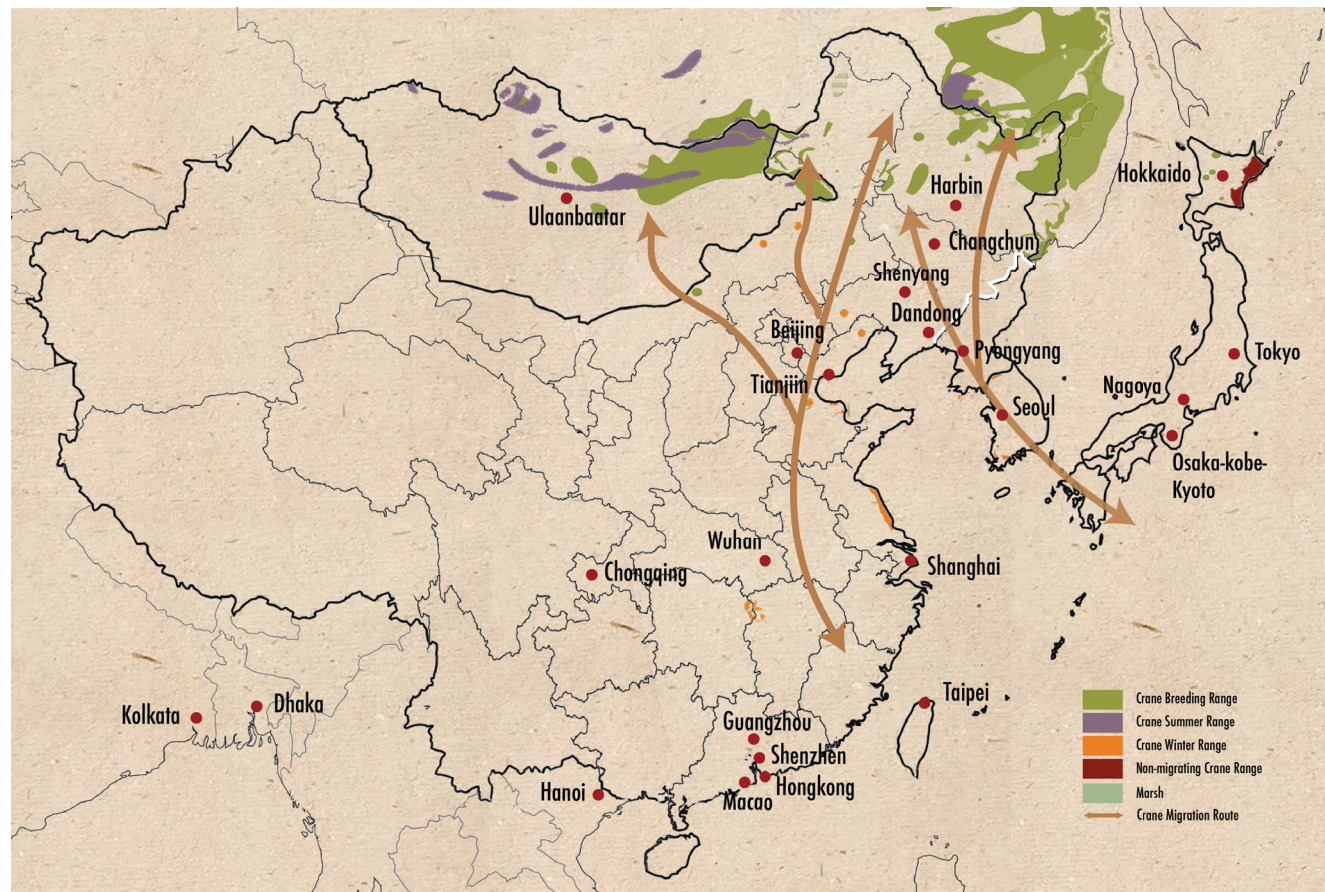


Figure 3.1
Five focused cranes migration route across China, DPRK, Russia and Mongolia. Indicates habitats in winter and summer for cranes.

CRANE MIGRATION ROUTE

East Asia has the most diversity of crane species atmosphere. Most of them spend their winter in the southeast area and spend their breeding time in the northeast area. Their entire migration route would cover five countries: China, South Korea, North Korea, Russia, and Mongolia. Red-Crowned cranes that lived in Hokkaido, Japan do not migration. These cranes' active area are generally along borderlines between countries. The transboundary conservation project would be a necessary strategy for crane conservation in East Asia.

HYDROLOGY ANALYSIS

Crane lives close to water because of their food construction. North Korea and China area have a sense of natural hydrology system. Furthermore, China and North Korea share one estuary and one fringing sea, the Yellow Sea. This geographic location and relation with hydrology provide the biodiversity on the site. China and North Korea border is also a popular resting spot along different crane species' migration route.

Figure 3.2
Focused hydrology analysis between China and DPRK.



CHINA & NORTH KOREA BORDER

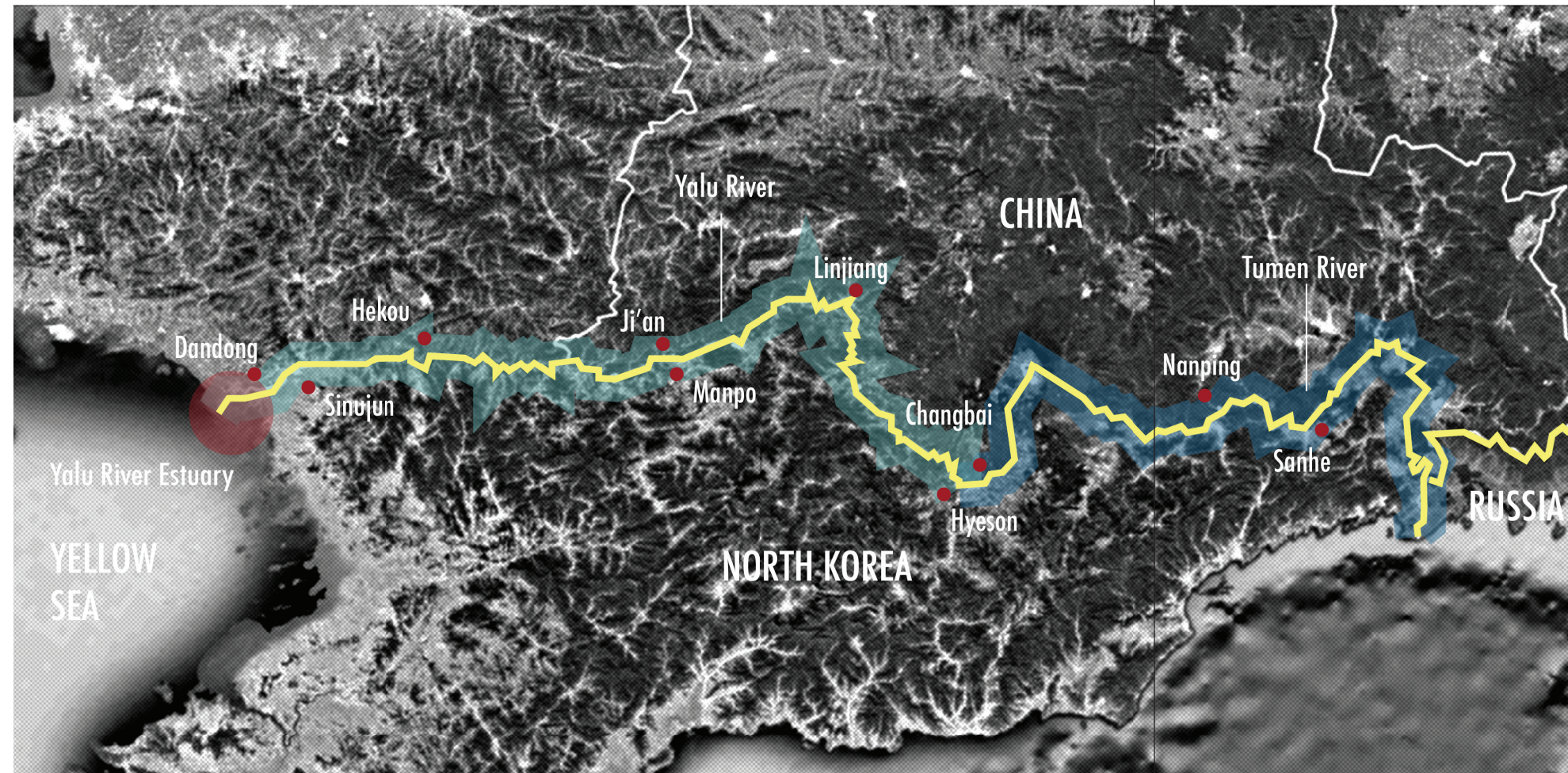


Figure 3.3
Border analysis between China and DPRK. Indicates important city, river and mountain along border.



Figure 3.4-3.7
Start from left top. China & North Korea border condition.

BORDER FACT

China and North Korea border use Yalu river, Changbai Mountain and Tumen river as natural border between two countries. China construct fens about 2.5 meters in 2006 along Yalu river shoreline and thin river way to prevent North Korean refugee. In November 2010, China increased the

fence to 4 meters due to increased North Korean refugees. North Korea construct their fens in August 2007 to prevent citizen sneak out. North Korea's border fence is about 10 kilometers along a thick tributary of Yalu river. Two countries share Yalu river estuary river way.



Figure 3.8
Yalu river estuary wetland.



Figure 3.9
Yalu river estuary marshes.

YALU RIVER ESTUARY

The Yalu River, known by Koreans as the Amnok River or Amnok River, is a river between North Korea and China. With the Tumen River to its east and a small portion of Paektu Mountain, the Yalu forms the border between North Korea and China. Its valley became the scene of several military conflicts in the past centuries. From 2500 m above sea level on Paektu Mountain on the China-North Korea border, the river flows south to Hyesan before sweeping 130 km northwest to Linjiang and then returning to a more southerly route for a further 300 km to empty into the Korea Bay between Dandong (China) and Sinuiju (North Korea). The bordering Chinese provinces are Jilin and Liaoning.

The river is 795 kilometers (494 mi) long and receives water from over 30,000 km² of land. The Yalu's most significant tributaries are the Changjin, the Hochon, the Togro rivers from Korea, and the Ai (or Aihe) and the Hun from China. The river is not easily navigable for most of its length. Most of the river freezes during winter and can be crossed on foot.

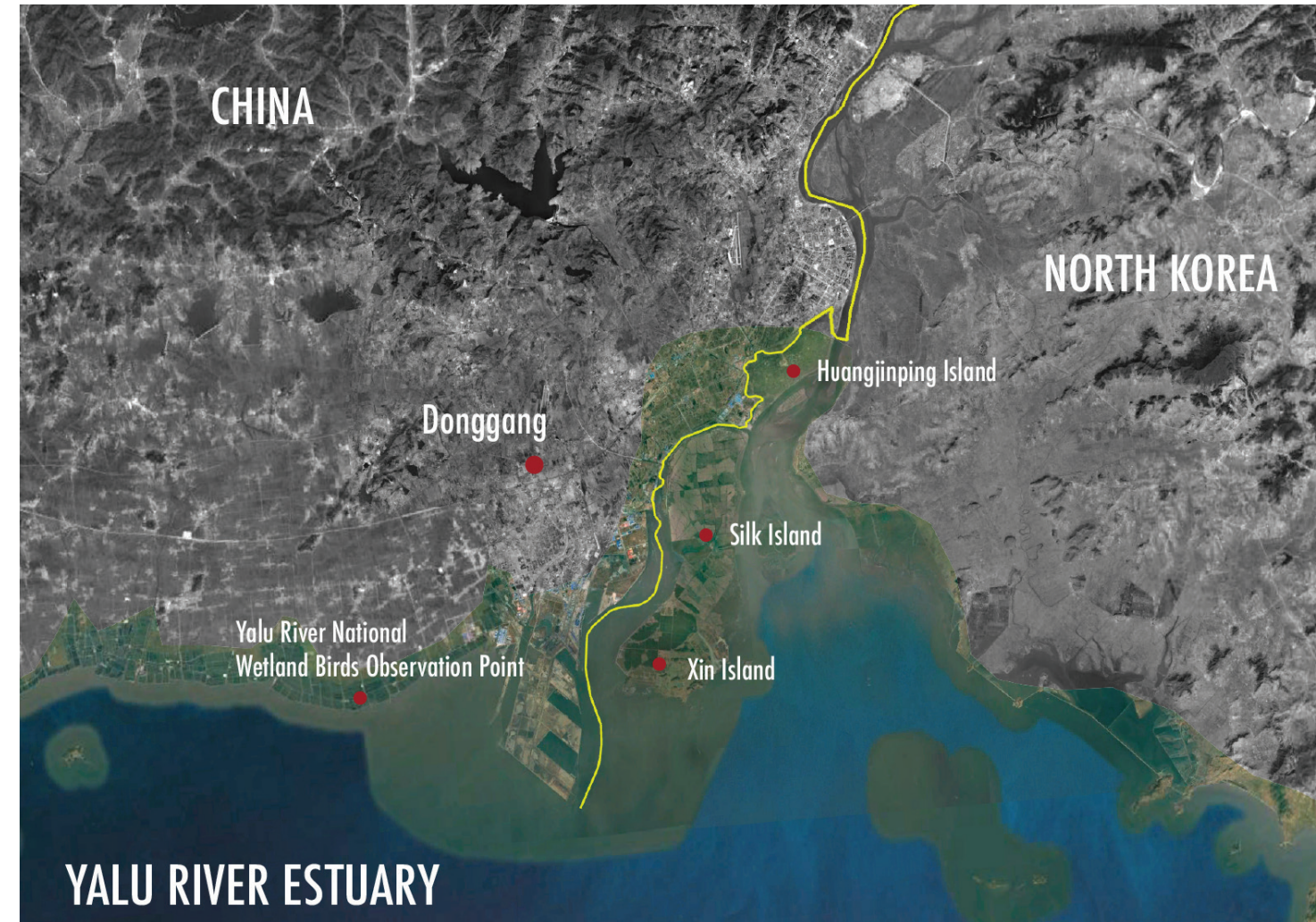
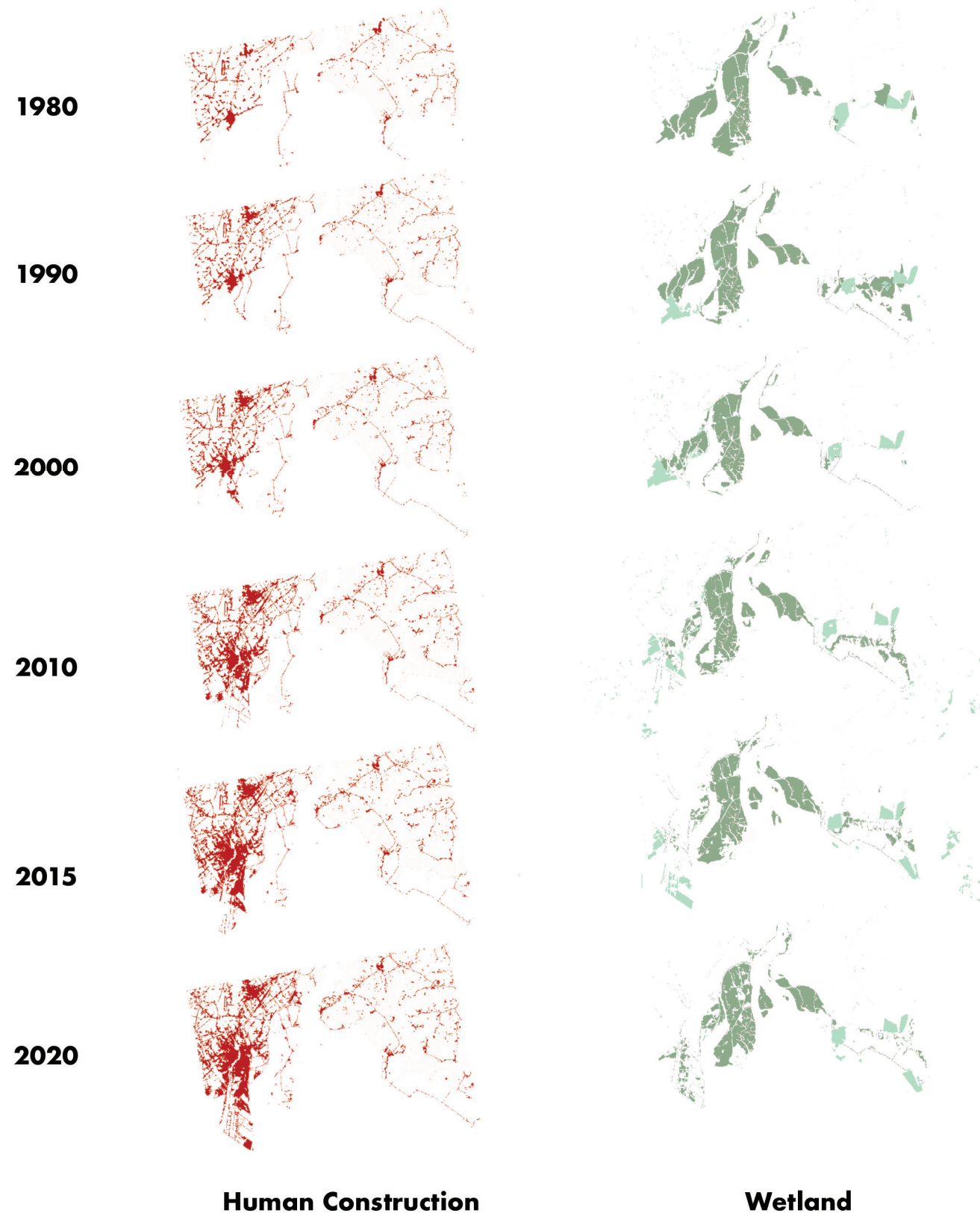


Figure 3.10
Yalu river estuary analysis indicates important islands in the estuary and important cities nearby.

Figure 3.11
Yalu river estuary urbanization and wetland changes through 1980 to 2020.



YALU RIVER ESTUARY

This area is home to the most wetland-dependent species. China lost more wetlands compared to North Korea from 1980 to 2020. Nevertheless, China also has more artificial wetlands created through 40 years. The urbanization rate and the wetland loss rate are interwound with each other. North Korea's slow urbanization rate protects primary wetland habitat. Although North Korea is losing wetland at a low rate, no policy or conservation happened in the North Korea region. As urban expanded, the wetland would disappear eventually. Protection should happen in the area for future prevention. International cooperation would be more effective in saving these wetlands instead of only conserving them in China.

Borderlines should not segregate species that live in this area. They share the commons, which should be conserved at the same time.



Figure 3.12
Location of yalu river.

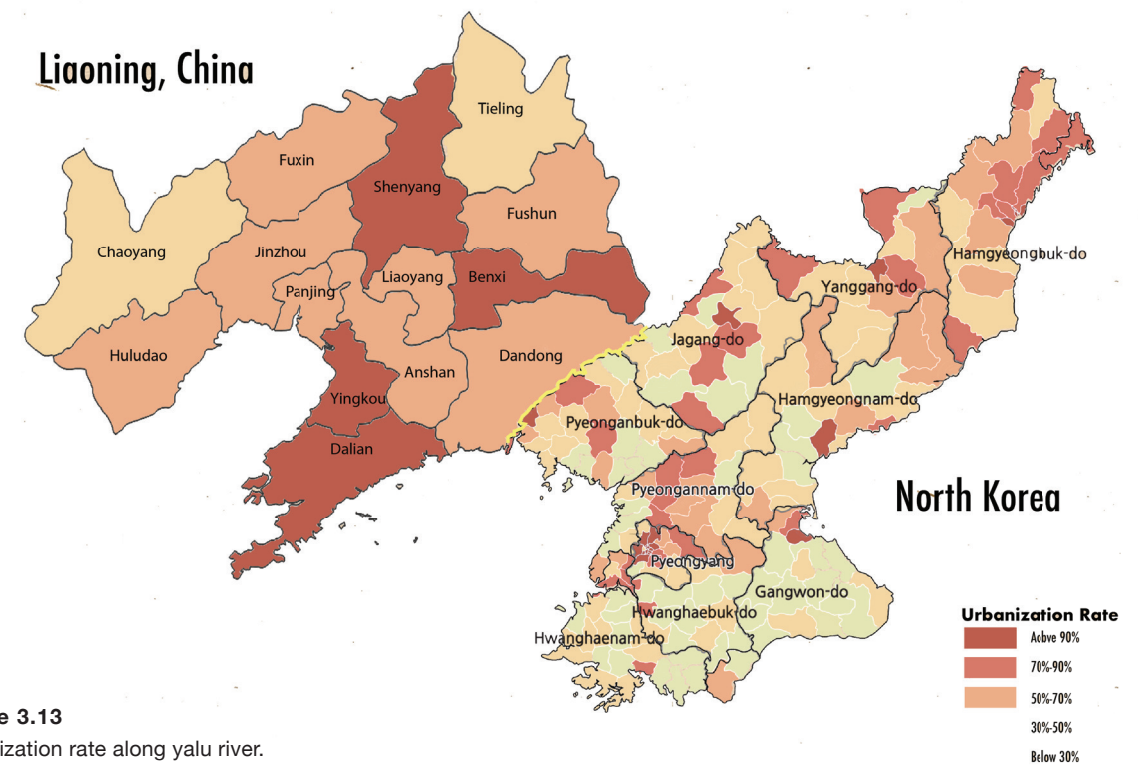


Figure 3.13
Urbanization rate along yalu river.

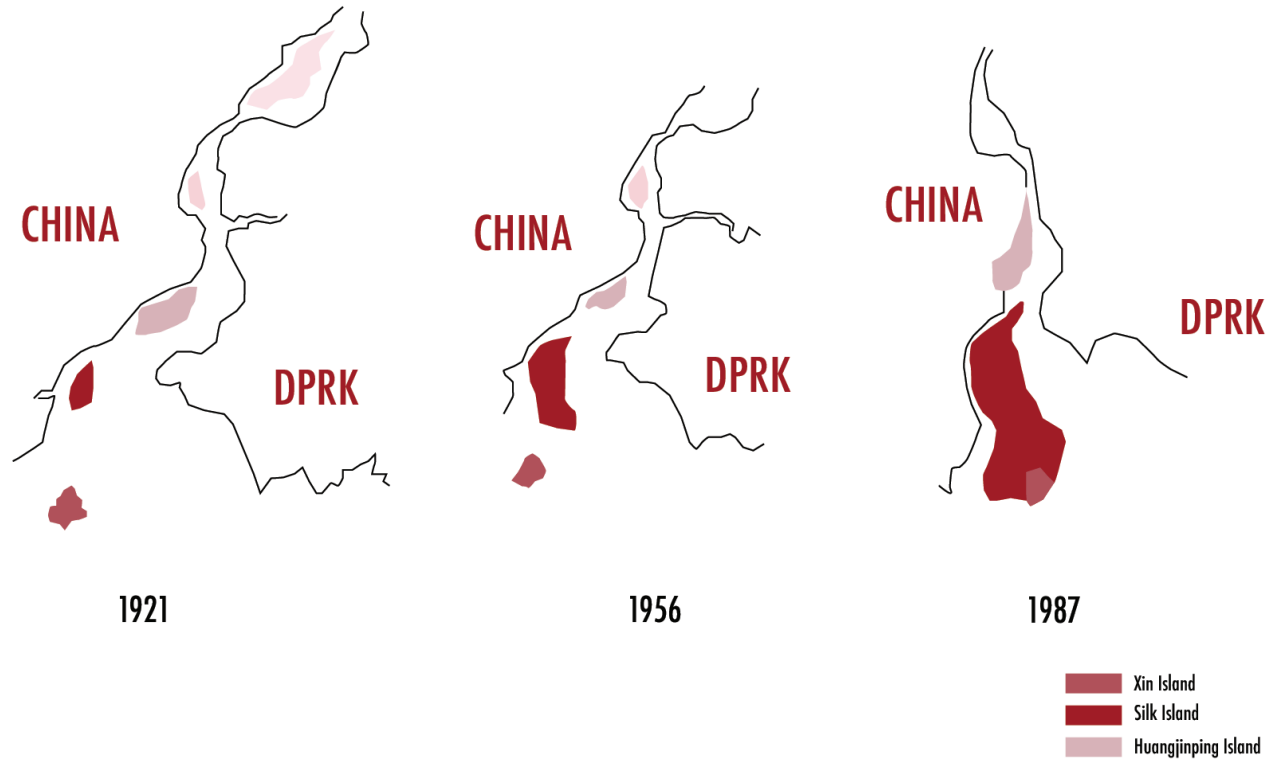


Figure 3.14
Sedimentation changes along Yalu river through 1921 to 1987.

connected to their main land.

YALU RIVER SEDIMENTATION

Sedimentation in Yalu river is gradually closing west river way of Yalu river (Gao et al., 2003). These sediments are not only carried from upstream to downstream. Research shows that it also has sediments come from downstream which move towards lands (Gao et al., 2003). Huangjingping island has completely attached to China's shoreline today. Xin island and silk island has emerged into one large island. Through Figure 3.8 we might predict that silk island and xin island would attached with China's shoreline one day. Nature is using its power to bring two countries together. In the future, it can provide a middle point and a transition ground for countries to establish collaboration. For countries like North Korea, collaboration should be established in phases. Allowing these countries to gradually open their border gate. Project providing a middle ground where is not

SILK ISLAND ANALYSIS

Silk Island is a continuously expanding sedimentary island in Yalu river estuary. Silk Island and Xin Island would be unified in this project since these two islands have already merges. There are four land-use types on the island: natural land, hills, human living area, and farmland. The majority of land on Silk Island is till wild land. The origin of Xin Island has the most human development and hills since Xin Island is the earliest island formed on the big Silk Island.

People gather around hills foot or near the water source. This island still have a great potential for wetland conservation and wetland depend species conservation.

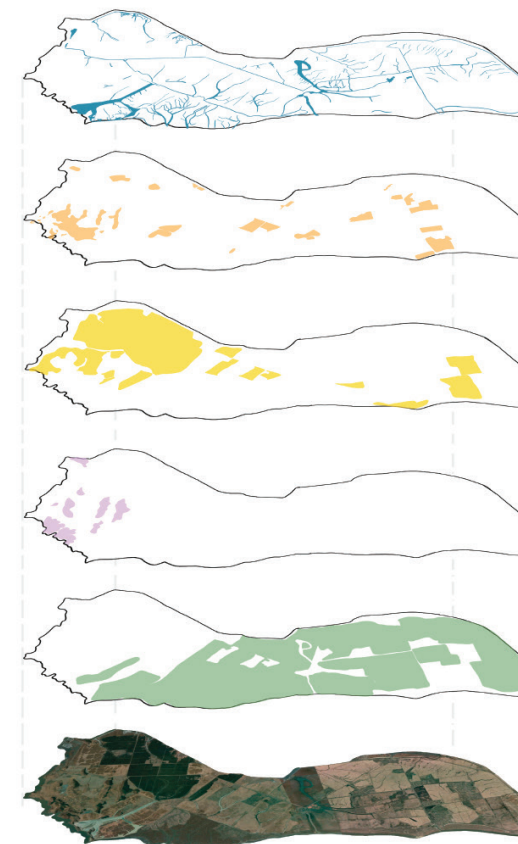


Figure 3.15
Silk island land use analysis.

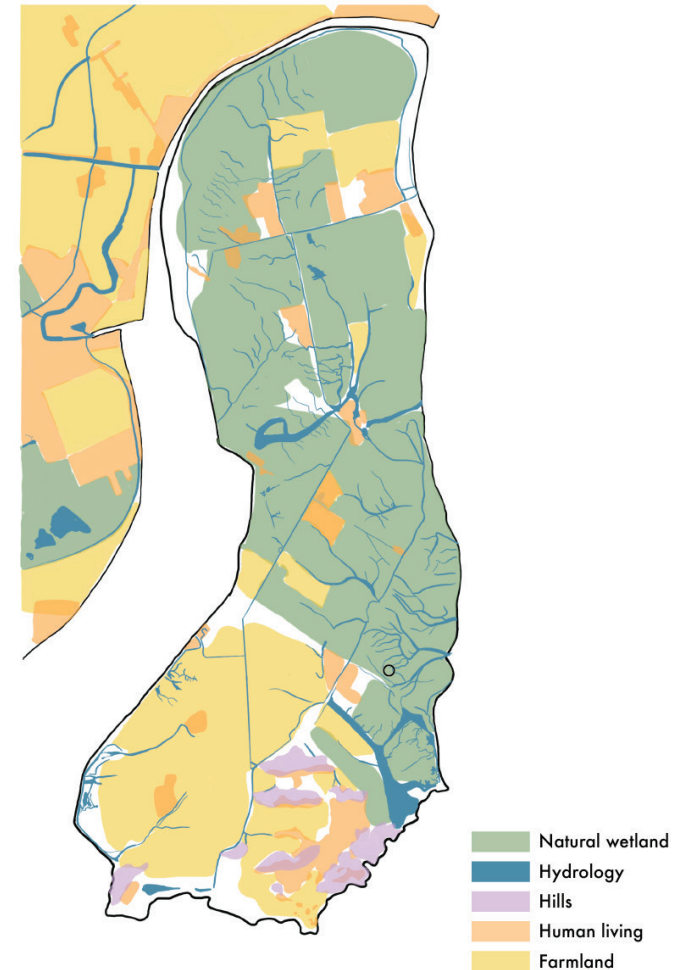
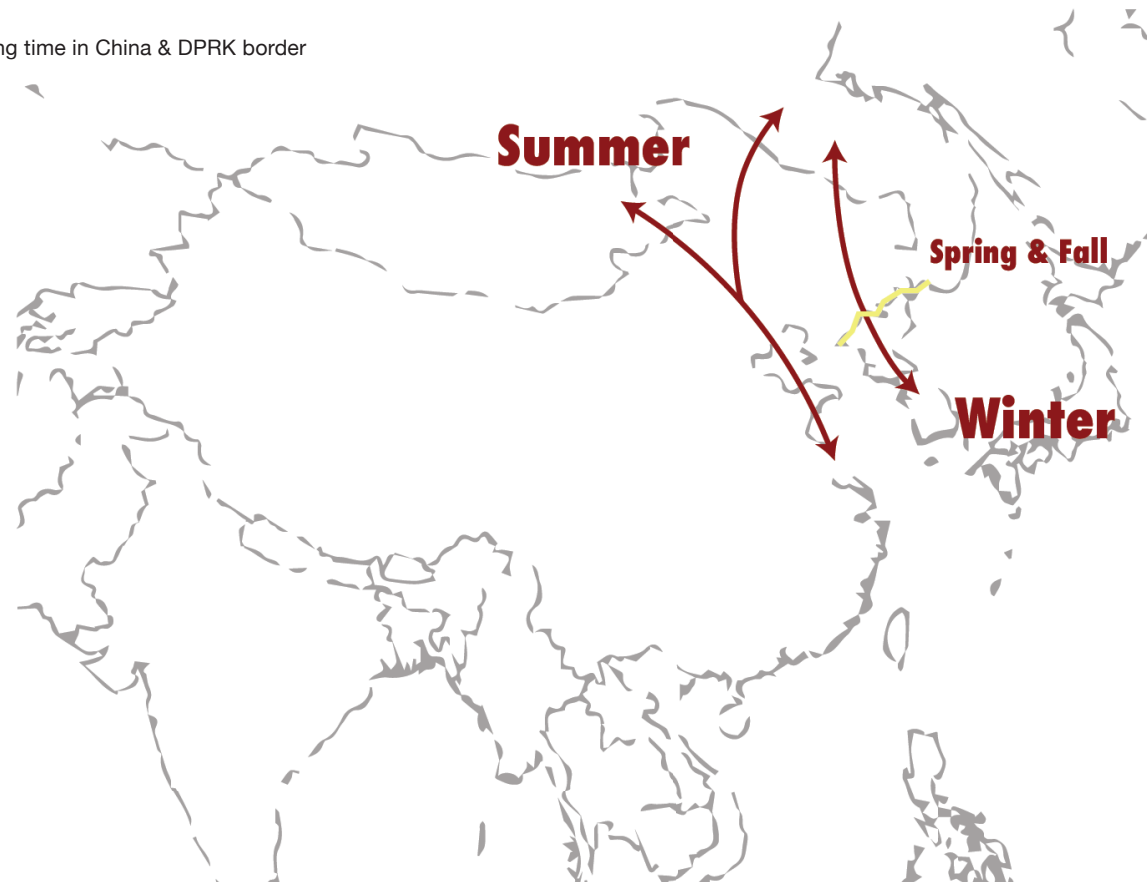


Figure 3.16
Cranes' arriving time in China & DPRK border



CRANES' DESIRED HABITAT

Cranes only arrive at China and North Korea border around spring and fall. They spend their summer in the northern East Asia and winter in the southern East Asia. When cranes arrive during spring, they start the preparation for mating and breeding. They would need opened space around shoal for crane dances. When cranes arrive during fall, they will be traveling with their new juvenile. These baby juveniles would need protection from high grassland. Their primary purpose on China and North Korea border would be refilling and resting for cranes. Cranes usually feed along river banks or shoal areas and rest in grassland. These two types of land would be the essential focus in the conserving zone.

Figure 3.17

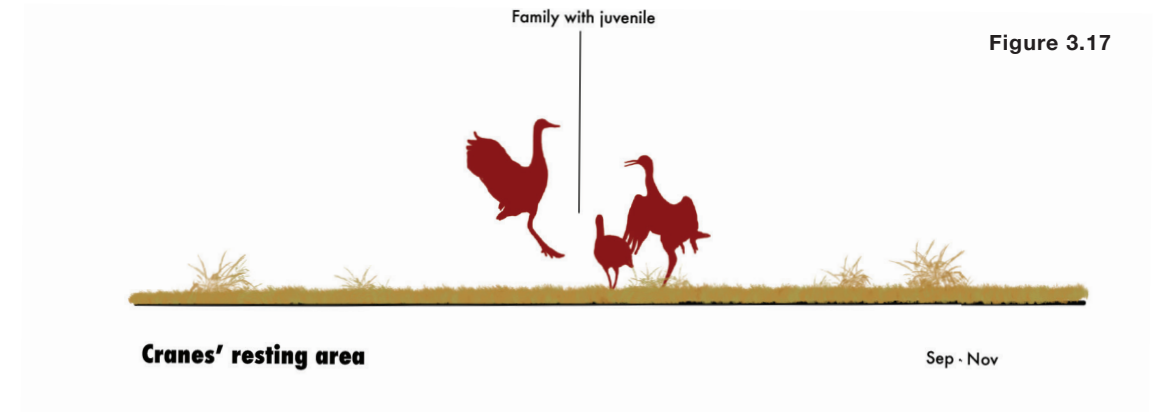


Figure 3.18

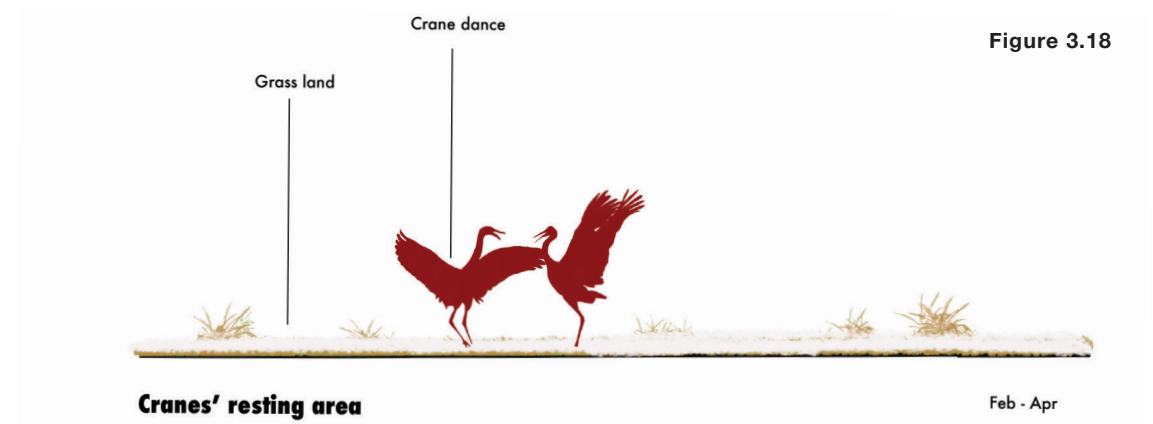


Figure 3.19

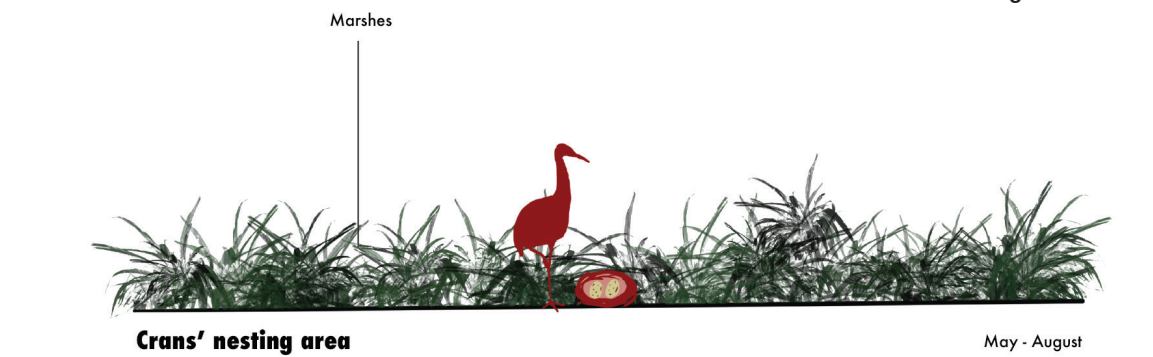


Figure 3.20

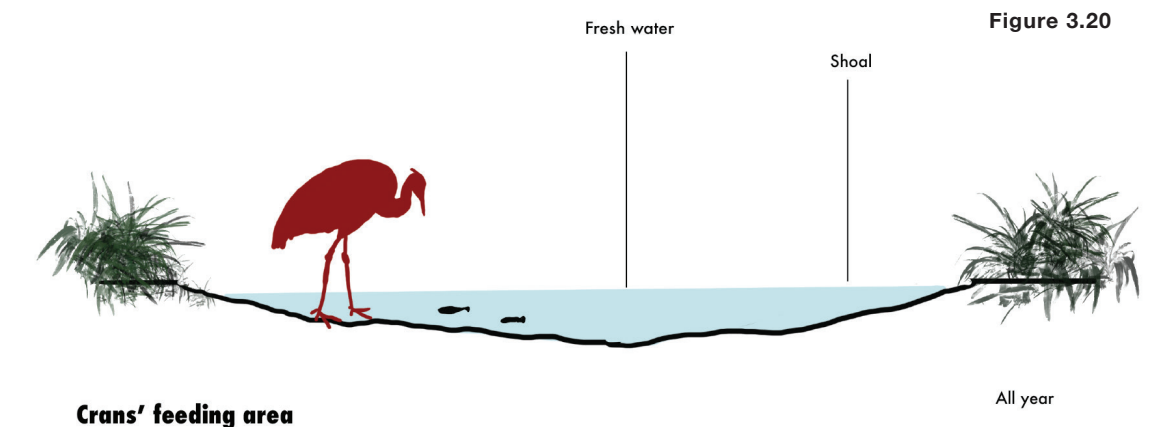




Figure 3.21:
Chinese traditional decorative pattern with crane

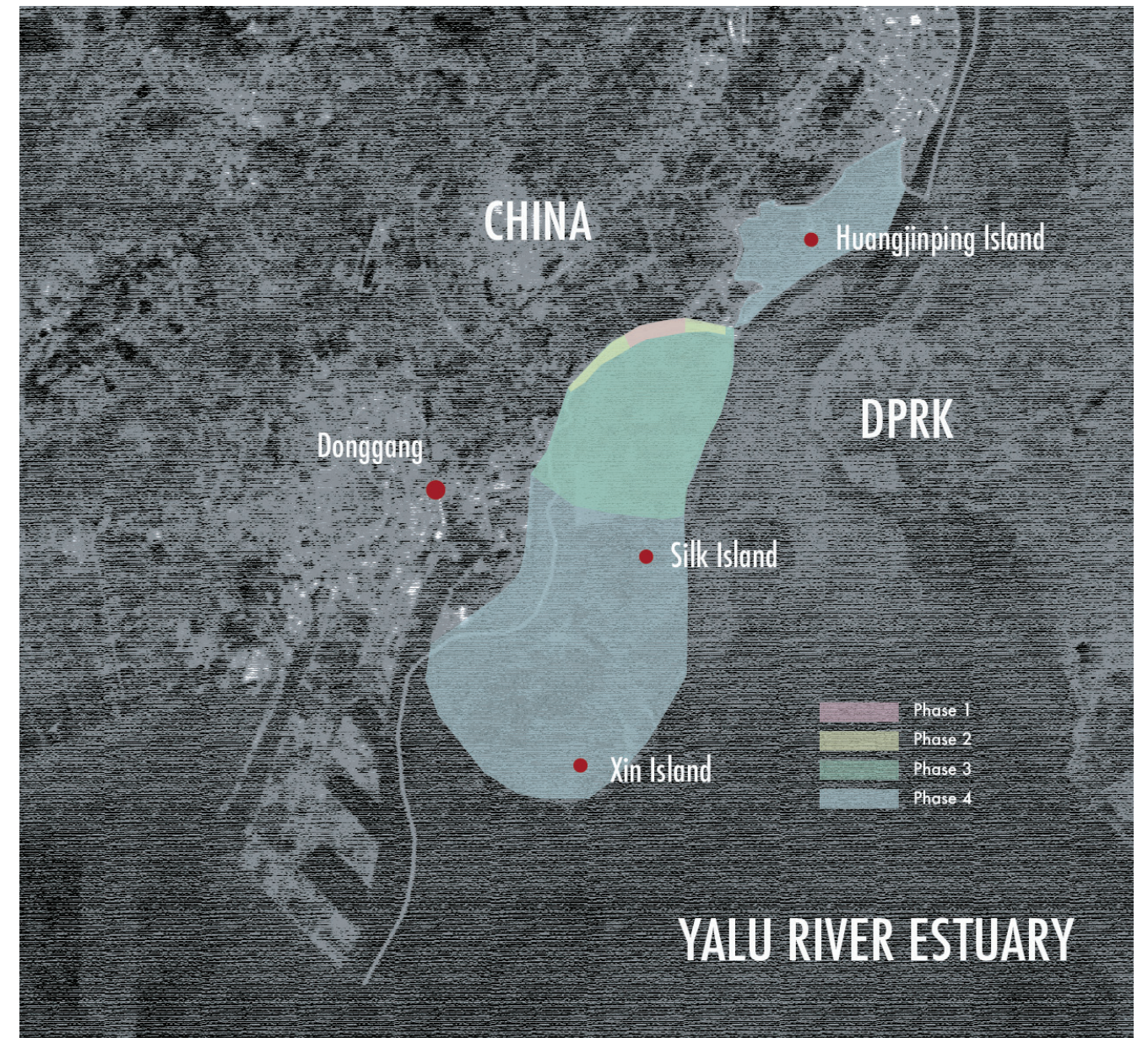
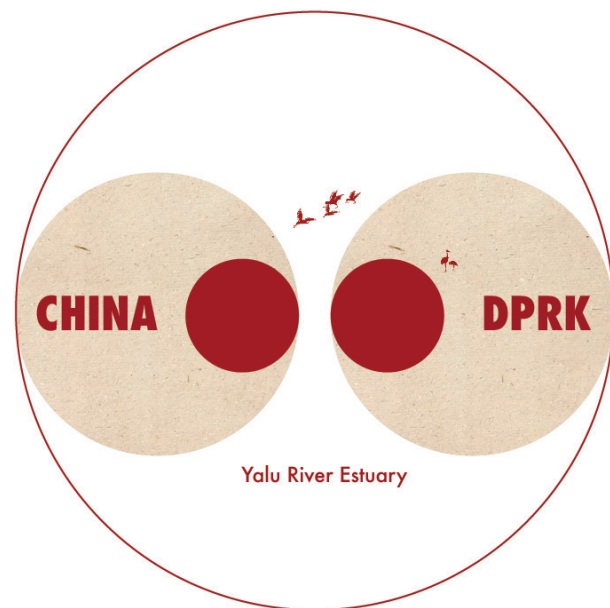


Figure 3.22
Phases planning in Yalu river estuary

PHASES PLANNING

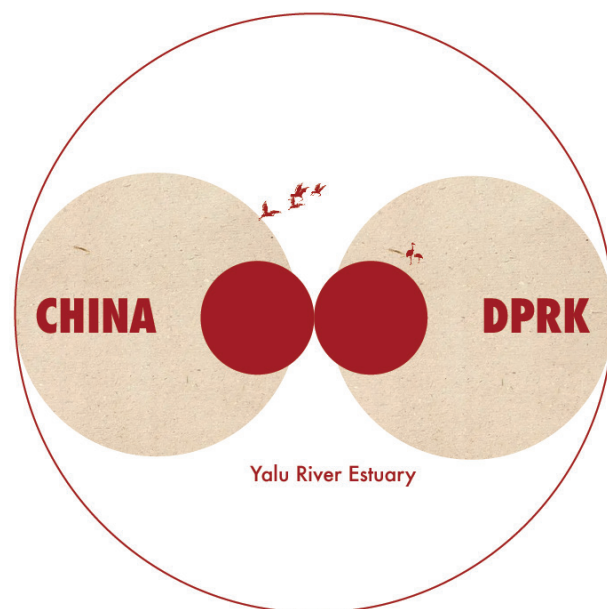
The project would be divided in four phases. These four phases would also change according to the sedimentation process. Through phases keep pushing forward, North Korea would be much more willing to cooperate. They might provide more data and research of Silk and Xin island which are fundamental for cranes conservation.

Figure 3.23
Design Phase



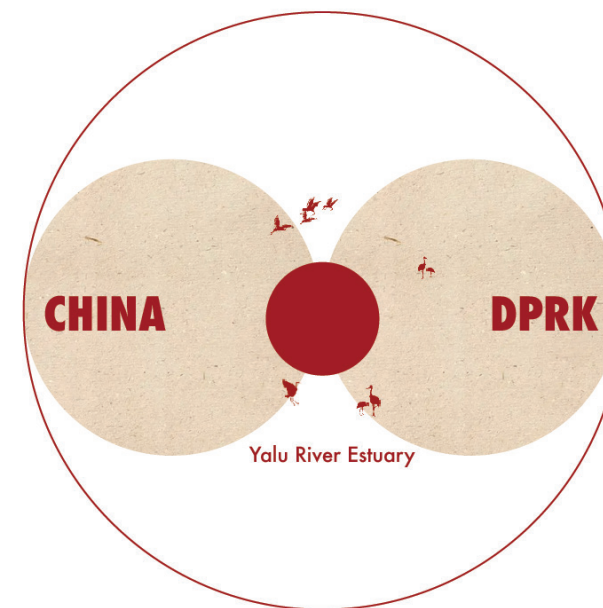
Phase 1

Figure 3.24
Design Phase



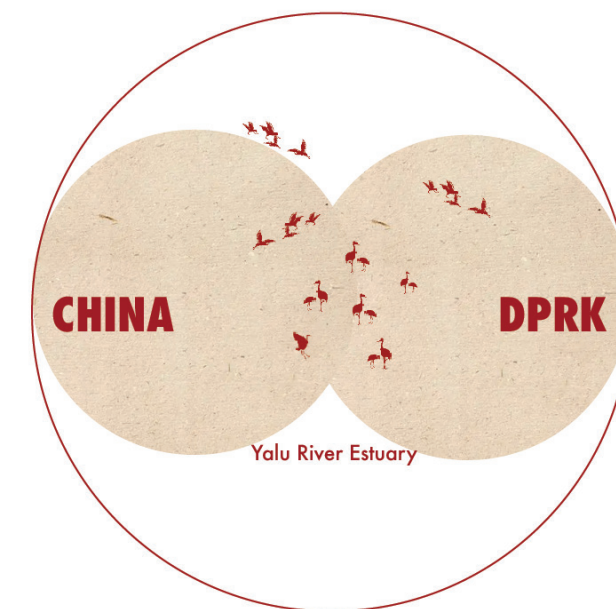
Phase 2

Figure 3.25
Design Phase



Phase 3

Figure 3.26
Design Phase



Phase 4

Ecology goals:

- China side habitat restoration
- Cooperative plan making

Political goals:

- Establishing starting point between neighboring countries
- Bring contact along border line (without actual contact)

Social goals:

- Interact activity happened between citizens (without physical contact)
- Bridge provided for citizens

Ecology goals:

- Habitat restoration cooperation team formed
- China side restoration still in process
- DPRK's

Political goals:

- Establishing mid-point between neighboring countries
- Contact at mid-point
- Provide a transition place between entire close to partial open

Social goals:

- Physical contact happened on mid-point
- Meeting ground provided
- Peace(grey) zone between countries

Ecology goals:

- Partial of border land emerged (sedimentation work)
- Shoreline restoration for cranes

Political goals:

- Special district formed, work for neighboring countries (ecological lead)
- Partial divided to economic lead area
- Improve neighboring region's economic growth

Social goals:

- Physical contact happened on mid-ground
- Meeting zone provided
- Peace(grey) district between countries
-

Ecology goals:

- Neighboring countries habitat restored
- Ready for other neighboring countries to join(along migratory route)

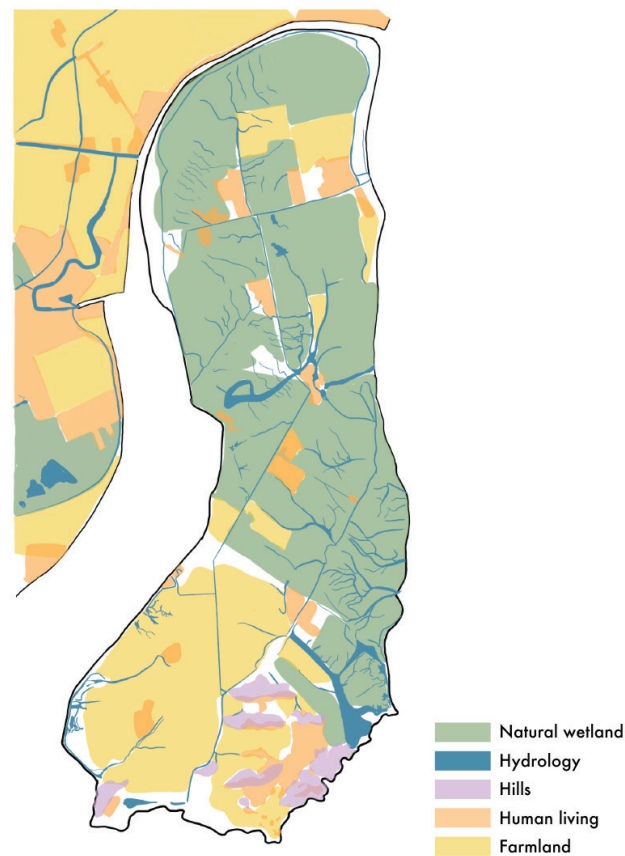
Political goals:

- Border open for other countries (DPRK condition)
- Improve international cooperation

Social goals:

- Physical contact happened freely in special district
- Meeting district provided
- Peace(grey) district between countries and propagandize peace and cooperation

Origin



Phase 1

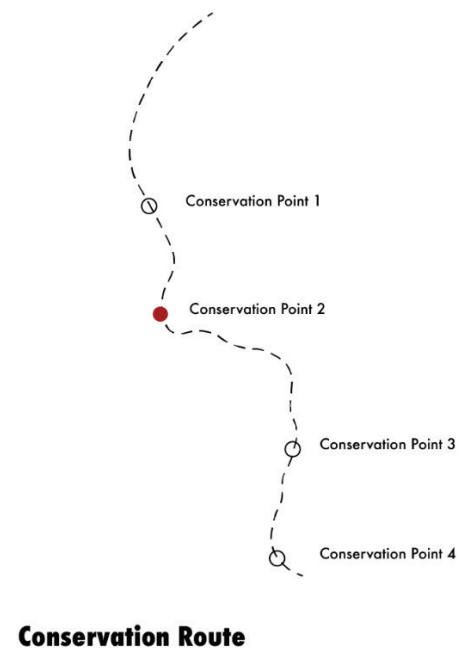


Figure 3.27
Phase Comparison

PHASES ONE PLANNING

Phase one is the preparation stage in the project. The design will happen along a grey zone area between countries. Riverbank surface softening and back to natural land would be the primary task. China and North Korea's conservationist will form a conservation group and start the conservation strategy and analysis of the silk island. In this phase, only conservation groups have access to the silk island. Their activity could be limited and watched by the North Korean government. This phase is also a point to establish a healthy relationship with neighboring countries and acquire more detailed information for the latter phases.

Figure 3.28



Conservation Route

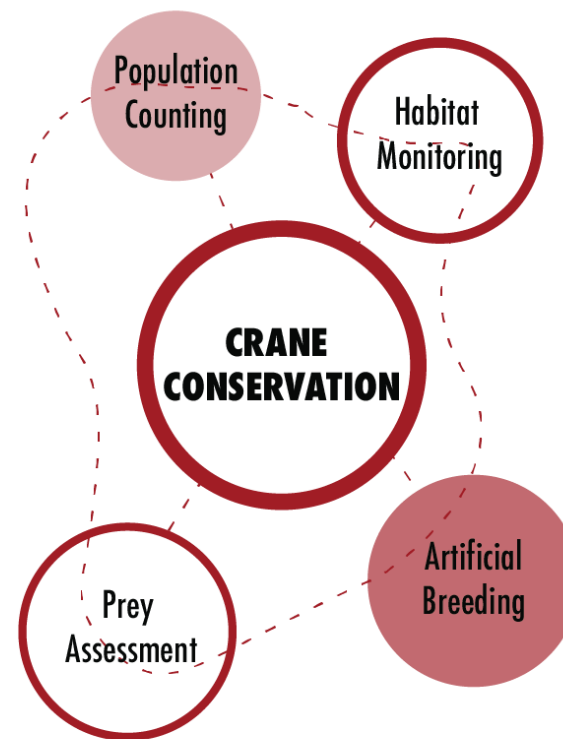


Figure 3.29

CONSERVATION

Conservationists would focus on habitat monitoring by exploring potential new habitats and conserving existing wetlands, marshes, and grassland. Artificial breeding on site would help with population growth and interaction with tourism. Conservationists would also need to cooperate with local farmers to count for the yearly crane population. Conservationists would focus on monitoring the prey and predator of the crane. Monitoring the farmland would also be essential, since farmland would be one of the big food sources for cranes during winter.

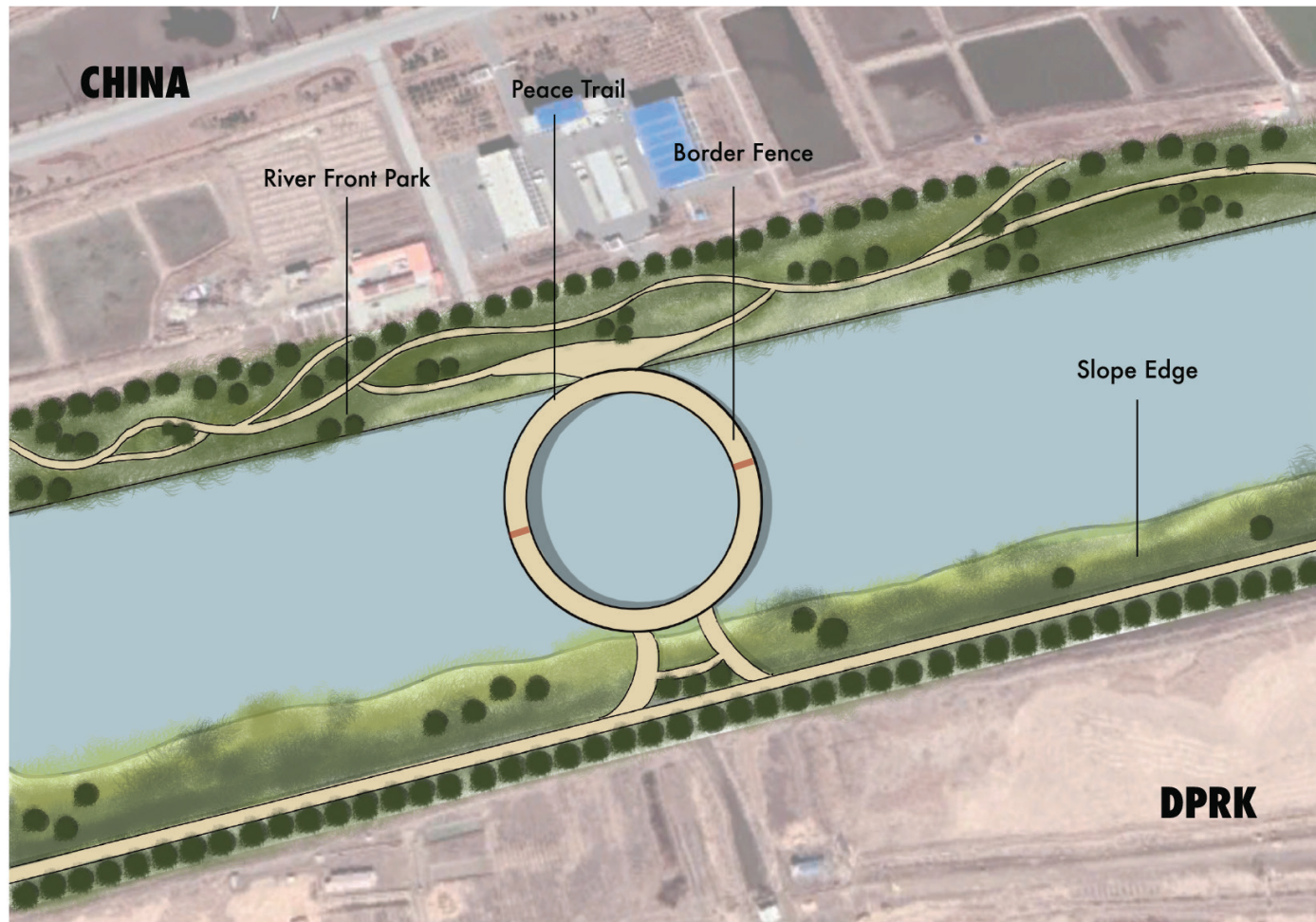


Figure 3.30
Phase 1 riverbank plan

PHASE ONE DESIGN

The design in phase one would focus on the peace park along the riverbank of China and North Korea. This peace park would consist of three parts: a China side riverfront park, a circle trail, and a North Korea side riverfront park. China's side riverfront park would soften the original industrial hardened surface of the riverbank. The circle trail would have border fences in the middle of the trail, which allowed people on two sides to share the same atmosphere, a grey zone, but without physically touching each other. North Korea's side riverfront would be designed back to natural slope edge instead of a sharp edge to solve the erosion problem. It would also indirectly provide more feeding areas for cranes.

This peace park aims to connect neighboring citizens from different countries and establish a good relationship with countries like North Korea, which is entirely closed. When the cooperation is hard to establish and asks a country to fully open, a grey zone or a midpoint would be a good start for the relationship establishment.

CHINA

Special Ecology District

DPRK

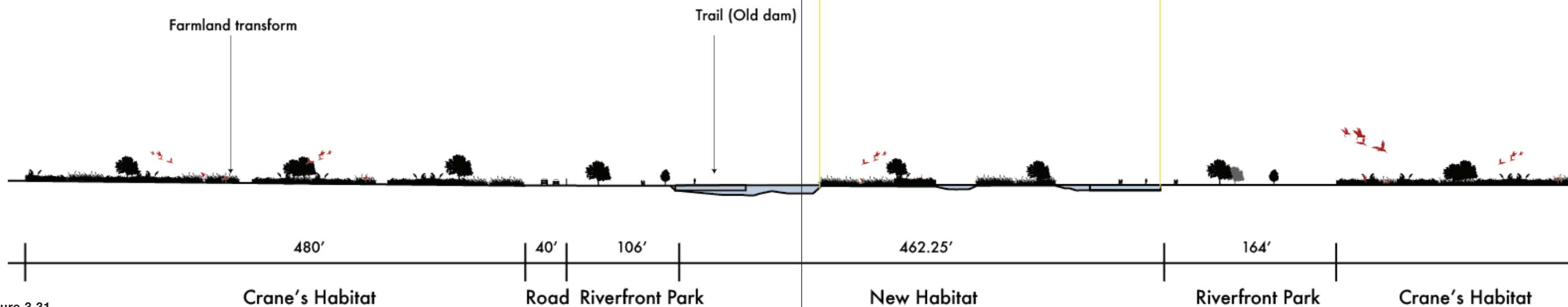
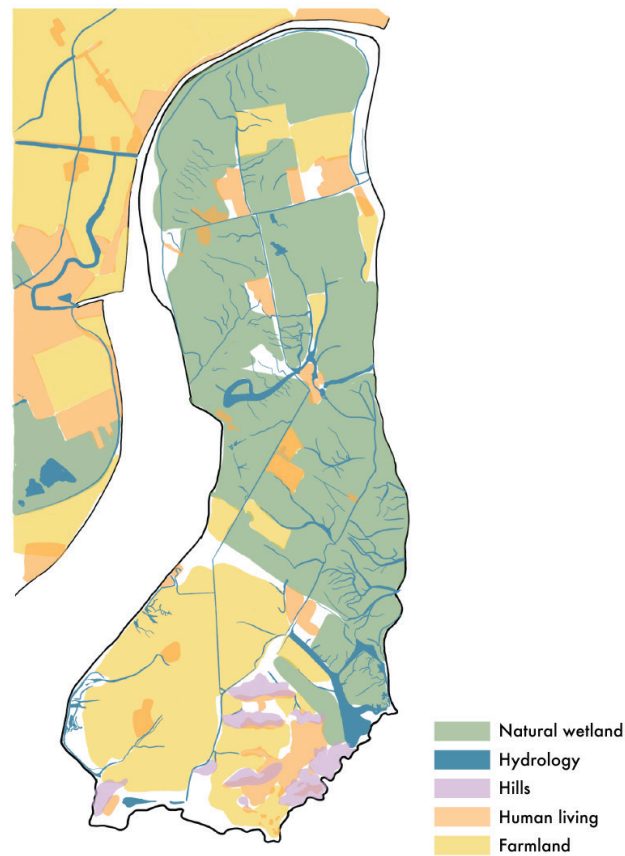


Figure 3.31
Phase 1 riverbank section

Origin



Phase 2



PHASES TWO PLANNING

Phase two is the wetland habitat restoration in the Yalu River stage of the project. The design will happen inside the circle trail and under the water. Sedimentation capture and water purification would be the primary task. China and North Korea's hydrologists will form a hydrology group and start the water pollution testing and sediment pollution testing. In this phase, hydrologists will join the conservation groups and are both granted access to the Silk Island. Their activity could be limited and watched by the North Korean government. This phase is based on the excellent establishment of phase one, and it is also a testing period for phase three.

Figure 3.32
Phase Comparison

Figure 3.33

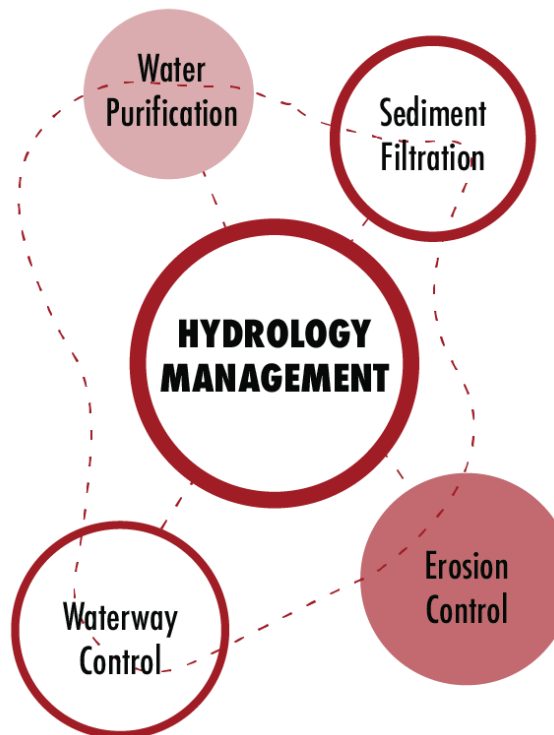
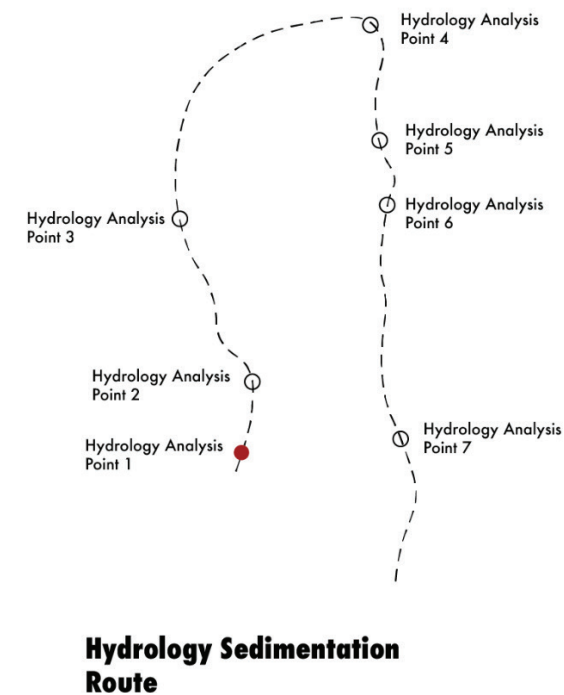


Figure 3.34

HYDROLOGIST

Hydrologists would focus on hydrology management by managing water purification and sediment filtration in the Yalu River. This management would help with providing healthy food sources for cranes. They would also focus on riverbank erosion to prevent more habitat loss for cranes and create more potential feeding areas for cranes. Another task they would have on-site would be waterway control which should allow ships in the east riverway to have enough space to sail safely. Their mission is focused both on ecology and social aspect.

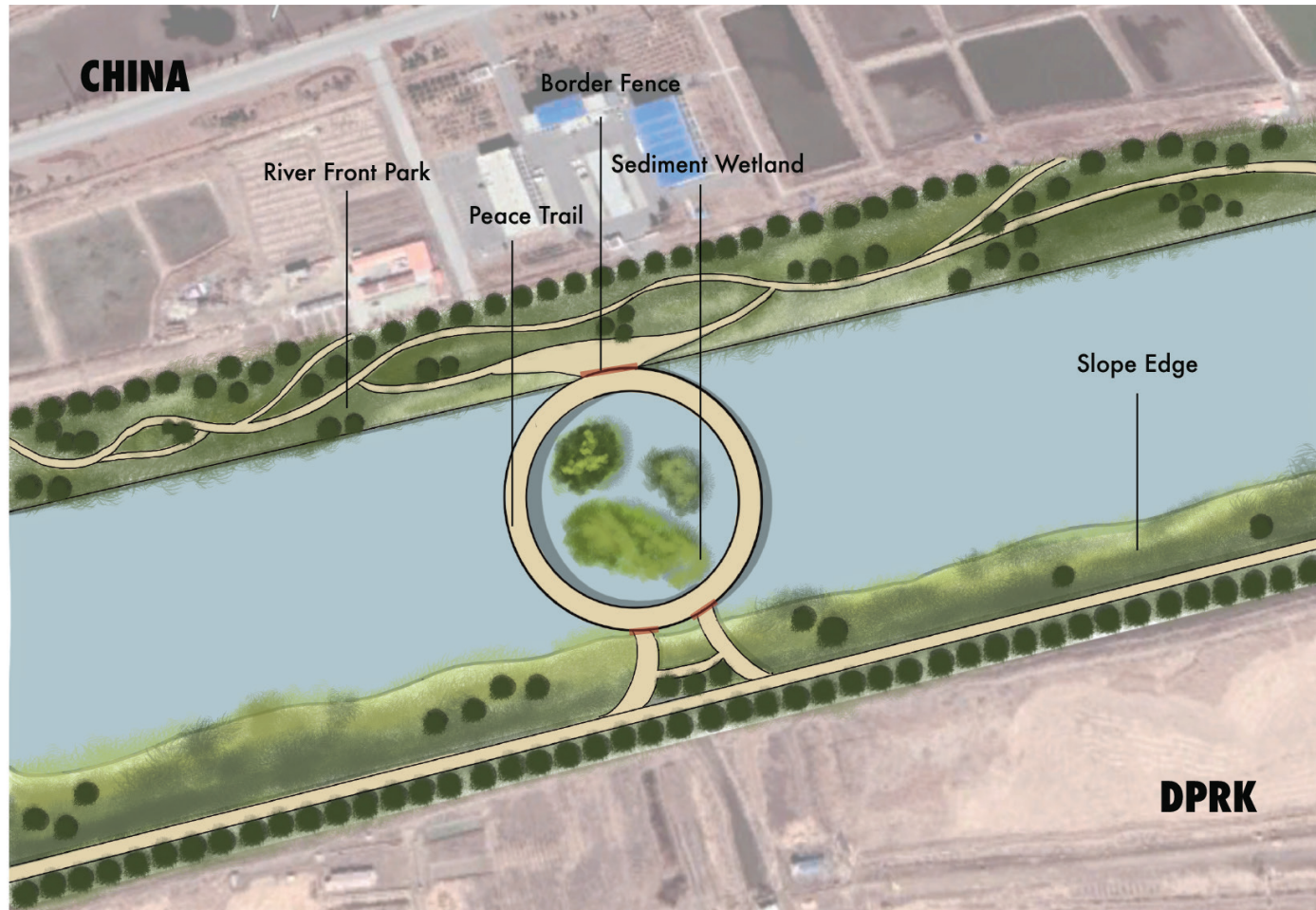


Figure 3.35
Phase 2 riverbank plan

PHASE TWO DESIGN

Phase two design along the riverbank of the China and North Korea border would be focused on the underwater sediment capture dam installation. The dam would be constructed with different elevations to slow down the water speed and trap the sediments in the gap. This strategy is based on the natural process at Yalu River. The sediment analysis previously shows that the sedimentary islands in Yalu River are merging. The design strategy is to help accelerate this process. The installation would be first tested inside of the circle trail. The wetland formed with this sediment capturing dam would serve as a feeding spot for cranes. The border fences on the trail would also be moved to the entrance of the trail on both sides. The circle trail itself became a meeting point or a grey zone for people on both sides.

Citizens have the chance to meet with other and play with each other physically. They can share their similar culture of cranes with each other.

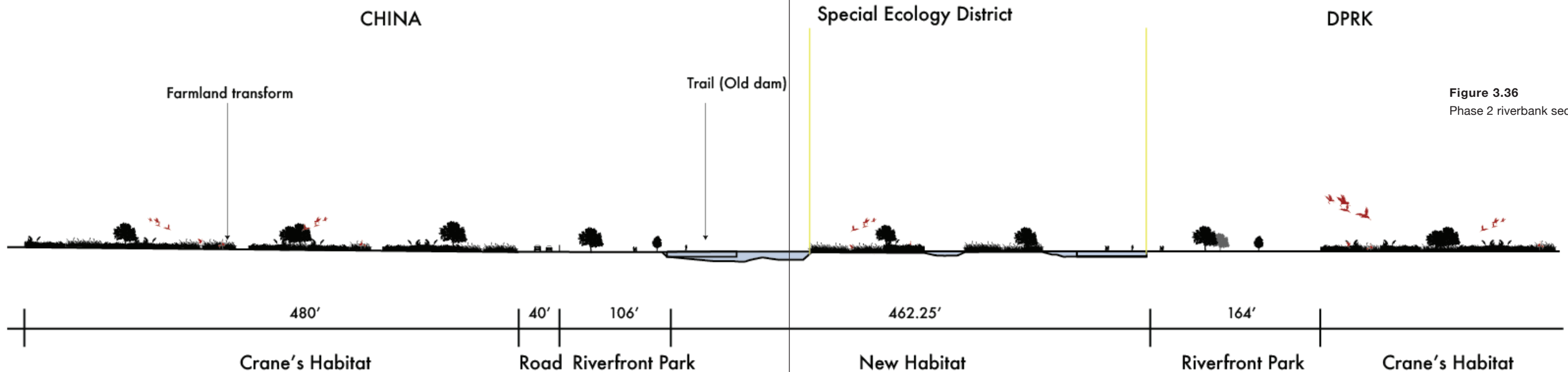
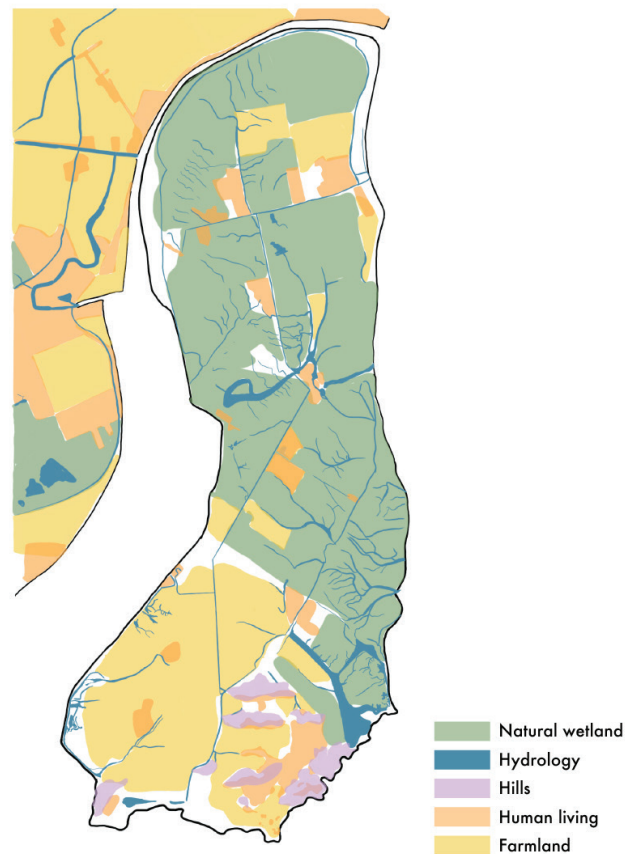


Figure 3.36
Phase 2 riverbank section

Origin



Phase 3

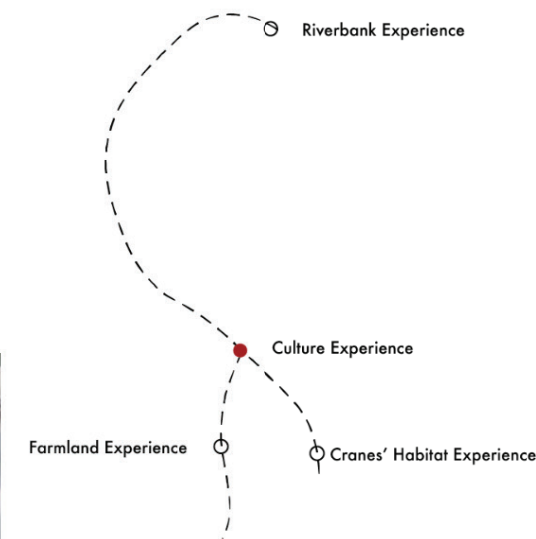


Figure 3.37
Phase Comparison

PHASES THREE PLANNING

Phase three is the further wetland habitat restoration in the Yalu River stage of the project. The installation of the sediment capturing dam would extend to the entire west Yalu River riverway. This installation is based on the successful testing in Phase two. Tourism will finally join the group and allow access to the Silk Island for more Cranes habitat visits and cultural experiences.

Figure 3.38



Tourism Route

TOURISM

Tourism, as the last group of people access to the Silk Island, will enjoy the paradise that conservationists and hydrologists provided for cranes. Thanks to this conservation project, people from outside of North Korea finally have a chance to enter mysterious North Korea. Tourism can experience local culture and compare local crane culture with China's crane culture. Tourism also gives a chance to learn the history of the China and North Korea border. Crane mimic route would be provided on Silk Island for experiencing crane migration and learning of wetland land dependent species.

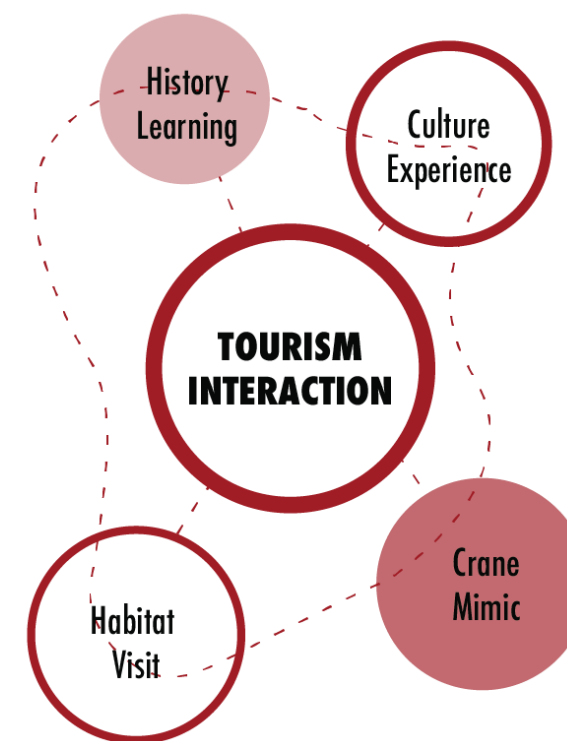


Figure 3.39

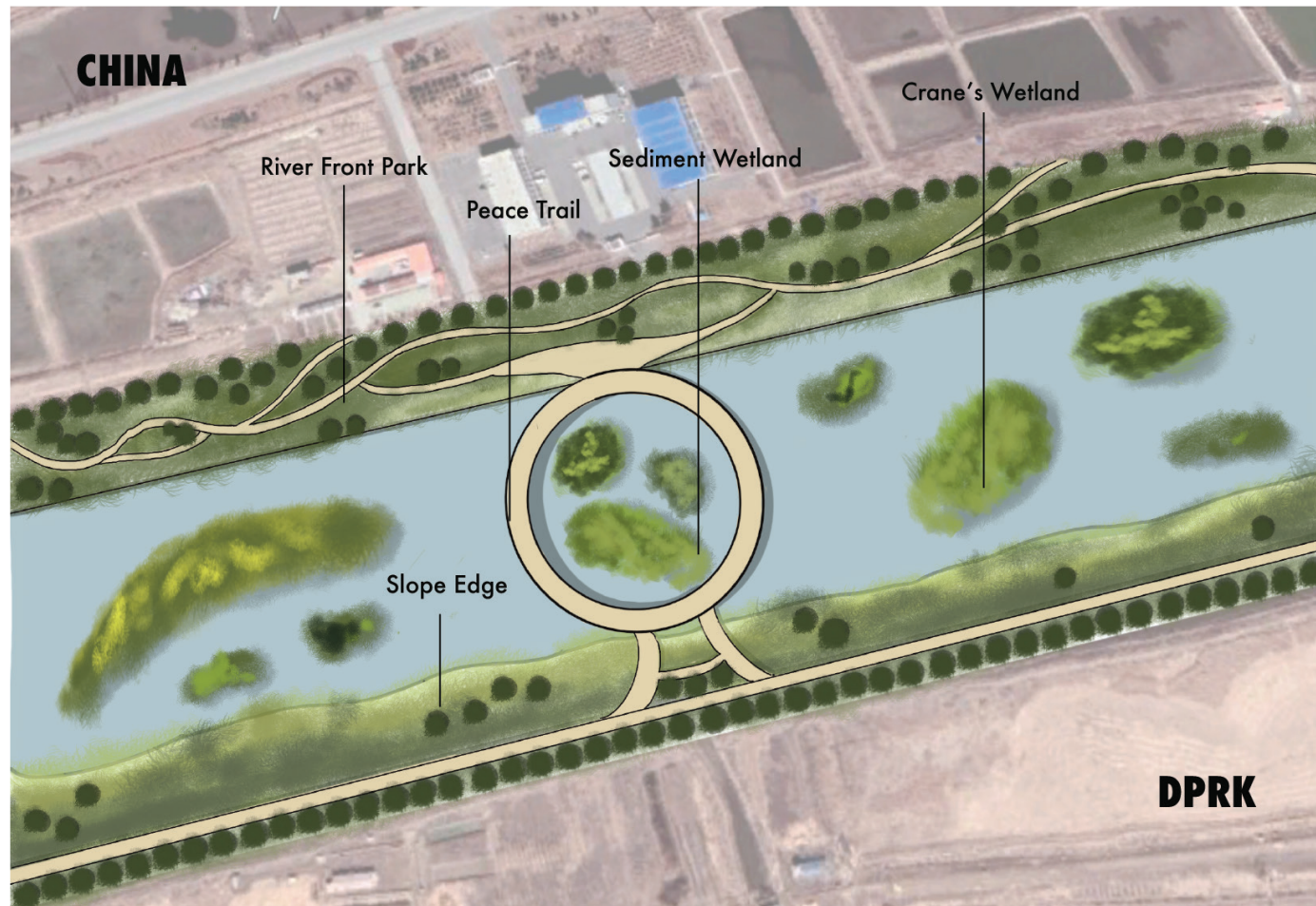


Figure 3.40
Phase 3 riverbank plan

PHASE THREE DESIGN

Phase three design is focused on the wetland island formation in the west river way of the Yalu River. More dams would be installed in the designed area based on the successful testing of the sedimentation capture dam in phase two. Since the west river way is filling each year naturally, the control of wetland formation would help to maximize the potential of the west river way. The sedimentary islands would be designed for wetland-dependent species. People on China side could finally enter the Silk Island and reveal the beautiful nature reserve on Silk Island. As all three phases ends well, phase four could be brought to the calendar which focused on the entire Yalu River conservation. It would also apply to all the borders that along crane's migration route.

Figure 3.41
Phase 3 riverbank section

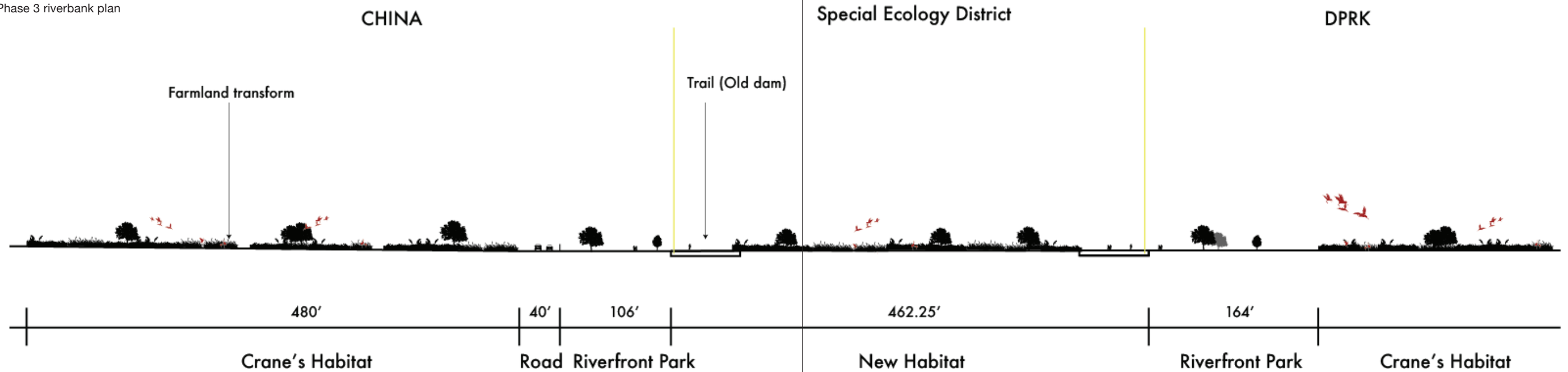




Figure 3.42
Crane dance performance inside Silk Island
Culture experience zone.



Figure 3.43
Crane's habitat inside circle trail.

CONCLUSION

The transboundary conservation project is an effective conserving strategy, especially for migrating species. The introduction of a peace park in the project would also strengthen the social and political bonding between neighboring countries. Due to the complicated management and conserving process in the transboundary project, dividing the project in phases would be more appropriate. Phase one needs to focus on social and political bonding establishment and own countries edge habitat restoration or conservation. Conservationists and other essential professional specialists could be the first round of people to enter the neighboring country. Phase two could penetrate more into neighboring countries for conservation purposes, and Sub-essential specialists should be allowed access to the special conservation district. Phase three could be open to all people, but the phase design should be adjusted to local conditions.

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