2022 EAAFP Small Grant Fund (WG/TF) Report

MAPPING OF SHOREBIRD SPECIES HUNTING ON THE EAST COAST OF ACEH, INDONESIA

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DATE OF SUBMISSION (11/01/2023)

PUSAT RISET KONSERVASI GAJAH DAN BIODIVERSITAS HUTAN (PKGB) SYIAH KUALA UNIVERSITY BANDA ACEH
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Section 1. Project Overview

1.1 BACKGROUND

Waterbirds are a term for birds that are very dependent on aquatic habitats to meet their life needs. Waterbirds can be classified according to their main habitat into seabirds and waterbirds that live on the coast and inland wetlands (Alikodra 2021). Based on their main foraging strategy and habitat, Faaborg (1988) subdivides shore and wetland birds into swimming birds (eg ducks, grouse), aerial prey hunters (eg gulls), and large waders (eg large waders). herons, egrets, herons) as well as shorebirds (or small waders) and marsh birds. Most of the shorebirds are migratory birds, namely bird species that make periodic movements from the Northern to the Southern Hemisphere or vice versa, to avoid winter conditions and famine in their places of origin. The birds will return to their place of origin, usually early spring, when climatic conditions and resources are sufficient to support their breeding (Alikodra 2021).

The East Coast of Banda Aceh City in Aceh Province is an important indicator for the sustainability of water birds, both those that live all year round/non-migrants (*Resident birds*) as well as the types of migratory birds that come every year when the rainy season arrives in the region. This area is outside the Nature Reserve Area (KSA) and Nature Conservation Area (KPA) so that it is possible for anyone to change their habitat and this is often done by violating spatial planning. In this area the life of water birds is threatened by various factors, including loss of habitat due to population growth and development which continues to pressure and turn swamps and beaches into areas for settlements, plantations, agriculture and aquaculture. Another threat to water birds is due to water pollution, which has the potential to poison swamp water bodies and coastal waters. Caused by the use of pesticides and insecticides as well as waste along the shoreline. Particularly for migratory (coastal) waterbirds, the environmental damage that occurs in their transit areas can result in death, due to the unavailability of sufficient food resources.

Every year, birds migrate to stop or survive in an area. Indonesia is one of the areas with the highest biodiversity in the world. As a result of the progress of systematic research and bird taxonomy, bird species in Indonesia have increased to between 1812 species (Burung Indonesia, 2021). But on the other hand, community activities in bird habitats are sometimes a threat.

Hunting activities for migratory birds are also still the main prey of the community (Greeners, 2020). The birds are often used by the community to improve the economic sector through the meat trade. For example, in several areas in Banda Aceh City such as Lampulo, Peunayong, Kampung Jawa, Gampong Pande and Alue Naga, migratory birds are still often found which are turned into snacks or human food.

Banda Aceh is one of the priority areas for shorebirds (Putra, et al. 2020). However, hunting for shorebirds species is of great concern. People on the coast still use knitted nets to catch birds (Noraini, et al. 2013), some even sell nets with a length of 30-40 meters. Actually the main target of the community is the Swinhoe's snipe (*Gallinago megala*) local name: *berkik* (Asep A. 2011), but all species of birds caught in nets without being selected are all taken for sale and consumption. People also hunt using air rifles for various purposes, some are just for fun and some are taken for consumption.

Bird hunting will be a major threat to various species of migratory birds, which makes the coastal area in Banda Aceh City one of the resting and feeding sites for some migratory birds. The source of food for shorebirds is mostly benthos, especially macrozoobenthos. Macrozoobenthos that are used as food by shorebirds include bivalves, gastropods, crustaceans, polychaeta, pisces, and insect larvae (Jing et al. 2007)

Based on the results of observations made, there have been no preventive efforts made by several related parties, therefore this project is the first reference in mapping hunting activities as an effort to increase public awareness of shorebirds species protection. The proposed project will involve all key stakeholders in Banda Aceh City for shorebirds species conservation.

A. Description of the Research Center for Elephant Conservation and Forest Biodiversity (PKGB) at Syiah Kuala University in Banda Aceh, Indonesia

Type of the organization - Government/NGO/Private Sector/Other	Government (College)
Name(s) of the division and/or position	ADM ACCOUNTING & FINANCE
The University of Syiah Kuala Research Center for Elephant Conservation and Biodiversity (PKGB) has a concern for the preservation of animals in Aceh Province. This also includes the conservation of migratory birds and saving their habitat. Since the year of its establishment (2018), there have been many public awareness activities carried out, such as involving school and college students to get to know more about bird species. We have guided Students of SMP Negeri 1 Bandar Baru, Pidie Jaya in introducing water birds in Banda Aceh in their natural habitat. Then, Perkasa Alam Banda Aceh students attended a seminar on migratory bird introductions at the University of Syiah Kuala which was also attended by teachers, lecturers and other related parties. Based on the results of a performance evaluation by Syiah Kuala University, PKGB for 2023 has received A accreditation, or the best, so that it becomes one of the reference research centers for wildlife conservation programs.	

B. Abstract

Banda Aceh is one of the priority areas for shorebirds (Putra, et al. 2020) in Aceh Province, Indonesia. However, hunting for shorebirds species is very concerning. Communities on the coast still use woven nets to catch birds (Noraini, et al. 2013), some even sell nets 30-40 meters long. This research aims to reduce the level of poaching, identify shorebirds species and shorebirds abundance with the Shannon-Wiener Index, conduct assessments and interview local people to map hunting activities and conduct public awareness from the school - university - community level. This research activity was carried out in Gampong Pande, Gampong Jawa, Peunayong, Lampulo, Lamdinding and Alue Naga. The coastal area of Lampulo Village, Gampong Jawa, Gampong Pande and Alue Naga are habitats for migratory birds. As far as the observations have been made, the habitat in Gampong Pande and Gampong Jawa is still beautiful/natural. Meanwhile, in Gampong Lampulo, Alue Naga and Lamdinding, there are still a number of obstacles to face, such as land tenure struggles, the level of public education about water birds and migratory birds is still low, and high economic inequality, so many people take shortcuts as support. family economy by hunting animals not only for birds, but also for other animals. The motive of this hunt is not only for consumption but also for sale if there is an order from the market to the hunters.

The coast of Banda Aceh City has several types of habitat that are suitable as havens for migratory birds, namely mangrove forests, tidal beaches, swamps and artificial wetlands such as ponds. apart from being a haven for migratory birds, mangrove forests are a place to find food and shelter. This is because shorebirds depend on the availability of coastal animals as a source of food, in the form of fish, crustaceans, molluscs, polichaeta, and other sea creatures. As with the research that has been done, migratory birds in the coastal area of Banda Aceh City occupy mangrove forest areas, shrimp ponds, swamps, and stretches of sand that are on the beach when the tides occur. In addition to the availability of food sources in Gampong Pande there are also some mangrove vegetation that support migratory birds to rest and carry out other activities, namely *Rhizophora apiculata* (bakau minyak)*, Rhizophora mucronata* (bakau kurap)*, Avicennia marina* (api-api putih)*, Avicennia alba* (api-api hitam)*, Casuarina equisetifolia* (cemara laut)*,* and *Leucaena leucephala* (lamtoro)*.*

1 .2 DETAILS

A. Detailed Project Progress

Title: MAPPING OF SHOREBIRD SPECIES HUNTING ON THE EAST COAST OF ACEH, INDONESIA

Objectives

The main objectives of this research are:

1. To map hunting activities carried out on shorebird species in Banda Aceh
2. To identify shorebirds species and shorebirds in abundance in Banda Aceh, Aceh's East Coast
3. To increase public awareness in the protection of migratory birds on the East Coast of Aceh

Fieldwork

Period: The field work was delayed by lockdowns caused by the COVID 19 pandemic. The research was also delayed because it coincided with the fasting month and Idul Fitri in Banda Aceh. New research was conducted from May 2022. The initial activity was obtaining permits from the research location from 1 to 15 May 2022. The inventory was carried out from 16 May to 31 May 2022. Inventory activities were carried out in advance due to the end of bird migration, so it must be done earlier. Hunting mapping activities were carried out from 1 June to 15 June 2022 and Public Awareness activities were carried out from 16 June to 30 June 2022.

The researcher also before carrying out the activity first validated the method to the Head of PKGB, Dr. Abdullah, M.Si. this is intended to avoid errors in the application of the method in the field later. Discussions were also held with several community organizations such as the Aceh KSLH and Sumatra's Lets Birding. This discussion was carried out via the Zoom meeting platform.

Weather: The weather was dominated by limited wind coming from a southwesterly direction with wind speed ranging from 0 to 3 meters/second. Daily cloud cover averaged 2/8 or 20%. Daytime temperatures raged from 33° to 35°Celsius.

Shorebird Inventory Team

A total of 6 bird researchers were involved in this study, 3 researchers from the Research Center for Elephant Conservation and Biodiversity Forest (PKGB) University of Syiah Kuala, 1 researcher from independent research, 1 researcher from the Tropical Medicine Masters Study Program University of Syiah Kuala and finally 1 people from Lets Birding Sumatra.

Methods

1. Shorebirds Inventory

Bird observations were carried out from 07.00 - 17.00 WIB with 4 repetitions. The method used is concentration count (Sabrina, Mardiastuti, and Hernowo 2019). Concentration count is a method that is carried out by only focusing on one or several points that are considered to be the center of the bird's existence. The block method was used to estimate the number of individuals on the shoreline (Howes, Bakewell, and Noor 2003). This method is used by making block estimates to count water birds that are perching. Birds that are in the block are then counted and multiplied by the number of existing blocks and added to the number of individuals outside the block (Howes et al. 2003). The observation distance to the shoreline is around 50-100 meters.

Diversity of waterbird species was calculated using the Shannon-Wiener (H') diversity index (Magurran and McGill 2011). Bird species that have been recorded are then divided into several groups, namely marandai, wading birds, shorebirds and seabirds, and then sorted by family and migratory status (migrants or settlers). Furthermore, birds are selected based on their conservation status according to CITES, IUCN Red List and Minister of Environment and Forestry No. P.106/MENLHK/SETJEN/KUM.1/12/2018. The tools used for observing waterbirds are binoculars, monocular telescopes, Nikon Coolpix P900 cameras, tripods, tally sheets, hand-counters, stationery, and field guides (Alikodra 2021; Eaton et al. 2016; MacKinnon, Phillipps, and Van Baleen 2010).

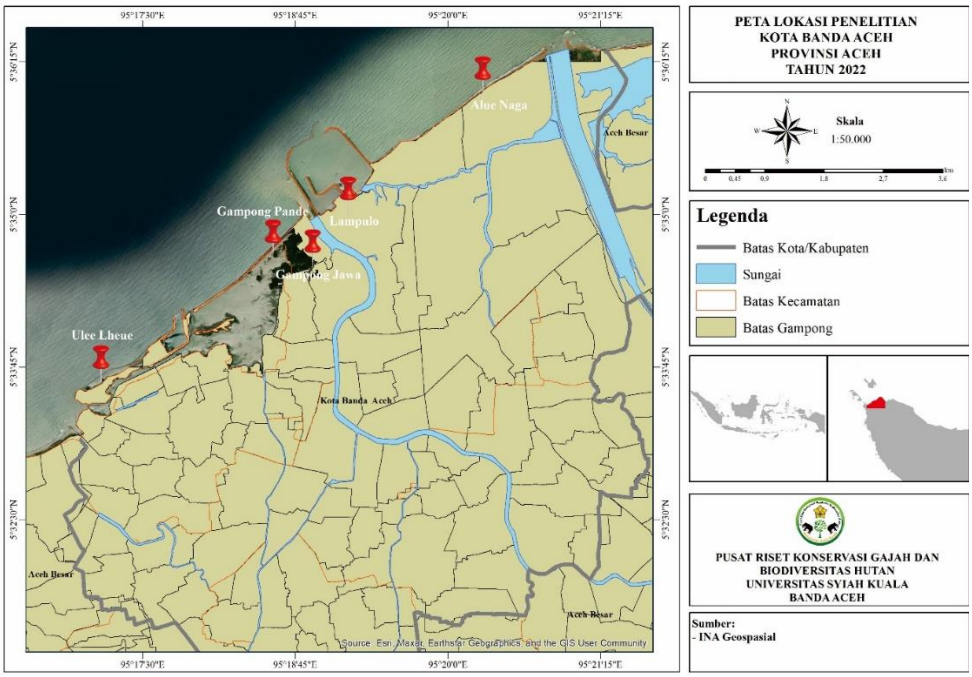


Figure 1. Research sites

2. Mapping of Shorebird Species Hunting

   a. Market Surveys

      We have survey the market in 7 sub-village in Banda Aceh City, namely Ulee Lheue, Gampong Pande, Gampong Jawa, Lampulo, Peunayong, Alue Naga dan Lamdingin. We have built good relationships with several community parties such as students, we have conducted the most intensive surveys there. For the validity of the market survey research data, we have conduct a survey 3 times (Rentschlar et al. 2018). Teams opportunistically followed major roads, visiting markets as they found them across each of the seven survey locations.

   b. Workshop Questionnaire

      We used a qualitative survey given to trappers, traders, and sellers to assess temporal changes in price and volume of species, with the intention of using this information to infer wild population trends as demonstrated by Harris et al. (2015) in Rentschlar et al. 2018). For this project, with the main focus on the Shorebirds Species:

      1. Which species of bird do you trap or sell the most?;
      2. Which species are the hardest to find?;
      3. Which five species have increased in value?;
      4. Which five species have decreased in value?

Interview

In this research, we focus on direct interviews with the public regarding migratory bird species and actions that have been taken so far. Each research location that we visited had its own characteristics, including the social community, different perceptions, different cultures and the habitat used by migratory birds also had its own characteristics.

1. Dokumentasi Proses Pengurusan Perizinan Penelitian

Figure 2. Licensing Coordination with Geuchik Gampong Peunayong, City of Banda Aceh.

Figure 3. Licensing Coordination with Geuchik Gampong Jawa, City of Banda Aceh

Figure 4. Licensing Coordination with Geuchik Gampong Pande, City of Banda Aceh

2. Migratory Bird Inventory Documentation and Local Community Interviews

Figure 5. Researchers are conducting interviews with one of the local people

Figure 6. One of the people showed their catch around the Water Bird Habitat in the form of an Octopus

Figure 7. One of the Ideal Potential Locations for Observing Migratory Birds in Gampong Lambadeuk, Peukan Bada District, Aceh Besar District, Aceh Province, Indonesia

Figure 8. One of the Ideal Potential Locations for Observing Migratory Birds in Gampong Blang, Meuraxa District, Banda Aceh City, Aceh Province, Indonesia

Figure 9. Location of Migratory Bird Inventory in Gampong Pande, Kutaraja District, Banda Aceh City, Aceh Province, Indonesia

Figure 10. Location of Inventory of Migratory Birds in Gampong Tibang, Syiah Kuala District, Banda Aceh City, Aceh Province, Indonesia

Figure 11. Migration Bird Inventory was conducted in Lambadeuk Village, Kuta Baro District, Aceh Besar. This location was chosen because it has a different habitat from other locations, because this location was previously a densely populated area, after the 2004 Aceh Tsunami, this location was filled with mangrove vegetation, but sometimes debris and building structures are still found.

Figure 12. Location of Inventory of Migratory Birds in Gampong Lampulo, Kuta Alam District, Banda Aceh City, Aceh Province, Indonesia.

Conference

Data from the results of the research that has been carried out, we seminarized at the 10th BIOTIK National Seminar 2022 located at Ar-Raniry State Islamic University Banda Aceh. Our articles can be viewed on the link https://jurnal.ar-raniry.ac.id/index.php/PBiotik/article/view/15866 , This seminar was carried out in a hybrid manner, namely offline and online. Conference participants who attended directly at the seminar location had undergone the standard Covid 19 Test process, and were declared Negative, so that with this very strict process only a few participants could attend Offline, while other participants took part in activities Online through the Zoom Meeting Platform. At the BIOTICS seminar we discussed the types of water birds in the East Coastal Area of Banda Aceh City, Aceh Province, Indonesia. Our articles are published in National Proceedings with ISBNs.

Figure 13. Presenters of the 10th BIOTIK National Seminar 2022

Figure 14. Seminar presenters were also given the opportunity to present research results in parallel classes with students of the Biology Education Study Program, FTK UIN Ar-Raniry

B. Problems Encountered/Adjustments

This research in its initial design was located in 5 villages, namely Gampong Peunayong, Gampong Lampulo, Gampong Jawa, Gampong Pande and Gampong Alue Naga. The first change that occurred was the addition of migratory bird inventory locations. This was done as a result of delays in observations during the fasting month and Eid al-Fitr 2022 which coincides in April-May. So that when inventory observations were made it was already at the end of the migration. Therefore, we decided to increase the number of observation locations, namely Gampong Lamdinding, Gampong Tibang, Gampong Ulee Lheue and Gampong Deah Raya in Banda Aceh City. We also made observations in Lambadeuk, Lampageu, and Lam Manyang villages in Aceh Besar District Administratively. So that the total number of research locations is 12 locations.

In carrying out the inventory of migratory birds we also involved a student who was completing his final assignment at the Biology Education Study Program, Faculty of Teacher Training and Education, Syiah Kuala University Banda Aceh, a research study was conducted to determine the location of the distribution of migratory bird stopover habitats in Banda Aceh City. So we collaborated in completing this research, so that the location map that we attach is the result of a joint analysis.

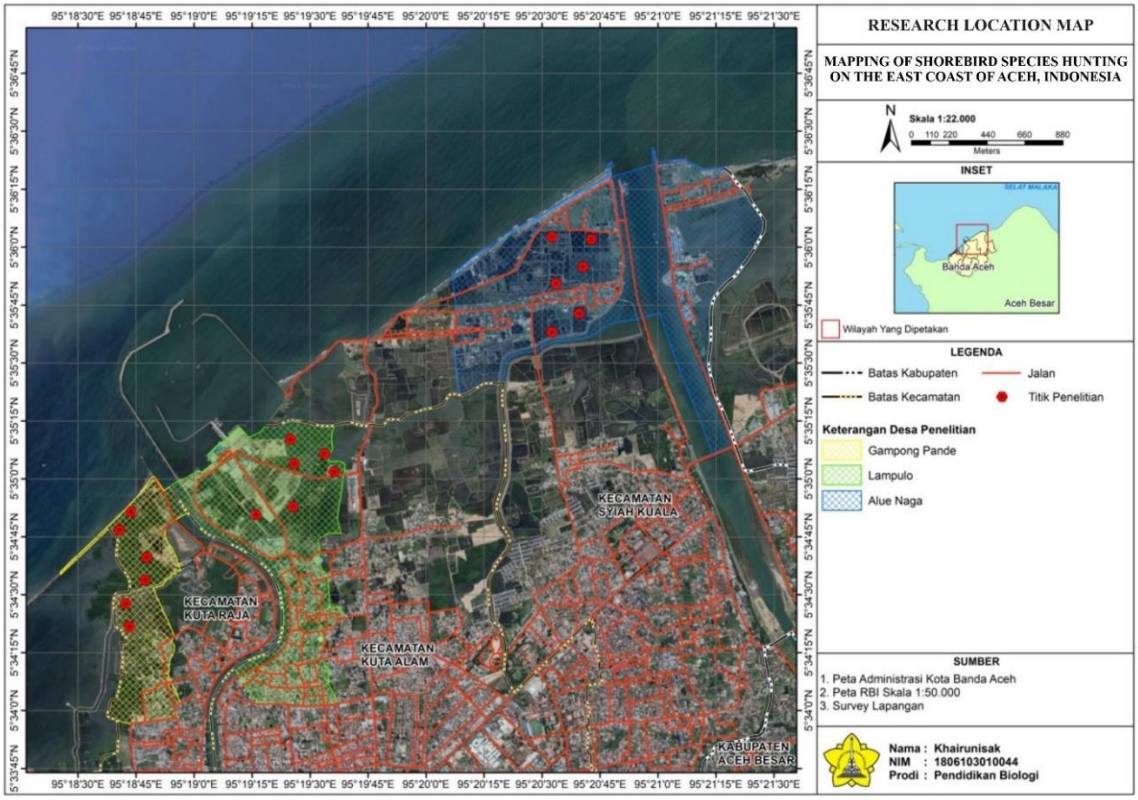


Figure 15. Map of the location of the research conducted jointly with students at the Syiah Kuala University in Banda Aceh

C. Community education and public awareness activities

We have carried out public awareness activities about migratory bird conservation starting from the community to the university level. The material we provide does not only focus on migratory birds but on how to manage the main areas and habitats in supporting sustainable conservation efforts, how the presence of migratory bird habitat can improve the economy of coastal communities, one of which is the conservation of mangrove ecosystems. Mangrove forests greatly support the economy of coastal communities, because they are a source of livelihood for people who work as fishermen. Ecologically, apart from being a habitat for marine biota, mangrove forests are also a resting area for migratory birds and spawning locations for fish seeds that live in the open sea. The diversity of mangrove species and their uniqueness also has the potential as a tourism forest vehicle and/or a buffer for the protection of coastal and coastal areas, from various threats of sedimentation, abrasion, prevention of seawater intrusion, as well as a food source for marine biota habitat.

In general, the condition of mangrove forests in Banda Aceh City is under heavy pressure. Apart from being encroached on and/or converted, mangrove areas in several areas, including in Kutaraja District, Syiah Kuala District and Kuta Alam District, Banda Aceh City for the benefit of ponds, is now rife. The consequences of this include disrupting the function of the mangrove area as a habitat for marine biota, protecting coastal areas, and breaking the food chain for living biota such as birds, reptiles and various other forms of life. The pressure on mangrove forests in the Banda Aceh City area, as a result of the growth of activity centers and various human activities, is also caused by several aspects of activities including: (a) Development of settlements, (b) Development of recreational facilities, dan (c) Utilization of tidal land for aquaculture purposes.

1. Coordination of Research Results in Government Institutions

Figure 16. Socialization of the Migratory Bird Research Program with the Chancellor of the Syiah Kuala University in Banda Aceh and his staff

Figure 17. Socialization of the Migratory Bird Research Program with the Head of the Education and Culture Office of the City of Banda Aceh

Figure 18. Socialization of the Migratory Bird Research Program with the Chancellor of Ar-Raniry State Islamic University Banda Aceh and his staff

2. Discussion on Migratory Bird Conservation with Perkasa Alam School

Figure 19. Socialization of the Migratory Bird Research Program with the Teacher Staff of the Perkasa Alam School, Banda Aceh City

Figure 20. Socialization of the Migratory Bird Research Program with Perkasa Alam School Students, City of Banda Aceh

Figure 21. Socialization of the Migratory Bird Research Program with Perkasa Alam School Students, City of Banda Aceh

Figure 22. Strengthening Wildlife Conservation Theory filled by Dr. Abdullah, M.Si (Head of the Research Center for Elephant Conservation and Forest Biodiversity)

3. Discussion on Migratory Bird Conservation with the Nature Lovers Community (Mapala Caniva) Faculty of Agriculture, Syiah Kuala University, Banda Aceh

Figure 23. Discussion on Conservation of Birds with Nature Lovers Community (Mapala Caniva) Faculty of Agriculture, Syiah Kuala University, Banda Aceh

Figure 24. Discussion on Conservation of Birds with Nature Lovers Community (Mapala Caniva) Faculty of Agriculture, Syiah Kuala University, Banda Aceh

Figure 25. Discussion on Conservation of Birds with Nature Lovers Community (Mapala Caniva) Faculty of Agriculture, Syiah Kuala University, Banda Aceh

Figure 26. Discussion on Conservation of Birds with Nature Lovers Community (Mapala Caniva) Faculty of Agriculture, Syiah Kuala University, Banda Aceh

4. Speaker at the 2022 World Migratory Bird Day Seminar at Syiah Kuala University

Figure 27. Speakers of the World Migratory Bird Day 2022 Seminar, this Seminar was attended by various groups, and also students

Figure 28. We convey research opportunities and challenges faced in migratory bird research in Banda Aceh City

5. Public

Figure 29. Together with the local community, they discussed bird conservation. This family was previously a bird hunter if there was an order from someone, whether it was for consumption or for pets. However, this activity is no longer carried out since cultivating horticultural crops in secondary forest areas.

Figure 30. Together with the local community, they discussed bird conservation

6. Introduction to Animal Types in Early Childhood (PAUD-Elementary School)

Figure 31. We also conduct socialization on bird conservation at the early childhood level, or early childhood education. This program is expected to give birth to generations of conservationists in the future.

D. Additional supporters of this project

We allocate some of the costs given in this research to publish the books we have compiled. There are 2 books published in 2022. This book is expected to be a reference for the community and students at universities in Aceh Province in conserving birds. We also have IPR (intellectual property rights) in the two books that we have published from the Ministry of Law and Human Rights in 2022. We hope that the results of this research can be utilized by the community as well as possible and further increase public awareness in bird conservation.

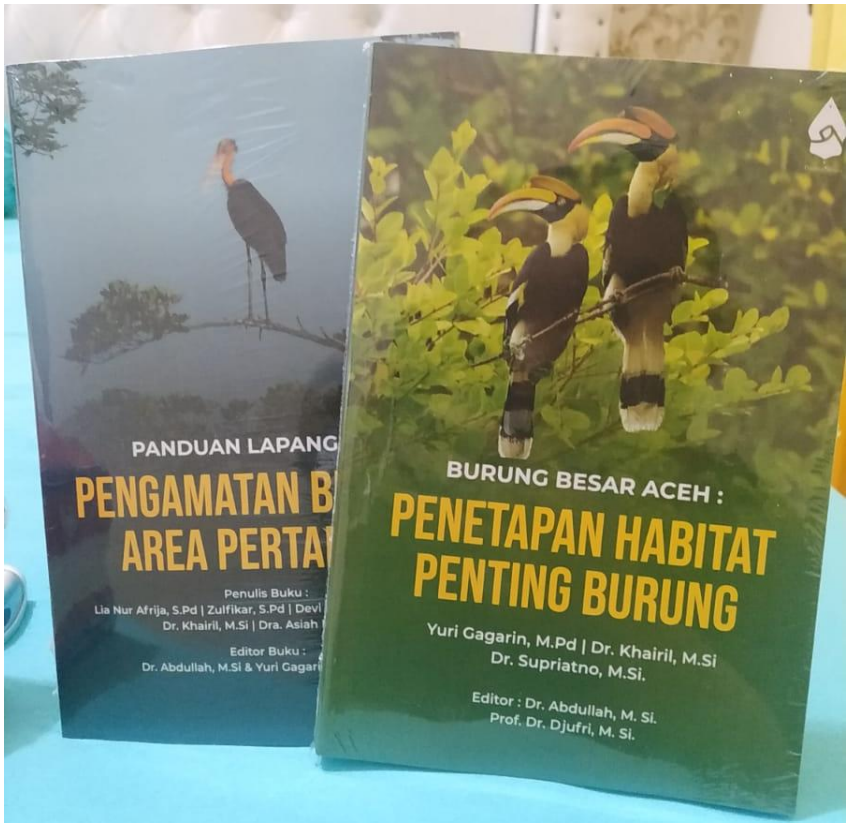
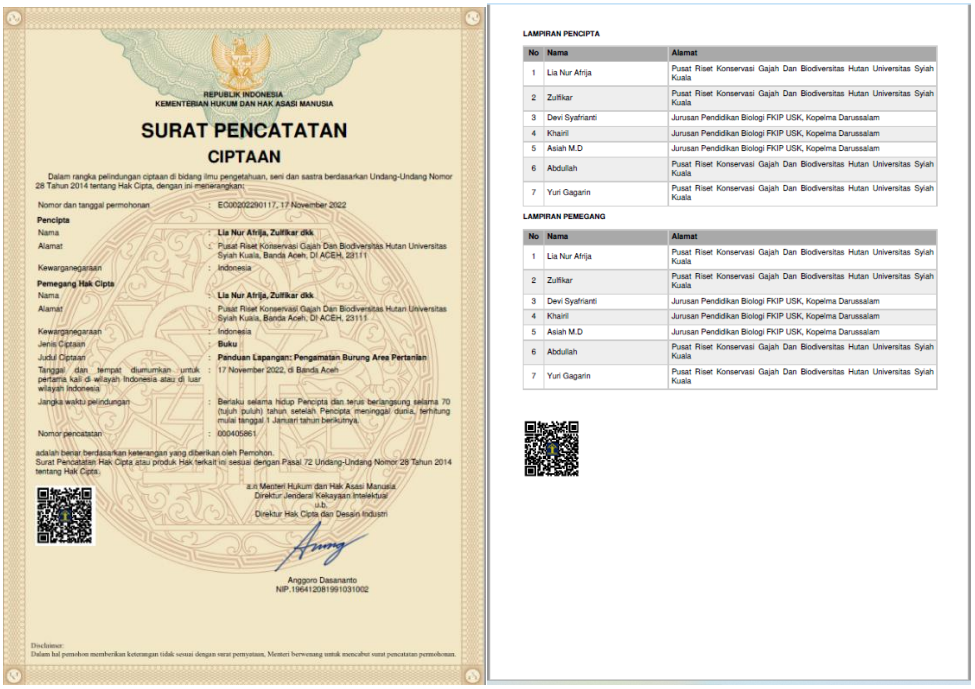


Figure 32. Learning Guidebook



REPUBLIK INDONESIA
KEMENTERIAN HUKUM DAN HAK ASASI MANUSIA

SURAT PENCATATAN
CIPTAAN

Dalam rangka pelindungan ciptaan di bidang ilmu pengetahuan, seni dan sastra berdasarkan Undang-Undang Nomor 28 Tahun 2014 tentang Hak Cipta, dengan ini menerangkan:

Nomor dan tanggal permohonan	:	EC00202290117, 17 November 2022
Pencipta		
Nama	:	**Lia Nur Afrija, Zulfikar dkk**
Alamat	:	Pusat Riset Konservasi Gajah Dan Biodiversitas Hutan Universitas Syiah Kuala, Banda Aceh, DI ACEH, 23111
Kewarganegaraan	:	Indonesia
Pemegang Hak Cipta		
Nama	:	**Lia Nur Afrija, Zulfikar dkk**
Alamat	:	Pusat Riset Konservasi Gajah Dan Biodiversitas Hutan Universitas Syiah Kuala, Banda Aceh, DI ACEH, 23111
Kewarganegaraan	:	Indonesia
Jenis Ciptaan	:	**Buku**
Judul Ciptaan	:	**Panduan Lapangan: Pengamatan Burung Area Pertanian**
Tanggal dan tempat diumumkan untuk pertama kali di wilayah Indonesia atau di luar wilayah Indonesia	:	17 November 2022, di Banda Aceh
Jangka waktu pelindungan	:	Berlaku selama hidup Pencipta dan terus berlangsung selama 70 (tujuh puluh) tahun setelah Pencipta meninggal dunia, terhitung mulai tanggal 1 Januari tahun berikutnya.
Nomor pencatatan	:	000405861

adalah benar berdasarkan keterangan yang diberikan oleh Pemohon.
Surat Pencatatan Hak Cipta atau produk Hak terkait ini sesuai dengan Pasal 72 Undang-Undang Nomor 28 Tahun 2014 tentang Hak Cipta.

a.n. Menteri Hukum dan Hak Asasi Manusia
Direktur Jenderal Kekayaan Intelektual
u.b.
Direktur Hak Cipta dan Desain Industri

Anggoro Dasananto
NIP.196412081991031002

Disclaimer:
Dalam hal pemohon memberikan keterangan tidak sesuai dengan surat pernyataan, Menteri berwenang untuk mencabut surat pencatatan permohonan.

LAMPIRAN PENCIPTA

No	Nama	Alamat
1	Lia Nur Afrija	Pusat Riset Konservasi Gajah Dan Biodiversitas Hutan Universitas Syiah Kuala
2	Zulfikar	Pusat Riset Konservasi Gajah Dan Biodiversitas Hutan Universitas Syiah Kuala
3	Devi Syafrianti	Jurusan Pendidikan Biologi FKIP USK, Kopelma Darussalam
4	Khairil	Jurusan Pendidikan Biologi FKIP USK, Kopelma Darussalam
5	Asiah M.D	Jurusan Pendidikan Biologi FKIP USK, Kopelma Darussalam
6	Abdullah	Pusat Riset Konservasi Gajah Dan Biodiversitas Hutan Universitas Syiah Kuala
7	Yuri Gagarin	Pusat Riset Konservasi Gajah Dan Biodiversitas Hutan Universitas Syiah Kuala

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4	Khairil	Jurusan Pendidikan Biologi FKIP USK, Kopelma Darussalam
5	Asiah M.D	Jurusan Pendidikan Biologi FKIP USK, Kopelma Darussalam
6	Abdullah	Pusat Riset Konservasi Gajah Dan Biodiversitas Hutan Universitas Syiah Kuala
7	Yuri Gagarin	Pusat Riset Konservasi Gajah Dan Biodiversitas Hutan Universitas Syiah Kuala

Figure 33. IPR (intellectual property rights)

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SURAT PENCATATAN
CIPTAAN

Dalam rangka pelindungan ciptaan di bidang ilmu pengetahuan, seni dan sastra berdasarkan Undang-Undang Nomor 28 Tahun 2014 tentang Hak Cipta, dengan ini menerangkan:

Nomor dan tanggal permohonan	:	EC00202290104, 17 November 2022
Pencipta		
Nama	:	**Yuri Gagarin, Abdullah dkk**
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Kewarganegaraan	:	Indonesia
Pemegang Hak Cipta		
Nama	:	**Yuri Gagarin, Abdullah dkk**
Alamat	:	Pusat Riset Konservasi Gajah Dan Biodiversitas Hutan Universitas Syiah Kuala, Banda Aceh, DI ACEH, 23111
Kewarganegaraan	:	Indonesia
Jenis Ciptaan	:	**Buku**
Judul Ciptaan	:	**Burung Besar Aceh: Penetapan Habitat Penting Burung**
Tanggal dan tempat diumumkan untuk pertama kali di wilayah Indonesia atau di luar wilayah Indonesia	:	17 November 2022, di Banda Aceh
Jangka waktu pelindungan	:	Berlaku selama hidup Pencipta dan terus berlangsung selama 70 (tujuh puluh) tahun setelah Pencipta meninggal dunia, terhitung mulai tanggal 1 Januari tahun berikutnya.
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No	Nama	Alamat
1	Yuri Gagarin	Pusat Riset Konservasi Gajah Dan Biodiversitas Hutan Universitas Syiah Kuala
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4	Khairil	Jurusan Pendidikan Biologi FKIP USK, Kopelma Darussalam
5	Cut Nurmaliah	Jurusan Pendidikan Biologi FKIP USK, Kopelma Darussalam
6	Djufri	Jurusan Pendidikan Biologi FKIP USK, Kopelma Darussalam

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4	Khairil	Jurusan Pendidikan Biologi FKIP USK, Kopelma Darussalam
5	Cut Nurmaliah	Jurusan Pendidikan Biologi FKIP USK, Kopelma Darussalam
6	Djufri	Jurusan Pendidikan Biologi FKIP USK, Kopelma Darussalam

Figure 34. IPR (intellectual property rights)

1.3 RESULT

1. Identify Shorebirds Species at Banda Aceh, East Coast of Aceh

The aim of field research on the East Coast of Banda Aceh City in Aceh Province is to implement water bird conservation, by first assessing the diversity of water birds. By carrying out an inventory and identification of waterbirds, the aim is to determine the potential and development of natural resources as well as the possibility of fostering responsible development and utilization that is able to preserve birds and their habitat, so that conservation goals will be optimally obtained.

This research also seeks to comply with the provisions for the protection and preservation of migratory bird species as required in the EAAFP Strategic Plan (2019-2028), namely at point KRA 3.2 A conservation status assessment for waterbird populations is made and updated to determine and adapt priority actions. KRA 3.5 Collaborative research programs established to provide effective support for conservation and sustainable management efforts, especially the sustainable use of resources for the survival of local communities.

Based on the observations, there were 26 species of water birds from 11 families. Most of the birds encountered were species from the swamp bird group, namely 11 species. In addition, 4 species of shorebirds were also found, 8 species of marandai birds and 3 species of raptors. The family most frequently seen utilizing coastal and wetland habitats is the Charadriidae family. It is suspected that the total number of species can still increase, because several species that have been found by the community have not been discovered by researchers.

The Scolopacidae group has more species because the Scolopacidae and Charadridae families are the two largest families in the shorebird group (Howes et al. 2003; Sabrina et al. 2019; Seipalla 2020). The shoreline (coastal) and wetlands at the study site are also suitable habitats for the two families, because in general these two families prefer habitat near the coast or in open wetlands, often near the sea (Alikodra 2021; MacKinnon et al. 2010).

Several protected bird species according to Government Regulation No. 7 of 1999 and Minister of Environment and Forestry No. P.106/MENLHK/SETJEN/KUM.1/12/2018 were also found at the study sites: *Numenius arquata*, *Ixobrychus flavicollis*, *Egretta (Ardea) alba*, *Haliaeetus leucogaster, Pernis ptilorhynchus* dan *Haliastur indus* (**Table 1**). Birds with Near Threatened conservation status were also found at the study site. There is only one species with Near Threatened conservation status which is also protected in Government Regulation No. 7 1999 and Minister of Environment and Forestry Regulation No. P.106 2018, and there are 3 species in the CITES Appendix II category, namely *Haliaeetus leucogaster, Pernis ptilorhynchus* and *Haliastur indus* from the family Accipitridae. Species with high conservation status are still found, indicating that this area has an important role for water birds, especially migratory birds as a stop over during the migration month.

The East Coast Coastal Area of Banda Aceh City is used as a habitat for water birds due to the availability of sufficiently abundant food, so that water birds can express a series of life activities, either partially or completely (looking for food, building or owning nests, incubating eggs, and caring for children). Activities that threaten the sustainability of water birds, namely: poaching, land conversion, and habitat destruction. Environmental damage can result in habitat loss and displacement of waterbirds.

Table 1. Water Bird Species in the Study Site

Species Name			Family	S	Protection		
Local	English	Scientific			PP/ PM	IUCN	CITES
Gajahan Erasia	Eurasian Curlew	*Numenius arquata*	Scolopacidae	M	DL	NT-d	-
Trinil Pantai	Common sandpiper	*Actitis hypoleucos*		M	-	LC-d	-
Kedidi Kecil	Little Stint	*Calidris minuta*		M	-	LC-i	-
Cerek Pasir Mongolia	Lesser Sandplover	*Charadrius mongolus*	Charadriidae	M	-	LC-u	-
Kuntul Kerbau	Cattle Egret	*Bubulcus ibis*	Ardeidae	P	-	LC-i	-
Kowak-malam abu	Black-crowned Night-heron	*Nycticorax nycticorax*		M	-	LC-d	-
Kuntul karang	Pacific Reef-egret	*Egretta sacra*		P	-	LC-s	-
Kokokan laut	Green-backed (Striated) Heron	*Butorides striata*		P	-	LC-d	-
Kuntul Kecil	Little Egret	*Egretta garzetta*		P	-	LC-i	-

Species Name			Family	S	Protection		
Local	English	Scientific			PP/ PM	IUCN	CITES
Bambangan hitam	Black Bittern	*Ixobrychus flavicollis*		P	DL	LC-d	-
Kuntul Perak	Intermediate Egret	*Ardea intermedia*		P	-	LC-d	-
Kuntul Besar	Great White Egret	*Egretta (Ardea) alba*		P	DL	LC-u	-
Elang-laut dada-putih	White-bellied Sea-eagle	*Haliaeetus leucogaster*	Accipitridae	P	DL	LC-d	Ap. II
Sikep-madu asia	Oriental Honey-buzzard	*Pernis ptilorhynchus*		M	DL	LC-d	Ap. II
Elang Bondol	Brahminy Kite	*Haliastur indus*		P	DL	LC-d	Ap. II
Kareo padi	White-breasted Waterhen	*Amaurornis phoenicurus*	Rallidae	P	-	LC-u	-
Cekakak Sungai	Collared Kingfisher	*Todiramphus chloris*	Alcedinidae	P	-	LC-d	-
Kirik-kirik laut	Blue-tailed Bee-eater	*Merops philippinus*	Meropidae	M	-	LC-s	-
Kirik-kirik biru	Blue-throated Bee-eater	*Merops viridis*		P	-	LC-s	-
Perling kumbang	Asian Glossy Starling	*Aplonis panayensis*	Sturnidae	P	-	LC-u	-
Kapinis rumah	House Swift	*Apus nipalensis*	Apodidae	P	-	LC-i	-
Kapinis laut	Pacific Swift	*Apus pacificus*		M	-	LC-s	-
Walet-palem asia	Asian Palm-swift	*Cypsiurus balasiensis*		P	-	LC-s	-
Layang-layang asia	Barn Swallow	*Hirundo rustica*	Hirundinidae	M	-	LC-d	-
Layang-layang batu	Pacific Swallow	*Hirundo tahitica*		P	-	LC-u	-
Kekep babi	White-breasted Woodswallow	*Artamus leucoryn*	Artamidae	P	-	LC-s	-

Notes:

1. Migration Status (S):
   - M = Migrant
   - P = Determiner
2. PP = Government Regulation Number 7 of 1999
3. PM = Minister of Environment and Forestry Regulation No. P.106/MENLHK/SETJEN/KUM.1/12/2018
4. Threatened status according to IUCN (2022):
   - EN = *Endangered* (hampir punah); VU = *Vulnerable* (rawan); NT = *Near Threatened* (hampir terancam); LC = *Least Concern* (kurang/sedikit diprihatinkan); NA = *has not yet been assessed for the IUCN Red List* (belum dinilai untuk Buku Merah IUCN).
   - population trend: d = *decreasing* (menurun); i = *increasing* (bertambah); s = *stable* (stabil); u = *unknown* (tidak diketahui).
5. Trade categories in CITES (2022):
   - Appendix I = all species that are endangered and impacted when traded; trading is permitted only under certain conditions, for example for scientific research.
   - Appendix II = species whose status is not yet threatened, but will be threatened with extinction if overexploited.

When compared with previous research on waterbirds in Aceh Province, the number of species found was far less than the research conducted by (Putra et al. 2020) who discovered 34 species of water birds, with research priority on the shorebirds group. This is because (Putra et al. 2020; Putra and Hikmatullah 2020) conducted observations at locations with a wider coverage, covering the entire East Coast of Aceh Province, as well as a longer research time, namely for 4 months from October 2019-January 2020. The difference in the number of species found was influenced by several things such as differences in time (months) observations made, the area of the observation site and feed potential.

The results of the analysis show that the Shannon-Wiener diversity index value obtained as a whole is moderate, namely 2.237 (**Table 2**). According to (Jumilawaty 2012; Sabrina et al. 2019) the time of tide affects the number of water birds that utilize an aquatic habitat, the longer the time of tide, the more the number of water birds that take advantage of it and vice versa. When the water level is low, water birds make more use of the expanse of the coastal area. This difference is also influenced by the water level in the mangrove area. Results of research conducted (Isola et al. 2000; Sabrina et al. 2019), stated that water level has an important variable in differentiating habitat use by waterbirds. This habitat spatial distribution pattern is related to the morphology of each species (Isola et al. 2000), larger species with long necks and legs can exist in a wider range of habitats (Colwell and Taft 2000).

The presence of birds in a habitat is the result of selection because the habitat is suitable for their life. The selection of this habitat will determine the bird species in that environment. According to (Alikodra 2002, 2010), the factors that affect the value of H' (diversity) are environmental conditions, the number of species, and the distribution of individuals in each species. Communities that have a high diversity index value have complex relationships between components in the community. However, if the situation is the other way around, the diversity of community types is under pressure. Diversity is a characteristic feature of a community that is related to the number of species and the number of individuals of each type as a component of the community (Rusmendro et al. 2009). Therefore, species diversity includes two things, namely the richness and distribution of diversity.

Table 2. Waterbird Diversity on the East Coast of Banda Aceh City

Group	Species Name	Activity	TH	∑	Pi	Ĥ
Burung Pantai (*Shorebird*)	*Numenius arquata*	Look for something to eat	TPt-Se; Sw-Ta	5	0,017	0,07
	Actitis hypoleucos	Look for something to eat	TPt-Se; Sw-Ta	7	0,024	0,09
	Calidris minuta	Look for something to eat	TPt-Se; Sw-Ta; HM	41	0,141	0,276
	Charadrius mongolus	Look for something to eat	TPt-Se; Sw-Ta; HM	123	0,423	0,364
Burung Merandai (*Large waders*)	*Bubulcus ibis*	Look for something to eat	HM; Sw-Ta	7	0,024	0,09
	Nycticorax nycticorax	Look for something to eat	TPt-Se	4	0,014	0,059
	Egretta sacra	Look for something to eat	HM	2	0,007	0,034
	Butorides striata	Look for something to eat	TPt-Se	6	0,021	0,08
	Egretta garzetta	Look for something to eat	Sw-Ta	2	0,007	0,034
	Ixobrychus flavicollis	Look for something to eat	TPt-Se	4	0,014	0,059
	Ardea intermedia	Look for something to eat	HM	2	0,007	0,034
	Egretta (Ardea) alba	Look for something to eat	Sw-Ta	2	0,007	0,034
Birds of Prey (*Raptors*)	*Haliaeetus leucogaster*	Fly	LT-PR-SB	1	0,003	0,019
	Pernis ptilorhynchus	Fly	LT-PR-SB	1	0,003	0,019
	Haliastur indus	Fly	LT-PR-SB	1	0,003	0,019
Swamp Bird (*Other Dependent Waterbirds*)	*Amaurornis phoenicurus*	Look for something to eat	Sw-Ta; Ra-Te	10	0,034	0,116
	Todiramphus chloris	Perch	Sw-Ta	2	0,007	0,034
	Merops philippinus	Perch	Sw-Ta; HM	2	0,007	0,034
	Merops viridis	Perch	LT-PR-SB	1	0,003	0,019
	Aplonis panayensis	Perch	TPt-Se	6	0,021	0,08
	Apus nipalensis	Fly	TPt-Se	12	0,041	0,131
	Apus pacificus	Fly	HM; Sw-Ta	16	0,055	0,159
	Cypsiurus balasiensis	Fly	HM; Sw-Ta	3	0,01	0,047
	Hirundo rustica	Fly	TPt-Se	7	0,024	0,09
	Hirundo tahitica	Fly	HM	20	0,069	0,184
	Artamus leucoryn	Fly	HM; Sw-Ta	4	0,014	0,059
Total Individuals				**291**	**1**	**2,237**

Catatan: Lokasi temuan (TH) = Hutan Mangrove dan nipah (HM); Sawah dan Tambak (Sw-Ta); Rawa dan Telaga (Ra-Te); Lahan Terbuka, Padang Rumput, dan Semak Belukar (LT-PR-SB), Tepi Pantai dan Selat (TPt-Se)
Note: Finding location (TH) = Mangrove and nipa palm forest (HM); Rice Fields and Ponds (Sw-Ta); Swamp and Pond (Ra-Te); Open Land, Grasslands, and Shrubs (LT-PR-SB), Beaches and Straits (TPt-Se)

The value of the diversity index is influenced by species richness and abundance of individuals. External factors that are thought to influence species richness and individual abundance in this study include dispersal/dispersal (migration) and season. The research was conducted at the end of the bird migration season, so that was one of the factors in the small number of migratory birds found (4 species). According to (Ma et al. 2010; Riefani and Soendjoto 2015) Variation in the number of species found in a habitat

variable is influenced by water bird life including: water level, water level fluctuation, vegetation, salinity, topography, type of food, ease of obtaining food, size of wetlands and wetland connectivity.

Shorebirds identified in Gampong Pande and Gampong Lampulo are birds that overstay, considering that this research was conducted at the end of the bird migration season. Birds that overstay are caused by several factors, firstly being late/lack of food stock for migration backflow due to competition for food hunting with other bird species/groups, second factor being separated from the group, and third factor there are various kinds of disturbances during the stopover period such as hunting.

Groups of birds that experience an overstay period will remain at the feeding site and resting site until the next migration season arrives, then rejoin the group for the next period of return flow. The need for habitat protection and abundant food availability at research sites is due to migratory water birds stopping by and making the coastal area of Banda Aceh City a stop over for migratory birds on the Asia-Australia route. Waterbird species are thought to use several research areas as temporary habitats in their migration activities (Putra and Hikmatullah 2020).

Figure 35. Research Results 2022

Figure 36. Research Results 2022

Figure 37. Research Results 2022

Figure 38. Research Results 2022

Figure 39. Research Results 2022

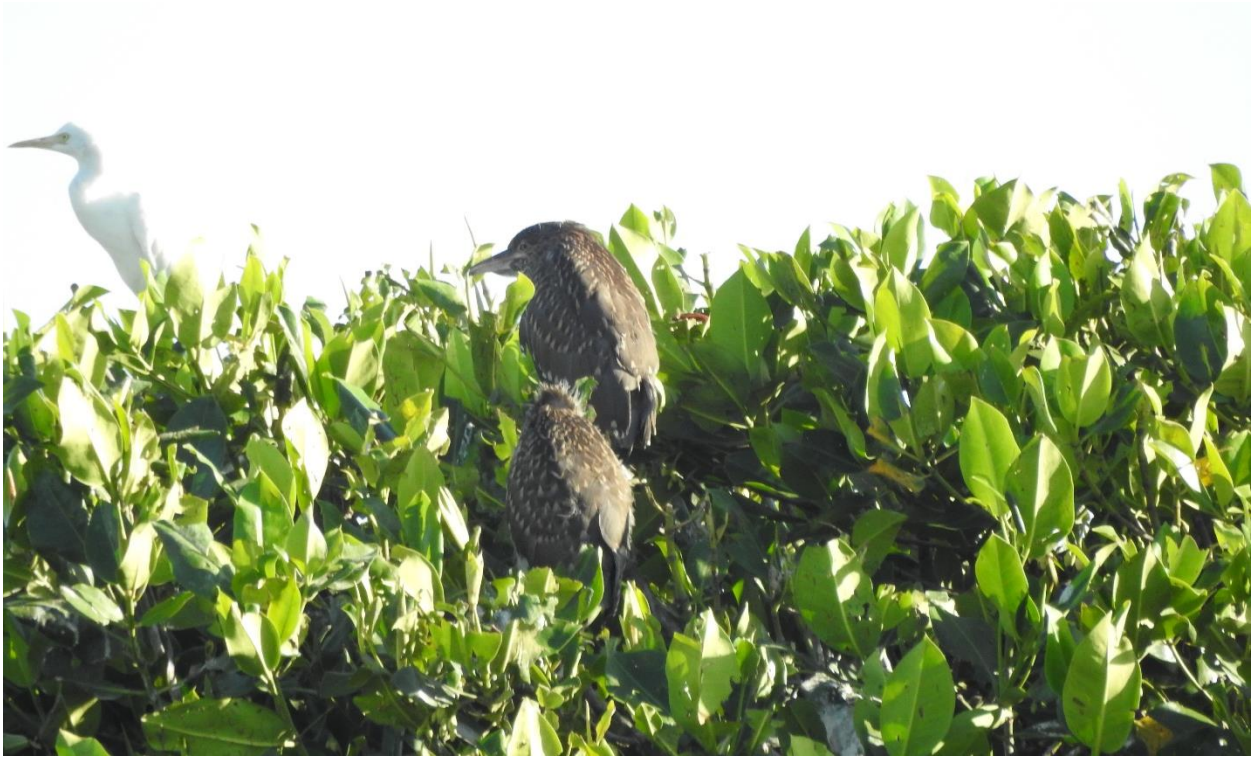

Figure 40. Research Results 2022

Figure 41. Research Results 2022

Figure 42. Research Results 2022

Figure 43. Research Results 2022

Figure 44. Research Results 2022

Figure 45. Research Results 2022

Figure 46. Research Results 2022

Figure 47. Research Results 2022

2. Hunting Activities Against Shorebird Species in Banda Aceh

Hunting data collection was carried out in two locations, namely Gampong Lampulo and Gampong Alue Naga. Poaching investigations for animals are a very sensitive issue for some communities, so we only obtained permits for 2 of the 5 study locations we had designed. In two locations, namely Gampong Lampulo and Gampong Alue Naga, we were able to interview 60 people who were or are still poachers for migratory birds. We ask casual, relaxed questions with the goal of not wanting the correspondent to feel like he's being interrogated. The mapping data of hunting activities for shorebird species in Banda Aceh can be seen in the table below.

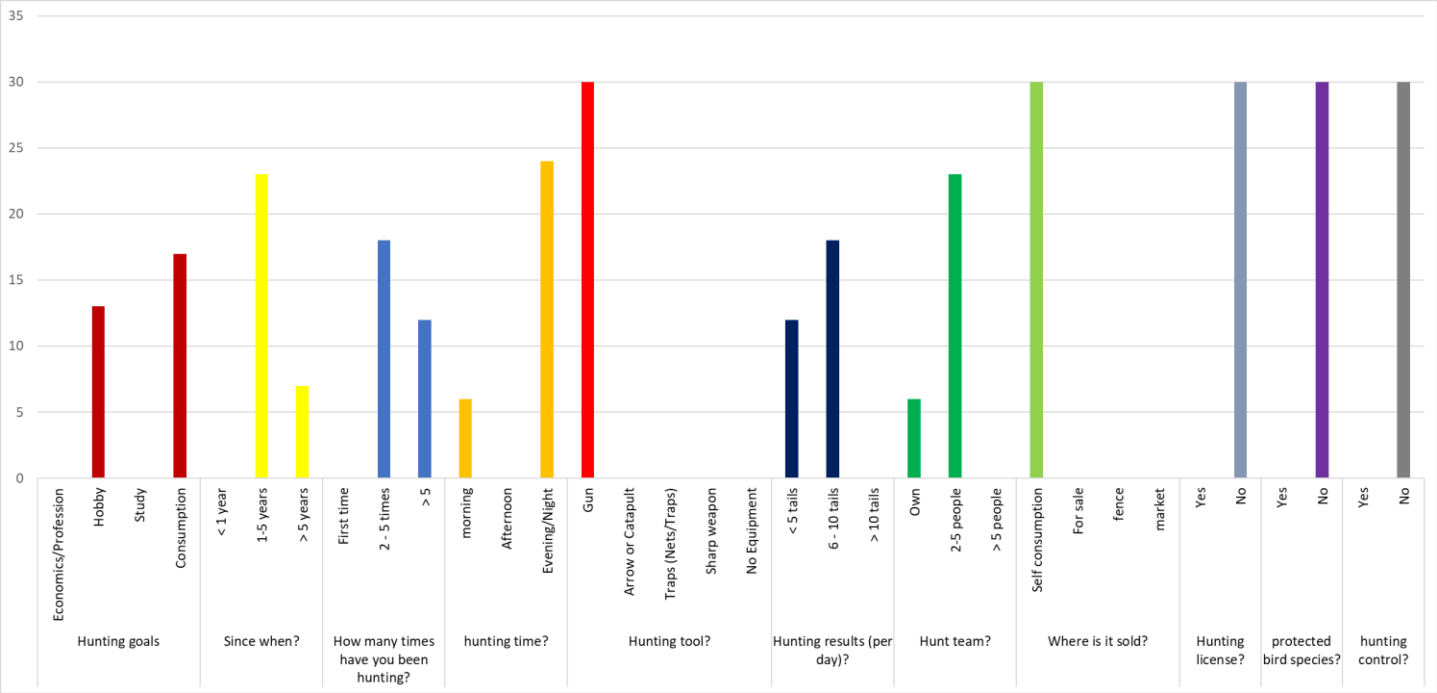

Figure 48. Data Analysis of Hunting Mapping in Gampong Lampulo, Kutaraja District, Banda Aceh City

Based on Figure 48, hunting activities carried out in Gampong Lampulo, Kutaraja District, Banda Aceh City are carried out with the aim of channeling hobbies and the results obtained will be consumed. This custom is carried out by some village youths at night. The consumption process is usually done by adding several ingredients such as instant noodles and several other traditional spices. This activity is still relatively new, because it has not been more than 5 years, so the chances of them stopping this hunting activity are very large. Hunting is done at night. Hunting at night using the air guns they have, in a day they can get as many as 10 fish for one cooking, usually done on Saturday nights. In addition, the game is only for personal consumption, there is no game for sale. This is because hunting with air rifles will kill the birds, so the chances of being bought by people are very small.

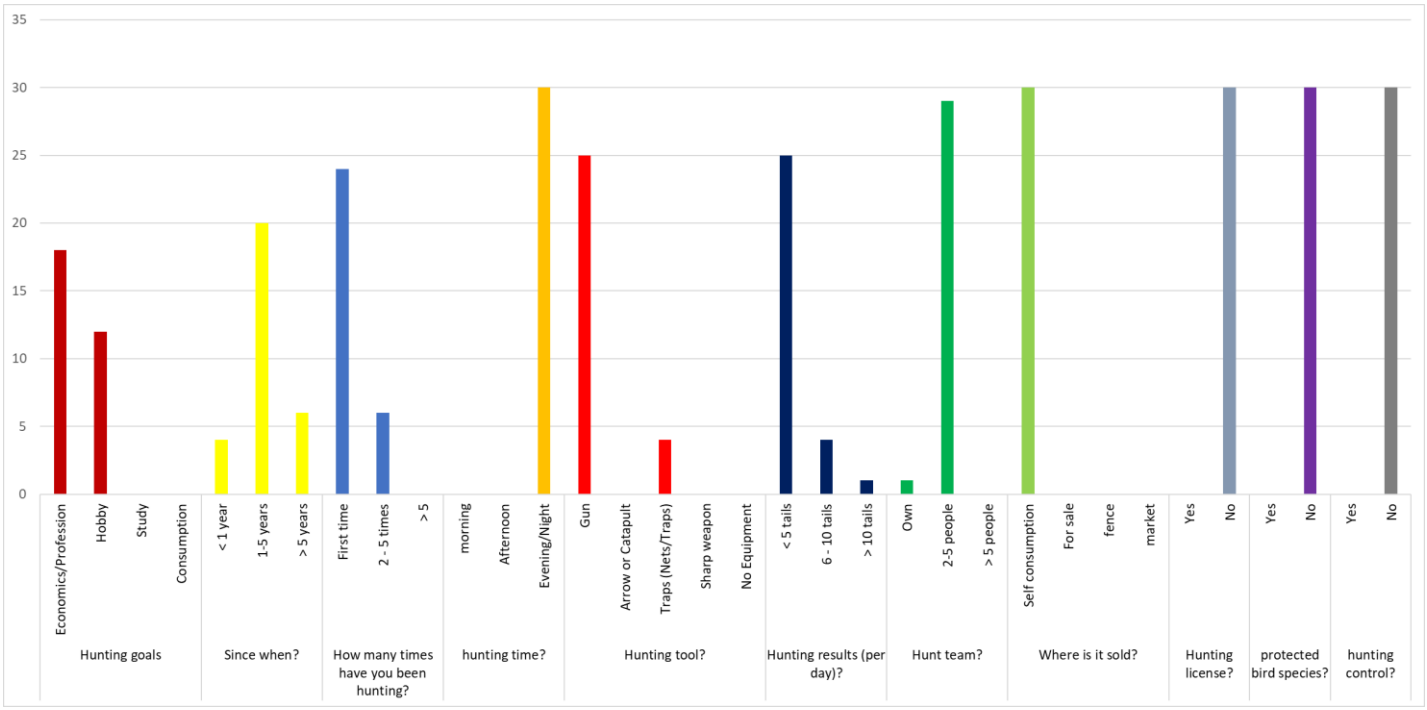

Figure 49. Data Analysis of Hunting Mapping in Gampong Alue Naga, Syiah Kuala District, Banda Aceh City

Meanwhile, based on Figure 49, hunting activities in Gampong Alue Naga, Syiah Kuala District, Banda Aceh City are not much different from Gampong Lampulo, except that in Alue Naga there is a community that works as shooters, so many migratory birds are targets for shooting. Hunted fish are also sold to several food stalls in Darussalam and the Ujoeng Bate tourist area. The size of the hunted bird can be easily recognized because it is relatively smaller than the size of a chicken. Dominant hunting was carried out at night, here the researchers never joined the hunters because it was done at night, limited equipment and materials so we just waited at the boat landing site. Researchers hope that there will be further research to map the hunting locations at night which are carried out in Gampong Alue Naga, because access to the hunting locations can only be done by boat. Some of the documentation below we are forced to cover our faces from hunters, in order to maintain a code of ethics because we also do not yet have full permission from these hunters regarding the documentation of their hunting activities.

Figure 50. We secure the Nets used for Catching Birds that have been left by hunters

Figure 51. Because Hunters Catch Birds at Night, so that in the morning we only find remnants of netting ropes left by hunters.

Figure 52. Several people in Gampong Lampulo helped us to collect nets in the water which had been stagnant by the high tide.

Figure 53. The bird caught is a white-breasted waterhen with a lot of juveniles. This bird will be sold to Pasar Lamdinding, Kuta Alam sub-district, Banda Aceh city

Figure 54. Hunted dead will usually be brought home by hunters to be consumed.

Figure 55. Hunters send us pictures showing the game they get for consumption. The types of birds shot were dominated by white-breasted waterhen

Figure 56. Apart from hunting water birds, several hunters in Gampong Lamdinding also hunt other types of animals, such as the *Tragulus kanchil*. The game results obtained will be consumed together at night.

Meanwhile, we conducted monitoring and survey activities in several locations in Aceh Besar District, including Gampong Lambadeuk, Lampageu, and Lam Manyang. These three areas are the main nesting habitats of the Shorebirds species. However, this habitat is far from the attention of the local community, because the access road is far from the main city road, so that many people use the migratory bird's habitat as a landfill and disposal of various other toxic substances. We will contribute to solving this problem because it is impossible for us to let this incident continue for long, it will have a negative impact on the quality of habitat, vegetation and of course migratory birds.

Figure 57. Shorebirds' potential habitat in Gampong Lambadeuk, Aceh Besar District, Aceh Province, is under threat due to decreased habitat quality due to anthropogenic activities.

Figure 58. Waterbird Habitat in Gampong Lambadeuk, Aceh Besar has become a garbage disposal site for the community, this condition cannot be allowed to continue for a long time, it will have fatal consequences.

Figure 59. Waterbird Habitat in Gampong Lambadeuk, Aceh Besar has become a garbage disposal site for the community, this condition cannot be allowed to continue for a long time, it will have fatal consequences.

1.4 RECOMMENDATIONS

1. Habitats

   The shoreline restoration program is very urgent to do. Although currently the reforestation program in the form of planting mangroves is very large, there are still other problems, namely not much of the planted mangroves grows. So that further coordination and assistance is needed regarding planting techniques and techniques for selecting the right seeds with the Gampong Lambadeuk Aceh Besar area. The success of this planting has become an important capital for several coastal locations in Banda Aceh and Aceh Besar considering they are migratory bird resting and feeding areas.

2. Habitat Quality Improvement

   Some of the locations we visited had the main problem in the form of waste, either from the community or trash sent from other areas, so it is necessary to encourage many communities and related agencies to deal with this waste problem in order to improve habitat quality.

3. Potential Toxic in the Environment

   The water bird habitats in Lambadeuk and Deah Syiah Kuala villages are the most dominant locations for waste disposal, such as water used for washing ponds, motor/car oil, water used for textiles. So we hope that there will be activities to measure the quality of water and soil to see the threshold for poison, because coastal areas are used not only by birds and other animals, but people also depend on them for their livelihoods.

4. Increasing the Role of Women

   During our research, we met that the hunters were children who were still at the high school level, so that the role of women as parents and business actors around coastal areas needed to be increased. One of the efforts, such as protecting the mangrove forest area besides being a place to find shellfish and fish, is also a location for water bird ecotourism, and women can take a role here, through this program it is hoped that it can improve the family's economy, so that the dependence of families on hunting migratory birds is optimally reduced.