

## COMMUNITY-BASED CONSERVATION AND AWARENESS OF MIGRATORY WATERBIRDS IN COASTAL ACEH

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### ABSTRAK

**Abstrak:** Ekosistem pesisir di Provinsi Aceh, Indonesia, merupakan habitat penting bagi burung air migran yang melintasi Jalur Terbang Asia Timur–Australasia (East Asian–Australasian Flyway). Namun, habitat tersebut semakin terancam oleh perburuan ilegal, gangguan manusia, dan rendahnya kesadaran masyarakat terhadap konservasi satwa liar. Kegiatan konservasi berbasis masyarakat ini bertujuan untuk meningkatkan kesadaran konservasi masyarakat pesisir melalui intervensi media visual dan kegiatan penyadartahuan lingkungan. Program dilaksanakan pada bulan Mei hingga Desember 2023 di kawasan pesisir Kabupaten Aceh Besar dan Kota Banda Aceh, Indonesia. Kegiatan konservasi meliputi koordinasi dengan masyarakat lokal, penyuluhan kesadaran konservasi, diskusi informal, serta pemasangan satu spanduk larangan berburu di habitat pesisir strategis yang sering diakses oleh masyarakat dan nelayan. Data dikumpulkan melalui observasi lapangan, dokumentasi, diskusi partisipatif, dan evaluasi kualitatif terhadap respons masyarakat terhadap pesan konservasi. Hasil kegiatan menunjukkan adanya respons positif masyarakat terhadap kampanye konservasi yang dilakukan. Masyarakat menunjukkan perhatian yang lebih besar terhadap informasi konservasi serta terlibat dalam diskusi mengenai perlindungan burung air migran dan isu perburuan ilegal. Pemasangan spanduk konservasi juga meningkatkan visibilitas media edukasi lingkungan di kawasan pesisir yang sebelumnya memiliki keterbatasan informasi konservasi. Meskipun penelitian ini masih terbatas pada evaluasi kualitatif jangka pendek, hasil kegiatan menunjukkan bahwa intervensi penyadartahuan berbasis masyarakat berpotensi mendukung pendidikan lingkungan dan mendorong partisipasi masyarakat lokal dalam konservasi burung air migran. Penguatan kolaborasi antara masyarakat, perguruan tinggi, dan organisasi konservasi penting dilakukan untuk menjaga keberlanjutan program kesadaran konservasi di ekosistem pesisir.

**Kata Kunci:** Konservasi Berbasis Masyarakat; Burung Air Migran; Kesadaran Konservasi; Ekosistem Pesisir; Aceh.

**Abstract:** Coastal ecosystems in Aceh Province, Indonesia, serve as important habitats for migratory waterbirds along the East Asian–Australasian Flyway. However, these habitats are increasingly threatened by illegal hunting, human disturbance, and limited public awareness regarding wildlife conservation. This community-based conservation activity aimed to improve conservation awareness among coastal communities through visual awareness interventions and outreach activities. The program was conducted from May to December 2023 in coastal areas of Aceh Besar District and Banda Aceh City, Indonesia. Conservation activities included coordination with local communities, awareness outreach, informal discussions, and installation of one anti-hunting conservation banner in a strategic coastal habitat frequently accessed by local residents and fishermen. Data were collected through field observations, documentation, participatory discussions, and qualitative evaluation of community responses toward conservation messages. The results indicated positive community responses toward the conservation campaign. Local residents showed increased attention to conservation information and participated in discussions regarding migratory waterbird protection and illegal hunting issues. The installation of conservation banners also improved the visibility of environmental awareness media in coastal areas where conservation information had previously been limited. Although this study was limited to short-term qualitative evaluation, the findings demonstrate that community-based awareness interventions have the potential to support environmental education and encourage local participation in migratory waterbird conservation. Strengthening collaboration among communities, universities, and conservation organizations is important for sustaining conservation awareness programs in coastal ecosystems.

**Keywords:** Community-Based Conservation; Migratory Waterbirds; Conservation Awareness; Coastal Ecosystem; Aceh.



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## A. INTRODUCTION

Migratory waterbirds are important components of coastal ecosystems and play significant ecological roles in maintaining wetland biodiversity and ecosystem balance (Yong et al., 2022). Many migratory waterbird species travel long distances along the East Asian–Australasian Flyway (EAAF), one of the world’s major migratory bird routes connecting breeding areas in northern Asia with wintering habitats in Southeast Asia and Australia (Alikodra, 2021; Shi et al., 2023). Coastal ecosystems in Aceh Province, Indonesia, provide important stopover and wintering habitats for several migratory waterbird species due to the availability of mudflats, estuaries, mangroves, and coastal wetlands (Putra et al., 2020).

Despite their ecological importance, migratory waterbirds in coastal Aceh face increasing threats from illegal hunting, habitat disturbance, and limited public awareness regarding wildlife conservation. Hunting activities targeting waterbirds are still found in several coastal areas, particularly in habitats frequently visited by local communities and fishermen. Similar conservation challenges related to hunting pressure on migratory birds have also been reported in several regions along the East Asian–Australasian Flyway (Yong et al., 2022). In addition, conservation education and environmental awareness programs related to migratory birds remain limited in many coastal communities. These conditions may negatively affect long-term conservation efforts for migratory waterbirds and their habitats (Nijman et al., 2024).

Community participation is considered an important component in biodiversity conservation because local communities directly interact with coastal ecosystems and natural resources. Community-based conservation programs have increasingly been recognized as practical approaches for encouraging environmental responsibility, strengthening local participation, and reducing harmful activities toward wildlife (Parasan et al., 2025). Awareness-based interventions using visual communication media, such as conservation banners and educational outreach, can help improve public understanding regarding the ecological importance of migratory waterbirds and the impacts of illegal hunting activities. Visual communication media have also been reported as effective tools for strengthening environmental awareness in community-based programs (Suwardana & Putra, 2024).

Previous studies in Aceh have primarily focused on the diversity, distribution, habitat use, and hunting pressure of migratory waterbirds in coastal ecosystems (Fithri & Tarmizi, 2025; Gagarin et al., 2022, 2024; K Khairunisak et al., 2022). Ecological characteristics of birds, as well as documentation of bird trade and conservation status (Abdullah, 2013; Amalia et al., 2019; Arico et al., 2025; Fithri & Tarmizi, 2025; Fitria et al., 2023; Gagarin et al., 2022, 2024; Nur et al., 2025; Putra & Hikmatullah, 2020). However, studies evaluating the implementation of community-based conservation interventions and public awareness programs for migratory

waterbird conservation remain very limited in the region. In addition, the use of visual awareness media as a conservation communication strategy in coastal communities has received limited scientific attention. This gap highlights the need for applied community-based conservation studies that evaluate not only ecological issues but also public responses and conservation awareness outcomes.

This study offers a community-based conservation approach through awareness interventions using visual communication media and direct engagement with local communities in coastal Aceh. Unlike previous studies that mainly documented ecological conditions and threats to migratory waterbirds, this study focuses on evaluating community responses toward conservation awareness activities, including the installation of anti-hunting conservation banners in strategic coastal habitats. Therefore, this study contributes practical insights into participatory conservation strategies that may support environmental education and strengthen conservation awareness in coastal communities.

Community-based conservation approaches emphasize the participation of local communities in conservation planning and implementation, aiming to promote sustainable coexistence between humans and wildlife. Educational interventions, awareness campaigns, and the installation of conservation information materials, such as warning signs and educational banners, are effective tools for improving public awareness and reducing harmful activities such as illegal hunting (Campos-Silva et al., 2021; Ihsannudin et al., 2025; Nugroho et al., 2025). These approaches not only enhance knowledge but also encourage behavioral change and foster a sense of responsibility toward environmental conservation. Accordingly, this study aimed to evaluate community-based conservation activities and examine their contribution to improving conservation awareness among coastal communities regarding migratory waterbird protection in coastal Aceh, Indonesia.

## **B. METHOD**

### **1. Study Area and Time**

This study was conducted in coastal areas of Aceh Besar District and Banda Aceh City, Aceh Province, Indonesia. These coastal ecosystems consist of mudflats, estuaries, mangroves, and coastal wetlands that function as important habitats for migratory waterbirds along the East Asian–Australasian Flyway (Putra et al., 2020; Khairunisak et al., 2022). Several coastal locations are frequently visited by migratory shorebirds during migration and wintering periods and are also utilized by local communities for fishing and other coastal activities (Gagarin et al., 2024). The conservation activities and field observations were carried out from May to December 2023.

## **2. Materials and Tools**

The materials used in this study included conservation banners containing anti-hunting messages and educational information regarding migratory waterbird conservation. Supporting materials included field documentation sheets and conservation outreach materials used during community engagement activities. The tools used during the study included a digital camera for documentation, writing equipment for recording field observations, and smartphones for communication and activity documentation.

## **3. Research Design**

This study applied a community-based conservation approach using qualitative descriptive methods (Soendari, 2012; Yuliani, 2018). The research focused on conservation awareness interventions through visual communication media and direct engagement with coastal communities. The approach emphasized community participation and environmental awareness activities in areas identified as important habitats for migratory waterbirds (Alikodra, 2021). The study combined conservation outreach activities, installation of conservation banners, participatory discussions, and field observations to evaluate community responses toward conservation messages. The qualitative descriptive approach was selected because the study aimed to understand community perceptions, responses, and participation related to migratory waterbird conservation activities in coastal ecosystems.

## **4. Conservation Intervention Procedure**

The conservation intervention began with preliminary field observations to identify strategic coastal locations frequently accessed by local communities and known as migratory waterbird habitats. Coordination and informal communication were conducted with local residents and community representatives before implementing the awareness activities (Wright et al., 2013). Conservation awareness activities were conducted through informal outreach and discussions regarding the ecological importance of migratory waterbirds, threats caused by illegal hunting, and the importance of protecting coastal habitats. As part of the awareness intervention, one anti-hunting conservation banner was installed in a strategic coastal area to improve the visibility of conservation messages within the local community. The banner contained educational and persuasive messages encouraging the protection of migratory waterbirds and discouraging illegal hunting activities.

## **5. Data Collection and Analysis**

Data were collected through direct field observations, documentation, participatory discussions, and informal interviews with local community members encountered during conservation activities. Field observations

focused on community interactions with conservation banners, public responses during outreach activities, and general perceptions regarding migratory waterbird conservation.

Documentation activities included photographs of conservation interventions and records of outreach implementation in coastal areas. Informal interviews and participatory discussions were conducted with local residents, fishermen, and community representatives to obtain qualitative information regarding conservation awareness and community responses toward the intervention activities. The collected data were analyzed using qualitative descriptive analysis. Community responses, participation, and observed reactions toward conservation awareness interventions were interpreted descriptively to evaluate the implementation and potential contribution of the community-based conservation program.

## **6. Evaluation of Conservation Intervention**

The effectiveness of the conservation intervention was evaluated qualitatively through direct observation and community responses observed during and after the implementation of conservation activities. Evaluation indicators included community attention toward conservation banners, participation during awareness discussions, recognition of conservation messages, and public responses regarding migratory waterbird protection and illegal hunting issues.

Comparative evaluation was conducted descriptively by assessing community understanding and responses before and after the intervention based on field observations and participatory discussions. Prior to the intervention, conservation awareness media related to migratory waterbirds were very limited in the study areas, and community discussions regarding migratory bird conservation were rarely observed. Following the awareness activities and banner installation, local residents showed increased attention toward conservation information and participated in informal discussions related to habitat protection and wildlife conservation. Although this study did not include long-term quantitative monitoring or structured behavioral surveys, the qualitative evaluation provided preliminary insights into the potential contribution of awareness-based conservation interventions in strengthening environmental awareness among coastal communities.

## **C. RESULTS AND DISCUSSION**

### **1. Conservation Intervention and Installation of Awareness Banners**

Community-based conservation activities were conducted in several coastal areas of Aceh Besar District and Banda Aceh City from May to December 2023. The program focused on increasing conservation awareness regarding migratory waterbirds through outreach activities and visual awareness interventions in coastal habitats. Preliminary field observations indicated that public information related to migratory waterbird conservation

was still limited in several coastal areas frequently accessed by fishermen and local residents.

As part of the conservation intervention, one anti-hunting conservation banner was installed in a strategic coastal habitat known as an important area for migratory waterbirds. The selected location was frequently visited by local communities and had previously shown indications of hunting activities and low conservation awareness. The banner contained educational messages encouraging the protection of migratory waterbirds and discouraging illegal hunting practices in coastal ecosystems, as shown in Figure 1.



**Figure 1.** Installation of Conservation Awareness Banner Prohibiting Illegal Hunting of Migratory Waterbirds in Coastal Aceh

The installation of visual awareness media represented a practical community-based conservation approach intended to improve public access to environmental information in coastal areas. Similar awareness-based interventions have been reported as useful tools for strengthening environmental education and promoting community participation in conservation programs (Runge et al., 2015), as shown in Table 1.

**Table 1.** Community-Based Conservation Activities Conducted in Coastal Aceh

Activity	Location	Output	Observed Community Response
Conservation banner installation	Coastal area of Aceh Besar-Lambadeuk coastal area	One anti-hunting conservation banner installed	Local residents observed reading conservation messages
Conservation outreach and discussion	Coastal communities in Aceh Besar and Banda Aceh	Informal awareness activities conducted	Positive discussion regarding migratory bird conservation and hunting issues
Field observation and documentation	Coastal habitats	Documentation and monitoring activities completed	Increased attention toward conservation information

## **2. Conservation Awareness Intervention**

The conservation awareness intervention was conducted through direct engagement with coastal communities, including informal discussions and environmental outreach activities related to migratory waterbird conservation. Outreach activities emphasized the ecological importance of migratory waterbirds, threats caused by illegal hunting, and the importance of protecting coastal habitats within the East Asian–Australasian Flyway.

During the implementation of conservation activities, local residents and fishermen showed interest in the information delivered during discussions. Several community members stated that they previously had limited knowledge regarding migratory bird movements and their ecological role in coastal ecosystems. The presence of conservation banners also increased the visibility of conservation messages in areas where environmental education media had previously been very limited.

Awareness-based interventions using simple visual communication media can become effective supporting tools for environmental education, particularly in coastal communities with limited access to conservation information. Community engagement activities also encouraged local interaction and discussion regarding wildlife conservation and habitat protection. Similar educational approaches have been reported to support public awareness and participation in community-based environmental programs.

## **3. Community Awareness and Response**

Field observations and participatory discussions indicated generally positive responses from local communities toward the conservation activities conducted during the study. Community members showed attention toward the installed conservation banner and participated in discussions related to migratory waterbird conservation and illegal hunting issues. Some local residents expressed concern regarding hunting activities occurring in coastal habitats and acknowledged the importance of maintaining environmental sustainability in areas used by migratory birds. Informal discussions conducted during outreach activities suggested that conservation interventions helped introduce new information regarding migratory waterbirds and their international ecological importance within the East Asian–Australasian Flyway.

Although the present study did not quantitatively measure changes in conservation awareness or behavioral transformation, the observed community responses indicated that awareness-based conservation activities may contribute positively to environmental education efforts in coastal communities. Community participation is widely recognized as an important factor supporting biodiversity conservation and sustainable natural resource management (Parasan et al., 2025).

#### **4. Role of Community-Based Conservation in Migratory Waterbird Protection**

Community-based conservation approaches are increasingly recognized as important strategies for supporting biodiversity protection, particularly in areas where local communities directly interact with natural ecosystems. In coastal Aceh, local residents and fishermen play important roles in shaping environmental conditions because their daily activities are closely associated with coastal habitats used by migratory waterbirds.

The implementation of awareness interventions in this study demonstrated that simple conservation actions, such as environmental outreach and visual communication media, can support community engagement and improve access to conservation information at the local level. The use of anti-hunting conservation banners also represented a practical approach for introducing conservation messages directly within coastal landscapes where hunting activities may occur.

Previous studies in Indonesia have highlighted the importance of integrating education, community participation, and local awareness in wildlife conservation efforts (Nijman et al., 2024). Therefore, strengthening collaboration among universities, conservation organizations, and coastal communities is important for supporting long-term migratory waterbird conservation programs in Aceh.

#### **5. Contribution to Migratory Waterbird Conservation in Coastal Aceh**

This study contributes practical information regarding the implementation of community-based conservation interventions for migratory waterbird protection in coastal Aceh. Unlike previous studies in the region that mainly focused on species diversity, habitat use, and hunting pressure (Gagarin et al., 2022; Gagarin et al., 2024), the present study emphasizes conservation awareness activities and public responses toward environmental outreach interventions.

The findings suggest that awareness-based conservation activities using visual communication media may support environmental education and encourage community participation in wildlife conservation programs. The intervention also demonstrated the potential value of integrating conservation awareness initiatives into broader coastal ecosystem management and community engagement programs. In addition, the study provides preliminary information that may support future conservation programs involving participatory approaches, educational outreach, and community-based environmental awareness campaigns in coastal ecosystems along the East Asian–Australasian Flyway.

## 6. Study Limitation

This study was limited to short-term qualitative evaluation of community responses following conservation interventions and did not include long-term quantitative monitoring of behavioral changes or reductions in illegal hunting activities. The study also did not apply structured questionnaires or statistical analysis to measure changes in public awareness levels before and after the intervention.

Future community-based conservation studies are recommended to incorporate quantitative or mixed-method approaches, including structured awareness assessments, pre- and post-intervention evaluations, and long-term monitoring of community behavior toward wildlife conservation. Such approaches would strengthen the scientific evaluation of conservation awareness programs and provide more measurable indicators of conservation outcomes in coastal communities.

## D. CONCLUSION AND RECOMMENDATION

This study demonstrates that community-based conservation interventions using visual awareness media and local outreach activities can support conservation awareness of migratory waterbirds in coastal Aceh. The installation of anti-hunting conservation banners and community engagement activities increased the visibility of conservation information in important coastal habitats and encouraged positive responses from local communities regarding habitat protection and illegal hunting issues. The study contributes to the development of participatory conservation approaches in coastal ecosystems by highlighting the potential role of simple awareness interventions in strengthening public understanding of migratory waterbird conservation along the East Asian–Australasian Flyway.

However, this study was limited to short-term qualitative evaluation and did not include long-term monitoring or quantitative assessment of behavioral change and hunting reduction. Future research is recommended to apply quantitative or mixed-method approaches, including pre- and post-intervention assessments, structured questionnaires, and long-term monitoring of community behavior to better evaluate the effectiveness of conservation awareness programs. Strengthening collaboration among local communities, researchers, educational institutions, and conservation organizations is also important for improving sustainable community-based conservation strategies in coastal Aceh.

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## REFERENCES

- Abdullah, A. (2013). Keberadaan Burung dan Penggunaan Habitat di Kawasan Pantai Kecamatan Syiah Kualakota Banda Aceh. *Jurnal Edukasi dan Sains Biologi*, 2(2), 771-78.
- Alikodra, H. S. (2021). *Konservasi Burung Air: Perjuangan Melawan Kepunahan*. PT Penerbit IPB Press.
- Amalia, L., Sabri, K., & Jannah, R. (2019). Keanekaragaman Jenis Burung Air di Kawasan Pantai Deudap Pulo Aceh Kabupaten Aceh Besar. *Prosiding Seminar Nasional Biologi, Teknologi dan Kependidikan*, 6(1).
- Arico, Z., Mustaqim, W. A., Fitria, D., Jayanthi, S., Putra, C. A., & Hikmatullah, D. (2025). Edukasi Konservasi Burung Migran Di SDN 10 Seunuddon Aceh Utara Melalui Metode Learning By Game. *JANNAH: Jurnal Pengabdian Kepada Masyarakat*, 1(04), 489–494.
- Campos-Silva, J. V., Peres, C. A., Hawes, J. E., Abrahams, M. I., Andrade, P. C. M., & Davenport, L. (2021). Community-based Conservation with Formal Protection Provides Large Collateral Benefits to Amazonian Migratory Waterbirds. *PloS One*, 16(4), e0250022.
- Fithri, A., & Tarmizi, H. (2025). The Presence of Migratory Shorebirds on the Coast of Aceh Besar Beach and Banda Aceh. *Jurnal Penelitian Pendidikan IPA*, 11(2), 871–879.
- Fitria, D., Mustaqim, W. A., Arico, Z., Jayanthi, S., Putra, C. A., & Hikmatullah, D. (2023). Pendidikan Lingkungan di SDN 16 Seunuddon Kabupaten Aceh Utara dalam Rangka Konservasi Burung Migran. *Martabe: Jurnal Pengabdian Kepada Masyarakat*, 6(12), 4431–4435.
- Gagarin, Y., Abdullah, A., Zulfikar, Z., & Ramadhan, H. (2024). Overstayed Migratory Bird Species on The Coast of Banda Aceh City, Aceh Province. *BIOTIK: Jurnal Ilmiah Biologi Teknologi dan Kependidikan*, 12(2), 111–124.
- Gagarin, Y., Tarmizi, H., Wahyudi, T., Abdullah, A., & Ramadhan, H. (2022). Studi Burung Air di Kawasan Pesisir Pantai Timur Kota Banda Aceh Provinsi Aceh, Indonesia. *Prosiding Seminar Nasional Biotik*, 10(2), 194–202.
- Ihsannudin, I., Hasan, F., Antriyandarti, E., Luthfiah, L., & Kuntadi, E. B. (2025). Integrating Endemic Bird Conservation and Aquatic-Based Livelihoods: Income-Generating Activities for Sustainable Development in Masakambing Island, Indonesia. *Egyptian Journal of Aquatic Biology and Fisheries*, 29(5), 793–811.
- K Khairunisak, A Abdullah, Huda, I., K Khairil, & A Asiah. (2022). The Potential Habitat for Bird Migration in the Coastline Area of Banda Aceh City. *IOP*

- Conference Series: Earth and Environmental Science*, 1116(1), 12081.
- Nugroho, P., Masdya Yudhistira, E., Muhamad, M., Dwindi Arnelita, N., Ichwan Budi Prasetyo, R., & Dwi Nugroho, H. (2025). Resident Support for a Community-based Bird Conservation Initiative in Indonesia. *Human Dimensions of Wildlife*, 1–17.
- Nur, M., Zulfikar, Z., Yulisman, H., & Abdullah, A. (2025). Potensi Habitat Burung Ordo Ciconiiformes di Kawasan Lahan Basah Kabupaten Aceh Barat. *Jurnal Jeumpa*, 12(2), 198–208.
- Putra, C. A., & Hikmatullah, D. (2020). Survey and Hunting Assessment of Shorebirds with special focus on Spoonbilled Sandpiper in Northern Sumatra (Aceh Province), Indonesia. In *A Report by Sumatera Living Legacy Foundation*.
- Putra, C. A., Hikmatullah, D., Yong, D. L., Muzika, Y., Arico, Z., Feryadi, Haka, I., & Chowdhury, S. U. (2020). Identifying Priority Shorebird Sites for Conservation on the East Coast of Aceh Province, Indonesia. *Forktail*, 36(1), 106–113.
- Runge, C. A., Watson, J. E. M., Butchart, S. H. M., Hanson, J. O., Possingham, H. P., & Fuller, R. A. (2015). Protected Areas and Global Conservation of Migratory Birds. *Science*, 350(6265), 1255–1258.
- Shi, X., Hu, C., Soderholm, J., Chapman, J., Mao, H., Cui, K., Ma, Z., Wu, D., & Fuller, R. A. (2023). Prospects for Monitoring Bird Migration Along the East Asian-Australasian Flyway Using Weather Radar. *Remote Sensing in Ecology and Conservation*, 9(2), 169–181.
- Soendari, T. (2012). *Metode Penelitian Deskriptif*. Bandung, UPI. Stuss, Magdalena & Herdan, Agnieszka, 17.
- Wright, H. L., Collar, N. J., Lake, I. R., Norin, N., Vann, R., Ko, S., Phearun, S., & Dolman, P. M. (2013). Experimental Test of a Conservation Intervention for a Highly Threatened Waterbird. *The Journal of Wildlife Management*, 77(8), 1610–1617.
- Yong, D. L., Kee, J. Y., Aung, P. P., Jain, A., Yeap, C.-A., Au, N. J., Jearwattanakanok, A., Lim, K. K., Yu, Y.-T., & Fu, V. W. K. (2022). Conserving Migratory Waterbirds and the Coastal Zone: the Future of South-east Asia's Intertidal Wetlands. *Oryx*, 56(2), 176–183.
- Yuliani, W. (2018). Metode Penelitian Deskriptif Kualitatif dalam Perspektif Bimbingan dan Konseling. *Quanta*, 2(2), 83–91.