

# Improving the perception of Christmas Island Frigatebirds by local fishermen on Pulau Untung Jawa, Jakarta, using the *Penyuluhan* method

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**Summary:** Human-wildlife conflict is a major threat to many declining wildlife species worldwide. The roosting population of the endangered Christmas Island Frigatebird at Pulau Rambut, Teluk Jakarta, is prone to entanglement in fishing lines and nets used by local fishermen for catching fish. We conducted interviews with local fishermen during May-July 2018 in order to quantify their perception of the frigatebird. Subsequently we conducted an educational program about frigatebirds by means of *penyuluhan*, an Indonesian style, culturally-sensitive, informal discussion technique. There was significantly greater positive perception of Frigatebirds in the group attending a series of informative *penyuluhan* meetings compared to the control group. As Indonesia has a strong oral tradition, we believe that this method offers potential benefits as a tool to improve conservation outcomes for threatened species.

**Ringkasan:** Konflik antara manusia-hidupan liar adalah ancaman utama penurunan jenis pada keanekaragaman hayati di seluruh dunia. Populasi Burung cikalang christmas di Pulau Rambut, Teluk Jakarta rentan terhadap berbagai ancaman nelayan lokal.. Persepsi para nelayan lokal tersebut terhadap Cikalang Pulau Christmas kemungkinan sangat penting bagi ancaman relatif terhadap populasi burung cikalang. Kami merancang kelompok-kelompok diskusi dan merekam jalannya proses sepanjang bulan Mei—Juli 2018 untuk memahami persepsi awal para nelayan terhadap cikalang; dan secara bersamaan berupaya meningkatkan persepsi mereka. Hal ini dilakukan dengan cara penyuluhan, sebuah metode kuliah-diskusi informal gaya Indonesia yang secara kultural sangat signifikan. Pada kelompok yang mengikuti penyuluhan ditemukan tingkat persepsi terhadap cikalang yang jauh lebih tinggi dibandingkan dengan kelompok control. Dengan kuatnya tradisi lisan di Indonesia, metode penyuluhan ini berpotensi sebagai alat memperbaiki hasil upaya konservasi burung-burung terancam punah.

## Introduction

The Christmas Island Frigatebird *Fregata andrewsi* is a large tropical seabird of the family Fregatidae, the five members of which are characterised by their long, pointed wings and tail, and aerial lifestyle (Orta *et al.* 2019). The species breeds only on Christmas Island in the eastern Indian Ocean, and has been assessed as Critically Endangered by IUCN since 2000 (Birdlife International 2017). On Christmas Island, it suffers from habitat loss from land clearing, as well as predation pressure from the introduced yellow crazy ant *Anoplolepis gracilipes* (Hill & Dunn 2004; Birdlife International 2017). The current population size fluctuates from 1,200 to 2,400 pairs (James 2003; BirdLife International 2017).

From their breeding grounds, Christmas Island Frigatebirds disperse mainly to the Indo-Malay Archipelago over the Sunda Shelf to South China Sea, Andaman Sea, Gulf of Thailand, Sulu Sea (between Borneo and Philippines) and off southwest Sulawesi (Orta *et al.* 2019). Ten

percent of the world population visits Jakarta Bay, off the northwest coast of Java, where they roost and forage around Pulau Rambut (Plate 1; Wardhani *et al.* 2014; Tirtaningtyas & Hennicke 2015). While Pulau Rambut is a designated conservation area, where access is restricted, the surrounding environs are freely accessible to residents of neighbouring islands and other visitors. Tirtaningtyas & Hennicke (2015) showed that the activities of local fishermen threaten the Pulau Rambut population of Frigatebirds through entanglement in fishing lines or nets, poisoning, capture and shooting. Entanglement in fishing nets may be accidental, but poisoning and shooting activities are deliberate attempts to kill birds, possibly because they are perceived by fishermen as competitors for fish (i.e. threatening their livelihood) or as a source of meat (Tirtaningtyas & Hennicke 2015).



**Plate 1.** Christmas Island Frigatebirds roosting on fish traps in Jakarta Bay. © Fransisca N Tirtaningtyas

The closest fishermen settlement to Pulau Rambut is on Pulau Untung Jawa (hereafter PUJ), which is located only about 800 m east of Pulau Rambut. During both the morning and afternoon, groups of frigatebirds glide over peoples' houses on PUJ. While the net and fishing line "pollution" in the waters surrounding Pulau Rambut do not necessarily originate from Pulau Untung Jawa fishermen, there is a high likelihood that these fishermen interact frequently with the frigatebirds.

Education and awareness campaigns are among many techniques frequently used by conservation practitioners to reduce human-wildlife conflict (Dickman 2010). In this study we sought to increase awareness among Indonesian fishing communities about the endangerment of frigatebirds through their activities using a method called *Penyuluhan*, a culturally-sensitive, informal discussion technique. We compared the perception of a group of fishermen that was given educational material using *penyuluhan method* with a control group, before and after their educational treatment.

## Methods

The *penyuluhan* method is a series of knowledge-sharing lectures and discussions regarding a specific topic among small groups of peers. *Penyuluhan* is a form of non-degree education existing in Indonesia since colonial times (Soejitno 1968). During Soeharto's *Orde Baru*, this type of lecture-discussion meeting were quite successful in various sectors, particularly agriculture. There are still some professional agricultural tutors (*penyuluh pertanian*) stationed at various remote areas where agriculture is the main source of income. We imitated this *penyuluhan* method on PUJ by trying to understand the fishermen's psychological background in order to foster a positive attitude towards frigatebirds.

Theoretically, perception is composed of knowledge (cognitive), attitude (affective) and behaviour (conative) aspects of a person based on his daily learning experience (Hilgard 1980). We believed that it may be possible to improve the perception of fishermen using knowledge about the frigatebirds, potentially motivating them to preserve Christmas Island Frigatebirds.

Prior to the study involving *penyuluhan*, we conducted interviews with 20 randomly-selected fishermen to quantify the initial state of the fishermen's perceptions of the frigatebird. These 20 men were excluded from the following *penyuluhan*. Understanding the initial perception of the fishermen was important as a consideration when constructing the questionnaire. The study, adopting the typical *penyuluhan* style (Soedjitno 1968), was conducted during May-July 2018 with 78 participants, who were divided equally into an experimental and a control group. Participants were all adult males, aged 30–45 years old, and affiliated to two of the four fishermen's associations on PUJ. The first association (*Kelompok Nelayan Samudera Bahari*) operated between PUJ and Tanjung Pasir, while the second (*Kelompok Nelayan Pinggiran*) operated further north around the small islands of Kepulauan Seribu.

Each group of 39 men, was sub-divided into two smaller sub-groups comprising 19 and 20 persons, respectively. Each sub-group of the experimental (*penyuluhan*) group was exposed to three meetings, including lectures and group discussions, held weekly each Friday morning from 08:00 to 11:30 hrs, concluded by a small lunch. The first meeting was tutored by students of Universitas Negeri Jakarta affiliated to Nycticorax Birdwatcher Club. The information conveyed focused on the identity and the identification of the frigatebirds. The second meeting pertained to the lives of frigatebirds, and threats to their survival, and was tutored by a frigatebird researcher (Plate 2). The third and final meeting was tutored by the head of Pulau Rambut and PUJ Resort, Balai Konservasi Sumber Daya Alam, Daerah Khusus Ibukota, Jakarta (BKSDA DKI Jakarta), whose lecture concerned national and international (IUCN, CITES) regulations about the conservation of birds on Pulau Rambut and PUJ, especially the frigatebirds. The second (control) group of 39 men received three main information sessions similar to those of the experimental group in the form of booklets, but without lectures and discussions. Both groups comprised members of both *Kelompok Nelayan Samudera Bahari* and *Kelompok Nelayan Pinggiran* associations.

A five-choice Likert scale (Allen & Seaman 2007) pre-post-test questionnaire was given to both groups prior to and following the treatment (series of *penyuluhan*). The questionnaire comprised 40 questions (Appendix 1) about fisherman's perception (positive or negative) of the frigatebird out of an original set of 54, of which 14 were invalidated following a Pearson Product Moment test. Each question was carefully designed to cover all three perception aspects (cognitive, affective and conative) and to elicit both negative and positive modes of speech in order to confirm whether participants had increased positive or negative perceptions towards frigatebirds. Gain scores were calculated to assess whether there was an

increase in conceptual understanding among participants (Hake 1999). The difference between initial and final perceptions was normalized using the difference between idealized score and initial scores (Hake 1999). The normalized gain scores between control and lecture-discussion groups of every participant were compared using the Student's t-test in SPSS Statistics version 24.



**Plate 2.** Expert session. Facing camera: F. Noni Tirtaningtyas (Burung Laut Indonesia) in checkered white shirt and Dede D. Permadi (BKSDA DKI Jakarta Resort Pulau Rambut-Pulau Untung Jawa) in army green shirt, surrounded by fishermen. © Esti Komariah.

## Results

While the fishermen most commonly used *bubu* (fish traps) to catch fish, they also used long dredging nets and multiple-hooked fishing poles. The latter gear was said by all initial interviewees ( $n=20$ ) and study participants ( $n=78$ ) to be the most dangerous for the frigatebirds, as the fishes caught on the line were often being pursued by the frigatebirds, resulting in the birds becoming entangled.

The cognitive aspects of perception (questions 1-4, Table 1) of Christmas Island Frigatebirds by the initial interviewees was relatively high ( $\geq 50\%$ ) compared to their conative aspects (questions 5-8,  $\leq 30\%$ , Table1). Both the *penyuluhan* group and control group gained perception scores following treatments (0.15-0.8 and 0-0.46, respectively), but the *penyuluhan* group obtained significantly higher scores than the control group (means, 0.58 and 0.26, respectively;  $t=7.388$ ,  $df=76$ ,  $p<0.001$ ). According to Hake's (1999) criterion, the average gain of the control group may be considered low ( $<0.3$ ), while that of the *penyuluhan* group is moderate (0.3-0.7) but not high.

**Table 1.** Initial responses by fishermen (n=20) to eight questions about Christmas Island Frigatebirds.

No.	Perception aspects	Percentage
1	Understood the general characteristics of species	60%
2	Understood their protection status	50%
3	Understood their role as fish school indicator	85%
4	Understood their migration season	100%
5	Experienced their entanglement by own fishing lines and nets	30%
6	Have eaten frigatebird meat	15%
7	Witnessed potassium poisoning of fellow fisherman	20%
8	Witnessed the bird being shot at	10%

## Discussion

### *Fishermen's initial perception*

All 20 interviewees addressed Christmas Island Frigatebird as *burung angin*, literally the *wind bird*, referring to its distinctive style of flying, which is perceived as harnessing the wind. None of the interviewees called the frigatebirds *Cikalang*, their formal Indonesian name (Sukmantoro et al. 2007; MacKinnon et al. 2013). They stated that they often see groups of frigatebirds perching on *sero* bamboo poles (fish trap), but none had seen them perched on trees on Pulau Rambut, as seen by Wardhani et al. (2014). Only 60% of interviewees (n=20) understood the general characteristics of the species. This is due to confusion between frigatebirds and cormorants, as both are black and perch frequently on *sero* poles.

Half (50%) of interviewees knew that frigatebirds were protected but none knew about their conservation status or the reasons for concern among scientists. Since 2014 there has been a signboard at the camping ground of PUJ, explaining that *burung angin* is protected (Ayuningtyas pers. comm., 2018). Any fishermen passing by should be able to read and understand the message.

The vast majority (85%) of fishermen at PUJ used the sighting of soaring frigatebirds as an indicator of fish schools. The most common indicator of schools of yellowfin tuna are terns (Tanke & Deni 2013). However, compared to terns, frigatebirds are larger and easier to see, even when visibility is limited. As the frigatebirds' only known roosting site in the Java Sea is Pulau Rambut, it is possible that the practice of using Christmas Island Frigatebirds as fish school indicators is exclusively by Kepulauan Seribu fishermen. All interviewees agreed that the highest number of birds occurred in the tenth month of the year (October) which is the start of *musim barat* (west season).

We considered threats to birds as either unintentional (e.g. entanglement with fishing lines and nets, and ensnaring on hooks), or deliberate (e.g. shooting and poisoning in order to obtain the meat for consumption). Although 30% of interviewees had experience with entangled birds, they tended to release birds that had superficial wounds. However if the birds were seriously wounded and looked weak, they often decided to kill them and eat the meat. This explains the discrepancy between responses to question #6 in which 15% interviewees admitted eating the flesh, and questions #7 and #8 in which interviewees witnessed the birds being killed by someone else (20% and 10% respectively).

None of our interviewees admitted to shooting and poisoning the birds to obtain their meat. Although one fisherman admitted to catching up to 15 birds in a single day, he subsequently revised his statement to merely witnessing the catching of those birds. If the former is true, it involved 7% of the maximum number of birds (209) counted by Tirtaningtyas & Yordan (2017).

## Fishermen's perception after *penyuluhan*

For many Indonesian people of rural communities, knowledge relies more on oral tradition than written materials (Czermak *et al.* 2003). Our results (Table 2) tend to support this, since the group with only written information had significantly lower perception gains than those that were exposed to *penyuluhan*. We suggest that any conservation effort in Indonesia, especially in traditional rural communities, should always involve oral information transmission such as *penyuluhan*. We believe any form of written publication (leaflets, posters, especially books) will have less impact than *penyuluhan*. Similarly, TV advertisements, are more likely to be effective if they include “conversation mode” where people are seen exchanging ideas, opinions and feelings with each other, rather than plain statements.

Beyond *penyuluhan*, conservation awareness may also be effectively fostered through peer to peer information-sharing or coaching (Showers & Joyce 1996; Bulte *et al.* 2007). The fishermen who gained knowledge from our *penyuluhan* can potentially “coach” their peers. In the daily life of rural Indonesians, information is commonly dispersed through neighbours “gossiping”. One month after the final *penyuluhan*, we visited the island incognito, and had informal conversations with a *kelurahan* official who was not included in our *penyuluhan* group, and a street cleaner working by the main road. The former understood that Christmas Island frigatebirds were migrants from Australia, and the latter understood the protection status of the frigatebirds, both atypical scenarios. When questioned, both persons confirmed that their knowledge was gained from informal conversations with our *penyuluhan* participants. Other methods such as the involvement of housewives and female community groups may also be useful, as they are proven effective Indonesian “gossip carriers” (Heryanto 2008; Meinarno & Suwartono 2011).

Whilst our study demonstrates the usefulness of the *penyuluhan* approach to disseminating information about this endangered species, we did not observe whether the experience had changed the behaviour of fishermen towards the birds in their daily fishing routine, for instance in designing and using more bird-friendly fishing gear or other conservation initiatives. However, one participant from the *penyuluhan* group had become almost a full time birding guide at Pulau Rambut. A follow-up study is required to assess the extent to which this exercise has been successful in protecting the Christmas Island Frigatebirds of the region.

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## Appendix 1

List of 40 questions used in interviews. Bold codes following question: 1, Cognitive aspect; 2, affective aspect; 3, conative aspect; a: positive item; b: negative item.

1. I have seen frigatebirds around Pulau Untung Jawa or Pulau Rambut **2a**
2. Participation in protecting frigatebirds is useless **3b**
3. Frigatebirds had received critical protection status **1a**
4. I do not care of the protection status of the frigatebirds **2b**
5. I feel upset witnessing the frigatebirds being eaten **2a**
6. Big trees on Pulau Rambut are roosting place for the frigatebirds **1a**
7. I will contribute in protecting the habitat of the frigatebirds **3a**
8. I accidentally hooked the frigatebirds **3b**
9. I am upset knowing the frigatebirds are captured by gunshot or poison **2a**
10. I am more happy seeing the frigatebirds fly free instead being hunted **2a**
11. When I see a frigatebird, I will try to catch it in order to generate income **3b**
12. Catching frigatebirds will supplement my income as they are marketable **1b**
13. Frigatebird poacher must be sentenced according to law **1a**
14. There is no need in protecting the frigatebirds as they lower the fish catch **2b**
15. Frigatebirds are protected as they experience population decline **1a**
16. I do not care of the existence of the frigatebirds **2b**
17. Groups of gliding frigatebirds are potential spectacle for fisherman community **3a**
18. I support efforts to conserve the frigatebirds **3a**
19. I do not feel comfortable with the socialization of frigatebird conservation **2b**
20. *Penyuluhan* about the frigatebirds must regularly be done **2a**
21. Frigatebirds do not provide any advantage for human **1b**
22. I disagree if frigatebirds are planned as tourist attraction **2b**
23. The original roosting trees should be replaced by other species **2b**
24. I have eaten frigatebird meat **3b**
25. I find frigatebirds uninteresting **2b**
26. I have never caught the frigatebirds in my net **3b**
27. I must report to the authority whenever frigatebirds are threatened **3a**
28. I have witnessed a dead frigatebird due to fishing line entanglement **1b**
29. The habitat of the frigatebirds must be managed, especially concerning garbage problem **2a**
30. Frigatebirds are a nuisance for fishermen **1b**
31. It is normal to cut the frigatebird roosting tree down **1b**
32. I have caught a frigatebird intentionally **3b**
33. I choose to free a caught frigatebird instead of killing and consuming it **3a**
34. Frigatebirds will make an interesting tourism object **1a**
35. I will try to protect the frigatebird by minding my hooks, lines and nets **3a**
36. I am willing to share valuable information about the frigatebirds to my colleagues **3a**
37. I am not disturbed by the existence of the frigatebirds **2a**
38. I am willing to introduce the frigatebirds to tourists on my island **3a**
39. I forbid my family to be informed about the frigatebirds **2b**
40. I do not feel any need in understanding information about the protection of the frigatebirds **2b**