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Utilization of waterbirds by Ujungpangkah Community, Gresik Regency, East Java

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Abstract. Mangrove ecosystem at Ujungpangkah is essential ecosystem and important areas for water bird habitat. Certain types of waterbirds are used by local community as protein substitute, but lately people also exploiting waterbirds for economic needs. As the consequences, populations and kind of species in the research area tend to decrease. This research aims to determine the diversity of water bird species that are utilized, to analyze water bird utilization rate, to analyze the water bird distribution and marketing network, and to create strategies for controlling water bird utilization. This research conducted in Pangkah Kulon village and Pangkah Wetan village, Ujungpangkah, East Java on February – March 2018 using interview to local people with purposive sampling and direct technique. The results showed, according to 95 respondents, 19 species waterbirds from 10 families are used. The form of utilization in order of the largest to smallest percentage are for consumption, for sale and as tourist attraction. Distribution and marketing water-birds meat are from hunter directly to the individual community and/or to the restaurant that provides birds menu.

1. Introduction

Ujungpangkah is located at northern region of Gresik Regency, East Java which is directly conterminous to Java Sea. Ujungpangkah Coastal Area is overgrown with mangrove ecosystems that are utilized by rural communities to support their needs, such as fishpond, aquacultures and capture fisheries, rice fields and also settlements. In addition, mangrove area is a part of essential ecosystems and important area for the habitat of waterbirds. The diversity of species of waterbirds in Ujungpangkah as many as 41 species, 25 species are immigrants and 16 other are settlers [9].

Utilization of wildlife by the Indonesian people has been done for a long time, especially as a source of food. The types of wildlife is a natural resource that can be used for many interests, the interests of ecological, economic, social and cultural [1]. Therefore, this abundance of waterbirds population causes community who live in coast area use waterbirds as side dish to fulfill their protein needs. Furthermore, most of Ujungpangkah area is the form of ponds, so the presence of waterbirds is considered as a disturbance that can decrease fishery products of ponds are stolen by waterbirds that seek food. Other problems caused by land conversion and logging of mangrove vegetation.

As time goes by, coastal villagers also sell waterbirds to urban communities to increase income. This is due to facts that most of coastal villagers are mainly fishermen whose their work time depends on the weather season, so people look for other alternatives to find income [5]. The number of request for waterbirds is increasing yearly, it causes trade network of birds ranging frong hunters, collectors, distributors also to the costumers. Exploitation of waterbirds in Ujungpangkah continuously carried out
without any control that is feared to threaten the extinction of certain bird species. This study aims to determine the diversity of waterbirds species that are used by community, to analyze the level of utilization of waterbirds, to analyze the distribution and marketing networks of waterbirds, and to formulate strategies to control waterbirds hunting and utilization. The benefit of this research is to provide data on the use of waterbirds in Pangkah Kulon and Pangkah Wetan Village, Ujungpangkah and suggestion for all parties to control the utilization of waterbirds and conservation, including as reference fo further research.

2. Materials and Methods

2.1. Location and time
Data collected in Pangkah Kulon and Pangkah Wetan villages, Ujungpangkah District, Gresik Regency, East Java from February to March 2018. Observation sites for waterbirds habitat and potential waterbirds hunting activities were carried out in 7 ponds and 2 points in Muara Bengawan Solo.

2.2. Tools and objects
The tools that are used to collect data are sound recorder, GPS (Global Positioning System), questionnaires, interview guides and camera. The subjects of this research are Ujungpangkah communities, the leaders of each communities, and local government. The objects that are observed is the characteristics of the communities and other supporting data such as place of catching birds, the tools to hunting waterbirds, type of utilization and marketing network of catched birds.

Table 1. The formula calculation of each parameter.

| No | Parameter                                      | Data analyst                      | Calculation formula |
|----|-----------------------------------------------|-----------------------------------|--------------------|
| 1  | Types of waterbirds that are used             | • Number of types (J)             | ΣJ = J1+J2+J3+...+Jn |
|    |                                               | • Number of individual per types  |                    |
|    |                                               | • Number of catches per day (t)   |                    |
|    |                                               | • Number day per year (h)         |                    |
|    |                                               | • Number of hunter (p)            |                    |
| 2  | Number of waterbirds which is utilized (T)    | • Number of hunter (p)            | ΣT = Σt × Σh × Σp  |
|    |                                               | • Hunting periods (day/week/month) |                  |
| 3  | Birds hunting intensity (I)                   | • Number of hunter at n site (pn) |                    |
|    |                                               | • Coordinate n site               |                    |
|    |                                               | • Hunting intensity at n site (Ip) |                    |
| 4  | Capture site of waterbirds                    | • Sales price per selling price   |                    |
|    |                                               | • Capital (costs incurred by hunter and cooking waterbird) | Profit = sales price – capital |
| 5  | Market prices and consumer profits            | • Sales price per selling price   |                    |
|    |                                               | • Capital (costs incurred by hunter or consumer in activity of cathing, buying and cooking waterbird) | Profit = sales price – capital |

2.3. Data collection
Data were collected through interviews with 95 respondents with purposive sampling technique. Interviews are conducted with respondents who were clearly more familiar about the use of waterbirds, impact of the use of waterbirds and water bird marketing networks. The respondents selected in this study are:

1. People who use waterbirds, both for personal consumption and sold to costumers (food stall and markets),
2. Birds huntsman around Pangkah Kulon and Pangkah Wetan,
3. Pond’s owner who catch waterbirds,
4. Informal figures of the communities who represent gender, ages, religious leader, and fellow leader, and
5. Formal figures, e.g. village head, sub-district head and related agencies who has authority over the villages.

The other method are direct observation to observe waterbirds habitat location and locations that are known to be frequently hunted by the huntsman around research sites.

2.4. Data analysis
Waterbirds diversity data were analyzed by tabulation system or collected directly from the number of each species that were found in site, percentage of results and qualitative descriptive. The formula calculation of each parameter is presented in Table 1.

All data are explained by qualitative descriptive. Qualitative descriptive data analysis is giving a review or interpretation of data obtained so it becomes clear and meaningful.

3. Results and Discussion

3.1. Respondents characteristic
Total respondents in this research is 95 people. There were 82% male and 18% female. The respondent age classes is divided into 6 age classes. Most respondents are in 41 until 50 y.o as much 24%, in this age class are often found because they are workers so I make interviews when they are in leisure time. In this age class also more known about waterbirds hunting history around Ujungpangkah. Percentage of age classes of Ujungpangkah respondents is presented in Figure 1.

![Figure 1](image)

**Figure 1.** Percentage of age classes respondents in Ujungpangkah.

The last level of education of respondents divided into 7 classes, those are respondents who not school, elementary/equivalent, middle school/equivalent, high school/equivalent, diploma, bachelor and magister. Most respondents are graduate from high school or 43%. Education are affect to know they knowledge about waterbirds, like species, the use of waterbirds, hunting method and control strategies of waterbirds hunting. The level education of Ujungpangkah has generally been good, but as many 2% did not done formal education. This condition is caused by the low level of income so they cannot attend formal school to higher level.

Respondents’ work in Ujungpangkah is quite diverse, there are 6 kind of respondents work. Those are entrepreneur, fisherman, government employee, pond’s owner, employee, pond’s keeper and student. Most of respondents or 36% are entrepreneur which they make their own industries at home so I met the entrepreneur more often than other workers. Percentage of respondents work is presented in Figure 2.
3.2. Waterbirds hunter characteristics at Ujungpangkah

Waterbirds hunter are usually from local community. There are 30 respondents that are known as hunter by local community. The age range of waterbirds hunter are from 18 to 76 years old with the last education average level high school/equivalent. Percentage of waterbirds hunter work is presented in Figure 3.

![Figure 3. Percentage of waterbirds hunter work.](image)

Hunter are categorize into hobby and profit seekers from selling waterbirds. From total respondents, there are only 5 respondents who claim to sell waterbirds to meet their economic needs. According to Iskandar’s statement [5] that birds hunting activities are usually carried out by weak economic communities as an additional business. Respondents that are sell waterbirds have seasonal job in average. In carrying out hunting, waterbirds hunter usually in group 2 – 5 people or up to 5 – 15 people by using air guns. Respondents are usually catching waterbirds from October to December during the breeding season or from February to March when migratory birds come to Ujungpangkah area. The average maximum income from selling waterbirds is IDR 43.000.000/year/hunter and minimum IDR 21.600.000/year/hunter. The capital issued by the hunter are air gun, bullets, kites, threads and transportation, total is about IDR 2.160.000/year/hunter up to IDR 7.600.000/year/hunter. Average income per year up to IDR 40.840.000/year/hunter with minimum income IDR 14.000.000/year/hunter. This income number from selling waterbirds is relatively affected in its contribution to increasing the income of the community of hunters and sellers.

3.3. Waterbirds diversity at Ujungpangkah

Bengawan Solo estuary on January until March there meet 41 species, which 24 are migrants and 17 more are settlers. Most waterbirds are from Scolopacidae family or as many 23 species. There are more than 111.250+ individuals on January-May 2017 [9]. This population are much larger than the
waterbirds population in the same ecosystem, which was carried out by Hadi [3] with the same method there are 7494 individuals in Wonorejo, Surabaya. Another research was done in Peniti Mangrove [2], Pontianak, Krangkeng, Indramayu Distict [4], Surabaya – Gresik boundary, each showing the result 19 species, 27 species and 30 species of waterbirds [10]. The result of the research in Percut Sei Tuan, North Sumatera that showed 50 species of waterbirds because her research are done in larger areas [6].

3.4. Waterbirds habitat condition in Ujungpangkah

Waterbirds important habitat at Ujungpangkah is on mangrove, mudflats and several points of pond. Each has different extensive area, according to KLHK (2016)’s, mangroves in Ujungpangkah is 1.639,32 hectare with 747,44 hectare of damage quality standard. The extent of mudflats area at 3 estuary is 1.820,7 Ha and the total area of ponds is 3.553,31 Ha [9]. Identified mangrove species in Ujungpangkah is about 16 species [7]. The most dominant and has highest density is *Avicenia alba* or called Api-api by local community. Mudflats area and mangrove ecosystem in Bengawan Solo Estuary is used as habitat for waterbirds, especially for feeding gound, breeding and also nesting place to caring for poult. Feeding ground habitat is about 3.337,2 Ha with relative density value of 3 individuals per m² [9]. Breeding and nesting habitat is usually in pond area with silvo-fishery system.

3.5. List of species that are utilized by Ujungpangkah community

List of species that are utilized by local community is about 18 species from 10 different family. Species that are often found in every location are egrets (*Egretta garzeta* and *Egretta alba*). The number of species that utilized each waterbird species is presented in Figure 4.

![Figure 4. Total respondents who ever utilized waterbirds.](image)

According to interview result, every respondents have ever consumed egrets species (*Egretta garzeta* and *Egretta alba*). Kuntul species (*Egretta garzeta* and *Egretta alba*) are the most found in all location in Ujungpangkah, so egrets hunting is very frequent. The smallest frequent hunting is Ibis roko-roko (*Plegadis falcinellus*) species from Threskiornithidae family which is migratory bird.

3.6. Waterbirds hunting location

There are 10 most hunting location according to interview to respondents, there are 7 points of ponds that are often visited by waterbirds, 4 ponds located in Pangkah Wetan and 3 ponds located in Pangkah Kulon. Furthermore hunting location are in field of Pangkah Kulon and 2 points of Bengawan Solo Estuary. Maps of waterbirds hunting location in Ujungpangkah are presented in Figure 5.
The location that became the frequent hunting location was in Pond 6 or 81% respondents hunting waterbirds from 6th pond and around it. Waterbirds hunting location in Ujungpangkah are presented in Figure 6.

![Waterbirds hunting location map](image)

**Figure 5.** Waterbirds hunting location map (Pangkah Kulon and Pangkah Wetan Village, Ujungpangkah Subdistrict).

The large number of waterbirds and abundance of the population at that time caused the waterbirds took feed to the community ponds around Ujungpangkah. Community who suffer losses because their fish seedlings are eaten by waterbirds, then community catch and trapping the waterbirds that approach in pond. This waterbirds began to be commercialized in 1976. The exploitation of waterbirds on a large

![Percentage of waterbirds hunting location](image)

**Figure 6.** Percentage of waterbirds hunting location in Ujungpangkah.
scale has resulted in population was declining and many waterbirds away from the nest and find a new nest. This has caused the location of waterbirds hunting is disperse.

3.7. Waterbirds hunting techniques
Tools that are used to catch waterbirds is air gun, kite, potassium, net, rod, catapult and glue. The most used by community is air gun because it more effective to catch waterbirds in large quantities. Technique using kite usually done with teenagers, kite thread are attached with glass dust, when it played it will cut off the part of waterbird body, this usually played on the yard.

Potassium are used when harvesting ponds, it inserted into a small fish in then will eaten by waterbirds. This method is dangerous because if the birds eaten by human, it will poisoning. Net and Rod are used just like when catching fish. And the simplest tool is catapult but now it rarely used. The least is using glue, actually it used as precautionary measure in ponds, but catched birds will also consumed by pond guards.

3.8. Waterbirds hunting intensity
Waterbirds hunting in Ujungpangkah is categorized as used for consumption, sold, as pond fertilizer and tourism object. The highest utilization of waterbirds is for consumption or 45% with the number per catched around 1 – 5 individuals. The percentage of waterbirds utilization for consumption is presented in Figure 7.

![Figure 7](image)

**Figure 7.** Percentage of waterbirds utilization for consumption.

Hunters who usually took in large quantities and are traded are from Bungah Subdistrict and Sembayat Subdistrict, Gresik Regency, Lamongan Regency and Surabaya. Waterbirds meat is sold to restaurants that serve waterbirds menus. The percentage of utilization of waterbirds for trade is presented in Figure 8.

![Figure 8](image)

**Figure 8.** Percentage of waterbirds utilization for trading by local community (per 3 months).
As many 35% of total respondents, they are knew and some had sold a large number of waterbirds. Waterbirds hunting is classified per 3 months intensity. In a 3-month period, the biggest percentage is 1 to 3 times catching or 31% of respondents are catching birds 1 to 3 times per 3 months. The sales intensity is 48 to 60 times and more than 61 times in 3 months. The ecological benefits from waterbirds is the way its feces can be natural soil muck so waterbirds can be ponds fertilizer. Another benefits is waterbirds can be tourism objects, 60% of respondents agreed that the bird sanctuary will be held again and the diversity of waterbirds species became an educational tourism at Ujungpangkah in addition to Bengawan Solo Estuary Mangrove Tourism.

Average intensity waterbirds hunting for consumption is about 16 times per month and 20 times per month for trade. Therefore, average intensity estimation for waterbirds hunted per year is 1152 until 14,400 individuals. If maximum times of hunting happen or 14,400 ind/year, it still fairly safe to do hunting in case the population still much more [9]. However, Sutopo’s object research is mostly migratory bird species and there is no calculation on the type of settler bird that is widely used by the community. So there should be control and further rearch about settlers waterbirds population.

3.9. Marketing trade of waterbirds

Waterbirds which is commercialized is dead and skinned. The price offered in accordance to its body size. Size 25-40 cm like Sterna hirundo, Tringa hypoleucos and other priced at IDR 3,000 – IDR 5,000, and bigger waterbirds or 50-100 cm priced at IDR 10,000 – IDR 15,000. Marketing network of waterbirds trade is quite short, that is from hunter to restaurant without middleman or traditional market. Restaurant that sell waterbirds sell up to 20 per day or 21,000 per year. The species available in each restaurant are found in Sembayat is egrets, ardeolas and grouse. Profits that are gained from a restaurant is almost IDR 10,000,000 per month. The hunters from Ujungpangkah usually sell waterbirds to restaurant in Sembayat subdistrict, Bungah subdistrict, Lamongan and up to Surabaya. The most waterbirds supply are from Banyu Urip because in Ujungpangkah there is already a prohibition regulation on birds hunting.

3.10. Waterbirds utilization control

There are 3 categories of wildlife protection status according to Soekmantoro, that is status of threatening IUCN (International Union for Conservation of Nature and Natural Resources) red list, International trade regulation CITES (Convention on International Trade of Endangered Species of Wild Flora and Fauna), protection status by government regulation PP (Peraturan Pemerintah) No. 7 at 1999 about Preservation and Utilization of Wild Plants and Wildlife [8]. Village regulation is Peraturan Desa Nomor 11 tahun 2016 about banning animal hunting. Actually there have been no sanctions imposed because this village regulation is only in the form of banners but has not been formulated and be appointed.

4. Conclusions

Utilized waterbirds species in Pangkah Kulon village and Pangkah Wetan village at Ujungpangkah are 19 species from 10 family. The form of utilization is for personal consume, for trade and tour objects. The most consumes species are: Kuntul Besar (Egretta alba) dan Kuntul Kecil (Egretta garzetta) from Ardeidae family. Distribution waterbirds trade are from hunters directly to restaurant owners who serve waterbirds menu and/or directly to community for personal consumption. The control strategies of hunting involves relevant stakeholders, there are Regional Government of Gresik Regency, Government of Pangkah Kulon and Pangkah Wetan villages, neighborhood association and surrounding community. Village regulation are sufficient to reduce the number of hunting in this two villages.

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