

Study on Conservation and Management of Cotton Pygmy-Goose Population in Assam (India)

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Abstract The Cotton Pygmy-goose, *Nettapus coromandelianus coromandelianus* Gmelin though a native bird of our the South Asian locality, the number being found in fluctuating since the first study made in this concern. The present study was conducted to have a detailed look over the factors responsible for the population decline in certain wetlands in Assam, India, from June 2006 to January 2011. The multifold anthropogenic pressures as well as the other natural pressures on the species are responsible for the steep decrease of its population in the study area. The present study deals with an assessment of problems and prospects of the conservation of the Cotton Pygmy-goose in Eastern plain of Assam during 2006-2011.

Keywords Anthropogenic, Conservation, Extinction, *Nettapus Coromandelianus Coromandelianus* Gmelin, Wildlife

1. Introduction

The Cotton Pygmy-goose, a Least Concern species, is previously a widely distributed species of South Asia still supposed to have maximum population though not quantified presently. Due to its wide South Asian distribution no researchers or naturalists have had the opportunity to study its ecology in detail. Only one field studies on the feeding and nesting behaviour (Mukherjee 1974) have preceded the current work. Until now, the biology of this species in winter has not been studied and little is known from its food habits, habitat use, movements, or population dynamics. These aspects of its ecology are fundamental to management and conservation.

The Cotton Pygmy-goose has a large range globally though not global population has been quantified, with an estimated global extent of occurrence of 1,000,000-10,000,000 km^2 . It has a large population estimated to be 59,000 - 1,100,000 individuals (Wei and Mundkur 2002). Global population trends have not been quantified, but the species is not believed to approach the threshold for the population decline criterion of IUCN Red List. For these reasons, this species is considered as Least Concern (Birdlife International 2004). The sub-species *N. c. coromandelianus* Gmelin occurs in South-East Asia with no record of occurrence in Australia. It is resident but local, practically throughout the Indian Union, both Pakistan's, Nepal terai, Ceylon, Straggler to Andaman and Maldives Island. It is

distributed from plains to c.300 meters altitude. Commonest in Pakistan, Punjab and Rajasthan, but not recorded from Kerala till 1983 (Ali and Ripley 1983), while 1,160 individuals were recorded in 1993 (Mundkur and Taylor 1993). The Indian population of the sub-species was found to be 16,763 in 1989, 18,827 in 1990 (Perennou *et al.* 1990), 18,967 in 1991(Perennou *et al.* 1991), 24,013 in 1993 (Mundkur and Taylor 1993) and 55,026 in 2002, 28,942 in 2003, 19,554 in 2004 and 9,304 in 2005 with an estimated Asian population between 125, 000 and 1,100,000 (Li *et al.* 2007).

The conservation perspectives relate the habitat use of a species. The Cotton Pygmy goose's habitat use has not been studied prior to the current work from Indian sub-continent. With residing in a wide geographic region it is very difficult to interpret concrete aspects of the habitat use. The current study reveals their active use of habitat during morning and evening for foraging. Habitat use was characterized by some distinct diurnal patterns and individual variability. The Cotton Pygmy-goose is observed sparsely on all parts of the studied wetlands, but typically is hidden in the vegetation and more difficult to observe under concealing condition. Seen in pairs during the breeding season and in smaller flocks (5 to 15, occasionally up to 50 or more, at other times up to 500 in Mysore). It prefers vegetation covered jheel or wetlands, village tanks and ponds, and also shallow lagoons (Salt Lakes Calcutta). It is mainly vegetarian; it feeds on shoots, corns and seeds of aquatic plants, grains of cultivated and wild rice. Occasionally prefers crustacean, worms and insects and their larvae (Balachandran and Rahmani 2005). Many ecological factors affect waterfowl breeding and ultimately the population, such as climate, hydro-period, and temporal availability of suitable food (Baldassarre and Bolen

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1994). In the present paper, both new and previous studies on population and conservation strategies of Cotton Pygmy-goose were synthesized and summarized.

2. Methodology

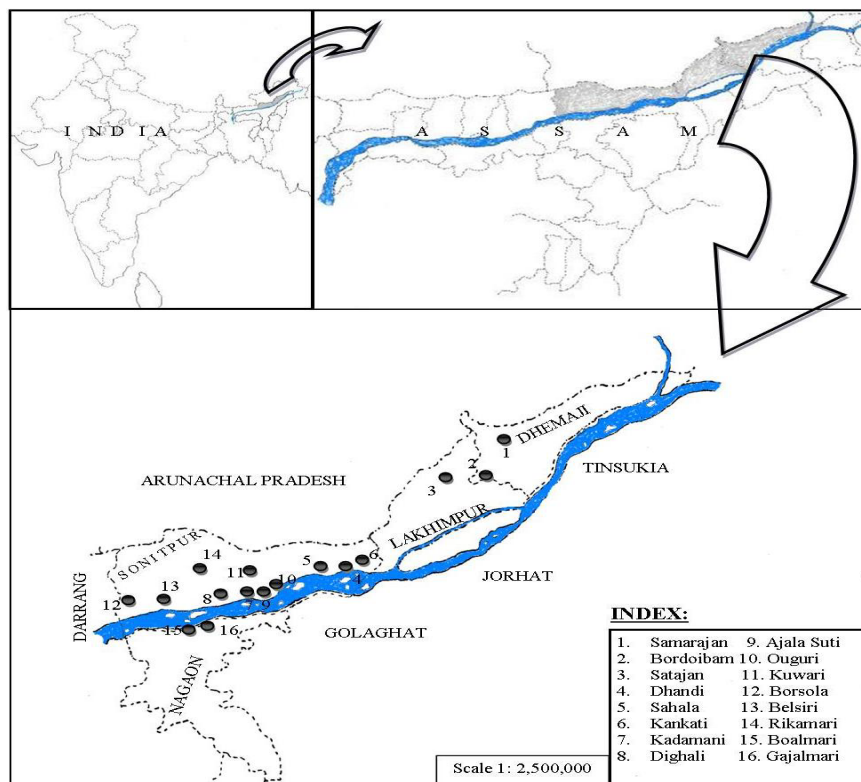
The study was carried out during 2006-2011 (January) in the wetland areas of Eastern Assam with inclusion of the three districts of Assam, *viz.* Sonitpur, Lakhimpur and Dhemaji covering the north of the river Brahmaputra. Sixteen wetlands were selected for the purpose (Map 1).

The habitat and the foraging area of the Cotton Pygmy-goose were observed frequently for atleast 15 days in each season with a minimum 10 point counts per day totaling 450 survey point counts. The population size of the bird was estimated by Lincoln-Peterson method and the factors affecting the population during the study period were assessed. The essential steps at urgent need were followed for conservation of the species in the study area during the study period.

3. Results & Discussion

The current population size of the Cotton Pygmy-goose from the 16 wetlands (2,492.98 hectares) is estimated to 203 with a density of 0.081 during January 2009, while the same was 0.124 during 2007. There is a steep decrease in population size and density of the goose in the study area

(non-protected areas). The main reasons behind this decrease was found to be the habitat loss (93.8%), hunting or poaching (50%), cutting of old aged trees which they use as nesting ground (31.3%), human exploitation (25.0%) and illegal marketing (18.75%). The destruction of the wetlands for agriculture and predatory behaviours of other animals are other two basic factors. However, even populations found within protected areas are not free from risk. They are frequently hunted for their good quality meat and often suffer from disturbance and habitat contamination by pollution and pesticides. The various anthropogenic activities affecting their survival in the area were illustrated in a tabular form (Table-1). The satisfactory population of the subspecies, though not quantified from India, is under threat of several anthropogenic activities. Their extinction is still a long term process. However, their extinction can be considered a two phase process. Primary factors can cause initial population reductions at broad spatial scales which might have been in process. The findings of the present study show that the primary factors were already affecting the survival of the Cotton Pygmy-goose. If population have declined, secondary threats are likely to affect the species. Again with a longer lifespan and environmentally controlled reduced reproductive rate, high duckling mortality, ecological naivety and lower resistance to new diseases the species is prone to the verge of extinction in near future. The causes of reduction in numbers were more or less same with the findings of Diamond (1984) and Temple (1985).



Map -1 Map showing the selected wetland sites for the study of Cotton Pygmy-goose in Assam.

Table 1. Frequency of occurrence of various anthropogenic activities in the studied wetlands of Assam, 2006-11

Sl. Nos.	Activities (2006-11)	Wetlands*	Scores	Rank	Frequency
1	Poaching	A, B, D, E, F, G, I, N	8	2	50.00%
2	Habitat loss	A, B, C, D, E, F, G, H, I, J, K, L, M, N, O	15	1	93.80%
3	Cutting of nesting trees	A, D, G, I, N	5	3	31.30%
4	Human exploitation	A, E, I, O	4	4	25.00%
5	Illegal marketing	E, F, N	3	5	18.75%

*A =Ajalasuti, B=Belsiri, C=Boalmari, D=Bordoibam-Bilmukh, E=Borsola, F=Dhandi, G=Dighali, H=Gajalmari, I=Kadamani, J=Kankati, K=Kuwari, L=Ouguri, M=Rikamari, N=Sahala, O=Samarajan & P=Satajan-Pahumara.

Additional predatory activities of Common myna (*Acridotheres tristis*), burn owl (*Tyto alba*) and certain egg eating snakes (*viz. Naja naja, Python molurus etc.*) also causes the natural loss of the birds' population. Once the population is sufficiently reduced or isolated, it becomes increasingly vulnerable to secondary threats. These threats are primarily stochastic ones, which by acting on even large population can lead extirpation. The Cotton Pygmy-goose is highly vulnerable to demographic and environmental stochasticity and catastrophes. All these threats must be adequately addressed to ensure species viability.

The decrease in population of the Cotton Pygmy-goose from the wetlands nearby to the human settlement is due to the pressure created by the human activities. The present study reveals several cases of anthropogenic activities. One of the most important among them is the habitat loss. The 50% of the studied area is suffering from poaching activities, while habitat loss is the main cause for its destruction in 93.8% of the total area.

Demographic stochasticity is the effect of random events on the reproduction and survival of individuals. It is usually considered that it would affect only at small population (Meffe and Carroll 1997). Environmental stochasticity refers to unpredictable events that change vital rates of an entire population, as opposed to individuals. The effects of environmental stochasticity are similar whether the population is large or small (Caughly 1994). Both the demographic and environmental stochasticity may have important influences on viability of Cotton Pygmy-goose.

Some catastrophes that jeopardize the Cotton Pygmy-goose are hurricanes, global warming, and tsunamis. Disease, environmental disasters, and anthropogenic threats also pose serious risks. These catastrophic threats can be reduced by: (i) having many populations geographically spaced, to decrease the chance of a catastrophe affecting all populations; (ii) having birds on other wetlands or lakes, that provide more protection from storms and heavy sea level changes; and (iii) developing post-disaster contingency plans to restore populations affected by catastrophes.

4. Management Recommendations

The population of Indian Pygmy-goose in Assam is far below its threshold level (1% =1,000). Therefore, to recover at least the threshold point strategies should be taken by

maintaining the population all over the state. Populations large enough to tolerate environmental uncertainties will also be able to withstand demographic uncertainties to some extent. Additional populations managed for gene flow among them are needed to withstand stochastic threats. Recovery strategies may include the habitat restoration, translocations to other wetlands of geographically isolated region, and prevention of any harmful alien species introduction to the habitats supporting Cotton Pygmy-goose.

The mass public of the areas should be informed with the value of the species as bio-indicator for the wetland condition. The public of the studied area were covered by several public meetings for their awareness.

Habitat restoration and the establishment of additional wild Cotton Pygmy-geese populations on the wetlands of other region will not only reduce the geese's risk of extinction, but also help to restore missing components of the Assam's ecosystem. Translocation of Cotton Pygmy-goose to the wetlands of other regions may- (i) reduce overcrowding during periods of high density, (ii) reduce the risk of extinction due to random stochastic events, (iii) restore the goose to ecosystems where Cotton Pygmy-goose existed, and (iv) act as temporary safeguards in areas free of threats.

The Cotton Pygmy-goose is adapted to a very harsh environment and flexible in its foraging behavior, which helps in translocation of the species easily if required. Translocation success is highest with wild-caught animals from high density and increasing source populations (Griffith *et al.* 1989). These conditions are normalized for the Cotton Pygmy-goose population. Birds should be removed when populations are increasing. Taking juvenile birds will probably have the least significant impact on the population. Removal of older birds, especially adult females, could cause a decline in the source population by decreasing production. Additional research work is needed to determine causes for the low number of females breeding successfully, and causes for duckling mortality. Management to increase duckling survival should be explored.

For a successful translocation, the primary threats that led to the species' initial extirpation must be controlled. Poor habitat quality is the most common reason for the failure of translocations (Griffith *et al.* 1989). In the case of Cotton Pygmy-goose, mammalian predators on the remote places of study area is identified as the primary limiting factor and will need to be controlled at proposed translocation sites. Sufficient food, water resources, vegetation cover, and breeding

sites must be available at the release location.

5. Conclusions

Steps should be taken to minimize the risks by habitat improvements and thereby increasing their carrying capacity as well as its brood rearing habitats, the nesting trees nearby the wetlands. Nest box utilization can introduce in certain cases like the other wood ducks so as to provide maximum breeding grounds. Translocation of wild fledged juveniles is one of the most desirable and feasible method for establishing new populations to reduce the extinction risk if the species limits its dispersal. Removal of wild eggs and captive propagation may also be applied for conservation with minimal impact on the source population.

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