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Adesh Kumar

Biodiversity & Wildlife
Conservation Lab, Department
of Zoology, University of
Lucknow, Lucknow, Uttar
Pradesh, India.

Amita Kanaujia

Biodiversity & Wildlife
Conservation Lab, Department
of Zoology, University of
Lucknow, Lucknow, Uttar
Pradesh, India.

Impact of community-based conservation on Sarus Crane *Grus antigone antigone*: A case study

Adesh Kumar and Amita Kanaujia

Abstract

Community-based conservation (CBC) encompasses several core principles, including: involving communities in decision-making; devolving control over resource management; developing community institutions for management; incorporating traditional or local knowledge; legitimizing community property rights; linking environment and development objectives; and providing incentives for conservation. In 2013- 2014, the study was done to assess how perceptions of the egg and nest destruction of Sarus crane might have changed over time. There were sustained high levels of support for conservation and positive perceptions of conservational activities on community. The Indian Sarus Crane (*Grus antigone antigone*), the world's tallest flying bird and a globally 'Vulnerable' species as per IUCN Red List of Threatened Species is the only resident breeding crane in India. The breeding biology of Sarus Crane was studied for two breeding (2013-2014) season in Lucknow District, Uttar Pradesh. Seven pairs were studied during study period at three sites. During the study nesting success in PGI and Mahona was 100% each and in Nagar Chaungwa was 50%. Continuous monitoring of study sites improved the nesting and breeding success of Sarus crane in the study sites.

Keywords: Sarus Crane, Breeding, Wetlands, Community-based conservation (CBC)

1. Introduction

Community-based conservation (CBC) involves several basic principles, including: involving communities in decision-making; developing community institutions for management; incorporating traditional or local knowledge; devolving control over resource management; legitimizing community property rights; linking environment and development objectives; and providing incentives for conservation (Western & Wright, 1994; Songorwa, 1999; Kellert *et al.*, 2000; Barrow & Murphree, 2001) [14, 13, 9, 5]. In 2013- 2014, the study was done to assess how perceptions of the egg and nest destruction of Sarus crane might have changed over time in district Lucknow. There were sustained high levels of support for conservation and positive perceptions of conservational activities on community. Due to their varying along class, ethnic, caste and cultural lines, representing diverse interests in conservation, Communities are more complex (Songorwa, 1999; Agrawal & Gibson, 2001; Barrow & Murphree, 2001) [13, 2, 5]. As a final point, incentives have often failed to be interpreted into increased support for conservation, with development gains disconnected from conservation (Adams & Thomas, 1996; Noss, 1997; Infield & Namara, 2001) [1, 11, 8].

The Indian Sarus Crane (*Grus antigone antigone*), the world's tallest flying bird and a globally 'Vulnerable' species as per IUCN Red List of Threatened Species is the only resident breeding crane in India. As per the count, Uttar Pradesh shelters 12,246 sarus crane, thus mitigating its status of being the biggest sarus supporting state in the country. Mainpuri reported maximum sightings (2,120) followed by Etawah (1,217) and Auraiya (895), Kanshiram Nagar (807), Etah (599), Ramabai Nagar (580) and Sohagibarwa wildlife sanctuary (503). The community based- breeding success and conservation of Sarus Crane was studied for two breeding (2013-2014) season in Lucknow District, Uttar Pradesh, India. For nesting Sarus Crane use the materials (*Oryza sativa*, *Ipomoea aquatica*, *Eichonia* *sps.*, *Cynodon dactylon*) immediately around the nest site pilling vegetation in to roughly round heap of vegetation.

This paper reflects the robustness and flexibility of the incentive, legal structures associated with a successful example of CBC and study emphasis on motivations for Sarus nest and eggs conservation, the way in which these work in a particular case study, and how they have changed over time. Incentives are important, but they are also linked to other issues. Communities' approaches towards conservation are thought to be influenced strongly by

Correspondence

Amita Kanaujia

Biodiversity & Wildlife
Conservation Lab, Department
of Zoology, University of
Lucknow, Lucknow, Uttar
Pradesh, India.

economic incentives (Freese, 1997) [6], but expecting the effect of economic incentives for conservation has proven challenging for numerous causes.

2. Study Area

Community based conservation for eggs and nest conservation and protection of Sarus Crane was studied for two breeding season in the year 2013 and 2014 in Lucknow District of Uttar Pradesh having 26°51'N and 80°55'E geographical coordinates. The maximum temperature recorded was 47.5 °C and minimum was 2.5 °C. The average rainfall recorded for was 1056 mm. The principal river Gomti originates near the Maldo Tada town of Pilibhit. The river extends to about 900 km. Some of the tributaries of this river are Kukrail, Loni, Beta etc. Sai river flows from the south of the city and in the east enters district Raebareli. It is surrounded on the eastern side by District Barabanki, on the western side by district Unnao, on the southern side by Raebareli and on the northern side by Sitapur and Hardoi districts. The main crops of Mahona, Nagar Chaungwa and PGI area are wheat, paddy, mint, banana cultivation and cultivation of seasonal vegetables.

2.1 Materials and Methods

The study consisted of surveys conducted between July 2013 to October 2014. This was followed by detail surveys during the breeding period. This detailed study coincided with the egg-laying season for sarus cranes that minimize pseudo replication because the birds remained close to their nests during this time to protect the nesting area and eggs (Aryal, 2004) [4]. Nest observation and monitoring was done

regularly. Observations and monitoring were done with the aid of an Olympus 10x50 binocular and photography was done with 60 D SLR Canon camera. Nesting success is calculated by Mayfield’s method.

In 2013-2014, a survey of all households was attempted, with 91% (n=76) of all households. Households were defined by physical dwelling and surveys were directed at either the male or female household head. Household surveys recorded: (1) general socioeconomic data; (2) perceived ‘best’ and ‘worst’ things about the Sarus conservation (3) awareness and perceptions of Sarus protection activities; and (4) perceptions of threats to the Eggs; and specifically of existing and potential conflicts between the Sarus and villagers.

3. Result and Discussion

The cranes preferred wetlands as nesting habitat at the levels of both the landscape and individual territory. A total seven pairs of Sarus crane were studied during study period at three different sites. In 2013-2014, a survey of all households was attempted, with 91% (n=76) of all households (n=84) surveyed in study period. Households were defined by physical dwelling and surveys were directed at either the male or female household head.

While a smaller percentage of households was surveyed during study period, the similarity of respondent characteristics (Table 1 & fig.1) increases confidence that any differences in responses between years is not due to sampling. While a minor fraction of households was surveyed in 2013-14, the similarity of respondent characteristics increases confidence that any differences in responses between years is not due to sampling.



Fig 1: The community was made aware and trained that about nest and eggs of sarus crane

A study is performed in Chitwan, Nepal for community forest users. A household level benefit-cost analysis was performed to quantify and compare the costs and benefits from community forest management. Only direct benefits were included in the analysis. The study revealed that older forest

user groups derive more benefits to households compared to more recently established ones. The magnitude of resources utilization also substantially influences the size of the household benefits. (Rajesh Kumar Rai *et al.*, 2016) [12].

Table 1: Characteristics of survey respondents and their households

S. No.	Characteristics	2013-2014 Survey (N=76)
1	% Male (n)	29 (22)
2	% Female (n)	71 (54)
3	Average age (years)	38
4	% Association of respondents (n)	78 (59)
5	% Association of non -respondents (n)	22 (17)
6	% Association of respondents households (n)	86 (65)
7	% Association of non-respondents households (n)	14 (11)

3.1 Perceptions of the nest and eggs protection’s impacts on the community and sarus’s nest and eggs protection

In 2013-14, the majority of survey respondents believed the nest and eggs protection and conservation had positive impacts on the community and sarus crane population. Simply opinions about impact of the eggs and nest protection and conservation on the community was significantly different, with a higher fraction of respondents seeing impacts as neutral (Table. 2). The popularity of a community-based approach, the concept of community rarely receives the attention it should get from those concerned with resource

management. This balanced volume redresses the situation, demonstrating both the promise and the potential dangers of community action (Arun Agrawal and Clark C. Gibson, 2001) [2].

A study was designed to define resident’s feelings about resource protection in their community and their attitude towards management. Member and nonmember households were surveyed which representing three of these eight villages; 74% of the sample were member households and 26% were non-member (Sara Alexander, 2000) [3].

Table 2: Apparent impacts (+=positive, 0=neutral, -=negative) of the nest and eggs protection on the Sarus population and community in 2013-14 by percentage of respondents (number of respondents shown in brackets). Percentages do not always equal 100 because ‘don’t know’ and ‘no answer’ responses are not included in the table.

S. No.	Parameter	Apparent impacts 2013-14 (n=76)		
		+=positive	0=neutral	-=negative
1	Sarus’s Nest and Eggs Conservation and protection	81% (51)	16% (10)	3% (2)
2	Community	78 % (50)	14% (9)	8% (5)

In terms of impacts on sarus crane, respondents were generally ambiguous in enlightening their positive statuses during study period, mentioning to their efforts to attention for the sarus crane. Respondents were aware of specific protection activities in 2013-14, but with significantly and higher levels of awareness activities in 2014 (Table 3 & fig.2). People living closest to natural areas or protected areas pay

the highest price for achieving conservation, willingly or unwillingly (C. Leisher, P. van Beukering and L.M. Scherl, 2007) [10]. Conservation does not come without a cost even when it is being done by communities themselves. Many times communities consider these costs integral to their efforts while at other times the costs begin to impact the sustainability of the initiative and communities even look for help to counter them (kalpavriksh.org) [7].

Table 3: Protection activities identified by percentage of respondents (number of respondents shown in brackets) in 2013-14.

S. No.	Protection Activities	Percentage of respondents 2013-14 (n=76)
1	Hatchling release	19 % (17)
2	Defending	29 % (26)
3	Predator control	22 % (19)
4	Egg removal	8 % (7)
5	Guiding	16 % (14)
6	None	6 % (5)



Fig 2: The nest and eggs being protected by the local community, farmers under guidance of experts in Lucknow region.

Sarus crane has a long breeding season right from July to September. Before community based conservation initiatives the status of sarus crane nests, eggs and breeding were not in good conditions or very poor. Breeding success was very scanty. In 2013 total two nests were monitored at PGI and Nagar Chaugwa. One egg was stolen from Nagar Chaugwa. In 2014 five nests were monitored 2 from PGI, 2 from Nagar Chaugwa and 1 from Mahona. One chick mortality was reported at Nagar Chaugwa in 2014 (Table 4). Estimation of

nest success was done through Mayfield’s method and result revealed that overall probability of success for a nest was very productive i.e. 1.97878 in 2014 (Table 5 & fig.3). After CBS (community based conservation) the chick survival rate is approximate 75%. This was small but positive the initiative of sarus habitat and population conservation and will be great milestone in future for sarus crane conservation in study area or others sarus prone areas in Uttar Pradesh.

Table 4: Showing the total data of nests, eggs, chicks and nest success

Study Area	Study period	No. of Nest	Eggs/Nest	Eggs/ chicks mortality	Chicks/Nest	Nest Success
Nagar Chaugwa	2013 (1 nest)	(3 nest)	1	1	1	50%
	2014 (2 nest)		1	1	1	50%
			2	0	2	100%
PGI	2013 (1 nest)	(3 nest)	2	0	2	100%
	2014 (2 nest)		2	0	2	100%
			2	0	2	100%
Mahona	2014 (1 nest)	(1 nest)	2	0	2	100%

Table 5: Estimation of nest success through Mayfield’s method

Year	Sd	Var (Sd)	H
2013	0.9795918	0.0004097	1.40944
2014	0.9846154	0.00002332	1.97878

(Sd :-survival rate, Var (Sd):- variance of survival rate and H:- overall probability of success for a nest)



Fig 3: Clock wise (A) Mating dance of Sarus crane IUCN Vulnerable (VU) Species (B) Nest construction activities (C) Eggs of Sarus crane (D) Incubation position (E) Chicks of Sarus crane (F) Chicks with their parent (G) Foraging activities of chicks (H) Sub-adult (I) Adults in group

4. Conclusion

There are not as much of stories of successful Community Based Conservation (CBC) in the literature. The collective problems arising when implementing CBC, justification of failure for species or environment, majority participation and to link conservation and development consequences and overview of community. The most significant achievement of the sarus crane conservation is the extent to which it has understood participation in exercise by community. In this case study, resource management, administration regimes and environmental protection have been made under community control.

Additional cases of effective and successful CBC are needed, as are studies that follow CBC projects over the time. Whereas there is much to be learned from failures, success stories provide equally relevant lessons, so that conservationists might try to replicate. After CBS (community based conservation) the chick survival rate is approximate 75%. This was small but positive the initiative of sarus habitat and population conservation and will be great milestone in future for sarus crane conservation in study area or others sarus prone areas in Uttar Pradesh.

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