

EFFECT OF RAINFALL ON GREY PELICAN (*PELICANUS PHILIPPENSIS*) ARRIVING AND BREEDING AT NELAPATTU BIRD SANCTUARY, ANDHRA PRADESH

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Introduction

Nelapattu Bird Sanctuary (NBS) supports the largest Pelicanry in South East Asia. It is an important breeding site for Grey Pelican (*Pelicanus philippensis*). It is also a breeding site for White Ibis, Open Bill Stork, Night Heron, Little Cormorant etc. Every year migratory birds visit and breed in the Sanctuary in winter i.e., from the month of October to March. Some of the birds are local migrants and some of the birds are extra-limital migrants.

Nelapattu Bird Sanctuary is located between 13° 51' and 13° 59' N latitudes and 79° 57' and 79° 59' E longitudes. It is situated near Nelapattu village in Doravarisatram Mandal of Nellore District in Andhra Pradesh.

Study Area

Total area of the Sanctuary is 458.92 ha. Composition of the forests and other lands constituting the Sanctuary (Management plan) is as below :

Kalluru R.F.	:	288.15	ha
Nelapattu tank	:	82.56	ha
Unreserved Forest	:	88.22	ha
Total	:	458.92	ha

Climate : The Sanctuary receives annual rainfall of about 1000 mm, mostly from North-East monsoon. Mercury touches 45° C in the month of May and dips to 23° C in the month of December and January.

Flora : The Sanctuary has "Barringtonia Swamp Forests" in the tank portion and "Southern dry evergreen scrub" in the R.F. and unreserved forests. Dominant species are *Manilkara hexandra*, *Maba buxifolia*, *Memicylon edule*, *Buchnanian angustifolia*, *Zizyphus xylopyrus* etc., in the R.F. and unreserved forest areas and *Barringtonia acutangula* in tank portion.

Fauna : There is no large mammal in NBS. However jackal, hare, monitor lizard, tortoise and some varieties of snakes exist here.

Avifauna : About 187 bird species occur in NBS, of which about 50 are migratory. Major species breeding in NBS are Grey Pelican, White Ibis, Openbill Stork, Night Heron and Little Cormorant. Other waterfowl visiting NBS are Pintail, Common Teal, Dabchick, Shoveller, Coot, Spot Bill Duck, Grey Heron, Darter, Black Winged Stilt, Garganey Gadwalls etc.

Legal status : The waterfowl have been roosting at Nelapattu tank since last 40 years and local people have been protecting

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them traditionally. Considering the importance of local migrant birds breeding in the tank the Government of Andhra Pradesh notified the area as NBS in 1976, u/s 18 and in 1997 u/s 26A of Wildlife (Protection) Act, 1972. In addition to the Nelapattu tank, primarily an irrigation tank, a portion of R.F. and unreserved forest were also included in the Sanctuary.

Suitability of NBS as a Breeding Ground of Pelican

Nelapattu Bird Sanctuary has many of *Barringtonia acutangula* trees in the tank portion, which provide a roosting site for pelican. The *Barringtonia* trees surrounded by water offer good protection to the roosting pelican.

The Pulicat Lake having an area of about 600 km², is only 10 km away. It acts as an inexhaustible feeding ground for the roosting pelicans in NBS.

Local people treat the birds as 'celestial' entities and offer protection. Droppings of pelican get dissolved in the tank water and act as good fertilizer when water is drawn to the agricultural fields. Hence there is a symbiotic relationship between the pelicans and villagers.

The R.F. and unreserved forests adjoining the tank supply required nesting material.

Population of Birds

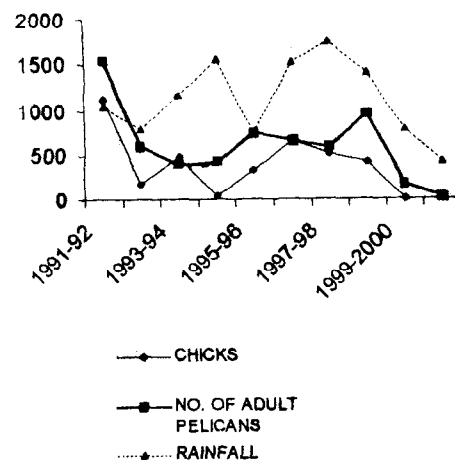
With the receipt of rains from the North-East monsoon the Nelapattu tank gets filled with water from the month of September/October. Pelicans start arriving Nelapattu during the months of September and October. Population of pelicans is

monitored by Sanctuary staff and it is recorded daily in NBS. Information like the time of arrival of pelicans, their population, hatching period, number of chicks developed, return time etc., are also recorded and studied from the daily counting.

Effect of rainfall on the arrival of birds and success of Breeding

There appeared to be a relationship existing between the amount of rainfall received and number of pelicans visiting the Sanctuary. To establish this, census figures of pelicans in NBS has been studied for the last 10 years. The number of pelicans visiting the Sanctuary is varying from year to year. The number of Grey Pelicans arrived at NBS in the last 10 years is given in Table 1. The relationship between the number of pelicans arriving at NBS and rainfall a graphically given in Fig. 1.

Fig. 1



Relationship between no. of pelicans arriving at NBS with quantum of rainfall

Table 1
Monthly Rainfall received (mm) and the number of pelicans recorded during study period

Year	Aug.		Sept.		Oct.		Nov.		Dec.		Jan.		Feb.		March.		Total	
	Rain- fall	No.	Rain- fall	No.	Rain- fall	No.	Rain- fall	No.	Rain- fall	No.	Rain- fall	No.	Rain- fall	No.	Rain- fall	No.	Rain- fall	No.
1991-92	109	2	36	1058	331	1069	546	1094	12	1535	0	1827	0	1834	0	226	1034	1834
1992-93	144	0	92	0	132	0	370	584	52	594	0	591	3	625	1	591	795	625
1993-94	145	0	117	0	352	0	398	388	149	394	0	497	3	568	0	546	1164	568
1994-95	150	0	13	0	404	65	477	327	501	418	0	455	2	462	0	462	1546	462
1995-96	225	7	115	59	184	631	214	714	6	748	0	872	0	840	0	468	744	840
1996-97	99	0	154	348	407	398	332	626	297	658	228	768	0	826	0	655	1517	826
1997-98	37	2	271	0	324	16	762	438	348	589	0	868	1	880	0	1245	1743	880
1998-99	200	0	209	0	378	459	325	942	290	956	0	956	0	1456	0	534	1401	1456
1999-2K	82	2	50	2	227	102	188	182	24	174	0	0	198	2	0	0	769	2
2000-01	186	0	39	0	93	0	110	0	54	25	0	0	0	0	0	0	482	0

Table 2

Pelican chicks hatched and success of breeding during study period

Year → Pelican chicks ↓	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-2000	2000-2001
Number	1125	179	486	51	330	658	516	428	0	0
Success of breeding	(1125/ 1535)	(179/ 594)	(486/ 394)	(51/ 418)	(330/ 748)	(658/ 58)	(516/ 589)	(428/ 956)	(0/0)	(0/0)
	100= 73%	100= =30%	100= 123%	100= 12%	100= 44%	100= 100\$	100= 87%	100= 45%	100= 0%	100= 0%
Rainfall (mm)	1034	795	1164	1546	744	1517	1743	1401	769	482

Note : Success of breeding = (No. of chicks / No. of adults) 100

Number of Pelican chicks hatched in Nelapattu Bird Sanctuary in the last 10 years i.e., from 1991 to 2000 is given in Table 2.

A study of Tables 1, 2 and Fig. 1 shows that there is no exact relationship between the number of birds visiting the NBS and the quantum of rainfall received in the Sanctuary. But when the rainfall received till the month of November is less than 700 mm, pelicans do not stay in the Sanctuary. Normally the pelicans arrive at the onset of North-East monsoons in the month of September or October. They form pairs and build nests in the month of October, mate in the month of November and lay 1 or 2 eggs in the month of December. Incubation period is 30 days. Chicks hatch in the month of January and are reared by both the parents till March. Pelicans leave NBS at the end of March.

During the years 1999-2000 and 2000-2001 the pelicans had not roosted in the Sanctuary as the rainfall was scanty. The area was declared as drought affected by the district administration. The Nelapattu tank was not filled even to half of its capacity. The population of pelicans was almost nil during these years. They roosted on the mudflats in Pulicat Bird Sanctuary and they did not indulge in breeding activity.

Comparison with temperature and relative humidity for the last 10 years also does not establish any exact relationship with the number of birds arrived.

The late rainfall does not give sufficient time for the chicks to grow and leave for the wintering ground. Graph drawn for number of chicks born and

quantity of rainfall received (Fig. 1) shows positive correlation between number of chicks developed and the quantity of rainfall received. Considering that one pair of pelicans lay two eggs and sibling rate is 100% the success of breeding is calculated and tabulated in Table 2. Comparison of success of breeding with the quantum of rainfall received shows that there is positive correlation between rainfall and success of breeding. Success of breeding is more than 70% when rainfall received is more than 700 mm up to November and success of breeding is below 45% when rainfall received is less than 700 mm up to November, exception being the year 1994-95 when the nests and eggs were damaged due to cyclone.

Conclusion

Success of breeding of Grey Pelican at Nelapattu Bird Sanctuary is directly proportional to the quantity of rainfall received between the months of August and November. Pelicans do not indulge in breeding activity when the rainfall is below 700 mm between August and November. This is because with that much rainfall, the Nelapattu tank does not get filled up with water sufficiently.

Arrival of pelicans at NBS is also dependent on rainfall to some extent, but not totally dependent on it. There may be some other factors affecting the number of pelicans visiting NBS. Similar studies on number of birds arriving at the other pelicanries in the country and the climatic and ecological conditions in those areas are required for comparison. Comparison of the factors operating in different pelicanries will possibly give the clue to real factors affecting the arrival of birds in the NBS.

SUMMARY

Nelapattu Bird Sanctuary is an important breeding site for Grey Pelican. The number of pelicans arriving at NBS vary from year to year. The number of birds visiting NBS and quantity of rainfall received was studied for the last 10 years. It indicates positive relationship between number of birds visiting NBS and quantity of rainfall received. Study also shows relation between the success of breeding and quantity of rainfall received. However it also reveals that the number of birds arriving NBS is not totally dependent on rainfall and further studies are required. However success of breeding is directly proportional to the quantity of rainfall received.

नलपट्टु पक्षि अभयारण्य, आंध्र प्रदेश में आने और प्रजनन करने वाले घूसर प्लव
(पेलिकानस फिलिप्पेसिस) पर वर्षा का प्रभाव

पी०के० शर्मा व पी०एस० राघवैया

सारांश

नलपट्टु पक्षि अभयारण्य घूसर प्लवों के प्रजनन करने का महत्वपूर्ण स्थल है। नलपट्टु पक्षि अभयारण्य में वर्ष दर वर्ष आने वाले प्लवों की संख्या में घट-बढ़ होती रहती है। पिछले 10 वर्षों में नलपट्टु पक्षि अभयारण्य में आए पक्षियों की संख्या और वहां हुई वर्षा की मात्रा का अध्ययन किया गया। इस अध्ययन से नलपट्टु पक्षि अभयारण्य में आने वाले पक्षियों की संख्या और वहां हुई वर्षा में सकारात्मक सम्बन्ध संकेतित होता है। यह अध्ययन प्रजनन कार्य की सफलता और वहां होती वर्षा में भी सम्बन्ध रहता प्रदर्शित करता है। तथापि, इससे यह भी प्रकट होता है कि नलपट्टु पक्षि अभयारण्य में आने वाले पक्षियों की संख्या पूरी तरह से वर्षा पर ही निर्भर नहीं करती, और इस बारे में अधिक अध्ययन किया जाना आवश्यक है। तथापि, प्रजनन की सफलता तो वहां होने वाली वर्षा की मात्रा के साथ प्रत्यक्षतः समानुपात में ही है।