EVALUATION OF HABITAT PREFERENCE OF GREAT REED WARBLER (*ACROCEPHALUS ARUNDINACEUS*) IN A FRESHWATER CHANDHARAWETLAND OF JAMMU AND KASHMIR, DURING BREEDING SEASON

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ABSTRACT

Very few studies have been conducted on habitat preference of Great Reed Warbler (Acrocephalus arundinaceus) during its breeding season in Indian subcontinent. The present investigation was carried out with an objective to understand its habitat preference in a freshwater wetland located in Himalayan flood plain area of Kashmir valley. The findings may prove helpful in safeguarding its breeding habitats, thereby ensuring its own conservation. The wetlands of J&K provide important habitat for a number of aquatic avifauna including some passerines such as Great Reed Warbler (Acrocephalus arundinaceus).This bird species utilizes the resources of freshwater wetlands of J&K during summer months for foraging and breeding. The present study was undertaken to evaluate its preference for various habitats available in Chandhara wetland during April 2008 to September 2008.This bird was found to show significant preference for Phragmites dominant area followed by open water area and dry land strip(X^2 =184.8, p<0.0001) during nesting period. It generally avoided Carex dominated floating zone and peripheral zones.During post nesting period Great Reed Warbler was found to display its significant preference for Phragmites dominant area (X^2 = 313.15, p<0.0001).

Key words: *Wetlands, Great Reed Warbler, Habitat, Preference, Phragmites,Sparganium*

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International Research Journal of Natural and Applied Sciences (IRJNAS) ISSN: (2349-4077)

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Introduction

The wetlands of J&K have remained as foraging and breeding grounds for a variety of avifauna for last many centuries.Till date forty-two (42) wetlands have been identified in J&K state.However, only few wetlands such as Hokarsar, Haigam, Mirgund, Shallabugh etc. are being managed by State Department of Wildlife.Most of remaining wetlands including Chandhara wetland are being neglected by State authorities.These valuable water bodies suffer from illegal encroachment, siltation, drainage, pollution, indiscriminate macrophyte harvesting and other anthropogenic pressures.Thesewetlands besides supporting a variety of invertebrates and vertebrates such as avifauna also harbour a rich gene pool both at planktoniclevel as well as vascular plant level. A number of hydrophytes contained in them are used as food,fodder and other economic purposes. Birds, being most conspicuous of all vertebrates,use them as foraging,breeding, overwintering grounds or stopover sites during various seasons of the year. Some passerine species utilize the resources of these wetlands during summer for feeding, breeding or roosting. Among passerines Great Reed Warbler(*Acrocephalus arundinaceous stentorius*)uses wetlands for feeding and breeding purposes during late spring and summer seasons. The main objective of present investigation wasto determine its habitat preference in Chandhara wetland located in Himalayan flood plains of South Kashmir .The findings will aid in ensuring its conservation in future.

Study Area

The study on habitat preference of Great Reed Warbler (*Acrocephalus arundinaceous stentorius*) was carried out in a permanent freshwater wetland called Chandhara wetland from April 2008 to September 2008. It is an emergent type of wetland (33° ,45′ ,32 N.lat. and 74º ,55′ ,35 E.long.) located nearby a village called Chandhara, at a distance of about thirteen (13) kilometers from Srinagar . The wetland covers an area of about twenty eight (28) hectares and lies amidst two small karewas. The wetland is fed by a small spring called '' Goonjar Nag '' located on its eastern border. It also receives run off from two adjacent karewas and seepage water from an irrigation channel situated at some distance towards its north western side. It is bordered by paddy fields on its northwest and southern sides. As far as history of its formation is concerned, no reliable information was available. However inquiries from elderly villagers revealed that this wetland was a cultivated crop land prior to 1940's ,with maize being the principle crop grown over it.

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Methodology

Due to lack of previous information on the study site, a preliminary survey of wetland was carried out to identify its avifauna and hydrophytes. The birds, their eggs and nests were identified with the help of identification keys given by Bates and Lowther (1952),S. Ali (1979) and Fleming,*et al*. (1979). Similarly different species of macrophytes were collected from the wetland. These were labelled,pressed and later identified with the help of hebarium available in the Department of Botany,University of Kashmir Srinagar.The study site was divided into various strata or habitat categories based on presence of conspicuous dominant vegetation and each habitat was accordingly named except open water area.Aerial photograph of wetland was obtained from Google Earth through internet services. The photograph of the wetland was traced onto an onion paper, overlaid with a graph paper and all squares that covered a particular habitat category or a vegetation stand were counted. Thus acreage of each habitat available in a study site was determined and recorded.

Since the study area contained dense growth of reeds,it was difficult to make exact evaluation of use of its habitats by avifauna. Six vantage/ survey points were established at elevated positions around the wetland in such a way that they could provide maximum and close overview of sizeable portion of various habitats in a study area. Care was taken to ensure that the fields of vision of adjacent vantage points did not overlap.Monthly survey of Great Reed Warblerwas carried out from vantage points using field binoculars (12/50 super zenith).Number and species of birds detected visually with the aid of field binoculars or heard aurally or seen hovering over a focal area were recorded in data sheets during a ten minute count while standing stationaryat each vantage or survey point. If a group of birds were detected in a particular habitat category, each bird was recorded as a single observation in data sheet. The data such as habitat category or type of habitat,in which a bird or a group of birds were detected, was also recorded in data sheets. The surveys were conducted early in the morning between 6.a.m to 9.am on days when weather conditions were conducive for surveying (i.e. good visibility, no precipitation or strong winds).Monthly count data of nesting period extending from April to June and post nesting period extending from August to September were separately pooled together for analysis.

 Habitat preference or avoidance displayed by Great Reed Warbler was later determined by calculating its proportion of detection or occurrence (observed usage) in each of the available habitat categories together with its expected usage equal to relative area of that habitat or the

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proportion it occupies in the wetland using Ivelev's index (Ivelev,1961) given by following formula,

Ei = (U- A) /(U + A)

Where '' U '' is the proportion of detections or sightings of a bird species in a habitat category &''A '' stands for availability of that habitat category equal to the proportion of the area it occupies in a study site.

By using this index ,different habitats in a study site were rated between a value of plus one (+ 1) and minus one (-1) passing through zero .A positive value indicated preference of that habitat while as a negative value indicated avoidance of that habitat category . This index provides simply a measure of preference or avoidance. It is not based on a statistical test; therefore a chi-square goodness- of- fit test (x^2) was used to determine whether there is a significant difference between observed usage of these habitat categories and their expected utilization based upon their availability, equal to their respective relative areas. When a significant difference in use versus availability was detected, a Bonferroni '' Z'' statistic or confidence interval technique (Neu*et al*.1974) was applied to determine as to which of the habitat category or categories was or were used more or less often than expected,by constructing a set of simultaneous confidence intervals around true proportion of utilization (pi) of that habitat category. The confidence intervals were calculated using following equation (Byers *et al*.1984)

Pi-Z /2k pi√ (1-pi)/n < pi <pi +Z /2k pi√ (1-pi) /n

Where (pi) = true proportion of use.

K = the number of habitat categories tested.

n = the total number of observations or detections.

Z /2k =the upper standard normal table value corresponding to probability tail area of   2k .

Confidence intervals were calculated for α =0.05.

If the expected proportion of usage did not lie within the interval, it was concluded that expected and actual usage are significantly different.

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Results and Discussion

The wetland was found to contain five different vegetation zones designated as habitat categories and little open water patches together constituting sixth habitat category named as open water habitat.These habitats include(1) an outer peripheral zone of vegetation comprising of short emergents like *Cyperusdifformis*,*Cyperusrotundus*,*Scirpus spp*.,and *Eleocharius spp*. It forms about 18% of total area of wetland. (2)Sparganium dominant area comprising about 49% of whole study area,with *Sparganiumramosa* constituting the major hydrophyte. (3)Floating patch covers about 23% of wetland and is formed by tangled underground parts of *Carexspp*. (4)Phragmites dominant zone,constitutes about 4% of total wetland area, with *Phragmites australis*as dominant emergent plant species.(5)Dry land strip, a narrow strip bisecting the wetland into two portions contributes about 2% of total area of wetland.It bears few isolated salix trees.

The results revealed that during nesting period Great Reed Warbler(*Acrocephalus arundinaceus*) showed highest preference for Phragmites dominant vegetatation stand or area (Ivelev's index = +0.81) followed by open water habitat and (Ivelev's index = =0.33) and Dry land strip(Ivelev's index = 0.33). The preferences were found statistically significant(X^2 =184.8, p>0.0001).This is in agreement with the observations of Tranka and Prokop (2006) who found them to be generalists in terms of food distribution.

The preference for Phragmites dominant area can be attributed to the availability of ideal nesting sites within Phragmites stands. This nest site selection is influenced by the availability of tall Phragmites shoots of adequate height for anchoring their nest above water and concealment from predators provided by dense cover of emergent Phragmites shoots (Hagen, 1984).The tendency of Great Reed Warbler to associate with taller and thicker reeds during breeding period has also been earlier reported by Hoi,*et al* (1991) and Poulin,*et al* (2002). The frequent sighting of Warbler hovering over open water habitat may be attributed to the availability of a variety of arthropod fauna especially chironomid larvae, spiders (Aranei) and hymenopterans in sufficient numbers as potential food source in open water areas. Since Phragmites stands are generally considered as suboptimal habitats because they support lower density and diversity of macro invertebrates (Angradi*et al* ,2001),therefore it is likely that Great Reed Warblers (*Acrocephalus arundinaceus*) are forced to explore other habitats for procuring food and other materials such as nesting material . The preference for Dry land strip can be explained on the basis of

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assumption that Salix trees planted over it serve as singing posts for male warblers for advertizing their presence to potential mates. The avoidance of Sparganium dominant area for nest building comes from the fact that its shoots were not tall and thick enough to support nests and shoots were so dense that it might have impeded movement of foraging birds both physically (Brodmann*et al*, 1997) and behaviorally (Desrochers and Hannon , 1997). The rejection of Peripheral zone with very low water level, comprising of short emergents may have resulted due to lack of submergent vegetation which serve as a source of support material for small macroinvertebrates. This inturn might have forced birds to abandon this zone either for foraging or nest construction as Great Reed Warblers typically prefer tall dense aquatic vegetation (Perrins, 1998). In post nesting period Great Reed Warblers continued their preference for Phragmites dominant area (Ivelev's index = +0.84 , X^2=313.15 ,p < 0.0001) simply because it spent most of its time in caring of its fledgelings bringing food from nearby adjacent inundated paddy fields or other habitats which can be several hundred meters away from the nest (Csorgo, 1995., Cramp, 1998). All other habitats and vegetation stands were generally avoided as their arthropod fauna had declined and density of their shoots had increased to prevent foraging.

Name of Habitat category	Relative Area	Observed usage (No. of sightings)	Expected usage
Peripheral Zone	0.18	1	9
Sparganium dominant area	0.49	16	24
Open water habitat	0.04	6	2
Floating patch	0.23	5	12
Phragmites dominant zone	0.04	20	2
Dry land strip	0.02	2	1

X^2 = 184.8, df = 5, P < 0.0001

Table1: Habitat Preference of Great Reed Warbler during nesting period

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Name of Habitat category	Relative Area	Observed usage (No. of sightings)	Expected usage
Peripheral Zone	0.18	1	12
Sparganium dominant area	0.49	27	32
Open water habitat	0.04	1	2
Floating patch	0.23	4	15
Phragmites dominant zone	0.04	30	2
Dry land strip	0.02	1	1

X^2 = 313.15, df = 5, P<0.0001

Table2: Habitat Preference of Great Reed Warbler during post nesting period

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Name of habitat category	Proportion of Expected usage (equal to relative area of habitat category)	Proportion of observed usage (pi)	Bonferroni simultaneous confidence intervals		Inference
			Lower limit	Upper limit	
Peripheral zone	0.18	0.02	0.032	0.072	*Avoidance
Sparganium dominant area	0.49	0.32	0.172	0.467	* Avoidance
Open water area	0.04	0.12	1.000	0.241	*Preference
Floating patch	0.23	0.1	0.012	0.212	* Avoidance
Phragmites dominant zone	0.04	0.4	0.217	0.582	*Preference
Dry land strip	0.02	0.04	0.033	0.113	* Preference

Table 3: Habitat Preference of Great Reed Warbler during nesting period

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Name of habitat category	Proportion of Expected usage (equal to relative area of habitat category)	Proportion of observed usage (pi)	Bonferroni simultaneous confidence intervals		Inference
			Lower limit	Upper limit	
Peripheral zone	0.18	0.015	0.025	0.055	*Avoidance
Sparganium dominant area	0.49	0.421	0.259	0.585	Avoidance
Open water area	0.04	0.015	0.025	0.055	Avoidance
Floating patch	0.23	0.062	0.017	0.141	* Avoidance
Phragmites dominant zone	0.04	0.469	0.304	0.633	*Preference
Dry land strip	0.02	0.015	0.025	0.055	Avoidance

Table 4: Post nesting Habitat Preference of Great Reed Warbler

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Habitat Category	Proportion Available(equivalent to its relative area) " A "	Proportion of Observed Usage (U)	Ivelev's index
Peripheral zone	0.18	0.02	-0.8
Sparganium dominant area	0.49	0.32	-0.19
Open water area	0.04	0.12	+0.5
Floating patch	0.23	0.1	-0.39
Phragmites dominant zone	0.04	0.4	+0.81
Dry land strip	0.02	0.04	+.33

Table 5: Habitat Preference Using Ivelev's index during nesting period

Habitat Category	Proportion Available(equivalent to its relative area) " A "	Proportion of Observed Usage (U)	Ivelev's index
Peripheral zone	0.18	0.015	-0.16
Sparganium dominant area	0.49	0.421	-0.075
Open water area	0.04	0.01	- 0.45
Floating patch	0.23	0.06	-0.58
Phragmites dominant zone	0.04	0.46	+0.84
Dry land strip	0.02	0.015	- 0.14

Table 6: Habitat Preference Using Ivelev's index during post nesting period

Conclusions

During the period of investigation, Great Reed Warbler (*Acrocephalus arundinaceusstentorius*) showed significant preference for Phragmites dominant zone, open water area and Dry land strip

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throughout its nesting period. However it avoided Peripheral zone, Sparganium dominant area and Floating patch. During post nesting period this bird species recorded significant preference for Phragmites dominant zone only while as all other habitat categories were avoided.
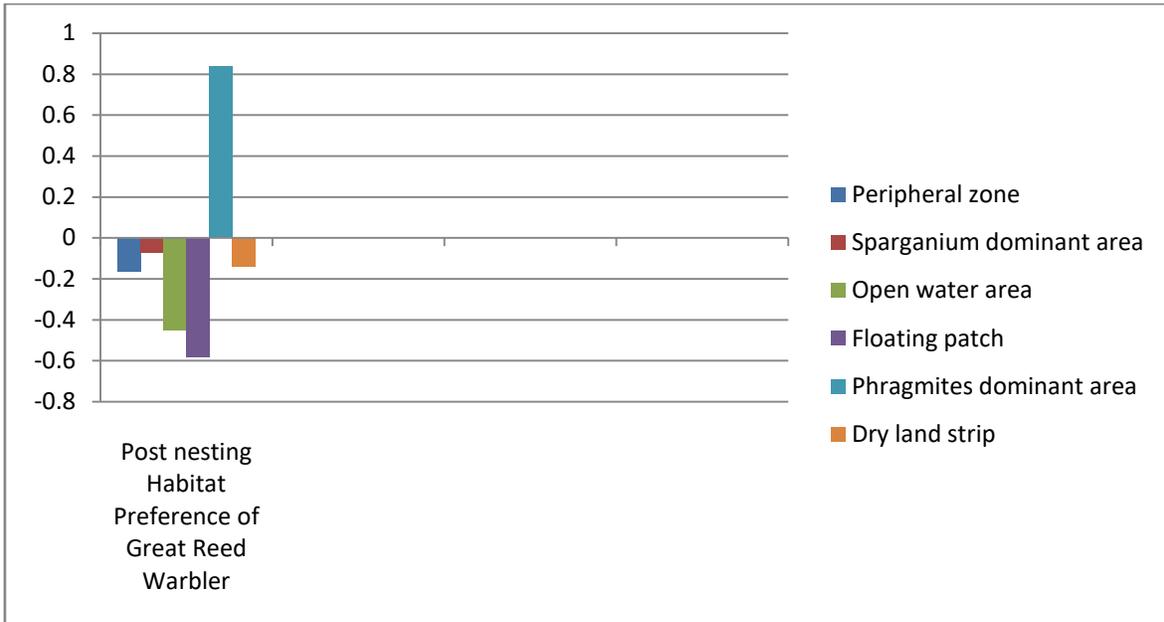

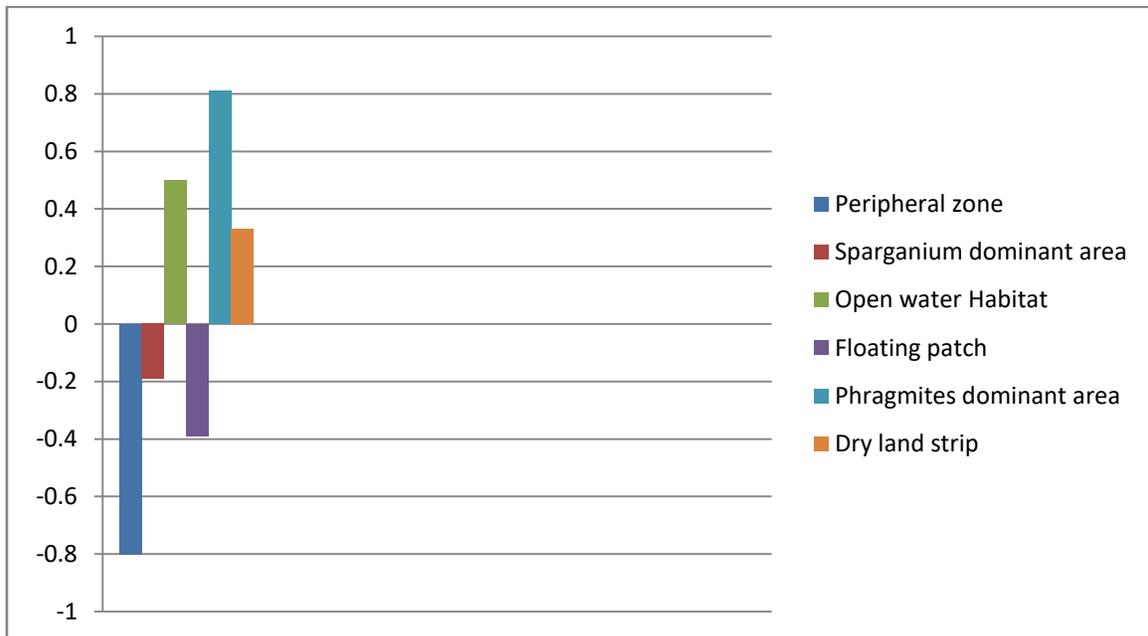**Chart 1: Habitat Preference of Great Reed Warbler during post nesting period using Ivelev's index**

Chart 2: Habitat Preference of Great Reed Warbler during nesting period using Ivelev's index

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References

1.Ali, S., (1979).The Book ofIndian Birds (11^thedition).Bombay Natural History Society Bombay.

2.Angradi,T.R.,Hagen,S.M.,Able, K.W.(2001). Vegetation types and the intertidal macroinvertebrate fauna of a brackish marsh,Phragmites versusSpartina Wetlands, Vol 21(1): 75.

3.Bates,R.S.P.,and Lowther, E. H.(1952). Beeding Birds of Kashmir.Geoffrey Cuberlage, Oxford University Press ,London E.C.4.

4.Brodmann,P.A.,Reyer, H.U.,Baer,B.,(1997). The relative importance of habitat structure and prey characteristics for the foraging success of water Pipit (*Anthusspinoletta*). Ethology, 103:222-335.

5.Byers,C.R.,Steinhorst,R.K., and Krausman, P.R.(1984). Clarification of a technique for analysis of utilization –availability data, Journal of Wildlife Management 48(3):1051-1053.

6.Csorgo, T. (1995). Birds (Aves). In: Varsarhelyit. (ed). Animal world of Reed belt. Hungarian Natural Museum, Budapest, pp. 98-105.Oxford Univ.Press.

7. Cramp, S. (1998). The complete birds of Western Palearctic.On CD-Rom.

8.Desrochers,A. and Hannon,S.J. (1997). Gap crossing decisions by forest song birds during the post fledging period.Conserv.Biol,11:1204-1210.

9.Dyrcz, A. (1980). Breeding ecology of Great Reed Warbler *Acrocephalus arundinaceus* and Reed Warbler *Acrocephalus scirpaceus*at fish ponds in SWPoland and lakes in NW Switzerland. Acta Orn.18:307-334.

10.Flemmingsr, Flemming Jr.,Bengdel, R.L.S.(1979).Birds of Nepal with reference to Kashmir and Sikkim.Avolok Publishers Katmandu,Nepal.

11. Hagen,K.C. (1984).Habitat and nest site selection of Marsh warbler (*Acrocephalus palustris*)in a farmland area .Vogel welt 105(3):81-97.

12.Hoi, H.,Eichler,T.and Dittami, J. (1991).Territorially spacing and interspecific competition in three species of reed warblers.Oecologia 87:443-448.

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International Research Journal of Natural and Applied Sciences (IRJNAS) ISSN: (2349-4077)

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13.Ivelev, V.S. (1961). Experimental ecology of the feeding of fishes. Yale University Press New Heaven.

14.Perrins, C.M. (1998).The complete birds of Western Palearctic on CD- Rom.Oxford Univ. Press, Oxford.

15.Poulin,B.,Lefebvre, G. and Mauchamp, A.(2002).Habitat requirements of Passerines and reedbed management of Southern France. Biol.Conserv.107:315-325.

16.Trnka, A.,Batary, P. and Prokop, P. (2009).Interacting effects of vegetation structure and breeding patterns on the survival of Great Reed Warbler (*Acrocephalus arundinaceus*) nests. Ardea 97(1):109-116.

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