Available online at www.elixirpublishers.com (Elixir International Journal)

Bio Diversity

Elixir Bio Diver. 54 (2013) 12466-12470

ISSN: 2229-712X

Monitoring of Birds in Recreational Kakan Region, Yasuj, I. R. Iran

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ARTICLE INFO

Article history:

Received: 24 November 2012;

Received in revised form:

27 December 2012;

Accepted: 8 January 2013;

Keywords

Yasuj,

Kakan,

Birds,

Biodiversity index,

Bird monitoring.

ABSTRACT

This research was carried out from April 2012 to late August 2012 in Kakan Region as a recreational area around Yasuj (the capital of the Kohgiloye - Boyer Ahmad Province), I. R. Iran. The method used in this study was based on radius point counts. In the study area, 29 terrestrial bird species were identified. According to the "Margalef Index", the most biodiversity richness was observed in June (3.259) and the least richness in August (3.250). According to "Menhink Index", the most richness was seen in June (0.395) and the least in August (0.390).According to "Simpson Index", the max. biodiversity richness was in August (0.928) and the min. biodiversity was June and April (0.925). According to "Shanon-viner Index" the max. biodiversity richness was observed in August (4.250) and the min. biodiversity in June (4.205). According to "Simpson Index" the most uniformity was in August (0.477) and the least uniformity was in June and April (0.460). The diversity of species uniformity indices indicate a high habitat quality around "Kakan" area and status of good conditions for birds which should be considered in the management issues. The suggestions proposed in this article can be effective in improving the conditions for birds in the region.

Introduction

Birds are among the best monitors of environmental changes and have been used to evaluate the environment throughout the history as biomonitors and the changes in their population, behavior patterns and reproductive ability have most often been used to examine the long term affects of habitat fragmentation. (Harisha and Hosetti, 2009). Birds constitute one of the common fauna of all habitat types, and because they are responsive to changes, their diversity and abundance can reflect ecological trends in other biodiversity (Furness and Greenwood, 1993). Because of their highly-specific habitat requirements, birds become increasingly intolerant of even slight ecosystem disturbance (Schwartz and Schwartz, 1951). An assessment of the abundance and diversity of bird species in ecosystem can, therefore, serve as a good indication of the health of the environment in and around the ecosystem (Bowden, 1990). Jarvinen and Vaisenen (1978) used line-transect data on bird abundance to monitor the effect of habitat change in Nordic countries, and reported that a change in forest structure caused changes in bird populations in Northern Finish forest. Hence they are the good indicators of ecological status of any given ecosystem (Bilgrami, 1995). So study the biodiversity of birds is very important As the basis for other studies of ecosystem.

Biological diversity is the richness and evenness of species amongst and within living organisms and ecological complexes (Polyakov *et al*., 2008). Biodiversity is mostly studied in species level. There are different indices to measure biodiversity. The most commonly considered facet of biodiversity is species richness. Evenness is another important factor of biodiversity. (Kharkwal *et al*., 2004). Evenness has been considered as a fundamental fact in habitats with more than one species (Hashemi 2010).

The conservation of biodiversity has become an important issue receiving national and international attention (Noss, 1991; Noss and Cooperrider, 1994; Wilson, 1992). Species diversity has two basic components: richness, or number of species in a given area, and evenness, or how relative abundance or biomass is distributed among species (Huston, 1994; Purvis and Hector, 2000; Magurran, 2001).

Many studies have been carried out on bird biodiversity indices around the world. For example, Elemberg, *et al*. 1994) in Finland and Sweden, (Herremans, 1999) in Botswana, (Mae and Hattori, 2001) in Japan, (Ratti, et al. 2001) in Dakota America in and (Yang and Quan, 2002) in China can be named.

Main objective of this study was to quantitatively analyse the biodiversity of birds in Recreational Kakan Region, Yasuj, I. R. Iran.

Study area

Recreational Kakan region is 30 kilometers away from south east side of Yasuj in Kohkiloye and Boyerahmad Province with the latitude and longitude of 30°35´N and 51°48´E.The average of height (above mean sea level)is 1920 meter.

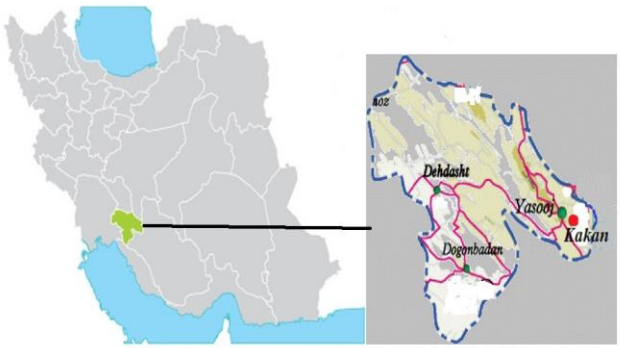

Fig. 1. Location of study area in Iran and Kohkiloye and Boyerahmad province

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Materials and Methods

We used the point count method (Manuwal and Carey, 1991) in the early morning to record birds at sampling points (Bibby et al., 2000) during the breeding season (April 3th– August 27th 2012). Each of the 96 points was visited fifteen times, over the five months. in adverse weather conditions (eg strong winds) or limited visibility we stopped working (Selmi, *et a,l* 2003; Bibby, *et al* ,1992; Mitchell, *et al* 2001; Kilgo, *et al* ,2002). Considering that the time of day affects bird activity, which in turn affects detection probability, the order of sampling points during one morning tour was alternated between start (1 h before sunrise) and finish (at the latest 5 h after sunrise) of each tour. Each visit lasted 15min to give a total of 15×15=90 min per sampling point (360 h over all). Presence of bird species was recorded visually and acoustically in a radius of 50 m, with the first 10 min of observations at the centre and the remaining 5min checking areas hidden from the observer. When counting birds, we took special care that individuals were counted once only. We did not distinguish between breeders and other visitors as distinction is difficult, and over-flying birds were counted only when they were flying low and/or showed connection to the ground environment (i.e. searching for food). Species rich- ness for each sampling point was defined as the total number of species detected during the fifteen visits. Abundance for each species and sampling point was defined as the maximum number of indi- viduals present in any of the fifteen visits. Data analysis was performed using software Ecological methodology and formulas listed in Table 1.

Table 1. Indicators used to assess biodiversity monthly

The regards	How to calculate
Species Richness Margalef index(1958)	R_1= (S-1)/LnN
Species Richness Menhnick's Index (1964)	R_2= S/√N
Species Diversity Shannon- Wiener Index	$H^{/}= -\Sigma^{s}_{i=1} P_i \ln P_i$
Species Diversity Simpson,s Index	$\lambda = 1- \Sigma^{s}_{i=1} [\{ni(ni-1)\}/\{N(N-1)\}]$
Evenness Simpson's Index	$E= \{(1/\lambda)-1\}/(e^{H/}-1)$

S= Number of species, N= Total size of population, Pi= Relative abundance of species i, ni= Number of species i, λ = Amount of Simpson's Index, $H^{/}$= Amount of Shannon- Wiener Index, e= Natural logarithm,

Results

In this study, 29 species were identified belonging to 18 families of 7 orders. passeriforms Order had the highest frequency, with 11 family and 18 species(table 2). Orders have been identified, including, *Falconiformes*, *Columbiformes*, *Strigiformes*, *Apodiformes*, *Coraciformes*, *Piciformes* and *Passeriformes*. Families have been identified, including *Falconidae*, *Columbidae*, *Strigidae*, *Apodidae*, *Meropidae*, *Picidae*, *Alaudidae*, *Hirundidae*, *motacillidae*, *Laniidae*, *Turdidae*, *Muscicapidae*, *Corvidae*, *Githalidae*, *Fringillidae*, *Ploceidae* and *Sturnidae*.

The dominant species

The results showed that among birds, *Passer domesticus*, was the dominant species in the region in all months. (table 2).

Total number of birds

Within the study area, the most number of individual were observed in August (5516) and the least numbers were observed in June (5379).(Figure 2)

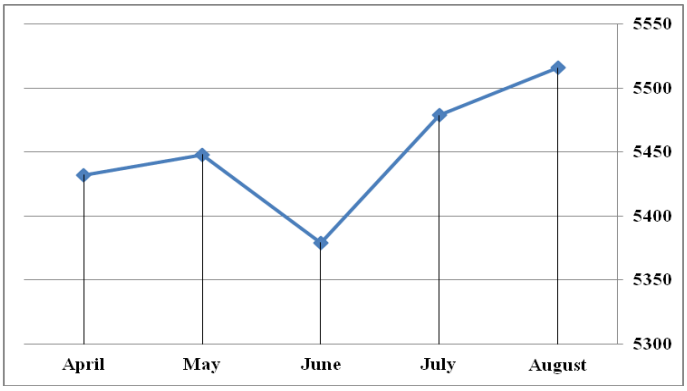

Fig. 2. Average monthly number of birds in Recreational Kakan Region, Yasuj, I. R. Iran since April to August 2012

Change in number of species

In all months of the study, there was no change in the number of species.

Species richness, diversity and evenness

According to the "Margalf Index", the most biodiversity richness was observed in June (3.259) and the least richness in July (3.252). According to "Menhink Index", the most richness was seen in June (0.395) and the least in August (0.390).According to "Simpson Index", the the max. biodiversity richness was in August (0.928) and the min. biodiversity richness was in April (0.925). According to "Shanon-viner Index" the max. biodiversity richness was observed in August (4.250) and the min. biodiversity in April (4.196).

According to "Simpson Index" the most uniformity was in August (0.477) and the least

Table 3. Amount of monthly index of biodiversity birds in Recreational Kakan Region, Yasuj, I. R. Iran since April to August 2012

	Index	Month				
		April	May	June	July	August
Richness	Margalef	3.255	3.254	3.259	3.252	3.250
	Menhink	0.393	0.393	0.395	0.392	0.390
Species diversity	Shannon-Wiener	4.196	4.215	4.205	4.213	4.250
	Simpson's	0.925	0.926	0.925	0.926	0.928
Eveness	Simpson's	0.460	0.467	0.460	0.466	0.477

Habitat of birds

In the study area, gardens and farms, were the habitat of species such as *Passer domesticus, Sturnus valgaris, Pica pica, Carduelis carduelis, Parus Major, Parus ater, Muscicapa striate, Luscinia megarhynchos, Erithacus rubecula and Lanius excubitor. Picoides syriacus* and *Upupa epops* Species, were frequently observed, in the oak forest habitat. Almost bare lands, were on other habitat that *Melanocorypha bimaculata* and *Alauda arvensis* were seen more there. *Corvus corone cornix* and *Passer domesticus*, were the species, preferred human waste more than others.

Discussion

Monthly review of population and diversity of birds in the recreation Kakan area shows that in August, the total number of birds is more than any other months of the study. This is for two reasons: First, birds like Sparrow and Nightingale, which are breeding in the region(During the review, the nest of this species in the region were identified) increase the number of birds in this month. Second, in this month, farms and orchards in the study area provide plenty of food to feed the birds and will attract more birds to the area.

Table 2. Average Monthly number of birds in Recreational Kakan Region, Yasuj, I. R. Iran since April to August 2012

	species	Common name	Month				
			April	May	June	July	August
1	*Falco tinnunculus*	Kestrel	5	6	7	6	7
2	*Streptopelia senegalensis*	Palm Dove	57	62	61	58	60
3	*Bubo bubo*	Eagle Owl	8	6	6	5	7
4	*Apus pallidus*	Pallid Swift	400	350	400	400	400
5	*Apus apus*	Common Swift	300	300	300	300	300
6	*Apus melba*	Alpine Swift	300	300	300	300	300
7	*Merops orientalis*	Green Bee-eater	450	450	450	450	450
8	*Merops superciliosus*	Blue-cheeked Bee-eater	450	450	450	450	450
9	*Merops apiaster*	Bee-eater	300	300	300	300	300
10	*Upupa epops*	hoopoe	35	37	29	46	54
11	*Picoides syriacus*	Syrian Woodpecker	30	22	37	36	34
12	*Melanocorypha bimaculata*	Bimaculated Lark	74	87	96	80	92
13	*Alauda arvensis*	Skylark	64	59	66	61	58
14	*Hirundo rustica*	Barn Swallow	200	200	200	200	200
15	*Motacilla alba*	Whaite Wagtail	350	361	280	352	290
16	*Lanius excubitor*	Great Gray Shrike	39	48	45	51	49
17	*Erithacus rubecula*	Robin	64	61	73	65	72
18	*Luscinia megarhynchos*	Nightingale	54	67	56	62	70
19	*Muscicapa striate*	Spotted Flycatcher	72	78	69	81	80
20	*Parus ater*	Coal Tit	95	110	99	107	100
21	*Parus Major*	Great Tit	101	110	95	90	110
22	*Sitta tephronata*	Great Rock Nuthatch	250	240	243	251	249
23	*Carduelis carduelis*	Goldfinch	180	183	185	190	184
24	*Rhodospize obsoleta*	Desert Finch	62	51	49	47	56
25	*Passer domesticus*	House Sparrow	1000	1000	1000	1000	1000
26	*Sturnus valgaris*	Starling	112	129	107	112	136
27	*Pica pica*	Magpie	110	108	96	95	101
28	*Corvus corone cornix*	Hooded Crow	200	201	205	198	196
29	*Corvus ruficollis*	Brown-necked Raven	70	72	75	86	111

Throughout the study, Sparrow, was the dominant species, which can cause reproductive success of this species and its high compatibility with human communities. Study on species richness index suggest an approximate similarity between fluctuation pattern of margalef and menhnick's index which menhnick's index shows a milder up and down during the period of study. Also by evaluating the simpson and Shannonwiener species diversity indexes, a harmony of fluctuation pattern is seen. Given that, the uniformity index species diversity, are indicators for habitat quality(Torres, 1990) , The study area is suitable for birds, which This must be considered in their management.

The structure of the world's landscapes is undergoing rapid change, mainly due to human-related activities. Indeed, some estimates state that between one-third and one half of the earth's landscape has been altered by human activities (Vitousek, et al. 1997). These changes in landscape structure and organization are believed to have a significant bearing on the distribution and maintenance of ecosystem integrity (Forman & Godron, 1987; Forman, 1995; O'Neill & Hunsaker, 1997; Dale et al., 2000). In particular, as part of the need to maintain long-term biodiversity, elements of biodiversity need to be preserved at different natural levels, ranging from genetic and species scales to ecosystems and landscapes (Heywood, 1995). Diversity indices continue to be employed by ecologists to describe the composition of a landscape using a single number (Turner, 1990; Rey-Benayas & Pope, 1995; Riitters et al., 1995). Positive relationships between indices of species and ecosystem diversity have been noted (Noderhaug, et al. 2000; Pino, et al. 2000). However there is a growing awareness that, across the world, comparisons of different landscapes reveal a general and worrying decline in diversity, not least arising from different management scenarios, including undesirable ownership regimes or management practices (Nagaike & Kamitani, 1999; Bartolome, et al. 2000; Fu & Chen, 2000; Zhou, 2000) . As a response to this decline, many studies have noted that the maintenance of high diversity is often a desirable objective for managers (del Valle, et al. 1998; Bartolome et al., 2000; Fairbanks & Benn, 2000; Fu & Chen, 2000). To this end, quantification of diversity has become increasingly crucial, both in the management of ecosystem and in the evaluation of their underpinning diversity. Species richness and species diversity are generally considered good indicators of the quality of nature and ecosystem health (Rapport, 1999). However, they have limitations and do not elucidate all aspects of the community dynamic: species richness does not consider the differences in species composition and diversity metrics have a limited comparability between points (Jost, 2006). Community analyses are used to explain changes in community composition (Moretti et al., 2006). The importance to identify thresholds of particular habitat vari- ables which, if exceeded or undercut would cause biodiversity to be maintained or even enhanced in the environment, has been highlighted by several studies (Marzluff and Ewing, 2001). Such predicted thresholds are important tools for convincing envi- ronmental managers and politicians of the effectiveness of specific measures. In addition, there is an increasing consensus that biodiversity is important for the quality of life of the people in general.

Birds are often chosen as indicators of habitat quality. Their ecology is well known and species respond well to the availabil- ity of habitat structures (Clergeau et al., 1998; Evans et al., 2009).

Due to the extensive construction in the study area, Bird habitats, including orchards and fields, oak trees and other habitats are destruction rapidly and In the not too distant future, we will see a sharp decline in the number of species of birds in this region. Hence, the solutions presented in the following will be helpful in reducing threats of habitat destruction and can prevent loss of bird habitats and extinction species of birds in this area.

1- stop the illegal construction
2- avoid the excessive and illegal land use change
3- Monitoring of the Environment Seriously
4- Providing manual birds, to identify areas to lovers and researchers of the environment
5- Cultural environment, to support the environment
6- Annual monitoring of birds and their habitats for management decisions
7- Avoid excessive removal of trees and plants in the area

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