IOP Conference Series: Earth and Environmental Science

PAPER • **OPEN ACCESS**

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To cite this article: V Ilina 2019 *IOP Conf. Ser.: Earth Environ. Sci.* **298** 012007

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The role of Aksu Zhabagly Biosphere Reserve in the bird conservation of West Tien Shan

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Abstract. The territory of Aksu Zhabagly has a high degree of representativeness at regional level. Aksu Zhabagly Biosphere Reserve has about 75% of total biodiversity of West Tien Shan. It has 72.5% of vertebrates. The ornithofauna of West Tien Shan consists of 415 species, including 210 nesting species and 205 migrating and wintering species. The bird fauna of Aksu Zhabagly Biosphere Reserve includes 306 species (73,7 %) as well as 152 nesting species (72,3 %) and 154 migrating and wintering species (75,1 %). The basis of nesting avifauna is formed of passerine birds (83 species). Besides nesting birds, the nature reserve's territory is habitat for at least 137 species in not-nesting period – in winter and during seasonal migrations in spring and autumn. There are 25 rare bird species (75,7%) from 33 species in West Tien Shan.

1. Introduction

Aksu-Zhabagly biosphere reserve is located in the Western end of Talasskiy Alatau and Southern part of Karatau in the West Tien Shan. The reserve's ecosystems have a very close relationship with the natural systems of the Near East and the Mediterranean than to the rest of the ecosystems of the Tien Shan[1]. The core zone represents one area of Northen-West part of Talasskiy Alatau with its long Western and partly Northern ranges and adjacent to the main ridge North-Eastern slopes of Ugam ridge. Buffer zone of Aksu-Zhabagly biosphere reserve comprises the lands of the buffer and protected territories of state reserve, it is one kilometer strip along the state border between Kazakhstan and Uzbekistan. Transition zone of biosphere reserve is 200,000 ha. The territory near the buffer and transition zones of reserve is the most densely populated region of South Kazakhstan (from 20 to 40 people per sq.km). In the nearest proximity (up to 75 km) there are settlements near oblast centers: Shymkent and Taraz cities, with population density of 50-60 and more people in 1 square km. Most of the lands, adjacent to nature reserve, are in state possession and are given on the right of constant or temporary land use.

The territory of the biosphere reserve has a high degree of representativeness of ecosystems in relation to the region of the Western Tien Shan. For example, all landscape types and subtypes of the Western Tien Shan are found in Aksu-Zhabagaly, of the 16 types of vegetation, 14 types are also observed in the reserve. About 75% of the total species diversity of the flora and invertebrate fauna of the Western Tien Shan is concentrated here. The purpose of this article is to assess the role of the Aksu-Zhabagly biosphere reserve in the conservation of regional species diversity of birds.

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2. Methods

The research methods are formal-logical and comparative-analytical, as well as traditional methods of zoological observations [2, 3]: point counts (surveys carried out by an observer standing in one place, that is, without moving the observer in space); site registrations (surveys at sites that are consistently bypassed by an observer moving throughout the site); route accounting (accounting performed by an observer moving along a linear route). Counts and collections of ecological-faunistic material, taking into account the specifics of certain groups and species of birds. To determine the conservation status of bird species, the method of intersectoral research is used.

3. Results and Discussion

3.1 Biological representativeness of Aksu-Dzhabagly Biosphere Reserve in West Tien Shan

The territory of Aksu Zhabagly has a high degree of representativeness at regional level. For example, it has almost all landscape types and sub-types of the West Tien Shan, except for deserts and gypsophilous subshrub communities, which are well below the reserve in altitude. Aksu Zhabagly Biosphere Reserve has about 75% of biodiversity of West Tien Shan. It has 71.5% of vertebrates, 221 of 254 fungi species, 63 of 80 moss species of and 15 of 17 vegetation types of West Tien Shan and 114 of 180 plant formations.

All vertebrates, except fishes, are well represented in biosphere reserve. So, 377 vertebrate species out of 527 are registered in the reserve (71.5%), and more than 70% of rare species are concentrated in this area. The representativeness is shown in the Table 1 (below). The representativeness was assessed on the base of published material in last 50 years [4, 5, 6, 7] as well as own observations in 2018.

Invertebrate fauna of West Tien Shan is represented by 60% in the reserve. Most representative groups are insects - ground beetles (62%), scarabs (66%) and horse flies (91%), the share of beetles – Middle Asian endemics and subendemics – is about a half (47%) of total composition of reserve's beetles [8].

Table 1. Fauna of vertebrates in Aksu- ZhabaglyBiosphereReserve

Class of vertebrates	*Number of species*		
	West Tien Shan	Aksu Zhabagly BR	%
Mammals	61	52	85.2
Birds	415	306	73.7
Nesting birds	*210*	*152*	*72.3*
Migrating and wintering birds	*205*	*154*	*75.1*
Reptiles	17	11	64.7
Amphibians	3	3	100
Fishes	31	5	16.1
Total	**527**	**377**	**71.5**

3.2 Birds of Aksu Zhabagly Biosphere Reserve

306 bird species are registered in biosphere reserve. Of these, 152 species are nesting, which is 72.3% of all nesting fauna of West Tien Shan. These 152 species belong to 12 orders (Ciconiiformes, Anseriformes, Falconiformes, Galliformes, Charadriiformes, Columbiformes, Cuculiformes, Strigiformes, Caprimulgiformes, Apodiformes, Coraciiformes, Passeriformes).

Nesting species belong to 12 orders (Ciconiiformes, Anseriformes, Falconiformes, Galliformes, Charadriiformes, Columbiformes, Cuculiformes, Strigiformes, Caprimulgiformes, Apodiformes, Coraciiformes, Passeriformes). The basis of nesting avifauna is formed of passerine birds (83 species). It includes such typical for West Tien Shan species as Red-billed Chough (*Pyrrhocorax pyrrhocorax*), Alpine Chough (*Pyrrhocorax graculus*), White-winged Grosbeak (*Mycerobas carnipes*), Paradise

Flycatcher (*Terpsiphone paradisi*), Crimson-winged Finch (*Rhodopechys sanguinea*), Brandt's Mountain Finch (*Leucosticte brandti*), White-winged Snowfinch (*Montofringilla nivalis*), Rufous-naped Tit (*Parus rufonuchalis*), Yellow-breasted Tit (*Parus flavipectus*), Blue Rock Thrush (*Monticola solitaria*), Common Rock Thrush (*Monticola saxatilis*), Orphean Warbler (*Sylvia hortensis*), Hume's Whitethroat (*Sylvia althaea*), White-throated Robin (*Irania gutturalis*), White-tailed Rubythroat (*Calliope pectoralis*), etc. Predatory birds are well represented by 15 species: Golden Eagle (*Aquila chrysaetos*), Booted Eagle (*Hieraetus pennatus*), Short-toed Snake Eagle (*Circaetus gallicus*), Cinereous Vulture (*Aegypius monachus*), Griffon Vulture (*Gyps fulvus*), Bearded Vulture (*Gypaetus barbatus*), Egyptian Vulture (*Neophron percnopterus*), Eurasian Hobby (*Falco subbuteo*), Merlin (*Falco columbarius*), Barbary Falcon (*Falco pelegrinoides*), Common Kestrel (*Falco tinnunculus*), Lesser Kestrel (*Falco naumanni*), Black Kite (*Milvus migrans*), Long-legged Buzzard (*Buteo rufinus*), Eurasian Sparrowhawk (*Accipiter nisus*).

Besides nesting birds, the nature reserve's territory is habitat for at least 137 species in not-nesting period – in winter and during seasonal migrations in spring and autumn. Many of them spend considerable part of their annual cycle (up to 4-5 months) in the reserve. This list also includes species in need of special protection, for example, Saker Falcon (*Falco cherrug*), Peregrine Falcon (*Falco peregrinus*), Common Crane (*Grus grus*), Demoiselle Crane (*Anthropoidesvirgo*), Great Bustard (*Otis tarda*), Little Bustard (*Otis tetrax*), etc. There are 25 rare bird species (75,7%) from 33 species in West Tien Shan. IUCN Redlist lists 2 bird species – Corncrake (*Crexcrex*) and White-winged Woodpecker (*Dendrocoposleucopterus*). The list of red-listed and rare species of Kazakhstan is presented below.

The list of species inserted in Red Data Book of Kazakhstan
from Aksu-ZhabaglyBiosphere Reserve

Class Aves
Order Pelecaniformes
Family Pelecanidae
Pelecanus crispus (Bruch) – in time of migration

Order Ciconiiformes
Family Ardeidae
Ciconia nigra L.
C. ciconia L. – in time of migration

Family Threskiornithidae
Platalea leucorodia L. – in time of migration

Order Anseriformes
Family Anatidae
Aythya nyroca (Guldenstedt) - in time of migration

Order Falconiformes
Family Pandionidae
Pandion haliaetus (L.) – in time of migration

Family Accipitridae
Circaetus gallicus Gmelin
Hieraaetus pennatus (Gmelin)
Aquila chrysaetus (L.)
Gypaetus barbatus (L.)
Neophron percnopterus (L.)

Aquila rapax (Temminck) - in time of migration
A. heliacal heliaca Savigny in time of migration

Family Falconidae

Falco cherrug Gray
F. peregrinus Tunstall - in time of migration

Order Gruiformes
Family Gruidae

Grus gruslilfordi Sharpe - in time of migration
Anthropoides virgo (L.) - in time of migration

Family Otididae

Otis tarda tarda L. - in time of migration
O. tetrax L. – in time of migration
Chlamydotis undulata (Jacquin) - in time of migration

Order Charadriiformes
Family Laridae

Larus ichthyaetus Pallas - in time of migration

Order Columbiformes
Family Pteroclidae

Pterocles orientalis L. - in time of migration
P. alchata L. - in time of migration
Syrrhaptes paradoxus (Pallas) – in time of migration

Order Strigiformes
Family Strigidae

Bubo bubo L.

Order Passeriformes
Family Turdidae

Myophonus caeruleus turcestanicus Zarudny
Carpodacus rubicilla Guldenstadt – in winter

A number of bird species are related to hunting and commercial – *Tetraogallus himalayensis*, *Alectoris chukar*, *Perdix perdix*, *Coturnix coturnix*, *Columba palumbus*, *C. livia* and *C. oenas*); *Streptopelia orientalis, S. turtur* and others.

3.3 The main threats to ornithofauna

There 7 main threats found in Aksu-Zhabagly biosphere reserve:

i. *Fires*, the most dangerous threat for biosphere reserve, causing a reduction of populations, environment degradation, soil changes, erosion, caused changes in the composition of plant associations and the reduction of juniper and other forests.
ii. *Cold and snowy winters* happen 2-3 times in a decade, causing number decrease of many bird species.
iii. *Atmosphere pollution by industrial enterprises.* Air pollution happens quite rarely in regional scale, caused by large chemical and energy factories of Chimkent and Taraz cities.

iv. *Accidental introduction of alien plant and animal species*. Ecologically illiterate resolutions of local authorities in secondhalf of last century let to accidental introduction of some alien species.
v. *Poaching.* Most vulnerable sites are lands adjacent to Topshaksaz tract. Increase of gun possession is a serious threat for bird populations in buffer zones and transition zone of the reserve.
vi. *Cattle overpasture* promotes environmental degradation.
vii. *Illegal logging*. Among the most significant factors affecting reserve's ecosystems in the past and in the present time, the leading role belongs to forest felling and dry grass burning. Forest logging on mountian territories leads to erosion, changes in hydrological regime and habitat decrease for bird species.

4. Conclusions

The role of biosphere reserve in bird conservation of regional ornithofauna is very important. The territory of Aksu Zhabagly has a high degree of representativeness at regional level and it has about 75% of total biodiversity of West Tien Shan, including 71.5% of vertebrates. The ornithofauna of West Tien Shan consists of 415 species, including 210 nesting species and 205 migrating and wintering species. The bird fauna of Aksu Zhabagly Biosphere Reserve includes 306 species (73,7 %) as well as 152 nesting species (72,3 %) and 154 migrating and wintering species (75,1 %).

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