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Ecological State and Characteristics of *Charadriiformes*, *Ciconiiformes*, and *Gruiformes* on the Southern Coast of the Caspian Sea

Abstract

The paper contains information about the current state of habitats of species of the orders *Charadriiformes*, *Ciconiiformes*, and *Gruiformes* found in the southern coastal part of the Caspian Sea, the influence of anthropogenic factors on their habitability, and the status of species included in international conventions. It was revealed that, 24 species found in the southern coastal part of the Caspian Sea have the status of global protection. Of the 154 species with European conservation status, only 48 are eligible for higher global conservation statuses. That is, 3 species are in crisis, 13 species are endangered and 29 species are vulnerable. The number of 2 species is unknown, and there is no sufficient information about 1 species.

Keywords: *Charadriiformes*, *Ciconiiformes*, *Gruiformes*, *Caspian Sea*, *habitability*, *anthropogenic factors*

Introduction

The studies were carried out on the Southern coast of the Azerbaijan sector of the Caspian Sea (Shahdili-Astara) in the spring, autumn and winter periods of 2018-2019. The current state of habitats of species of the orders *Charadriiformes*, *Ciconiiformes*, *Gruiformes*, the influence of anthropogenic factors on their habitability and the status of species included in international conventions were studied.

The main purpose of the work was to identify species that have international status, to study anthropogenic factors affecting their abundance, distribution and habitats, and to develop a scientifically based system of measures for their protection.

Research

Due to the change (rise and fall) of the level of the Caspian Sea over the past 50 years and the increased influence of anthropogenic factors on the coastline (more over the past 20 years), species from the orders *Charadriiformes*, *Ciconiiformes*, *Gruiformes* inhabiting and arriving for wintering on the southern coast of the Caspian Sea (Shahdili-Astara: indicated on the map) face the threat of

loss of their habitats. This, in turn, has a serious impact on the population dynamics and status of a number of species (Babayev, 2002).

It was established that the status of the Eurasian Spoonbill (*Platalea leucorodia* Linn, 1758), Corn Crake (*Crex crex* Linn, 1758), Collared Pratincole (*Glareola pratincola* Linn, 1766), Common Snipe (*Gallinago gallinago* Linn, 1758) inhabiting the Southern coast of the Azerbaijan sector of the Caspian Sea are near threatened (NT), the Sociable Plover (*Chettusia gregaria* (Pallas, 1771) and Slender-billed Curlew (*Numenius tenuirostris* Vieillot, 1817) are critically endangered (CR).

The main negative anthropogenic factors affecting the habitats and distribution patterns of these species are intensive construction work by private companies and individuals in biotopes inhabited by species (Gasimov, 2004).

As a result of hunting and using the habitats of species of the orders *Charadriiformes*, *Ciconiiformes*, *Gruiformes* for human economic activity throughout the world, including in Azerbaijan, the number of species included in these groups has significantly decreased. In addition to hunting and aesthetic value, the species belonging to these groups play an important role in the circulation of substances and the transformation of energy in nature. In addition to the above, species belonging to the orders *Charadriiformes*, *Ciconiiformes*, *Gruiformes* are also important as biological indicators of wetland biotopes. Therefore, the preservation of the integrity of biological diversity requires the study of each species of birds.

Material and Methods

The studies were carried out during the period between 2017-2020 on the coast of the Southern part of the Azerbaijan sector of the Caspian Sea. It took 178 days to collect material in the field. The material was collected in the Absheron, Gobustan, South-Eastern Shirvan, Salyan, Lankaran coastal waters of the Caspian Sea, in the Gizilaghaj State Nature Reserve, in the Lesser Gizilaghaj State Nature Reserve, in the Shirvan National Park (Greater and Lesser Gizilgaz lakes) and in the Yenikand floodland.

In the open waters of the Caspian Sea, the Bays of Greater and Lesser Gizilaghaj, birds were counted by point count method. Hills of 5-10 m high in the studied area served as points. A complete count of birds was carried out at a distance of 2-3 km. Birds were counted after dividing the area into squares. The area of the squares was 0.2 km² in reservoirs rich in reeds and 18–20 km² in water areas. The total number of birds in the port of Pirman, Khazar and Aghgush subasars was determined by extrapolation. The information of scientists and guards of the Absheron and Shirvan National Parks, Gizilaghaj State Nature Reserve was also used.

The categories of animals according to population density are based on A. P. Kuzyakin (Kuzyakin, 1962) and G. T. Mustafayev (Mustafayev, 1985): the population of 0.1-0.9 individuals per 1 km² is considered rare; A population of 1-10 individuals is considered normal, and a population of more than 10 individuals per the same area is considered numerous.

During the research, a telescope, binoculars, a car, motor and non-motor boats were used.

Brief ecological and geographical characteristics of the Southern coast of the Azerbaijan sector of the Caspian Sea. The coastline of the Southern part of the Azerbaijani sector of the Caspian Sea consists of the Absheron-Gobustan, Southern-Eastern Shirvan, Lankaran coastal waters and adjacent territories.

Absheron-Gobustan coast. The islands, reefs and rivers that make up the Southern and Southern-Eastern extension of the Absheron Peninsula bear the common name of the Absheron Archipelago. The Absheron archipelago occupies an important place in offshore oil production.

It is extended towards the coastline in the Southern part of the Absheron Peninsula. To the West of the Shah Spit (cape), the coast stretches for 25 km towards Cape Hovsan. Baku Bay is surrounded by the islands of Bayil Spit, Nargin (Greater Zira), Wulf (Sone tire) and Plate (Tava) in the South, Sand Zira Islands in the East. Cape Sangachal consists of sand dunes up to 16 m high, extending along the coast to the north for a distance of 4 m, and the Northern-Eastern coast smoothly flows into the sea. Starting from Sangachal, the coast stretches to the South and South-

Eastern and borders on Cape Alat. Cape Alat is located 13.5 km south of Sangachal (Geography of the Azerbaijan Republic, 2014).

Intensive oil and gas production, various construction works by private companies and individuals have been and are being carried out in the region.

South-Eastern coast of Shirvan. It starts from Cape Pirsaat, and 22 km South of it is Cape Bandovan, then the coast stretches to the South-Western for 21 km, and from there it passes to the delta of the Kura River at 16 km to the South-Eastern. In this part, the coast is mostly covered with sandy plains that have recently been freed from sea waters. The delta of the Kura River is located 37 km South of Cape Bandovan. Garabatdagh, Gutan, Babur, Sangi-Mughan, Greater and Lesser Gizilgaz lakes are located in the Northern-Western part of this region, and Yenikand Subasari is located in the Southern part. Oil wells are drilled in coastal waters. In general, this coastline was exposed to strong anthropogenic influence.

Salyan coast. It consists of the coastal waters of the Caspian Sea and the deserts bordering it. The coastal waters of Salyan are located between the delta of the Kura and the island of Kurdili. The front part of the Gizilaghaj reserve is called the Aghgush subasar. The Aghgush river flows into this part. The delta of the Kura River is located 37 km South of Cape Bandovan. The Kura delta begins near Salyan. The vegetation of the coast is of desert and semi-desert type. The predominant groups of plants in the area are wormwood and wormwood-saline. Soil types: a certain part is made up of medium-humus soils with salinization and humus, solonchaks, ordinary meadow soils and bog soils. In the delta of the Kura river and on the territory of the Gizilaghaj reserve, bulrush and reed thickets are found (Geography of the Azerbaijan Republic, 2014).

Lankaran coast. It covers the Lankaran plain. Until the 50s of the 20th century, most of the lowland territory was rich in swampy biotopes, typical for the habitat of waterfowl and shore birds. However, by the 70s of the 20th century, the swamp biotopes in the Southern, central and Northern-Western parts of the lowland were completely dried up. These biotopes were replaced by areas of gourds that are not important for bird habitat. In modern conditions, wetland biotopes consist of the lesser Gizilaghaj basin and the Pirman harbor, located only in the Northern-Eastern part of the lowland. The shallow coastal waters of the South Caspian bordering the plain are also habitats for waterfowl and shore birds (Babayev, Rajabova, & Samadova, 2015). The maximum depth of the Caspian Sea (1025 m) is located in the South Caspian lowland near Lankaran. The maximum development of organisms that make up the food of birds was recorded at a depth of 110 m, and that of mollusks at a depth of up to 25 m (Babayev, 2003). The oxygen regime in the shallow waters of the South Caspian is favorable for the life of phytoplankton, which is the food of birds, and marine animals. There is very little oxygen in the deep part of the sea. In places with hydrogen sulfide, there is no oxygen at all. In places with great depth, benthic fauna does not develop (Babayev, Askerov, & Akhmedov, 2006).

Results and Discussion

Over the past 20 years, intensive works have been carried out on the extraction of oil and gas on the Southern coast of the Azerbaijan part of the Caspian Sea and border areas. It has has a negative impact on the main places where birds gather. Since the birds are restless in crowded places, they are forced to move to other areas with a smaller food supply, as a result, they weaken and die of starvation.

An analysis of the literature data shows that in the Southern coastal strip of the Azerbaijan part of the Caspian Sea, the habitats of species belonging to the orders *Charadriiformes*, *Ciconiiformes* and *Gruiformes*, and the factors influencing them, often change. Therefore, scientific information given 10-20 years ago is of a historical nature (Babayev, 2002; Babayev, 2003; Babayev, Askerov, & Akhmedov, 2006).

Order *Charadriiformes*. The fauna of Azerbaijan includes 72 species belonging to 8 families and 30 genera (Babayev, 2002). In the course of the studies, 48 out of 72 species included in this order were recorded on the Southern coast of the Caspian Sea. Of these, 5 species are sedentary, 17 are migratory (they occur in our country during migration), 17 arrive for breeding, 8 arrive for wintering, and 1 species is random (Table 1).

As can be seen from the table, 6 species (*Chettuisa gregaria*, Pall, 1771 (CR), *Numenius arquata* Linn, 1758 (NT), *Numenius tenuirostris* Vieillot, 1817 (CR), *Glareola nordmanni* Nord, 1842 (DD)) from 48 ones included in the order Charadriiformes has a global conservation status (Table 1). These species are also included in the "Red Book" of Azerbaijan ("Red Book" of the Azerbaijan Republic, 2013).

Order Ciconiiformes. In Azerbaijan, there are 14 species belonging to 3 families and 11 genera (Taxonomic spectrum of the Azerbaijan fauna (vertebrates), 2020). At the time of our research (2017-2019), 12 out of 14 species were distributed on the Southern coast of the Caspian Sea. Of these species, 4 are sedentary (they occur year-round), and 8 species come to breed (Table 1). As can be seen from the table, 8 species (12 species) have a European conservation status, and 4 species are not protected. Among these species, the Eurasian Spoonbill has a global conservation status, being included in all 5 conventions (Table 1). This species is also listed in the Red Book of Azerbaijan ("Red Book" of the Azerbaijan Republic, 2013).

Order Gruiformes. There are 14 species belonging to 3 families in Azerbaijan (Taxonomic spectrum of the Azerbaijan fauna (vertebrates), 2020). 6 out of 14 species included in this order are recorded on the Southern coast of the Caspian Sea. 3 of them are sedentary and 3 species are migratory (Table 1).

Of 6 species included in this group, 3 are included in the European conservation status. One species, the Corn Crane is included in the global (*IUCN Red List*) conservation status, and 2 species are not protected (Table 1). Corn Crane is also included in the "Red Book" of Azerbaijan (Taxonomic spectrum of the Azerbaijan fauna (vertebrates), 2020). It is protected worldwide as a near threatened species and as a non-recovery species (H) in Europe (Birds in Europe, 2004; Ward et al., 1997). It has the status of protection in most European countries and included in the Ramsar, Bern, Bonn conventions.

Table 1.
The current state of species of the orders Charadriiformes, Ciconiiformes, Gruiformes in the Southern coastal strip of the Azerbaijan sector of the Caspian Sea (Absheron-Gobustan, South-Eastern Shirvan, Salyan, Lankaran) and their relation to international conventions

Orders Species	International conventions						Status	Habitability (seasonal characteristics)
	Global conservation status	European conservation status	Ramsar	CITES Appendices 1 and 2	Bern Appendices 1 and 3	Bonn Appendices 1 and 2		
<i>Ciconiiformes</i>								S
1. Great Bittern		H	+		+	+	+	N
2. Little Bittern		H	+		+	+	+	N
3. Black-crowned Night heron		H	+		+			S
4. Great White Egret		S	+		+			S
5. Little Egret		S	+		+			S
6. Grey Heron		S	+		+			N

7. Purple Heron		D	+		+	+	+		N
8. Boat-billed Heron		D	+		+				N
9. Cattle Egret		S	+		+				N
10. Glossy Ibis		D	+		+	+	+		N
11. Common Spoonbill		R	+	+	+	+	+	n,a	N
12. White Stork		H	+		+	+	+		
<i>Gruiformes</i>									
1. Spotted Crake		S	+		+	+	+		S
2. Baillon's Crake		R	+		+	+	+		Tr
3. Corn Crake	NT	H	+		+	+			Tr
4. Common Moorhen		S	+		+				S
5. Purples Wamphen		L	+		+			sch	Tr
6. Common Coot		S	+		+	+	+		S
<i>Charadriiformes</i>									
<i>Charadriidae</i>									
1. Eurasian Golden Plover		S	+		+	+	+		Tr
2. Common Ringed Plover		S	+		+	+	+		Tr
3. Little Ringed Plover		S	+		+	+	+		N
4. Caspian Plover		EN	+		+	+	+		Tr
5. Kentish Plover		D	+		+	+	+		N
6. Simply Stone-curlew		VU	+		+	+			N
7. Sociable Plover	CR	CR	+		+	+	+	nk,a,b	Tr
8. White-tailed Plover		S	+		+	+	+	nk,a	N
9. Northern Lapwing		VU	+		+	+	+		S
<i>Recurvirostridae</i>									
10. Black-winged Stilt		S	+		+	+	+		N
11. Pied Avocet		S	+		+	+	+		N,H, Tr
<i>Scolopacidae</i>									
12. Green Sandpiper		S	+		+	+	+		S
13. Common Redshank		D	+		+	+	+		N
14. Spotted Redshank		D	+		+	+	+		Tr
15. Red-necked Phalarope		S	+		+	+	+		Tr
16. Terek Sandpiper		S	+		+	+	+		Tr
17. Little Stint		S	+		+	+	+		Tr
18. Temminck's Stint		S	+		+	+	+		Tr
19. Curlew Sandpiper		NE	+		+	+	+		Tr
20. Dunlin		H	+		+	+	+		H
21. Slender-billed Curlew	CR	NE	+		+	+	+	a,b,x	Tr
22. Great Snipe	NT	D			+	+	+	n,k,b	Tr
23. Eurasian Woodcock		D			+	+	+		H
24. Common Snipe		D			+	+	+		Tr

25. Eurasian Curlew	NT	D	+		+	+	+	n,b,a	H
26. Whimbrel		S	+		+	+	+		Tr
27. Black-tailed Godwit	NT	VU	+		+	+	+	n,b,a	H
Glareolidae									
28. Cream-colored Courser		EN	+		+		+	n,b,a	Er
29. Collared Pratincole		D	+		+	+	+		N
30. Black-winged Pratincole	DD	EN	+		+	+	+	n,k,a,b	N,Tr
Laridae									
31. Pallas's Gull		S	+		+	+	+		H
32. Little Gull		S	+		+	+	+		Tr
33. Black-headed Gull		S	+		+		+		S
34. Slender-billed Gull		L	+		+	+	+		N
35. Herring Gull		S	+		+				H
36. Caspian Gull		S	+		+				S
37. Grey Gull		H	+		+				H
38. Mediterranean Gull		S	+		+	+	+	a,n	N
39. Little Gull		H	+		+				Tr
40. Black Tern		H	+		+	+	+		N
41. White-winged Tern		S	+		+	+	+		N
42. Whiskered Tern		H	+		+				N
43. Caspian Tern		S	+		+	+	+		Tr
44. Sandwich Tern		H	+		+	+	+		N
45. Common Tern		S	+		+	+	+		N
46. Little Tern		D	+		+	+	+		S
47. Gull-billed Tern		VU	+		+	+	+		N

Note: *CR* – the critically endangered species; *EN* – endangered; *VU* – vulnerable; *NT* – near threatened; *NE* – not evaluated; *DD* – data deficient; *D* – species with decreasing number; *R* – rare species; *L* – species collected in a small area; *S* – unprotected species; *n* – speciesless than 1 individual per 1 km²; *a* – "Red Book" of Azerbaijan; *nk* – endangered (less than 1 individual per 10 km²); *b* – Red List of the IUCN; *x* – not found; *k* – occurs during migration; *sch* – the number of elements is too large; *S* – sedentary; *N* – come to breed; *H* – come to hibernate; *Tr* – occurs during the migration period; *Er* – wandering bird.

Results and Recommendations

1. Over the past 20 years, great changes have taken place in the avifauna of the Azerbaijani shores of the Caspian Sea. In the avifauna of this territory, 66 species of rare and endangered birds have been studied.

2. Coastal waters bordering the Shah Spit, Gobustan, Yenikand flood lands of the Caspian Sea, the Greater and Lesser Gizilaghaj Bays are places where the number of birds gathered here is of international importance.

3. 8 out of 12 species belonging to the order *Ciconiiformes* living on the Southern coast of the Azerbaijan sector of the Caspian Sea have European conservation status. One species (Common spoonbill) has the status of global protection with inclusion in all 5 international conventions.

4. 3 out of 6 species of the order *Gruiformes* living on the Southern coast of the Azerbaijani sector of the Caspian Sea have European conservation status. One species (Corn Crane) has global protection status, being included in 3 international conventions.

5. 26 out of 48 species belonging to the order *Charadriiformes*, found on the Southern coast of the Azerbaijani sector of the Caspian Sea, have European conservation status, 6 species (Sociable Plover, Slender-billed Curlew, Great Snipe, Black-winged Pratincole, Common Curlew, Black-tailed Godwit) have the status of global protection.

6. It is important to take the following conservation measures to protect species belonging to the orders *Charadriiformes*, *Ciconiiformes* and *Gruiformes*, which have global and European status, and to protect their habitats.

1. Restore the border and the main canal of the Gizilaghaj National Park and restore the pumping of water from the Kura to the port of Pirman, the Khazar and Aghgush floodlands through the main canal.

2. To expand the area of Absheron National Park.

3. In order to prevent the threat of complete extinction of the birds living on the coastline of the Caspian Sea, as well as the threat of complete extinction of the ecosystems, the State should prohibit the construction works of individuals and private companies (legal and illegal) operating in these areas.

4. In order to preserve species that are in critical state (Sociable Plover, Slender-billed Curlew), near to threatened (Corn Crake, Great Snipe), and species that are declining in numbers (Black-winged Pratincole), special areas should be allocated in their habitats, and in these places it is necessary to reduce the negative impact of anthropogenic factors.

5. It is advisable to declare the Kura delta, the Yenikand floodland and the waters of the Caspian Sea adjacent to them as a reserve, given that they are one of the largest concentrations of waterbirds during migration and wintering in Azerbaijan.

6. The nesting, wintering and feeding places of the species (Black-winged Pratincole, Slender-billed Curlew, Sociable Plover, Corn Crake) along the coast of the Caspian Sea, about which there is insufficient information in the territory of Azerbaijan, should be identified, monitored and their numbers should be determined.

7. Species that have the status of protected on a global scale and make up a small part of the total number in the world in Azerbaijan (crake, slender-billed curlew, great snipe) and, conversely, make up the majority of the number in the world, are listed in the Red Book of Azerbaijan and are subject to protection on the territory of the republic.

8. Identify the main dangerous sites for species included in the IUCN Red List and Red Book of Azerbaijan on the coast of the Caspian Sea, and at the same time identify threats to these species.

9. Find out the factors that directly and indirectly affect the deterioration of living conditions, the decline in numbers and the gradual death of species common on the coast of the Caspian Sea in Azerbaijan and included in the IUCN Red List and European conservation status lists.

10. It is expedient to create a reserve in the Kura delta, the Yenikand foodland and the adjacent coastal waters of the Caspian Sea, since these territories are one of the largest concentrations of wetland birds and shorebirds during migration and wintering in Azerbaijan.

Thus, 24 species found in the Southern coastal part of the Caspian Sea have the status of global protection. Of the 154 species with European conservation status, only 48 are eligible for higher global conservation statuses (CR, VU, EN). That is, 3 species (CR) are in crisis, 13 species (EN) are endangered, 29 species (VU) are vulnerable. The number of 2 species is unknown (NE), and there is no sufficient information about 1 species (DD).

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