EUROPEAN JOURNAL OF BIOMEDICAL AND PHARMACEUTICAL SCIENCES
http://www.ejbps.com

ISSN 2349-8870
Volume: 6
Issue: 10
56-61
Year: 2019

BASIC APPROACHES TO THE INVENTORY OF REGIONAL FAUNAS IN UZBEKISTAN

Kashkarov R. D.*[1], Mitropolskaya Yu.O.[1], Gritsina M.A.[1], Ten A.G.[1], Abduraupov T.V.[1]

[1]Institute of Zoology, Academy of Sciences of Republic of Uzbekistan, Republic of Uzbekistan, Tashkent.

***Corresponding Author: Kashkarov R. D.**
Institute of Zoology, Academy of Sciences of Republic of Uzbekistan, Republic of Uzbekistan, Tashkent.

Article Received on 02/07/2019 **Article Revised on 22/07/2019** **Article Accepted on 12/08/2019**

ABSTRACT
To inventory and assess the current state of the country‘s fauna is one of the basic principles of sustainable use of animal resources in Uzbekistan. The conservation and use of biological resources in Uzbekistan are based on a strict administrative structure. Nevertheless, the fauna of Uzbekistan has never been inventoried on the provincial level. This encouraged the Institute of Zoology under the Academy of Sciences of the Republic of Uzbekistan to launch the project “The inventory and assessment of the current state of vertebrates in Tashkent Province as a foundation for the development of a biological resources monitoring system”. This article describes approaches that can further be used to inventory the faunas of the other provinces and to develop a uniform accounting and monitoring system in the country.

KEYWORDS: inventory, sustainable use, monitoring system, regional fauna, database, annotated list.

INTRODUCTION
Uzbekistan is a country with a rapidly developing economy and a high population density. Conservation and sustainable use of the environment and bioresources is becoming an increasingly important task against the background of the country’s rapid economic and social development and ranks as one of the priorities in the state policy of Uzbekistan.[1]

The main steps to be taken for the conservation and sustainable use of faunistic diversity in Uzbekistan are to develop a system of protected natural territories, keep the national Red Data Book, control the use of wildlife on a governmental level, keep a cadastre of wildlife and biodiversity monitoring. The inventory and assess the current state of the fauna form the basis of all these steps. They make it possible to start developing a monitoring system as an instrument for the conservation and sustainable use of biodiversity.

The conservation and use of biological resources in Uzbekistan are based on a strict administrative structure. Nevertheless, the fauna of Uzbekistan has never been inventoried on the provincial level. Therefore, there is an objective need to develop standard approaches to the inventory, using one of Uzbekistan’s provinces as a case study. After being tested, these approaches will be replicated to other provinces of the country.

In 2018, the Institute of Zoology under the Academy of Sciences of the Republic of Uzbekistan launched the project “The inventory and assessment of the current state of vertebrates in Tashkent Province as a foundation for the development of a biological resources monitoring system”.[2] This project has 2 main goals: 1. Assessment of the current state of the vertebrate animals in Tashkent Province as an important component of the natural environment to ensure environmental stability; 2. Development of a monitoring system as an instrument for the conservation and sustainable use of biodiversity based on the inventory.

The article analyses the 2018 results of the project showing the main ways to be taken to achieve these goals.

1. MATERIALS AND METHODS
Tashkent Province of Uzbekistan is an optimal reference territory to achieve the project’s goals. It is an integral natural complex with an area of 15,250 km^2 in the north-east of the country, which has natural geographic boundaries. The south-western part of Tashkent Province consists of flat terrain between two large rivers – the Chirchik and Ahangaran, both the tributaries of the Syr Darya. The north-eastern part of the province includes the spurs of the Western Tien Shan – the Karzhantau, Ugam, Pskem, Maydantal, Talas, Kuramin and Chatkal Ranges with extensive lowlands (*adyrs*). This area presents a variety of natural landscapes – from river

valleys and diverse water bodies to high mountains and glaciers. The area is (or was in the past) a home for 75 rare species of terrestrial vertebrates listed in the Red Data Book of the Republic of Uzbekistan (2019)[3] and in IUCN Red List.[4] They include a number of unique species, such as Snow Leopard *Panthera uncia* and Menzbier's Marmot *Marmota menzbieri*, Saker Falcon *Falco cherrug* and Cinereous Vulture *Aegypius monachus*, Meadow viper *Vipera renardi* and Central Asian tortoise *Testugo horsfieldi*

In addition, the province features a considerable number of large industrial enterprises and is covered with a network of modern roads. Extensive mountainous and flat areas are used in agriculture for transhumance and crop production. In recent years there has been an intensive increase in population due to an influx from neighboring areas. The total population of Tashkent Province is currently more than 6 million people, with the density of 350 people/km^2. The travelling industry has also been actively developed in the province, with the number of tourists visiting natural areas growing year after year. This resulted in the reconstruction of old recreation zones and construction of new ones.

Earlier the authors made attempts to inventory populations of certain species.[5,6] However, the terrestrial vertebrate fauna has never been inventoried on the provincial level in Uzbekistan. This is why it is necessary to develop within this project standard approaches that can further be used to inventory faunas in other provinces and design a uniform accounting and monitoring system.

The project's first step was to develop a model of links between objectives, issues, contents and the qualitative characteristics of expected outcomes (Fig. 1). This pattern provided a clear picture of basic requirements for the database format, database proper, mapping and the sequence of steps.

Based on this pattern, the team members responsible for each vertebrate group made up a preliminary list of species for the subsequent inventory.

After that the project team identified main available sources containing information on the fauna of the project territory and started to process them on a systematic basis.

The specialists then used these lists of species and sources of information to design the format of a database to enter, store and analyze data. At the same time, to clear disputable issues and fill gaps the team made field research into the project territory following common zoological methods.[7, 8, 9, 10, 11, 12]

Since work of this kind was for the first time carried out in Uzbekistan, we thought it expedient to give a detailed description of project activities in the Results & Discussion section.

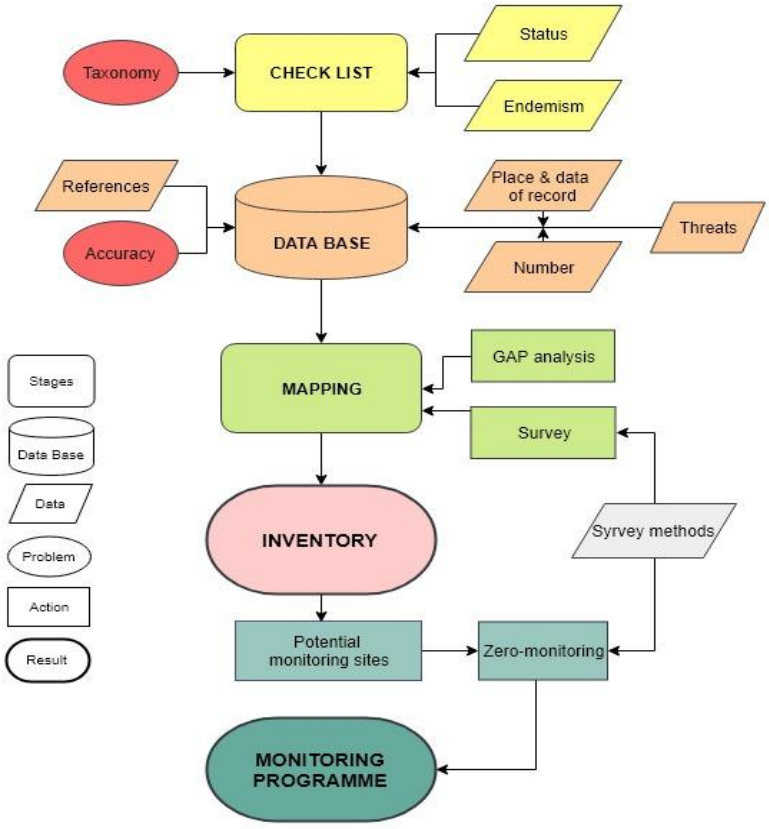

Figure 1. Actions to inventory the regional fauna.

2. RESULTS AND DISCUSSION

The team analysed the results of the inventory and specified 5 basic approaches to this process, whose descriptions are provided below.

Approach No. 1: Systematic lists of species are the foundation for the inventory of the fauna.

The first stage included the preparation of a list of terrestrial vertebrate species from across Uzbekistan (amphibians – 5 species, reptiles – 61 species, birds – 467 species, mammals – 109 species). These lists correspond with contemporary and the most common (but not 'extreme') views on the taxonomy.[13, 14, 15, 16] Each species was provided with a four-digit identification number (ID), where the first digit symbolised the order (1 – amphibians, 2 – reptiles, 3 – birds, 4 – mammals), and the next three ones – their ordinal number in the systematic list. The list format is shown in Table 1.

Table 1: The format of the systematic list of faunal species for the inventory.

ID	Scientific name	Russian name	Uzbek name	English name	Nature conservation status					
					IUCN	UzRDB	CITES	CMS	Endemism	On a provincial level

When creating lists of vertebrates in Tashkent Province the experts deleted from the total list species not inhabiting the project territory, but left unchanged the IDs of those living in the area. This would make it possible to compare the lists of species in different provinces.

Thus, the first list of vertebrates in Tashkent Province was made up as part of the project. The list includes 3 amphibian species from 1 order, 22 reptile species from 2 orders, 387 bird species from 20 orders and 67 mammal species from 6 orders. It is possible that changes will be made to this list as new information is obtained. As of today, the project territory is inhabited by 36% of Uzbekistan's total amphibian and reptilian fauna, 82.9% of ornitofauna and 61.5% of mammal fauna.[2] This indicates that Tashkent Province features a very high biodiversity and is highly important from the conservational aspect.

Upon the completion of the inventory the lists of terrestrial vertebrate species in the project territory will include one more characteristic – the species' conservation status within the province (green). This is necessary to prepare regional Red Data Books.

Approach No. 2: The database is the main instrument for successful inventory.

The inventory database should meet the following requirements: be as convenient as possible to enter data; be sufficiently informative to carry out a time and territorial analysis and make annotated lists of animal species; be suitable for the preparation of cartographic materials and processing with the help of software; have a format compatible with those of relevant databases for other provinces. These requirements suggest that the format of terrestrial vertebrate database should be developed in EXCEL. Its contents are provided in Table 2.

Table 2: The format of the database for the inventory.

ID	Russian name	Date	Year	Month	Encounter location	Habitat	Altitude above sea level	Northern latitude N – coordinates	Eastern longitude E – coordinates	Number	Source of information

Records in the database must be typical for all provinces, quite brief and laconic. For this purpose special terms and abbreviations were developed: a fixed list of habitats (for entire Uzbekistan)[4, 17, 18]; the character of the seasonal stay of species across a territory (abbreviations); categories of threats to species (global and national, abbreviations); endemism (abbreviations for the countries of the region); a list of main threats leading to the loss of biodiversity and rate of their impact across Uzbekistan.[19] For the convenience of the project team these lists are made on separate sheets are added to the database in the EXCEL form.

As of today, the database for the inventory of the fauna of Tashkent Province contains 821 records on encounters with amphibians and reptiles, 7,958 records on birds and 1,700 records on mammals.

Approach No. 3: Reliable sources of information are the 'basics' of inventory.
To inventory species sources of information meeting standard reliability and objectivity requirements should be used. The result of the zoological research that has been carried out in Tashkent Province for over 100 years is several hundred special scientific publications on the composition and features of the vertebrate fauna. In addition, various conservation, research and other organisations possess important data on the fauna collected during a long period. All these data can serve as a 'basis' and must be used in inventory, since they make it possible to carry out a retrospect analysis of the dynamics of species composition, habitats and threats. Therefore, the recommendations of some researchers to 'use only recent literary sources written within the last 10 years' to study and conserve biodiversity are groundless and unacceptable.

At the time the project was launched over 80% of the abovementioned information was in disorder and poorly available, which made it next to impossible to analyse it and, therefore, make proper decisions. That was why the first thing to do to inventory the fauna was to make a list of sources of information, which allowed the specialists to start processing it on a systematic basis.

Our practice of collecting information across Tashkent Province demonstrates that several types of data sources can be used in each territory:
- Scientific publications;
- Official information (statistic data and records by sanitary, hunting management and nature conservation organisations);
- Research data obtained as part of national and international nature conservation projects;
- Museums and other scientific zoological collections[20];
- Data recorded by nature lovers and conservation NGOs[21, 22];
- Research results and archival material obtained by research institutions as part of their practical or contract-based activity (Academy of Sciences of Uzbekistan);
- Nature chronicles and the results of monitoring in protected areas.

To ensure proper mapping and analysis of information entered into the database it is necessary to provide the data with geographical coordinates and altitudes above sea level. For this purpose we recommend using the free software SAS Planet[23] featuring a wide range of topographic bases and satellite images. Google Earth[24] images can be used as an auxiliary instrument. The project team was given training to work with these programmes.

Approach No. 4: Obtainment of latest information on species distribution and the results of assessing the state of habitats and the level of anthropogenic pressure.
Field research is being carried out to obtain updated information, solve disputable issues concerning the distribution of these or those species and to assess the state of habitats and the level of anthropogenic pressure.

The work is primarily based on stationary and transect lifetime surveys. Another important source of information on rare and resource species is interviews with local population or wildlife users, orally or with the help of questionnaires. It is advisable that the project team consist of experts in diverse fields. This would make it possible to collect information simultaneously on several groups of terrestrial vertebrates, which would enhance considerably the efficiency of field research. As of today, a total of 38 field trips have been made and 123 sites have been studied as part of the project to inventory the fauna of Tashkent Province.

Approach No. 5. Annotated lists are short descriptions of species that can be used to make conservation or use decisions:
The annotated lists of species are an important result of the inventory of fauna. The format of these lists developed by our team is provided in Table 3. In the list, each species recorded in Tashkent Province is provided with the following information: taxonomic position, conservation status across Uzbekistan, distribution pattern, character of stay, typical habitats, number in Tashkent Province, cartographic material, existing threats, economic significance or recommended (proposed) conservation status for the project territory. This description can be used to make prompt conservation and economic use decisions. In future the annotated lists are supposed to be used to make regional faunistic monograph on reptiles, birds and mammals and to prepare the Red Data Book of Tashkent Province.

To facilitate the entry of information into this form an appendix was developed containing a range of standard definitions and abbreviations.

Table 3: The format of the annotated lists of terrestrial vertebrate species.

<table>
<tr><td colspan="2">CLASS (Lat/Rus/Uzb/Eng)</td></tr>
<tr><td colspan="2">ORDER (Lat/Rus/Uzb/Eng)</td></tr>
<tr><td colspan="2">FAMILY (Lat/Rus/Uzb/Eng)</td></tr>
<tr><td colspan="2">Species: full name in Lat/Rus/Uzb/Eng</td></tr>
<tr><td>Conservation status: Short description; endemism; threat category in IUCN and UzRDB; CITES, CMS</td><td rowspan="5">Map of locations in a province where species are recorded</td></tr>
<tr><td>Character of stay /distribution pattern</td></tr>
<tr><td>Distribution in Tashkent Province:</td></tr>
<tr><td>Habitats: from the Appendix</td></tr>
<tr><td>Altitudinal distribution: m above sea level</td></tr>
<tr><td colspan="2">Distribution across administrative units: figures from the Appendix</td></tr>
<tr><td colspan="2">Number: General assessment and tendencies as a minimal requirement + any specific information available</td></tr>
<tr><td colspan="2">Threats/Rate: threat type/rate in conformity with the List of basic threats and impacts</td></tr>
<tr><td colspan="2">Economic significance:</td></tr>
<tr><td colspan="2">Recommended conservation status for a province: <u>For rare species only</u>! In conformity with national categories + brief proposals</td></tr>
</table>

As of today, the annotated list compiled based on the inventory project results includes 158 rare and economically important species of terrestrial vertebrates inhabiting Tashkent Province.

3. CONCLUSION

The following approaches need be used to inventory regional faunas:

1. The inventory is based primarily on systematic lists of species. Lists referring to different provinces must be compatible and intercomparable.
2. The database is the main inventory tool. Its format must meet the following requirements: be as convenient as possible to enter data, informative to carry out analysis and make annotated lists of animal species, suitable to prepare cartographic material and compatible with databases for other provinces.
3. The main sources of information forming the 'base' of the inventory programme should be found in research publications and various organisations associated with nature conservation and use. Significant volumes of biodiversity data can be obtained from nature conservation projects, NGOs, birdwatchers' clubs, travellers and so on. The information taken from sources like these ones must be brought in order and systematised.
4. Modern information on disputable issues concerning the distribution of species and assessment of the state of habitats and level of anthropogenic pressure must be obtained through field research and interviews with representatives of local communities. The wide specialization of members in a research team would ensure the obtainment of a larger volume of information during field research.
5. The annotated lists of terrestrial vertebrate species are an important result of the inventory of the regional fauna. They contain basic information necessary to make prompt decisions on the conservation and economic use of species, which can also be used as the foundation for regional faunistic monographs and regional Red Data Books.

REFERENCES

1. Action Strategy for the development of the Republic of Uzbekistan in 2017-2021 in five priority areas: Appendix 1 to Decree No. 4947 'On the Action Strategy for the Further Development of Uzbekistan' issued by the President of the Republic of Uzbekistan on 7 February 2017 [in Russian] http://lex.uz/docs/3107042
2. Mitropolskaya Yu, Kashkarov R. First results of inventory of the fauna of mammals in Tashkent region: Zoosociology of terrestrial vertebrates. Materials of the Conference dedicated to the 80th anniversary of birth of Professor Oleg Vilevich Mitropolskiy,Tashkent, October 9-11 2018 – Tashkent, 2018: 83-87. [in Russian]
3. Red Data book of Uzbekistan, 2019. http://redbook.uz/ru
4. IUCN Red List of Threatened Species IUCN www.iucnredlist.org
5. Mitropolskaya Y, Kashkarov R. Rare predatory mammals of Uzbekistan: condition of populations and their protection European Journal of Biomedical and Pharmaceutical Sciences, 2016, Volume 3, Issue 12: 544-552.
6. Kashkarov R, Atakhodjaev A, Mitropolskaya Yu. Turkestan white stork *Ciconia ciconia asiatica* (Aves: Ciconiiformes) in Uzbekistan: current size and condition of population: International Journal of Zoology Studies, Volume 2; Issue 1; January 2017: 96-101.
7. Scherbak N. Quantitative accounting // A guide into amphibians and reptiles. - Kiev: Naukova Dumka, 1989. – 110 pages. [in Russian]
8. William J. Sutherlan. Ecological CensusTechniques. A handbook Second Edition. - Cambridge University Press. 2006. - 450 p.
9. Raffael Aye and Manuel Schweizer with Tobias Roth. Birds of Central Asia: Kazakhstan, Turkmenistan, Uzbekistan, Kyrgizstan, Tajikistan and Afganistan. - Christopher Helm, London. 2012. - 336 p.

10. Kovshar A., Yanushko P. New data on the mammals in the Aksu-Jabagly Reserve // Works by the State Aksu-Jabagly Reserve. Issue 2. - Alma-Ata, 1965: 203-236. [in Russian]
11. Wilson D et all. Measuring and Monitoring Biological Diversity. Standard methods for mammals. Smithsonian instituton press. Edited by D.E.Wilson, F.Russel Cole et all. - Washington and London, 1996. - 409 p.
12. Mitropolskaya Yu. Assessment of anthropogenic impacts on the mammal fauna to develop measures to conserve it and ensure its sustainable use: methodological recommendations. - Tashkent, 2017. - 43 pages [in Russian]
13. Frost D. Amphibian Species of the World: an Online Reference. Version 6.0. Electronic Database accessible at American Museum of Natural History, New York, USA. Downloaded 10 July 2016 http://research.amnh.org/herpetology/amphibia/index.html.
14. Ananyeva N., Borkin L., Darevsky I, Orlov N. Amphibians and reptiles // Encyclopedia of Russian wildlife. - M.:ABF, 1998.-576 pages [in Russian]
15. Koblik E, Arkhipov V. Avifauna of the States of Northern Turasia (fopmer USSR): Checklists. – Zoologicheskie Issledovania, № 14. 171 p.
16. Pavlinov I. Systematics of Recent Mammals: Archives of the Zoological Museum jf Moscow State Universi. Vol XLVI. - Moscow, 2003: 3–297. [in Russian]
17. Kashkarov R, Welch G and Brombacher M, eds. Important Bird areas in Uzbekistan – priority sites for conservation. - Tashkent, Uzbekistan: Uzbekistan Society for the Protection of Birds (UzSPB), 2008. 188 ps.
18. Mitropolskaya Yu, Talskikh V. An overview of planning to conserve and ensure the sustainable use of biological diversity in Uzbekistan. Copyright © UNDP. - Tashkent, 2015. – 59 pages [in Russian]
19. Kashkarov R, Mitropolskaya Y. The experience of a mark estimation of anthropogenous threats in foothills and middle part of Western Tien-Shan mountains in Tashkent region of Uzbekistan. Biological Journal of Uzbekistan 2009; 62: 48-52. [in Russian]
20. Mitropolskaya Y, Kashkarov R. Zoological collections of Uzbekistan as a basis for an inventory of the modern fauna: Biological collections today and tomorrow. Contributions to Conference «Advanced technologies and prospects of the usage of zoological collections». - Zoologicheskie Issledovania, 2018, 20: 62-66. [in Russian]
21. www.birds.uz
22. Uzbekisnan Society for the Protection of Birds www.uzspb.uz
23. SAS Planet http://www.sasgis.org/sasplaneta/
24. Google EARTH https://www.google.com/intl/ru/earth/