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Tugay forests in Tajikistan: the last remainders of globally endangered ecosystem

DETAILED FINAL REPORT for 2011

Compiled by Pavel Kvartalnov

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Foreword

"Tugay" – riverbank forests at plains and mountains of Central Asia. These ecosystems suffer from the high human pressure. We planed to investigate the modern state of "tugay" forests and adjacent deserts at the Tigrovaya Balka Natural Reserve (South of Tajikistan Republic). We expected to get the modern information about the state of riverbank forests and adjacent deserts animal communities of Tigrovaya Balka Reserve, estimate numbers of rare bird, mammal and reptile species. We had two key groups - Sylviidae warblers and Agamidae lisards. We wanted to estimate numbers of globally vulnerable species - *Acrocephalus orinus* and *Phrynocephalus sogdianus*. We expected to study the possibility for *Acrocephalus orinus* to breed at the forests at plains. We meant to get information about modern status, interspecific interactions, social organization, ecology and social behaviour of several Sylviidae warbler species, to record acoustic signals of warblers (to investigate functional organization and evolution of bird songs), to collect blood samples for DNA analyses. We expected to get the information about species richness of Agamidae lizards, based also on DNA analyses of tissue samples, information about ecology and numbers of several lizard species. Also we planned to collect blood samples and information about ecology of *Parus bokharensis* - a species, potentially vulnerable – due to the intergradation with *Parus major*, and also the information about numbers and ecology of *Cervus elaphus bactrianus* and *Phasianus colchicus bianchii*.

The actual plan of our works had some differences with the initial. We did not get the permission for the work on the territory of the "Tigrovaya Balka" reserve. So we stayed only three days at the peripheral part of the reserve; some information about current mammal numbers in "Tigrovaya Balka" was collected by Z. Amirov. The main study territory at plains was Shakh sands (Kabodian region, near Teshik-Tash village, valleys of lower Kafirnighan and Amu-darya). We got the possibility to reach valleys of mountain streams in Gorny Badakhshan Autonomous region, so in June and July we worked there in Panj valley, near Zumudg village (Ishkashim region). Our contributor A. Abdulnazarov collected additional information about *Acrocephalus orinus* and the condition of riverside forests and bushes in Shugnan region. A. Krupitskiy collected information about fauna and distribution of butterflies mainly in Rushan region.

Contributors to the project:

Main Russian contributors:
Pavel Kvartalnov – PhD, scientist, Lomonosov MSU (fauna, ecology and behaviour of vertebrates, field works from April to July mainly in Kaborian and Ishkashim regions)
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Svyatoslav Fedorov – PhD, scientist (systematic of birds, worked with collected materials in Moscow)
Other contributors in Moscow (working with collected materials): **Vladimir Ivanitsky** (DSci, analysis of acoustic data, Lomonosov MSU), **Irina Marova** (PhD, analysis of acoustic data, Lomonosov MSU), **Nikolay Kovylov** (PhD student, analysis of acoustic and molecular data), **Anna Bannikova** (PhD, molecular analysis), **Arkady Savinetsky** (DSci, Severtsov Institute of Ecology and Evolution, identification of osteological materials), **Eugeny Koblik** (PhD, MSU Zoological museum, bird systematic), **Stanislav Red'kin** (PhD, MSU Zoological museum, bird systematic), et al.

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Abdusattor Saidov – PhD, director of Pavlovsky Institute of Zoology and Parazitology (fauna and ecology of mammals; field works in May in Kabodian region)
Abdulnazar Abdulnazarov – PhD, scientist, Pamir Biologycal Institute (fauna and ecology of vertebrates; field works in June, July and later in Shugnan and Ishkashim regions)
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Zayniddin Amirov – scientist, Pavlovsky Institite of Zoology and Parasitology. Took part in investigations of mammals in Kabodian and Jilikul regions, provided information about the status of mammal species at the territory of "Tigrovaya Balka" reserve.
Also **five PhD students** from the Institute of Zoology and Parasitology took part in mammal, bird and reptile counts in Kabodian and Jilikul regions (April-May). In September-October **several students** from the Central-Asian University took part in searching for *A. orinus* at Gunt and Panj valleys with A. Abdulnazarov.

In Badakhshan we received an invaluable help from officers of the local forestry organization.

Main field methods

1. Counts of vertebrates and butterflies in different biotopes.
2. Searching for bird nests, mammal traces.
3. Mist-netting birds, catching small mammals by live traps.
4. Observing biology and behaviour of individually marked birds and lizards on study plots.
5. Measuring of caught butterflies, birds, mammals, reptiles and amphibians.
6. Taking skin and blood samples from caught animals.
7. Geobotanical description of studied biotopes.
8. Acoustic recording of bird voices.

Main laboratory methods

1. Sequencing mitochondrial and nuclear DNA from skin and blood samples.
2. Analyzing of acoustic recordings in Syrinx and AviSoft programs.
3. Identification of collected bones using museum collections.
4. Investigation of changes in fauna composition by searching for vertebrates collected earlier at studied territories in museum collections (in Dushanbe and Moscow).

Calendar of works

18.04-22.04 - Dushanbe, working with collections in Zoology and Parasitology Institute; a visit to Varzob valley.
23.04-25.04 – "Palvan-Tugay" [N 37°21' E 068°27'], studying bird community of riverside forests at the Vakhsh river, at the North part of "Tigrovaya Balka" reserve and visited nearby deserts.
26.04-28.05 - Shakh sands, studying bird and reptile community in bushes, forests and semideserts at plains and hills near Kafirnighan and Amu-Darja rivers [N 37°03' E 068°12'].
29.05-31.05 - Searching for remains of psammophile reptile fauna in Kabodian, Shakhrituz and Jilikul regions.
1.06-7.06 - Dushanbe, working with collections in Zoology and Parasitology Institute; a visit to Varzob valley.
8.06 - Dushanbe-Khorog
9.06 - Khorog, a visit to Pamir Biological Institute and Botanical garden.
10.06 - Khorog-Zumudg
11.06-11.07 - Zumudg village, Ishkashim region, Gorny Badakhshan [N 36°55' E 072°11'], studying bird communities at willow and sea buckthorn thickets at Panj valley.
12.07-15.07 - Zumudg-Dushanbe and staying at Dushanbe.

Anatoly Krupitskiy worked 2-6.06 at Varzob valley near Dushanbe (Gissar gorge), 10.06.2011 at Zumudg village, 13.06 in Khorog Botanical garden, 14-19.06 near Khuf village, Rushan region [N 37°50' E 071°40'].

Abdulnazar Abdulnazarov searched for *Acrocephalus orinus* in Gunt valley 28.06-18.07. He also did observations at Gunt and Panj valleys in July-October (with help of students from Central-Asian University (Khorog)).

Zaniddin Amirov visited “Tigrovaya Balka” reserve several times from April to July.

Species diversity of studied nature communities

I. Vertebrate fauna at plains and low mountains (Kabodian, Shakhritus and Jilikul regions).

Bird diversity

We recorded 109 bird species in Kabodian, Shakhritus and Jilikul regions from 23.04 to 30.05. Most of these birds were transient. Local ornithofauna is quite poor, although it has several characteristic species.

1. Shrubs at temporarily wet places:

1a. Tamarix thickets at Amu-darja valley (with reeds, camelthorn, rare silverberry, etc., without canals or pools). Breeding birds – *Phasianus colchicus*, *Galerida cristata*, *Lanius schakh*, *Hippolais rama*, *Sylvia mystacea*, *Cercotrichas galactotes*, *Passer indicus*; possibly breeding – *Cuculus canorus*, *Pica pica*, *Saxicola carpata*. Transient species are common, including *Coturnix coturnix*, several species of warblers and wagtails, etc. Marsh harrier (*Circus aeruginosus*) who was regularly hunting at these thickets possibly bred at reed stands near Amu-darja.

1b. Tamarix thickets at Beshkent valley (with irrigation canals). Only briefly inspected. Possibly breeding birds – *Galerida cristata*, *Motacilla feldegg*, *Hippolais rama*, *Saxicola carpata*.

1c. Thickets at dried Shaartuz lakes with tamarix and reeds (canals and pools were present). Briefly inspected. Breeding birds – *Motacilla feldegg*, *Hippolais rama*. Possibly breeding birds – *Galerida cristata*, *Calandrella cheleensis*, *Motacilla* (*citreola*) *calcarata*, *Saxicola carpata*, *Cercotrichas galactotes*.

2. Reeds with certain shrubs at stable wet places (canals, etc.). Breeding birds – *Cuculus canorus*, *Acrocephalus stentoreus*. Possibly breeding – *Saxicola carpata*, *Cercotrichas galactotes*, *Emberiza bruniceps*.

2. Forest:

2a. Turanga poplar (*Populus diversifolia*) forest with tamarix and silverberry near Teshik-Tash village. Breeding birds – *Pica pica*, *Hippolais rama*, *Hippolais pallida*, *Sylvia mystacea*, *Parus bokharensis*. Possibly breeding – *Accipiter badius*, *Phasianus colchicus*, *Gallinula chloropus* (on pools), *Streptopelia turtur*, *Cuculus canorus*, *Strix aluco*, *Lanius schach*, *Cercotrichas galactotes*, *Luscinia megarhynchos*. Transient birds were common, including *Streptopelia orientalis*, warblers, etc.

2b. Turanga forest with rare tamarix and silverberry at Vakhsh valley. Briefly inspected at the end of April. Breeding birds – *Picus leucopterus*, *Pica pica*, *Parus bokharensis*. Possibly breeding (birds recorded during this study) – *Accipiter badius*, *Phasianus colchicus*, *Streptopelia turtur*, *Columba eversmanni*, *Cuculus canorus*, *Otus brucei*, *Lanius schach*, *Corvus corone*, *Hippolais rama*, *Sylvia mystacea*, *Remiz coronatus*.

3. Low mountains with small and rare pistachio and other shrubs. Breeding species – *Ammoperdix griseogularis*, *Scotocerca inqueta*, *Oenanthe picata*, *Sitta tephronota*, *Passer indicus*. Possibly breeding – *Gypaetus barbatus*, *Neophron percnopterus* (we found a nest

possibly belonged to this species), *Falco tinnunculus*, *Apus apus*, *Apus melba*, *Ammomanes deserti*, *Corvus corax*, *Oenanthe pleschanka*, *Monticola solitarius*.

4. Semidesert with saxaul stands. We recorded no birds breeding in saxaul at Shakh sands. Transient birds used saxaul bushes for feeding (cuckoos, doves, warblers, etc.). At the semidesert we found nests of *Pterocles orientalis* and *Galerida cristata*. Possibly breeding birds – *Charadrius dubius*, *Pterocles alchata*, *Caprimulgus europaeus*.

5. Villages, gardens and fields. Breeding birds – *Upupa epops*, *Hirundo rustica*, *Acridotheres tristis*, *Passer indicus*. Possibly breeding – *Accipiter badius*, *Falco subbuteo*, *Phasianus colchicus*, *Columba livia*, *Streptopelia decaocto*, *Streptopelia turtur*, *Streptopelia senegalensis*, *Cuculus canorus*, *Hirundo daurica*, *Lanius schach*, *Lanius minor*, *Oriolus oriolus*, *Pica pica*, *Passer hispaniolensis*.

Birds of several species bred in niches and burrows in clay steeps: *Athene noctua*, *Coracias garrulus*, *Alcedo atthis* (near river and ponds), *Merops persicus*, *Riparia riparia*, *Passer indicus*.

Other recorded species that could be resident – *Phalacrocorax carbo*, *Phalacrocorax pygmeus*, *Tadorna ferruginea*, *Anas platyrhynchos*, *Anas acuta*, *Anas quercuedula*, *Buteo rufinus*, *Hieraaetus pennatus*, *Aegypus monachus*, *Falco cherrug*, *Himantopus himantopus*, *Actitis hypoleucos*, *Sterna hirundo*, *Sterna albifrons*, *Merops apiaster*, *Motacilla personata*, *Lanius phoenicuroides*, *Sturnus roseus*, *Acrocephalus agricola*, *Oenanthe finschii*, *Monticola saxatilis*.

Mammal diversity. Mammals that inhabit open lands – *Erinaceus auritus*, *Crocidura suaveolens*, *Lepus tolai*, *Spermatophillus leptodactylus* (only at the North-Eastern border of "Tigrovaya Balka" reserve), *Nesokia indica*, *Ellobius tancrei*, *Meriones erythrourus*, *Canis lupus*, *Canis aureus*, *Vulpes vulpes, Hyaena hyaena* (observed on the territory of "Tigrovaya Barka" reserve by Z. Amirov), *Gazella subgutturoza* (deserts at the right side of Vakhsh). Mammals inhabit bushes and forests (except listed above): *Hystrix leucura*, *Sus scrofa*, *Cervus elaphus bactrianus*.

Diversity of reptiles and amphibians. Species recorded at Shakh sands and nearby territory (Kaborian region): *Rana* cf. *ridibunda*, *Bufo* cf. *viridis*, *Crossobamon eversmanni*, *Cyrtopodion fedtschenkoi*, *Cyrtopodion caspius*, *Mediodactylus russowi*, *Teratoscincus scincus*, *Phrynocephalus* cf. *interscapularis*, *Trapelus sanguinolentus*, *Varanus griseus*, *Eremias grammica*, *Eremias lineolata*, *Eremias nigrocellata*, *Eremias regeli*, *Eremias scripta*, *Eryx tataricus*, *Naja oxiana*, *Boiga trigonatum*, *Platypus karelini*, *Psammophis lineolatus*, *Spalerosophis diadema*, *Echis carinatus*. At Palvan-Tugay (Vakhsh valley) we also recorded *Testudo horsfieldii*.

II. Vertebrate fauna of mountain river valleys at high altitude.

1. Thickets at Panj valley (sea-buckthorn and willow bushes with reeds, liquorices, etc.). Breeding birds: *Motacilla* (*citreola*) *calcarata*, *Lanius phoenicuroides*, *Pica pica*, *Corvus corone*, *Cettia cetti*, *Acrocephalus orinus*, *Sylvia althaea*, *Phylloscopus sindianus*, *Luscinia megarhynchos*, *Luscinia svecica*, *Parus flavipectus*, *Caprodacus erythrinus*. Possibly breeding (nests or fledglings were not seen): *Streptopelia orientalis*, *Cuculus canorus, Lanius schach* (rare), *Lanius minor* (rare), *Sylvia hortensis*, *Sylvia communis*, *Phylloscopus griseolus* (rare), *Garrulax lineatus* (near Ishkashim village, absent near Zumudg), *Passer indicus*. Regularly searched for food in the bushes or nearby on ground: *Columba rupestris*, *Coracias garrulus*,

Upupa epops, *Sturnus pagodarum* (rare), *Pyrrhocorax pyrrhocorax*, *Serinus pusillus*, *Bucanetes mongolicus*, *Rhodospiza obsoleta*. Mammals: *Lepus tolai*, *Sylvaemus uralensis*, *Microtus juldaschi*, *Vulpes vulpes*, *Mustela altaica*. Amphibians and reptiles: *Bufo baturae*, *Natrix tesselata*.

2. Mountain slopes, bushes in canyons, mountain streams, rocks and dunes. Breeding birds: *Alectoris chukar*, *Columba livia*, *Ptyoprogne rupestris*, *Cinclus pallasii*, *Sylvia althaea*, *Phoenicurus ochruros*, *Myophonus caeruleus*, *Sitta tephronota*, *Tichodroma muraria*. Possibly breeding birds: *Gypaetus barbatus*, *Tetraogallus himalayensis*, *Columba rupestris*, *Bubo bubo*, *Apus apus*, *Apus pacificus*, *Motacilla cinerea*, *Pica pica*, *Pyrrhocorax pyrrhocorax*, *Phylloscopus neglectus*, *Oenanthe picata*, *Oenanthe deserti*, *Oenanthe xanthoprimna*, *Monticola solitarius*, *Chaimarrornis leucocephalus*, *Enicurus scouleri*, *Passer indicus*, *Serinus pusillus*, *Bucanetes mongolicus*, *Emberiza stewarti*. Mammals: *Lepus tolai*, *Marmota caudata*, *Vulpes vulpes*. Reptiles: *Laudakia himalayana*.

3. Villages, gardens and fields. Breeding birds: *Falco subbuteo*, *Streptopelia decaocto*, *Upupa epops*, *Dendrocopos leucopterus*, *Sturnus pagodarum*, *Parus flavipectus*, *Passer montanus*. Possibly breeding: *Coturnix cotirnix*, *Coracias garrulus*, *Merops apiaster*, *Hirundo daurica*, *Alaudo gulgula*, *Oriolus oriolus*, *Acridotheres tristis* (near Ishkashim, absent in Zumudg), *Pica pica*.

Other birds recorded near Zumung village: *Cyrcus pygargus*, *Riparia diluta* (possibly preeding), *Motacilla personata* (possibly breeding), *Sturnus roseus*, *Acrocephalus stentoreus*, *Rhodospiza obsoleta*. The whole list of birds found at Ishkashim region includes 68 species.

Investigations of Key Species

We selected several key species to highlight main features of potentially threatened natural communities.

1. *Hippolais* (*Iduna*) *rama* and *Acrocephalus stentoreus*: a phenomenon of reduced territoriality.

In 1999-2003 yrs Pavel Kvartalnov investigated breeding biology and behaviour of *Acrocephalus agricola* – a species that breeds at semidesert lakes in shrubs and reeds. This bird has small territories comparing with territories of others reed warblers. Birds often fly to each others breeding plots, distant between nests usually 5-20 meters. P. Kvartalnov supposed that *A. agricola* has reduced territoriality because this bird breeds at productive but unstable habitats. In wet years it has large areas for breeding, but in dry years areas suitable for breeding are very small. *A. agricola* can breed in high densities and support high numbers in dry years. Later this phenomenon was found by Alexey Opaev at other reed warbler species – *Acrocephalus stentoreus* breeding with high densities at semidesert lakes of South Kazakhstan (other large reed warblers – *A. arundinaceus* and *A. orientalis* – have strict territoriality and large territories [protected breeding plots] (observations of P. Kvartalnov and A. Opaev)).

Hippolais (*Iduna*) *rama* is one of the most numerous birds at Central Asia plains. We studied its breeding biology and social behaviour at tamarix shrubs in Amu-darja valley (at Shakh sands). We found 11 nests at our study plot (and 4 nests outside it), caught 60 adult birds. (Our study plot had 1.5 ha; there were not only paired birds but also several unpaired males). *H. rama* males demonstrated weak defense of territories. Mobility of birds was high. We observed two cases of pair formation. At one case key interrelations between birds took place outside male's territory. At other case two males competed for a female in one bush. As *A. agricola*, *H. rama* is a monogamous species, but males often search for extrapair copulations. We tried to gather blood samples from adult birds and nestlings for DNA-fingerprinting, but many nests were destroyed by predators, so we gathered blood of nestlings from only 3 nests. This material will be analyzed by Julia Poznyakova.

We also gathered data about *A. stentoreus*. We observed a settlement of this reed warbler at a canal with reeds not far from Teshik-Tash village. At 21.V we found 11 fresh nests. Some of them were at a building stage, other had clutches (one with a cuckoo egg) or nestlings. We found 11 pairs and 3 unpaired males at a part of the canal that had only 180 meters length (and not more than 3 meters width). A distance between neghbour nests was 1.5-20 meters. All found males were monogamous (or bachelors), although the polygyny is common in *A. arundinaceus* and *A. orientalis* and is known for *A. stentoreus*.

2. *Phrynocephalus interscapularis* s.l.: a tragedy of a psammophile specialist.

Agamas from *Phrynocephalus interscapularis* complex live only at sands in Central Asia. This complex has two known species – *Ph. interscapularis* and *Ph. sogdianus*, but the real composition of this species complex is more diverse and remains unstudied, mainly because of lack of contemporary materials. The agamas from South-West Tajikistan were thought to be *Ph. sogdianus*, but results of morphometry and DNA analysis of tissue samples from animals caught at Shakh sands (Amu-darja valley) showed that these lizards were closely related to *Ph. interscapularis* s.str. Our results showed that the area of typical *Ph. sogdianus* can be smaller that it was previously thought; if there are really differences between agamas from Shakh sands

and agamas from the type territory, the typical form inhabits only sand deserts between Vakhsh and Panj rivers, mainly at Kashka-kum desert at "Tigrovaya Balka" reserve (only 14 km²).

We inspected habitats possibly suitable for *Phrynocephalus* agamas at different points of Kaborian, Shakhritus and Jilikul regions (except the main territory of "Tigrovaya Balka" reserve because we had not permission to work there). The only place where we found *Phrynocephalus* agamas were Shakh sands near Teshik-Tash village. This species preferred sand dunes without any plants. It can live at sand roads near human settlements, but avoids roads used by cattle, abandoned fields and saxaul stands. The area suitable for *Phrynocephalus* agamas at Shakh sands is not more than 1500 ha, where these reptilians live in local settlements on sand hills, the area between hills was covered by grass and not suitable for agamas. The density of *Ph. interscapularis* in suitable habitats – 30 animals for 1 km².

3. *Acrocephalus orinus*: a vertebrate endemic of Badakhshan "tugay" stands.

Acrocephalus orinus is a species which breeding area was found only in last years. According to our data and data from other ornithologists (partly unpublished) this bird breeds in thickets along Panj river and its tributaries – Kokcha-darja, Vakhan-darja (Afghanistan), Pamir, Shakhdara, Gunt, Vanj (Tajikistan) at altitudes 2000-3000 m. Nests of this species were not found earlier. We described 15 nests belonged to 13 breeding pairs placed in *Hippophae* and *Salix* thickets near Zumudg village. Blood samples were taken from 9 adult birds and 8 nestlings (from 4 nests). DNA analysis (made by Veronica Samotskaya) revealed that those birds were really *A. orinus*. We found that *A. orinus* and its closest relative *A. dumetorum* have stable differences in vocalization, nest construction and egg colouration, so *A. orinus* is a "full" species, not a subspecies of *A. dumetorum* [the subspecies rank for reed warblers breeding in Badakhshan was supposed by A.B. Kistyakovskiy (1950)]. The clutch of *A. orinus* is small (as in many other passerine birds breeding at Badakhshan, including *Ph. sindianus*) – 2-5 (usually 4) eggs (5-6 eggs in *A. dumetorum*). *A. orinus* prefers to place its nests in thick *Hippophae* bushes, because nest predators including magpies, shrikes, mountain weasels, etc. are quite abundant. Like *A. dumetorum*, *A. orinus* is a monogamous species with both parents care of eggs and nestlings, although males search for extrapair copulations.

A. orinus prefers wet places (near river or canals) at edges of thickets. At our study plot (152 ha) 14-20 pairs lived. First birds began breeding at the end of May, many others – at the middle of June, but new birds (males and females) continued to arrive at the beginning of July. At 2.VII (sic!) we found 7 actively singing bachelor males and 2 newly-formed pairs near Langar village (at the mouth of Pamir river). This prolonged arriving can be a good adaptation for unstable weather conditions at high altitudes.

Comparing with other passerines breeding in thickets at Badakhshan, *A. orinus* is a stenotopic species. For example, *Phylloscopus sindianus* breeds at high altitudes but not only at wet places. Other birds (*Cettia cetti*, *Sylvia althaea*, *Luscinia megarhynchos*, etc.) breed also at lower altitudes.

Phylloscopus sindianus is a second bird species that is characteristic for bushes which grow along rivers at high altitudes. The biology of this bird is poorly known: at former Soviet Central Asia its nests were never found. We discovered 4 nests (in *Hippophae* thickets), described eggs and nestlings, caught 15 adult birds and took blood samples. We also recorded song from

several males. *Ph. sindianus* is a species from the *Ph. collybita* complex, its closest relative is *Ph. lorenzii* from Caucasus.

Both studied species – *A. orinus* and *Ph. sindianus* – demonstrate high level of egg mortality, may be due to the shortage of calcium in their diet (we have not seen at Panj valley any snails which are usually used by birds as a source of calcium). Further investigations of *Ph. sindianus* and *A. orinus* will help us to reconstruct the history of Central Asia mountain dendrophile ornithofauna.

Our studies of structure of songs performed by (a) *A. dumetorum* on passage, (b) *A. dumetorum* on breeding grounds and (c) *A. orinus* on breeding grounds show that these songs clearly differ from each other. So it is possibly to make judgments on the status of these species and made counts of these birds based on their songs.

New data about rare vertebrate species

Mammals

Bactrian deer – *Cervus elaphus bactrianus*
Critically endangered. Still common at "Tigrovaya Balka" reserve, although its numbers decreasing due to disturbance and possibly hunting (Z. Amirov, *pers. comm.*). We saw fresh traces of sole deers at Palvan-Tugay and at Shakh sands (near Teshik-Tash village). These traces show that remains of forests along Vakhsh and Amu-darja rivers still can be used by deers as corridors for local migrations.

Goitered gazelle – *Gazella subgutturosa*
Vulnerable worldwide, critically endangered in Tajikistan. Very rare in the country: several animals live at the desert on the right side of Vaksh river outside the borders of "Tigrovaya Balka" reserve. We saw there one animal and old tracks of sole gazelle at 25.04.

Mountain weasel – *Mustela altaica*
Near threatened worldwide, included to the Red Data Book of Tajikistan. This species is common in bushes at the Panj valley near Zumidg village (we saw it several times). Weasels often destroy birds` nests (they eat eggs and nestlings).

Long-clawed ground squirrel – *Spermophilopsis leptodactylus*
Least concern worldwide, endangered in Tajikistan. In Tajikistan a colony of ground squirrels (formerly widespread) survived only at one place – at the North-East borders of "Tigrovaya Balka" natural reserve near Dusti village [N 37°20' E 068°32']. 30.05 we saw there two animals.

Indian Porcupine - *Hystrix leucura*
Least concern worldwide, included to the Red Data Book of Tajikistan. Traces and an old scull were found near Teshik-Tash village. Traces were recorded in 2010 yr in Kondara valley, in June 2011 – in Panj valley to the West of Khorog.

Birds

Bianchi's Peasant – *Phasianus colchicus bianchii*
Endangered. This bird is still common at forests and bushes in Vakhsh and Amu-darja valleys. One nest with 3 eggs was found (and destroyed) by local people at 19.05 (Shakh sands). We recorded this species (in small numbers) also at fields and gardens. The major threat is hybridization with birds of other subspecies released from aviaries where they are keeping for hunters. Other threats – illegal hunting (we saw hunters with dogs), destroying of nests by people, dogs and cattle, destroying of habitats. Logging of silverberry (*Eleagnus angustifolia*) trees deprives peasants of there main autumn food.

Cinereous Vulture - *Aegypius monachus*
Near threatened. Still common in Tajikistan. At least formerly this bird was breeding in riverside forests at "Tigrovaya Balka" reserve. We saw flocks of Cinereous Vultures up to 8 birds.

Egyptean Vulture – *Neophron percnopterus*
Endangered. This species is still common in Tajikistan. In 2010 and 2011 yrs we saw these vultures near Dushanbe city. It possibly breeds at Ak-Tau mountains (between Vakhsh valley

and Shakh sands). We found one abandoned nest placed at a niche in rocks, saw adults and young birds. 2-4 birds were often seen near Teshik-Tash village. Major threat for this bird in Tajikistan is disturbance at nests by local people.

Pale-backed Pigeon – *Columba eversmanni*
Vulnerable. These pigeons breed in forests of "Tigrovaya Balka" reserve: we saw little flocks there at 24.04 and 30.05. It needs large massifs of riverside forests. We did not record this bird at forest fragments or in gardens near Shakh sands.

Large-billed Reed Warbler – *Acrocephalus orinus*
Listed as "Data deficient" by IUCN. This bird is common in bushes along Panj and other rivers in Badakhshan. It should be treated as near threatened because its known breeding area is quite small (Panj river and its tributaries at 2000-3000 meters). This species should be included in the Red Data Book of Tajikistan. This species is a subendemic of Tajikistan. Findings of *A. orinus* in Kazakhstan and Kyrgyzstan are questionable (erroneous information on labels at skins).

Brahminy Starling – *Sturnus pagodarum*
Listed as "Least concern" worldwide but rare and irregular breeding bird in Tajikistan. This bird was not recorded earlier in the country. We found one pair in a poplar grove at Zumudg village (Panj valley, Badakhshan). The birds were constructing a nest. This rare and decorative bird should be included in the Red Data Book of Tajikistan.

Other recorded birds that are included to the Red Data Book of Tajikistan: ***Hieraaetus pennatus***, ***Gypaetus barbatus***, ***Ammoperdix griseogularis*** (breeds in Ak-Tau mountains, locally common), ***Tetraogallus himalayensis***, ***Pterocles orientalis*** (breeds in deserts in Kabodian region, a nest with 2 eggs was described), ***Garrulax lineatus***, ***Terpsiphone paradisi***.

Reptiles

Central Asian Cobra – *Naja oxiana*
Listed as "Data defficient" (probably endangered) by IUCN. This species seems to be common at the South of Tajikistan. Lives at anthropogenic habitats (bushes and fields along canals). We saw one individual killed by local people who said that cobras were common at fields near Teshik-Tash village. Killing by local people is a major threat for this species in Tajikistan.

Central Asian Tortoise – *Testudo horsfieldii*
Vulnerable. Still common in Tajikistan, also its numbers tend to decrease. In the network of our project a count of tortoises was made in the end of April by T. Nadjmiddinov and R. Muratov in Kabodian and Jilikul regions. We recorded the tortoise at Palvan Tugay. Traces possibly belonged to this species we saw near Teshik-Tash village. The species should be included to the Red Data Book of Tajikistan.

We recorded several other reptile species included to the Red Data Book of Tajikistan: ***Crossobamon eversmanni***, ***Cyrtopodion caspius***, ***Teratoscincus scincus***, ***Varanus griseus***, ***Eremias grammica***, ***Eremias scripta***, ***Eryx tataricus***, ***Boiga trigonatum***, ***Echis carinatus***. For many of these species Shakh sands became a new point of registration, formerly unknown. The finding of one individual of **Black-headed Cat Snake (*Boiga trigonata melanocephala*)** is the most intriguing. This snake is one of the least studied species of Tajikistan: there are no more findings than one for a decade. According to our investigations, **Lichtenstein's Toad-headed**

Agama (*Phrynocephalus interscapularis*) should be included to the Red Data Book of Tajikistan as vulnerable species due to the decreasing of its habitats. We did not find the **Transcaspian Toad-headed Agama (*Phrynocephalus raddei*)** at Beshkent valley and near Ayvadj village where it was common previously (collections of Zoology and Parasitology Institute, Dushanbe). This species is now endangered or critically endangered in Tajikistan due to shortening of its habitats.

Results of entomological studies

The main target of entomological researches was a study of biodiversity of butterflies of Ghissaro-Darvaz and Western Pamir mountain systems. The study was performed in the following localities:

30 km N Dushanbe, Ghissar ridge, Varzob gorge, Gazhni vill., N 38°47' E 68°49', 1200-2000 m, 02-06.VI.2011 – rocky slopes with *Prangos* sp. and *Rheum* sp., dry stream beds;

W Pamir, Shugnan ridge, Khorog, N 37°27 E 71° 35', 2400 m, 13.VI.2011 – Khorog Botanical Garden;

W Pamir, 40 km NE Ihskashim, Zumudg village, N 36° 56' E 72° 13', 2700 m, 10.VI.2011 – sands with shrubs of *Hyppophae rhamnoides* in the valley of Pyandzh river;

W Pamir, Rushan ridge, vicinity of Khuf village, N 37°50' E 71°40' 3000-3500 m, 14-19.VI.2011 – arid mountain slopes with *Acantholymon* sp.

During the study we found 58 species of butterflies. The most important site in the point of biodiversity of butterflies is Rushan ridge where 30 species were found including two new taxa of blues (family Lycaenidae). Most of these species are very interesting in zoogeographical point of view such as endemics of Western Pamir and Himalayan species which inhabit Western Pamir as the westernmost limit of their distribution. Due to the fact of highly isolation of this site and low level of anthropogenic pressure special measures of conservation are not needed.

Another important place is the valley of Panj river near Zumudg village where rare *Plebejus samudra rognedus* was found. This species requires protection as indicator of primary associations of *H. rhamnoides* which support also a number of bird and mammal species of conservation importance.

Materials collected for further studying:

-- Blood samples from 160 birds (18 species including *Parus bokharensis* and first recorded for Tajikistan *Phylloscopus viridanus plumbeitarsus*) – for DNA analysis, part of them transferred to the specialists from the Moscow Zoological Museum, other are hold at the Vertebrate Zoology department, Biology faculty, Lomonosov MSU.

-- Tissue samples of several reptile species are hold at the Moscow Zoological Museum and Vertebrate Zoology department, Biology faculty, Lomonosov MSU.

-- Acoustic recordings, included songs and calls of *Hippolais rama*, *Acrocephalus dumetorum*, *A. orinus*, *Phylloscopus sindianus, Cercotrichas galactotes*, will be hold at the Veprintsev library of wild animal voices (Puschino, Russia).

-- Bones of birds, mammals and lizards from pellets of Little Owl, Tawny Owl and Eagle Owl are hold at the Laboratory of Archaeozoology, Severtsov Institute of Ecology and Evolution Problems.

-- Unhatched eggs and leaved nests of *Acrocephalus orinus*, *Phylloscopus sindianus*, *Cercotrichas galactotes* are hold at the Moscow Zoological Museum, partly (two eggs of *A. orinus*) – at the British museum (Tring, UK).

-- Other materials (mammal bones and dead birds) are hold at the Moscow Zoological Museum and at the Laboratory of Archaeozoology, Severtsov Institute of Ecology and Evolution Problems.

-- All information about caught and ringed birds will be held at the Moscow Ringing Centre.

Other activities

We worked with collections hold at Pavlovsky Zoology and Parazitology Institute (Dushanbe). The reptile collection is highly destroyed after the period of Civil war. The collection of bird skins is highly destroyed too, but we were lucky to find three skins of *Acrocephalus orinus* collected at 1961 at river Vanj (Badakhshan) – at the place where breeding of "*Acrocephalus dumetorum*" was said (A.V. Popov saw fledglings, in: Abdusalyamov, 1972). These skins were labeled as "*Acrocephalus dumetorum*". They were collected in expedition leading by A.V. Popov, in breeding time and – with no doubt – from breeding population. We found also a probable hybrid between *A. agricola* and *A. scirpaceus* (also labeled as "*A. dumetorum*"), collected at Shaartuz lakes (Kabodian region).

We visited several times Kondara and Gazhni valleys (near Varzob valley) where we worked at 2010 yr. We collected additional materials about ornithofauna of forests at mountain slopes of Gissar range. All forests or any other natural communities in Varzob valley were destroyed, there are only roads, villages and restaurants, but at Kondara, where an experimental Botanical station is placed (from 1930-s yrs) main natural complexes including small forest patches remain quite stable for more than 70 years, with high diversity of plants and animals. We proved breeding of *Phoenicurus caeruleocephalus* and saw several other bird species rare for this region. Kondara valley is a good example of situation when traditional management such as grazing, selective logging and hunting with low levels of anthropogenic pressure is not a severe risk for natural communities. But when the pressure became higher the natural complexes in the region with extreme climate conditions (with cold winter, dry and hot summer) began to collapse and disappear quickly (what we can see at Varzob valley).

Major threats for nature communities

Whole destruction

Nearly all natural communities at Tajikistan are more or less destructed by humans. The situation is the worse at plains. In Soviet times large areas of sand deserts and semideserts and riverside forests were replaced by cotton fields. These fields were abandoned after the increase of soil salinity or during the period of the Civil war. Now there are saline lands with very poor flora and fauna. Some types of natural communities such as sand deserts need too much time for restoration, so many animal species (*Phrinocephalus* agamas, fore example) are now under the risk of the whole extinction.

In modern times the destruction of nature habitats is continued. We visited the Beshkent valley (Shakhritus region) where in XX century was placed a base for field investigations for zoologist from Dushanbe. Not more than 20 years ago there was a desert with rich herpethofauna including several globally threatened species. Now there are villages, fields and gardens with no place for wild animals or plants.

The rural economy in Tajikistan remains more extensive that intensive. New areas are still recruited for fields and gardens. Abandoned lands can not be a place for threatened fauna and flora. Most of animal species become extinct, replaced by anthropogenic fauna.

Selective logging

We recorded regular cases of selective logging in all places where we worked in Tajikistan. Local people have to cut wood due to shortage of electric power in winter period. At the Kabodian and adjacent regions they cut in first hand silverberry trees and old poplars. This activity results in decreasing numbers of several vertebrate species. Silverberry fruits formerly were the main autumn food of a vulnerable Bianchi's peasant. Now the silverberry is completely excluded from riverside forests and bushes outside protected territories. The lack of old poplar trees leads to disappearance or rarity of cave-nested birds such as White-winged Woodpecker, Bukhara Tit, Pallid Scops Owl. Disturbance during logging results in decrease of Bukhara deer numbers in "Tigrovaya balka" reserve (observations by Z. Amirov).

Selective logging of sea-buckthorn and willow bushes in mountain river valleys in Badakhshan results in rejuvenation of thickets makes it more suitable for the Large-billed Reed Warbler and other bird species.

Grazing

The level of grazing is high in Kabodian region. In the tamarix bushes where we investigated the breeding biology of Syke's warbler every day at least three large goat flocks were grazed. Flocks of goats and cows were grazed every day at the poplar forest near Teshik-Tash village. We recorded intensive grazing at the peripheral parts of "Tigrovaya Balka" reserve (Palvan Tugay). Intensive grazing results in degradation of natural plant cover and extirpation of reptile species such as Toad-headed Agamas. Goats, cows and also dogs and people that follow herds disturb mammals and birds, destroy birds' nests.

Low level of grazing can be useful for natural communities. Many birds include cattle fur and hairs in their nests. Cows thin out thickets in mountain river valleys in Badakhshan so they become more suitable for birds such as Large-billed reed warblers, etc.

Hunting

Hunting level is low in the modern Tajikistan. Main objects for hunting – **Chukar Patrige (*Alectoris chukar***) and **Wild Goat (*Capra aegargus*)** in mountains. We recorded traces of hunting in the peripheral part of "Tigrovaya Balka" reserve (Palvan Tugay). We saw a company of illegal blood sport hunters with dogs that searched for Bianchi's Peasants in tamarix bushes at the valley of Amu-darja (Kabodian region). They shot one male peasant.

Introduction of alien species

Introduction of alien forms of *Phasianus colchicus* (from hunting farms) can be dangerous for the native *Ph. c. bianchii*.

Current level of protection

Protection at the nature reserve

We tried to get permission for the work at the territory of the "Tigrovaya Balka" natural reserve but had not got it. We spent only three days at the North part of the reserve (Palvan-Tugay) at the right side of Vakhsh river (the main protected territory is at the left side). The anthropogenic pressure at Palvan-Tugay is high: we saw traces of hunting and selective logging, fishing by local people and cattle grazing. The main territory of the reserve is protected more strictly. The reserve has guards who try to catch illegal hunters and other intruders. Our Tajik colleagues who had the possibility to visit the reserve said that there were hunting, logging and other illegal activities organized by the head of the reserve. It is a tragedy of nature reserves placed at formerly Soviet republics, mainly at Central Asia and Caucasus. The territories of the reserves are strictly protected from any unwilling intruders including scientists and environmental specialists. The bureaucracy can do at these protected areas all they want to do – including hunting, fishing, logging, etc. The situation at "Tigrovaya Balka" is not the worst, but the tendency when specialists from other countries are not allowed to the reserve is alarming.

Protection by Forestry and Hunting guard

This protection is weak at plains. Forestry guarding at plains is not effective if ever present. Hunting guard we saw only once when two officers came to inspect us after a call from the Ministry of Natural resources (which officers did not give us permission for work at the reserve). These guards protect mainly migrating birds such as *Chlamydotis undulata*. We said that we don't hunt or collect animals and they allowed us to continue our works.

Protection of natural communities at Gorny Badakhshan is quite effective, especially in recent years. Our work was successful due to collaboration with Abdulnazar Abdulnazarov – a head of forestry and hunting service in Tajik Badakhshan. All remains of natural forests and shrubs growth (especially at river valleys) are protected. There is a net of irrigation canals that provides the water for growing bushes and trees. Nearly in each mountain village there is a man who works as a forest guard and cares for the irrigation system. Penetration to forests and bushes by local people is strictly regulated, logging and grazing is prohibited in many places. Such system of forestry service is open for collaboration with scientific and forestry specialists and in modern conditions seems to be more effective in Tajikistan than a system of natural reserves.

It will be a problem for birds breeding in thickets at rivers valleys if the protection will be too strict. Many birds (including *Acrocephalus orinus*) live in young bushes, but not in forests. It is lucky for them that these natural communities still have a low but stable level of anthropogenic pressure with selective logging and cattle grazing.

Protection by frontiers

We worked at Tajikistan-Afghanistan border. It has quite good protection along Amu-darja (Kabodian region). There are reed stands and forest remains along the river – at protected areas along the border. Of coarse we could not inspect closely these growths. We saw that fishing and cattle grazing were restricted there but not prohibited. Other human activities at the border were restricted too. This area as closed from scientific workers or environmental specialists can not provide a stable protection for native fauna and flora, although nowadays natural communities along the border seem to be in good conditions. The Afghanistan side of

the border is less protected by frontiers and natural communities there seem to be much more destructed. Good forest patches remain at the neutral territory on Panj and Amu-darja islands.

There is no continued area protected by frontiers along the international border in Badakhshan. The guarding of the border at many parts of the Panj valley is more a work of the forest guard who look for unwelcome intruders in areas covered by shrubs than a frontiers concern.

Suggestions for protection of studied communities

1. The territory of Shakh sands (Kabodian region, near Teshik-Tash village) should be protected as wildlife preserve. It has rich fauna of reptiles endangered in Tajikistan. All gathered information about this area will be sent to the Tajik Ministry of Natural Resources.
2. Logging and grazing at plain forests and bushes should be strictly regulated by the local forestry officers. The good example of such regulating of agriculture management we can see in Badakhshan.
3. The territory of "Tigrovaya Balka" reserve should be open to local and international scientists. The modern condition of herpethofauna of Kashka-Kum (sand desert at the territory of the reserve) should be studied.
4. All major projects at the territory of Tajikistan (irrigation works, building new roads and settlements, expansion of areas under cultivation, etc.) should be forestalled by the comprehensive ecological expertise to prevent the destruction of threatened species and habitats.
5. All information about rare vertebrate species gathered during this project should be included to the new edition of the Red Data Book of Tajikistan. The status of several species (desert lizards) should be changed from threatened to vulnerable or endangered due to the continuing degradation of their habitats.
6. Such species as *Phrynocephalus interscapularis* and *Acrocephalus orinus* should be included to the new edition of the Red Data Book of Tajikistan. They can be treated as key species of endangered habitats (sand deserts and semideserts and riverside bushes at mountain river valleys).
7. Additional information is needed about the current status of *Phrynocephalus sogdianus* from the territory of "Tigrovaya Balka".
8. Investigations of *Acrocephalus orinus* numbers, distribution and breeding biology should be continued at Panj river and its tributaries.

Interactions with local people during the project

In Kabodian region we took advantage of hospitality of Rais Abdullayev Rakhmatullo. He organized a recreation place for local people and guests from another regions and countries. It was his desire to inventory of vertebrate fauna of nearby deserts. This information will help him to combine adaptation of the territory for recreation with protection of animals.

In our days Tajik people can not live without using natural resources such as wood and grasses used for heating, cooking and feeding livestock. Only scientific investigations can determine the permissible level of utilization of natural resources by local people communities. All our results will be shared with nature protection, hunting and agricultural organizations of Tajikistan.

Out-of-press publications

Kvartalnov P.V., Samotskaya V.V., Abdulnazarov A.G. (2011) From museum collections to live birds [First data about breeding biology of Large-billed reed warbler (*Acrocephalus orinus*)]. – Priroda (popular science journal of Russian Academy of Sciences). N12. Pp. 54-56. [in Russian, with colour photographs]

Presentation of scientific results

Krupitskiy A.V. Entomological investigations in Tajikistan. – Presented at the Entomological workshop at Severtsov Institute of Ecology and Evolution, 19.10.2011

Kvartalnov P.V., Abdulnazarov A.G., Samotskaya V.V., Poznyakova Yu.M., Ilyina I.Yu. First data about breeding and behaviour of Large-billed reed warbler (*Acrocephalus orinus*) – an endemic of Badakhshan. – Presented at meetings of Moscow Naturalists Society (Moscow Zoological museum, 6.10.2011) and Saint-Petersburg Naturalists Society (Zoological Institute, 1.11.2011).

Plans for future

In 2012 yr we want to continue our investigations in Gorny Badakhshan Autonomous region in Tajikistan. We are planning to organize a complex expedition with vertebrate zoologists, hydrobiologists, heobotanists and forestry specialists from Russia (Lomonosov MSU, Moscow Zoological museum) and Tajikistan (Pavlovsky Institute of Zoology and Parasitology, Pamir Biological Institute, Forestry organization of Badakhshan, Central-Asian University). Our aims for 2012 yr – further studying of biology and distribution of rare and little-known species (such as *Acrocephalus orinus*), describing the current condition of riverside forests and other sensitive nature communities of Pamir mountains, detecting the permissible level for human usage of natural resources in Badakhshan.