countries. It is recommended, in general, that policies for the development of biofuels made from food products or that imply the displacement of food production should be avoided.

3 Measures to take advantage of the potential of Andean crops

- Innovation is vital in the exploitation of the commercial potential of Andean crops. It is recommended that innovative ideas should be exploited to access niches in the market that value biodiversity.
- Likewise, conference participants recommended the creation of measures and mechanisms to allow the local population to have access to Andean products at reasonable prices, which would in turn help to reduce the indices of chronic malnutrition.
- It is recommended that a programme of education be developed to provide information on the appropriate use of food products, including adequate combinations and quantities of food, nutritious recipes and the use of medicinal plants.
- There needs to be the creation of mechanisms for the protection of property rights and patents for natural resources that originate from Andean ways of life, forms of use and customs as well as for the protection of intellectual property, especially in the area of plants that have nutritious and medicinal value.
- It is recommended that governments from Andean countries prioritise the development of strategies on various levels to counteract climate change, to guarantee the preservation of the biodiversity of food and food sovereignty in the towns of the sub-region, and to urge the countries to contribute towards reversing the process of climate change.

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Invertebrate Monitoring at GLORIA Target Regions: The First Results From the Urals and Need for Global Networking

Yuri Mikhailov

Vascular plants remain the key objects in the research of alpine biodiversity and prime indicators for biological monitoring of climate change in alpine habitats. However, other organisms have clear potential as biosensors as well. For example, insect herbivores appear to be more sensitive to climate change than their host plants (Hodkinson and Bird 1998). In general, animal species diversity may exceed plants by factors of five to ten (Körner 2001). Therefore zoologists are able to provide an important contribution in our understanding of alpine biodiversity patterns in general. Unfortunately only very few of us participate in European or global networking activities as actively as botanists do.

GLORIA (Global Observation Research Initiative in Alpine Environments) is a long-term international observation network studying climate change impacts on mountain biodiversity (*www.gloria.ac.at)*. The basic attempt of GLORIA is the 'Multi-Summit approach'. Providing the data on the different altitudes on species richness, composition and distribution patterns along vertical and horizontal gradients are among the main aims of this approach (Pauli et al. 2004). This makes it possible to assess the potential risks for biodiversity losses due to climate change.

Although the 'Multi-Summit approach' focuses on vascular plant diversity in exact target regions, other organism groups are integrated on an optional basis as additional indicators. Taking into account the high indicator value of invertebrates, the decision was made to add them to the monitoring of the summits of the Urals as the target regions (RU-SUR and RU-PUR) during a re-recording campaign in 2008. As there has been no specific research protocol for invertebrate monitoring, the original one for this purpose was developed by myself *(www.gloria.ac.at)*.

As most typical alpine insects are wingless and crawl or run on the surface of the soil like spiders and millipedes, pitfall trapping (Barber's traps) is the best way for intercepting invertebrates. The standard plastic cups (75 mm) proved to be the best kind of containers for sinking into ground. Three percent water solution of acetic acid was used and strongly recommended as a fixative for the traps left for less than a week as the most ecologically safe and easily available means to trap the insects.

For GLORIA research, a so called "cross-pattern" of two lines with 10 traps each (20 traps per pattern) was first proposed and approved (Figure 1). For this purpose the main line (10 traps) of each "cross-pattern" follows one of the principal measurement lines: North, South, West, East (Figure 2) and another 10 traps form a perpendicular line to the first one. The "cross patterns" are established between the principal corner points p5m and p10m (see Multi-Summit sampling design in Pauli et al. 2004). If the summit area is very small, it is possible to establish traps between HSP and p5m, but in both cases their situation is fixed in connection with the corner of respective quadrant cluster. The "ideal case" for the "ideal summit" is shown on Figure 1. However, the complexity of the summit landscape and large number of stones always causes a different actual pattern.

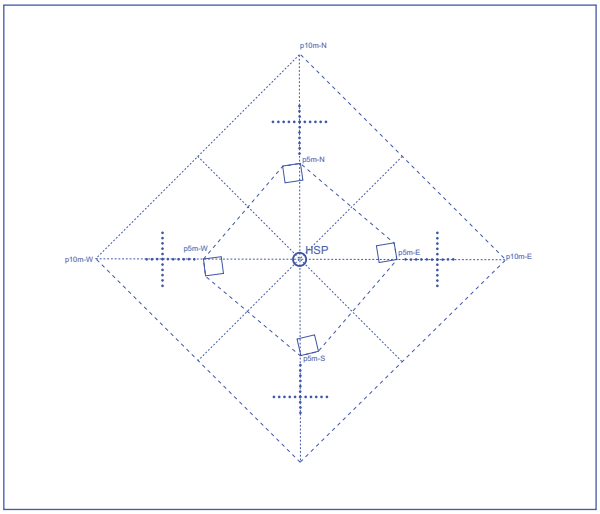


Figure 1: Cross pattern trap - ideal case for "ideal summit".

After a fixed period (from two or three days to one week) the traps are removed and the invertebrates from each trap are recorded separately in a field manual. If any insects are still alive, it is better to release them to minimise the negative effect on local fauna. The exact determination of collected insects is made in the laboratory by comparing them with reference collections.

As a result the species lists are made for each summit area section. Each species in the list is provided with the following information:

1 Number of collected specimens;

2 Abundance (in the form of dynamic density, i.e. number of collected specimens per unit of trappability (10 trap/days);

3 Role of a species in a biotope (Renkonen's dominance – rarity). Species with percentage five percent and more are dominant, from two percent to 4.9 percent - subdominant and less than two percent - rare;

4 Distribution area (longitudinal aspect): Holarctic, Palaearctic, Eurasian, Euro-Siberian, West- or East-Palaearctic, Siberian, subendemic or endemic to the Urals);

5 Distribution area (latitudinal aspect or zonobiome/altibiome preference): alpine, arctic-alpine, boreo-montane (including hypoarctic-montane), boreal (including arcto-boreal), polyzonal, etc.).

The above information is a subject for further comparisons between summit area sections inside one summit and between summits in space and time. The analysis is still in progress but the first results from the South Urals are important enough to present here.

Before, we expected (Mikhailov and Olschwang 2003) that climate change may cause the decrease of true alpine, arctic-alpine and similar species and increase of those of widespread (polyzonal) ones. This may be not only an indicator of the "well-being" of the local fauna on each summit but also show the nature of expected shifts. In this case the lower summits show what may happen on the higher ones under conditions of further climate change.

For dominant and subdominant species, the latitudinal aspect of their distribution (zonobiome/altibiome preference) was studied (Figure 3).

From this point of view, the highest summit – Bolshoy (Big) Iremel' (1,565 m.a.s.l.) – demonstrates classic composition of invertebrates: alpine + arctic-alpine + boreo-montane elements. Only these groups occur on the western and southern sectors. From these sectors, both alpine and arctic-alpine species constitute from 25 percent to 40 percent while boreo-montane species are less important (20-33 percent). Polyzonal species occupy only 13 percent both on the eastern and northern sectors and boreal species (13 percent) only on the northern sector. At the moment this summit is in perfect condition.

On the lower summit – Malyi (Small) Iremel' (1,437 m.a.s.l.) – composition is similar, but both alpine and arctic-alpine species constitute a lesser proportion (18-22 percent). At the same time, boreo-montane species play a larger role (20-44 percent). Boreal species here appear at all sectors and their proportion rises up to 30 percent. Polyzonal ones still constitute a lesser part (10-18 percent), everywhere except the eastern sector.

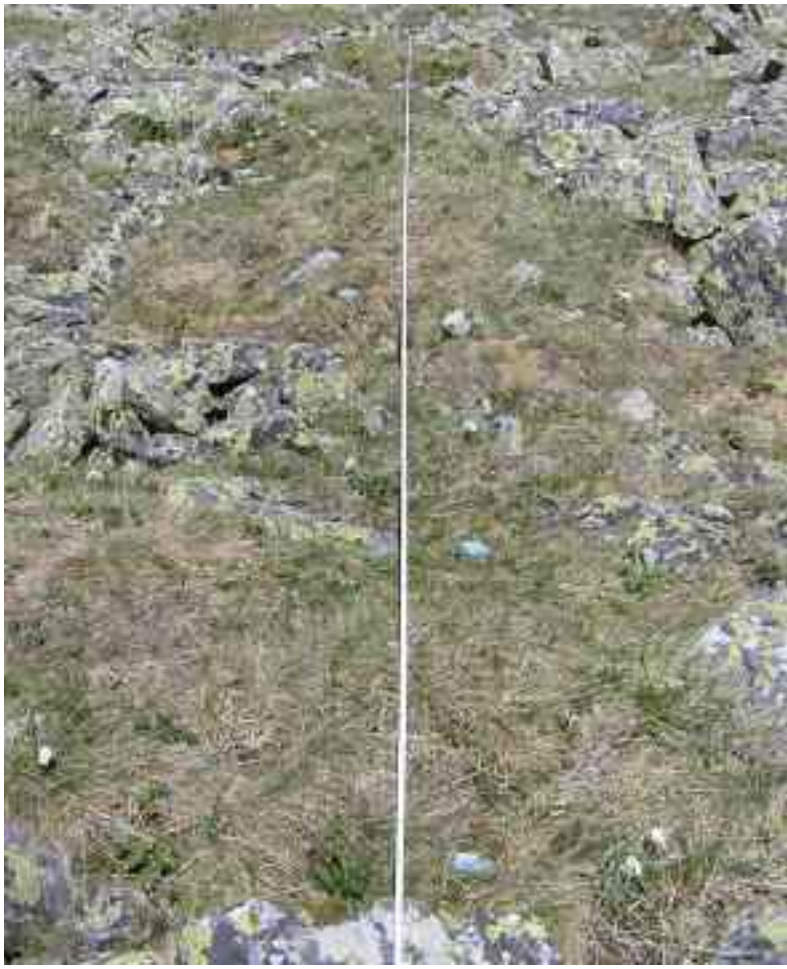
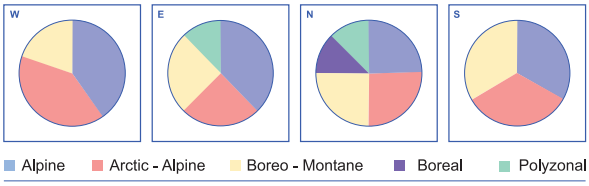


Figure 2: View of actual pattern of pitfal traps on the summit Bolshoy (Big) Iremel' (SUR-BIR). Photo: Yuri Mikhailov .

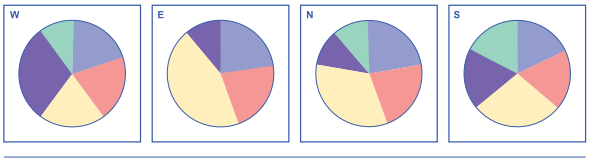
The lowest summit – Dal'niy Taganay (1,109 m.a.s.l.) – demonstrates quite a dramatic picture. Polyzonal species occupy from 27 percent to 38 percent of this area. Typical alpine groups (alpine + arctic-alpine + boreo-montane) occupy more than half only on the western sector; both northern and southern sectors share only 47 percent of these species. The eastern sector no longer posesses real alpine fauna. With boreal and polyzonal species (46 percent and 38 percent respectively) dominating, it has only eight percent of both arctic-alpine and boreo-montane species and no alpine species at all! This conclusion is supported by phytosociology. The eastern sector of Mount Dal'niy Taganay is covered not by true grass-moss mountain tundra as other sectors and other summits but by tundra-like vegetation of snow protected heath.

Still, these are only the first results and only from the south Urals. But the Urals as a whole, especially this part, have suffered more from climate change, as during the last 70 years the alpine zone in the south Urals has reduced by 10 - 30 percent (Moiseev and Shiyatov 2003). The data from Polar Urals is being analysed, while future investigations are planned for other parts (Pre-Polar, Northern, Middle Urals). Other target regions of GLORIA badly need their invertebrate researchers. Colleagues willing to join the zoo-team are welcome to contact GLORIA co-ordination or the author.

Mt. Big Iremel', 1565 m a.s.l. (RU-SUR-BIR)



Mt. Mal. Iremel', 1437 m a.s.l. (RU-SUR-MIR)



Mt. Dal'ny Taganai, 1109 m a.s.l. (RU-SUR-TAG)

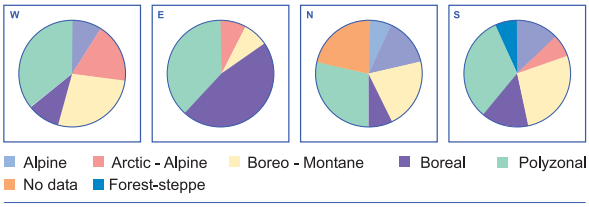


Figure 3: The percentae of species with diferent types of distribuation lalittudnal aspect or zonobime/attilsiome preference at the summit of the target region, South Urals.

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For further information about GLORIA, contact Dr. Harald Pauli *harald.pauli@univie.ac.at* or go to GLORIA (Global Observation Research Initiative in Alpine Environments) *www.gloria. ac.at*).

Walking through My Land: A little Sparrow

Walter Bishop V.

With a diversity and quantity that makes them almost annoying, the sparrow, member of the *Passeriformes* order and of the *Emberezidae* family, is mentioned in an incredible amount of poems, songs and in plain literature of all languages.

In Mexico there is a famous song about this little bird: "Gorrioncillo Pecho Amarillo" (Yellow Breasted Sparrow) composed by Tomas Mendez and sung by all the Mexican country singers. In English there is an Australian song written by Bruce Woodly for the Seekers, appropriately called "The Sparrow Song".

"Fly little sparrow
High above the clouds,
Looking for a place to
Lay your weary body down.

Fly on little sparrow
Northward to the sun,
Wonder if you'll ever
Find yourself a home."

These are the first and second verses of this melancholic melody, that I bring to your attention because they exemplify the plight of one of Mexico's sparrow species catalogued as 'Endangered', and about to disappear forever (2008 IUCN Red List Category, as evaluated by BirdLife International, the official Red List Authority for birds for IUCN).

The Sierra Madre sparrow, *Xenospiza baileyi*, Gorrion Serrano in Spanish, is the only species of the genus *Xenospiza* and is endemic to Mexico. Because of the loss of its habitat, it can only be found today in two locations in the country: one in the State of Mexico; and the other in the State of Durango. This is

Sierra Madre Sparrow. Photo: W. Bishop V.