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Refugial Forest from the Western Lesser Caucasus

Priject ID – 090107

Final Report

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Project Background and introduction

The Caucasus is included in the IUCN list of the Biodiversity Hotspots (Zazanashvili 2004). The reasons are a high overal diversity of plant and anymal species compared to other places in temperate zone, and continuous antropogenic impact on the wildlife. Proportion of endemic species within Caucasus region also are high, reaching to 80% in some taxnomic groups. Several Priority Areas are outlined, within the Caucasus Hotspot, including the Western Lesser Caucasus (WLS from here). Forests of this area have extraordinarily high proportion of Tertiary relics (Denk, 2001). Until early Pliocene, forests with domination of beach were widespread throughout the northern hemisphere. After "Messinian Crisis" continuous forest area became fragmented. This caused separation of the ranges of many species into isolated fragments and triggered evolution of endemic forms. 20 to 30% of Caucasian flowering plants, fish, and terrestrial vertebrates are endemics, and possibly not less invertebrates. For example 75% of terrestrial mollusks are endemic to the Caucasus. WLC, where humidity is the highest in the western Eurasia (rainfall up to 4,000 mm), has especially high number of endemics. Typical relic species are Rhododendrons, other evergreen shrubs, stream salamanders, mud-divers, beach snail, a complex of rock lizards (Darevskia), Robert's vole etc. These species often depend on the old-grown broadleaf forests.

Extensive logging, in recent two decads caused the degradation of forest. There are two anticipated reasons: use of wood for fuel and harvesting valuable timber. Commercial logging is targeted on the old-grown broadleaf forests. According to the UNDP/Sida Report (2005), 393,000 cubic metre timber was harvested in Georgia in 1990, 290,000 in 1995, 327,000 in 1996, 447,000 in 1998, and 442,000– in 2000. Thus, the volume of harvested timber in early 1990s (the local economic situation was very poor) increased to less extent than in late 1990s (the situation started to improve). Therefore, timber trade is more important problem than logging for local needs. Commercial logging destroys first of all forests and is main hazard for the local biodiversity. Although fact of deforstation concerned the public, no special attention is paid to the old-grown forests. It is assumed that presence of forest itself is important, but what kind of not really discussed. Logging is advocated if any reforestation measure is planned, even if planting species non-typical for the area. This does not help to maintain biodiversity.

Determining conservation priorities should be based on scientific investigations. So far most of conservational activities conducted in Georgia were not supported information received from scientific studies. For example, all national parks except Colchis was created only as a result of visual pleasure and not based on any judgment of its importance compared to other places. The same could be said regarding to most of the conservational projects realized in Georgia recent 20 years.

We know that WLC and particularly Meskheti range is richest in endemic and relic species (Denk, 2001; Zazanashvili 2004). Even without knowing levels of anthropogenic pressure, such a place with very high biodiversity should be protected.

The project was due to outlining the most important sites for the conservation of the relic and endemic species complexes of the WLC priority area and raising public concern for the endemic complexes. To approach our aims, we have made two main working directions in our project. First was preparing the reliable background to judge the importance of the target places for the biodiversity maintenance and the second - the public oriented work, which includes educational works with local people and exchanging information with decision making organizations.

Methodology

Species distribution data: For identifying most important sites for endemic and relic species in the WLC we choose species from different taxonomic group for further study. This species are:

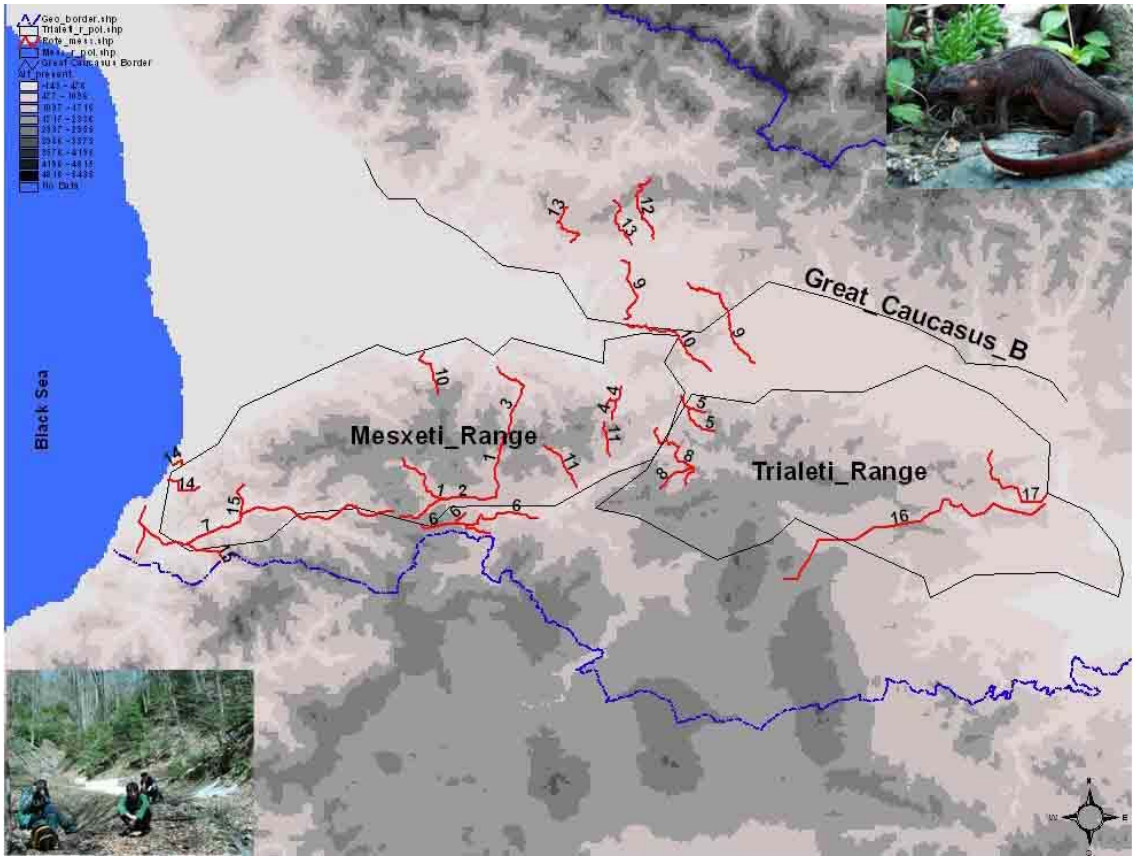
1. Rhododendron ponticum - Plant
2. Rhododendron ungerni - Plant
3. Rhododendron smirnovi – Plant
4. Fagus orientalis - Plant
5. *Dendrobaena faucium – Earthworm*
6. Helix buchi – Mollusk
7. *Procerus caucasicus - Insect*
8. Mertensiella caucasica – Amphibia
9. Pelodytes caucasicus – Amphibia
10. Darevskia clarkorum – Reptile
11. Darevskia mixta - Reptile
12. *Vipera kaznakowi – Reptile*
13. *Chionomys roberti – Mamal*

14. Neomys schelkownikowi – Mamal
15. Sciurus anomalus - Mamal

All above listed species are either forest inhabitant or relic ones.

Although some bibliographic data are available for the distribution of enumerated species, most of the data are not suitable for any local distribution pattern analysis. Range prediction and habitat suitability analysis using multivariate methods requires precisely identified presence locations. Besides that, to predict species distribution pattern more preceselly, collected samples should be as good representative for whole population as possible. For this aim, we collect distributional data within WLC and closely situated Trialeti range, ecological data for habitat requirements for each species and conduct field works in the study region. Expeditions were continuously conducted from early summer to the end of autumn in 2007 (map 1). For capturing small mammals (voles, shrews) and running beetles we used live traps. Other species were recorded during investigation along the transects (map 1). For each locality where target species were found, point description - forest type, mean size of trees, exposition, elevation and GPS coordinates were obtained. Selecting sampling

map 1. Study areas (black lines) and transects (red lines)



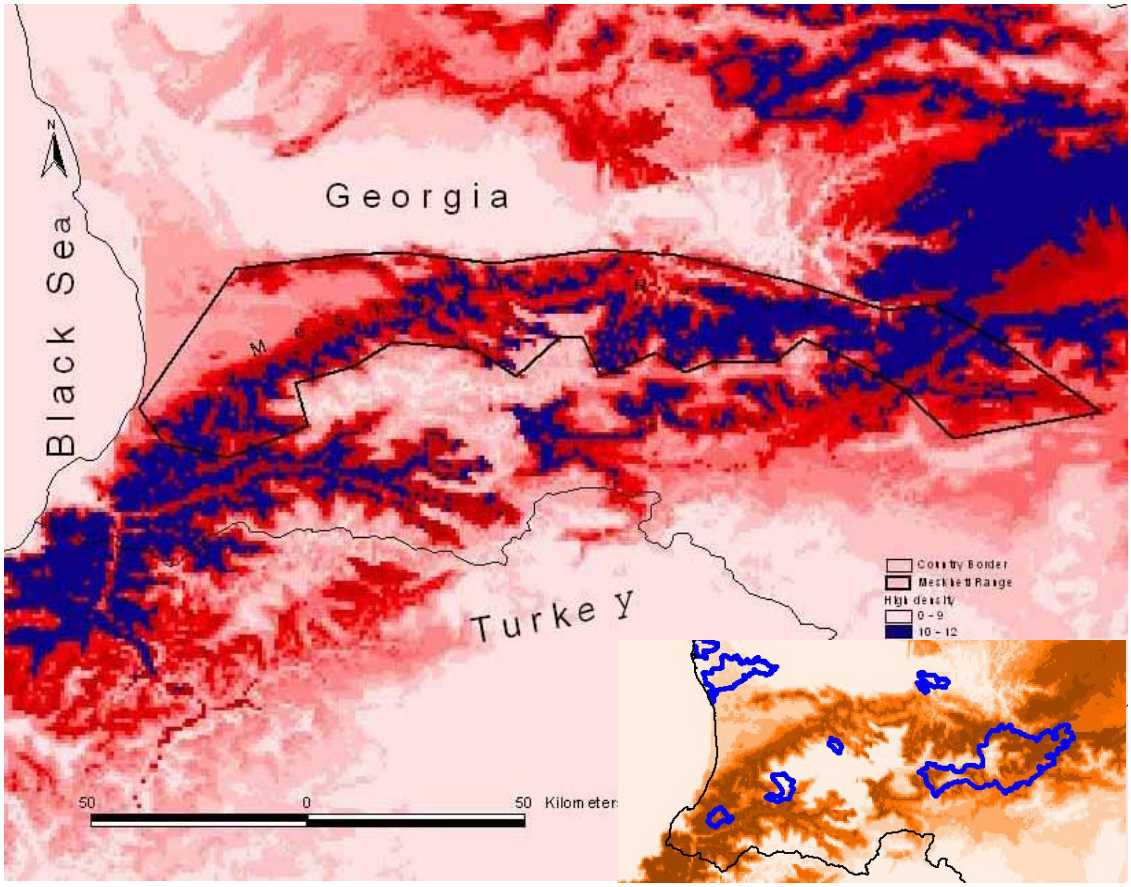
strategies and field data collection was guided by the methods described in Newtons (2007) and Southwood&Hendersons (2000) books.

Environmental data: Besides the data collected during field work, we also obtaine climate data from worldclim database (http://www.worldclim.org) which includes 19 bioclimatic variable with resolution ~1km. From http://www.cgiar-csi.org we have downloaded elevation data with resolution of 90 m., using this data we calculate landscape rigidness. All above environmental variables were used to model probabilistic distribution areas of target species. For modeling we used several algorithmic approaches available in GIS. To test model performance we used AUC (area under receiver operating character (ROC) curve) and model with high AUC values (>0.8) where used for following analysis. Modeling algorithm - BIOCLIM which gave acceptable AUC values for most of species (11) were chosen as a final modeling technique (Hijmans, 2005). After obtaining species distribution models, each model were multiplied (i.e. probability for each corresponded 1X1 km grid cells were multiplied for each species) to produce map of important habitats for target species.

Project Results and Future implications

Modeling: As a result we have created species distribution data which was used later to produce map of most important areas for endemic and relic species (map 2). In final mapping we used only 11 species out of 15 (above listed species in normal font with AUC>0.8). Main predictor for in our analysis was the climatic variables (mean monthly temperature, precipitation in driest month and temperature warmest month – predicts 75 % of species distribution within studied area). As it shown on the map 2, most important places are continuously distributed from East to West and include manly the unprotected areas. Precisely, only 14 % of Meskheti range is included in three national parks (Borjomi, Kintrishi and Mtirala national parks). It is also possible to conclude, that identified areas must be important corridor for the species distributed in this area. East to Meskheti range situated Goderdzi pass is pre historically main barrier for species dispersal as it shown in our analysis and other studies as well (Tarkhnishvili et al, 2000). North from Meskheti range Colchis lowland plays the role of uncrossed border and the Likhi range remains the only bridge between South and Great Caucasus. In this point of view, Meskheti range and

especially outlined part within the range (map 2) are most important areas to maintain wildlife.



map 2. Blue areas – most probabilistic suitable areas for endemic and relic species. Blue lines in small map – borders of protected area

Treats to the study area and Public awareness: Although our project was not intended to identify and measure the levels of the treat, during field work, we had a close contacts with local people. As we identified, everyone without exception from the study area are using timber as fuel in winter. Also in Meskheti range we

Fig 1. Such big trucks with timber in Meskheti range is usual

have counted 37 small working saw-mill. Meskheti range is experianced by such kind of influence for several tens of years, but the threat is much higher now than before, unregulated timber utilisation is the reason of this. As a result of unregulated timber production manly old and reproducable trees are cuted down. Another problem associated with timber production in this region is the forest flore degradation during the transportation.

Fig 2. Degraded forests in the Meskheti range

During field work, we had an intensive educational work with local villagers. We were lecturing them about the importance of old grown forest as a resurce for ecosystem functioning, ecotourism and diversity maintanance. Later on we have developed informational booklets for the locals, demonstrating historical importance of old-grown forests and endemic complexes as national (and world-scale) heritage. The point of the booklet was: to inform that we still have the species extinct elsewhere in Europe millions of years ago; to show that endemic species survived for over ten millions of years, are at risck to destroy them for short-term needs in few years; to state that it is the nation's responsibility to protect one of the Planet's

biodiversity hotspot. The booklet was shown both the mysterious primary forest landscapes and their endemic inhabitants, on which, because of their secretive mode of life, usually insignificant attention is paid. Although public awareness is very important in conservational framework, there are other factors influencing on it as well. Meskheti range is not very atractive to develop intensive tourist infastructure. Only reliable perspective seems to be the conservational education for local people and economic well-being not defended on the woods to survive. As the recent years, the economic situatuin is getting much better, we hope rising conservational and general education should be an impresive effect.

Project results were anounced to the decision making organisation of govermental and nongovermental bodies. We had a one day presentation/discusion meetngs with stuff of agency of protected areas, WWF representatives, Georgian Red List commision and other small NGOs, where we presented our results and gave suggestions how to continue the work for future conservation. We have shown strong correlation between our result and Eco-regional Conservation Action Plan for the Caucasus and NBSAP of Georgia.

Benefits for team members: During project implementation we have improved skills and gained knowledge in different fields. First of all, we got experiance in field work, collected lots of data, which was used in this project, will be usefull for future scientific purposes. Project team and particulary team leader got familiar with GIS environment, an important tool for anyone working in conservation. We also gained some important equipment from this project, which is considirable for our future work as well.

Future paln: We are going to continue work on conservation issues towards to several direction: 1) environmental and conservational education for communities inhabited in Meskheti range; 2) developing scientific base to strengthen conservational importance of Meskheti range 3) working with decision making organization to promote actions for Meskheti range conservation.

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