

# European biodiversity research for a sustainable Europe:

Research contributing to the implementation of the EU Biodiversity Strategy



**Report of an electronic conference, March 2007**



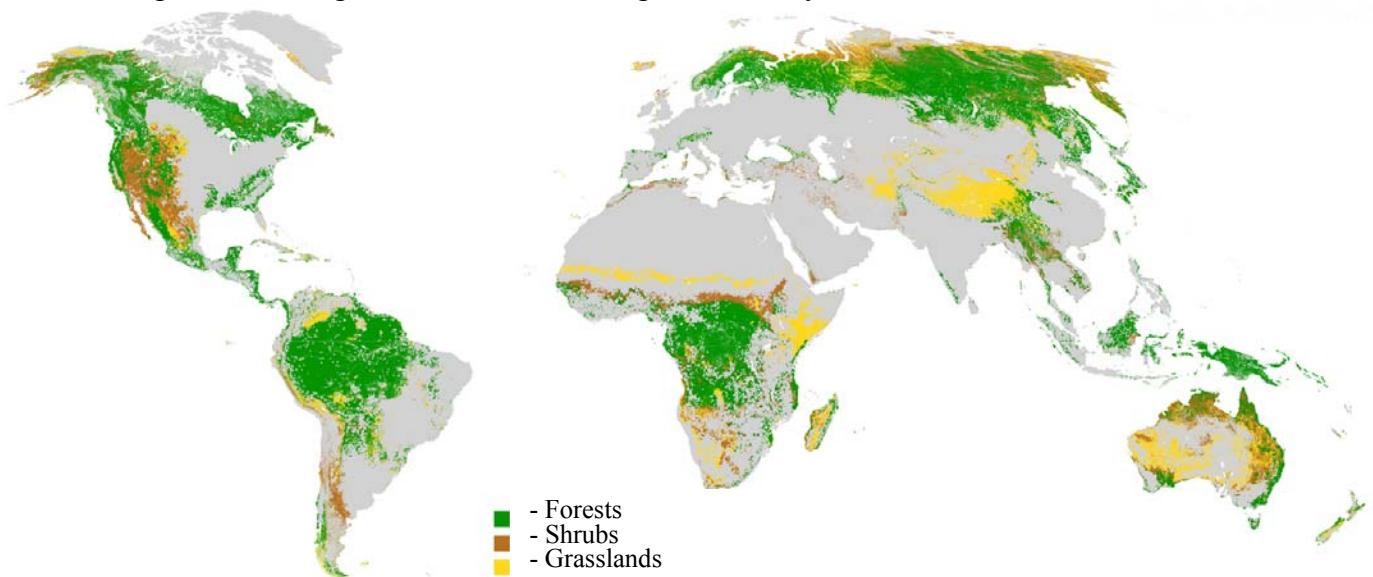
## Megadiversity vs. keydiversity

**Elena Bukvareva**, Severtsov Institute of Ecology and Evolution, Russian Academy of Sciences, Moscow.

### 1. Expanding the coverage of “global perspective”.

Traditionally the general direction of the “global perspective” is from Europe to tropical areas and developing countries. I believe that coverage of “global perspective” must be expanded. Today there are four main realms of natural ecosystems in the Earth (see fig.1): two boreal realms (North-American and North-Eurasian) and two tropical realms (South-American and African). The other larger parts of the globe have no productive natural ecosystems (arid territories, highlands, ice, man-transformed areas). These four main nature realms provide the most part of biosphere regulation. They are key territories for biosphere stability and “global perspective”.

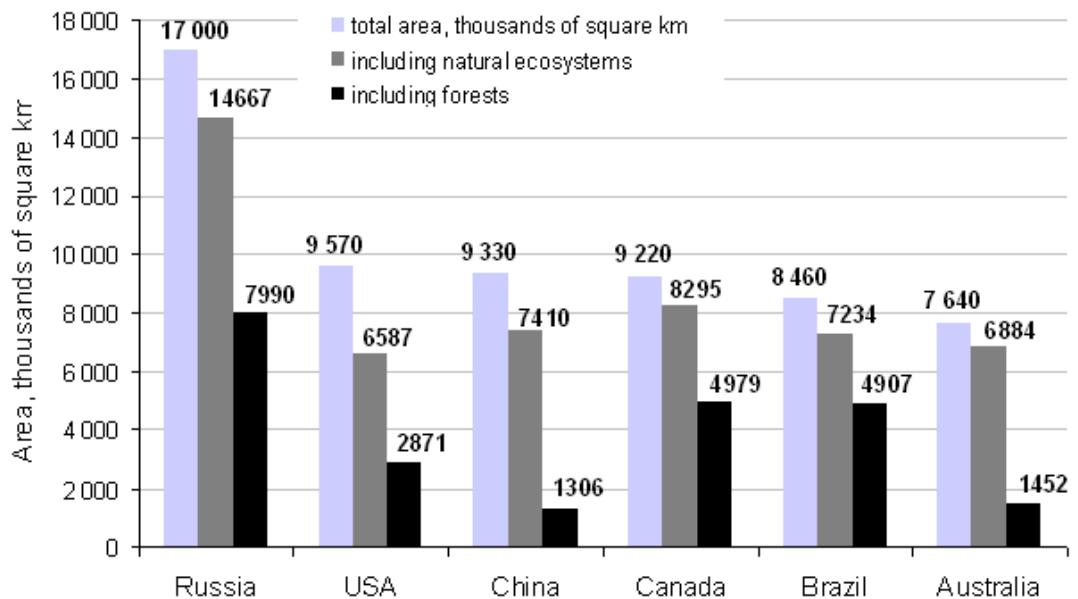
Figure1. The largest massifs of surviving nature ecosystems



Sources: Global Land Cover 2000 and Millennium Ecosystem Assessment 2005

In terms of politics there are three countries that are responsible for conservation of the largest massifs of productive natural ecosystems: Russia, Canada and Brazil (fig.2, based on data of the GEF project “Conservation of Biodiversity of Russian Federation”). The African nature realm is divided between many countries. In fig.2 the black bars show forests – the land ecosystems which are the most important for biosphere regulation. Russia, Canada and Brazil are responsible for conservation of the largest forest areas and providing its biosphere functions. These countries are key elements of “global perspectives”. Stability of biosphere first of all depends on nature management in these countries.

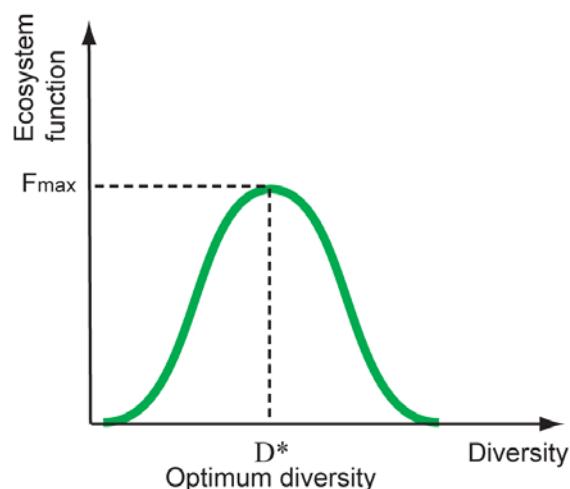
Figure 2. Countries that are responsible for conservation of globally-significant nature massifs



## 2. “Megadiversity” vs “Keydiversity”

Species diversity is essential, but not the most important criterion for prioritisation of life-supporting functions of ecosystems. Undisturbed nature systems (ecosystems as well as species and populations) have optimum levels of diversity (species diversity, intraspecific and intrapopulation diversity, accordingly). Optimum levels of diversity provide the most viability of a biosystem and the most effective ecosystem functioning (fig.3).

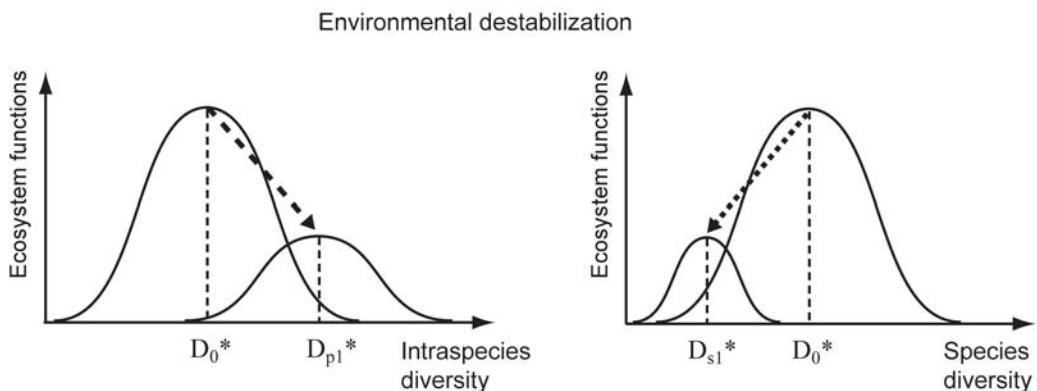
Figure 3. Optimum biodiversity and ecosystem function



The value of optimum diversity depends on environmental factors and properties of the biosystem. When we compare evolutionary similar biosystems the most important factors are stability and “richness” (intensity of resource flow) of the environment. Our modelling researches show that species diversity and intraspecies diversity

change in opposite directions when environmental instability increases. In more unstable environment species diversity decreases, but intraspecies diversity increases (fig.4). There are many empirical studies of this pattern.

Figure 4. Changes of optimum levels of biodiversity when environment becomes more unstable



This result may be interpreted as redistribution of regulating functions between diversity in two adjacent hierarchical levels – biocenosis (with species diversity) and species (with intraspecific diversity). Thus, in more unstable environment significant part of regulatinf functions pass from species diversity to intraspecies diversity. Such is indeed the case in relatively unstable and “severe” boreal biomes. Taxonomic diversity per se can't serve as criterion of effectiveness and stability of ecosystem function. The criterion is the natural state of ecosystems and species which have the optimum levels of diversity. Undamaged by man ecosystems are key elements of global regulation. That is we need to speak not about “megadiversity” regions and countries, but about “keydiversity” regions and countries.

### 3. Cataloguing at the time of fire

Inventory and cataloguing of biodiversity is necessary and important activity. But... against a background of global and massed destruction of biota it looks like demand to hurry up with cataloguing of books at the time of fire in library... Today incompleteness of our biological knowledge can't be an obstacle for nature conservation. The main barriers are socio-economic and political factors: poverty, wrong income distribution, lack of political will, human population explosion...etc. What is the matter – biologists don't know what to say? Other people (politicians in the first place) hear them badly - therein lies a problem!

### 4. Tropical and boreal biodiversity: competition for attention of investigators

As regards identification of biodiversity - it is far from complete, and not only in tropical areas. In boreal ecosystems, the main taxons which play key ecological roles (protists, fungi, lower plants, many groups of invertebrates) are not adequately explored. Exact numbers of species in these taxons is unknown. But it is only a part of problem. As mentioned above, in boreal ecosystems a substantial part of regulating functions passes from species diversity to intraspecific diversity. In the north, loss of any geographic or ecological form of a widespread species will lead to great degradation of ecosystem functions – just as loss of a species will in tropics. Have we got full information about intraspecific diversity of boreal species? This question is rhetorical.