

NATURE MANAGEMENT, RESOURCE SAVING AND ECOLOGY

Kovalenko Ihor

Doctor of Biological Sciences, Professor of the Department of Ecology and Botany
Sumy National Agrarian University, Ukraine

Karpenko Maryna

Master's Student
Sumy National Agrarian University, Ukraine

CLIMATE CHANGE AS ONE OF THE PRIMARY THREATS OF THE BIODIVERSITY DECLINE

Climate relates to a complex physical system that is determined by the interactions between the states of atmosphere, space, the surface of the oceans and continents, glaciers, volcanoes, and biota. Due to these interactions, complex natural fluctuations arise in the climate system in diverse time frames ranging from several weeks to hundreds of years [1]. Climate change is a shift in the climate state that can be identified by changes in the mean and the variability of its properties continuing for extended periods. Climate change may be caused by natural internal processes and/or human activity [2].

Biodiversity is defined as the diversity of all living organisms, including terrestrial, marine, and other aquatic ecosystems and the ecological complexes; this concept covers diversity within species, between species, and the diversity of ecosystems. Biological diversity is the basis for human existence, an integral part of the environment. At the same time, human activity has substantially disrupted the state of the environment, including endangering of fauna and flora, natural ecosystems [3]. Today, biodiversity loss is one of the global environmental challenges.

According to the World Wildlife Fund's Living Planet Record of 2014 [4], there are seven principal causes of the global decline of biodiversity (Fig.1.).

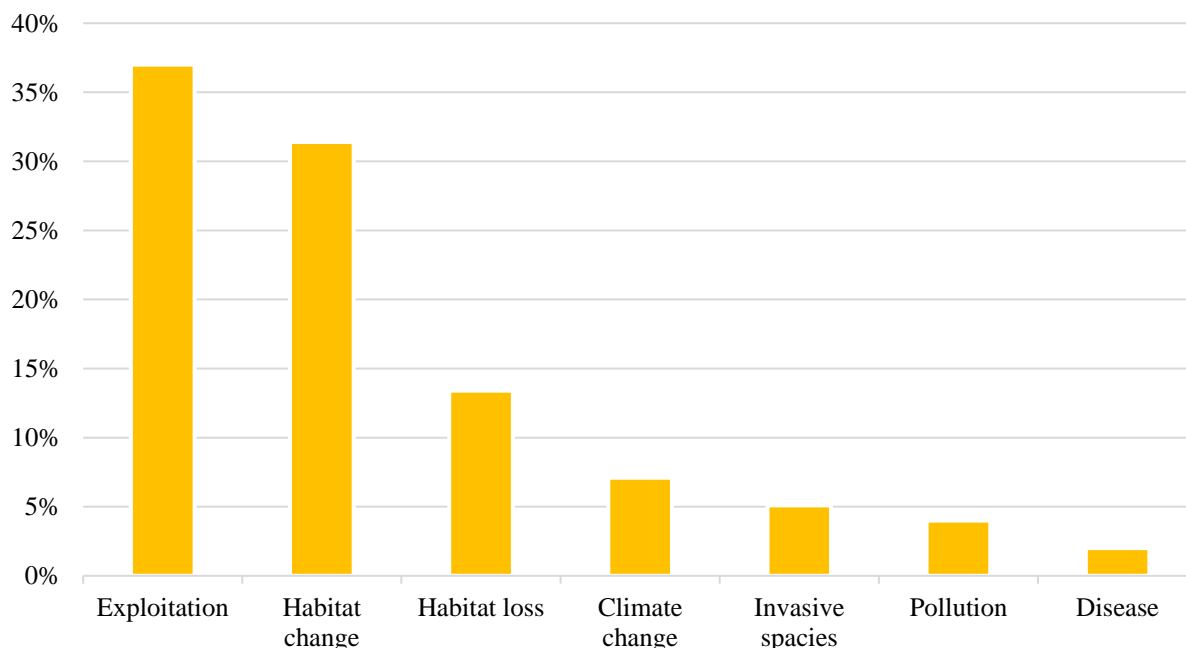


Fig. 1. The principal causes of the global decline of biodiversity

In percentage terms, the exploitation driving by human beings has the greatest impact on the population decline. It includes intentional or accidental fishing and hunting. As a result of excessive poaching, sturgeon stocks in the Black Sea and Sea of Azov have actually been destroyed. The level of poaching of birds and mammals, even those listed in the Red Book of Ukraine (e. g. golden eagle, great bustard, European bison, lynx), is constantly increasing. The above reason also contributed to a significant decrease of the Ukrainian population of brown bears from almost 1,300 to about 300 individuals over the past 50 years. The number of moose has significantly reduced as well; in general, the total amount of ungulates in Ukraine has decreased by 30 per cent over the last 11 years [3].

The Fig. 1. shows that habitat change and habitat loss (as a result of the fragmentation or complete destruction of the habitat, as well as the deterioration of its basic features); invasive species (which can compete against native ones for the territory, waters, food or other resources); pollution and disease are primary threats to species diversity too. Concurrently, the percentage of climate change impact on biodiversity loss amounts only to 7,1 points.

On closer scrutiny, all those threats are exactly the result of climate change or, at least, are interrelated matters. Such weeds as hogweed and ragweed provide a

good illustration. They are found throughout Ukraine today, gradually replacing local perennial plants and posing a danger to human health. This case can be referred to “invasive species” threat classification. However, a detailed study of the issue reveals that habitat change, the rapid emergence and settlement of invasive species, including many poisonous weeds, allergens, etc., are provoked by precisely climate change [5] as invasive species are usually more sustainable and relatively undemanding, having a high ability to adapt to swiftly changing state of the environment.

The impact of climate change on biodiversity is underestimated, as it significantly exacerbates (or even causes) the above threats, leading to changes in habit conditions, its degradation, and the emergence of new factors that affect the life cycles of species, disrupt established conditions, and reduce the ability to adapt.

Climate change is a crucial factor in environment alteration, particularly alterations in the habitats of plant and animal species, in the animal migration routes, in the life cycles of species, their productivity, relationships with other species, etc., resulting in modification of biodiversity functions [3]. Biological diversity trends are important because they are the general indicators of ecosystem health. The global Living Planet Index, a measure of the world's biodiversity state based on population dynamics of vertebrate species, shows an average 68 per cent loss in population volumes of birds, amphibians, mammals, fish and reptiles between 1970 and 2016 [4].

The problem of biodiversity decline is relevant both for the whole world and Ukraine. Despite the fact that Ukraine occupies 5,7 per cent of Europe's territory, at minimum 35 per cent of the European biodiversity is represented on its territory, which defines the importance of Ukraine in preserving the European biological species [3]. The projections indicate that the impact of climate change factors may lead to the reduction of plant species by 8 per cent and, respectively, of animals species by 10 per cent in Ukraine [5].

References:

1. Соколов Л. В. Климат в жизни растений и животных. ил. первое издание. СПб : изд-во «ТЕССА», 2010. С. 10–11.

2. IPCC Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Geneva, Switzerland. 2014. P. 119–120.
3. Kostyshyn V.A., Gubar, S.I., Domashlinets V.G. Strategy for developing the monitoring of biodiversity in Ukraine. Kyiv. 2009. P. 7–8.
4. WWF Living Planet Report. 2014. URL : <http://surl.li/acfis>.
5. Іванюта С. П., Коломієць О. О., Малиновська О. А. та ін.. Зміна клімату: наслідки та заходи адаптації: аналіт. доповідь. К : НІСД, 2020. С. 36–39.