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The Distressing Impact of Biodiversity Loss

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The dominance of mankind on Earth is accompanied by destruction of terrestrial and oceanic habitats and annihilation of a large number of animal and plant species ('Biodiversity loss' or 'Anthropocene* defaunation'). Despite the minor public awareness to the continuous impairment of biodiversity, meticulous research reveals severe consequences over humanity (Refs. 1, 2):

Economic harm: Biodiversity loss affects tremendously Earth's ecology, but also has a significant impact on the global economic output. The fishing industry is just one example of the decline of a primary protein source for over 20% of Earth's population, due to overfishing and ocean contamination and acidification. Another problematic example is the reduced diversity of agriculturally grown crops, that may endanger the food supply in case of a global species-specific disease or some unprecedented growth failure.

Food supply: Ever since feeding of humans depends heavily on agriculture, the growth of many crop species, that depends on fertilization by pollinators**, is threatened along a decline in pollinator populations (e.g., bees), a situation that reduces the global food availability.

Collapse of ecosystems: Each ecosystem is composed of complex networks of plants and animals, and so obliteration of any constituent may damage a food chain and the entire ecosystem and impair the balance developed amongst its components. A recent example was the 'Trophic Cascade' in Yellowstone park, when systematic eradication of wolves caused over-multiplication of elks (their preferred prey), which led to severe overgrazing and loss of plant species as well as to soil erosion. Remarkably, the collapse in this ecosystem stopped by introducing new wolf herds to the park. Another increasing threat has originated from massive deforestation particularly of tropical ecosystems (plants, fungi, algae, rare microorganisms) and the loss of potential pharmaceutical compounds (e.g., Taxol, Quinine) and other potential antimicrobial compounds. Such rare composites (actually secondary metabolites) are valuable to improve the crisis of antimicrobial increasing resistance. Notably, about 25% of all modern drugs were derived from such ecosystems (Ref. 3).

Loss of ecosystem services: Nature provides essential services, such as purifying air, filtration of drinking water and production of oxygen and macromolecules (in the photosynthetic processes employing CO2 and H2O as building blocks with sunlight as energy source). Particularly important is the absorbance of excess CO2 (produced mostly by the industry) that raises the green-house effect along rise in global temperature. The massive extinction of forests and oceanic cyanobacteria destroys Earth's carbon sinks, which emphasizes a need for disposal of the large CO2 quantities produced by humanity. Thus far, excess CO2 is piped into deep oceanic basins, where it liquidizes under the enormous

pressure. However, this is quite a risky solution as in case of a volcanic eruption, huge quantities of CO2 gas would be released to the atmosphere.

Increased risks to public health: In addition to the massive contamination of the environment and increased risks to living organisms including humans (Ref. 4), zoonotic dispersion of microbiological pathogens like the Corona, Ebola and West-Nile viruses may be boosted upon biodiversity loss and destruction of wild habitats serving as buffers that limit the viral spread***.

Increased human vulnerability to environmental disasters: Human populations are partly protected by surrounding vegetation (e.g., forests, grasses) from devastating storms, floods, avalanches and erosions. Intact ecosystems, such as mangroves and coastal wetlands, are natural shields of human communities. The destruction of the protecting ecosystems raises the vulnerability of populations under risk to alterations of extreme weather disasters.

The public apathy: The overuse of natural resources, massive environmental contamination as well as the continuous destruction of wildlife and biodiversity loss, are highly annoying, particularly due to the limited public awareness of putative future consequences. People should realize that besides dominance on Earth, Homo sapiens is just one species among many that evolved during millions of years along the development of all other life forms. All organisms are divided into various ecosystems, each maintaining balanced relations among its food-chain members. The developed cognition of mankind is unique in Animalia and could be expected to help in future survival and in aplying appropriate measures for Nature preservation. However, little was done while the current destructive situation of our Earth habitat may expedite human termination together with all other live organisms. In addition, the physical weakness of humanity limits attempts to withstand catastrophic incidents (hit by a very large asteroid; detrimental irradiation arriving from deep space; increase of sea level upon melting of the poles; microbiological uncontrolled pandemics; gigantic nuclear war). Ironically, not only that the ignorance of most people in regard to the distressing consequences of biodiversity loss would most likely harm humanity, it often provokes questions about the contribution of various species (e.g., ants, mosquitoes, flies, scorpions, centipedes, snakes, wild beasts) to human life. Since life on Earth developed in various directions (see tree of life), and each creature has some role in its ecosystem, people must accept that all other life forms did not develop according to a plan of serving mankind. Ants for example are vital for Earth's ecosystems, by dispersing seeds and plants pollination, control pests through predation and scavenging, aerate the soil and recycle nutrients via decomposing organic matter. Their immense biomass and abundance contribute significantly to soil turnover, associated with water infiltration, and being a food source for many other organisms. Mosquitoes and flies and their larvae play a foundational role as pollinators, food source for many animals, fertilizers of soil and water ponds, as well as nutrient recyclers. Scorpions, centipedes and snakes are natural ecosystem controllers, while being as well food source for various animals. Evidently, all such animals have a role in their ecosystems and so their obliteration may destroy food-chains and the delicate balance developed.

Overall, biodiversity loss undermines ecosystems crucial also for survival of mankind. Its direct effects include compromised food security (mostly via pollinator decline), increased risks of zoonotic diseases as habitats shrink, economic instability in agriculture

and fisheries and loss of yet unexplored medicinal compounds. Therefore, increase in human awareness to the need of wildlife preservation is definitely required.

*Anthropocene is composed of the Greek words anthropos-human; cene-kainos-recent; raised by the Nobel prize chemist P. Crutzen and biologist E. Stoermer to describe the recent era affected so roughly by humanity.

**mostly insects (e.g., bees, ants, beetles, flies, butterflies, moths), but also birds (e.g., hummingbirds in the Americas, sunbirds in Africa and Asia, honeyeaters in Australia) as well as vertebrates (e.g., lizards, mice, bats, lemurs).

***initial spread from wild animals to humans by close contact with blood, organs, or body fluids of infected wildlife (e.g., bats and monkeys).

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