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Climate change scenario foresees 30 pct of land birds extinct by 2100

Climate change may prove fatal for many bird species, with as much as 30 percent of all land bird species at risk of extinction by 2100, according to the worst-case scenario of a Stanford University study in which temperatures are projected to increase by 6.4 degrees Celsius. The most optimistic outlook foresees the extinction of up to 550 bird species.



Dr. Çağan H. Şekercioğlu

A recent study from Stanford University has stated that climate change may cause as much as 30 percent of all land bird species to become extinct by 2100, as rising temperatures will limit the availability of suitable habitats and sustenance. The research was funded by the National Geographic Society, the Wildlife Conservation Society, the Edward S. Moore Family Foundation, the Christensen Fund, the Koret Foundation and the Winslow Foundation. Dr. Çağan H. Şekercioğlu, a senior research scientist at Stanford University Center for Conservation Biology in California and the study's lead author, noted that the worst-case scenario of 6.4 degrees Celsius surface warming combined with extensive habitat loss is the basis for the 30 percent estimate.

The study, prepared by Şekercioğlu with three co-authors, including Stanford climatologist Stephen Schneider, found that hundreds of birds could become extinct owing to the "escalator effect." "Of the land bird species predicted to go extinct, 79 percent of them are not currently considered threatened with extinction, but many will be if we cannot stop climate change," stressed Şekercioğlu. "Our best guess is that climate change effects exacerbated by habitat loss will result in about 400-550 land bird extinctions by 2100, based on a 2.8 degree Celsius warming," he noted.

Şekercioğlu emphasized that increasing habitat loss exacerbates the effects of climate change because organisms seeking more suitable conditions will be less likely to find intact habitats. He noted that even with an intermediate 2.8 degrees Celsius warming, 400 to 550 land bird species extinctions are expected. "The worst climate scenario, on the other hand, foresees temperatures rising by 6.4 degrees Celsius, bringing with it an extensive loss of habitat and a loss of 30 percent of land bird species by the end of the century. Vegetational shift is the key issue here. Birds will follow the shift in habitat," he noted.

Şekercioğlu indicated that in his research he modeled changes to elevation limits of the ranges of more than 8,400 species of land birds using 60 scenarios, explaining that the scenarios consisted of various combinations of surface warming projections from the 2007 Intergovernmental Panel on Climate Change (IPCC) report, habitat loss estimates from the 2005 Millennium Ecosystem Assessment (MEA) report and several possibilities of shifts in elevation range limits. The IPCC report determined that power plants, transportation and factories contribute to global warming through the burning of fossil fuels and the MEA was the first global survey of the planet's ecosystems by 1,360 experts around the world.

Noting that all plants have certain temperature and precipitation requirements they need to flourish, Şekercioğlu said as lowlands become too warm for some species, higher elevations that were formerly too cool become better suited to their needs and the distributions of plants slowly move upward. "That shifting of populations renders bird species vulnerable to a host of challenges. Food will be more difficult to find as lowlands become warmer and plant and animal species on which birds feed either vanish or move to higher elevations, which may put birds in competition for food with additional species over smaller areas. Each bird species is found between specific elevations, limits based mainly on temperatures at which it can survive and the presence of plants, insects and other animals on which it feeds," he noted.

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Temperature decreases as one ascends a mountain, so as lowlands become warmer, plant and animal communities need to move higher in order to remain in their required microclimates. Most bird species live in the tropics, mainly in lowland environments. In many of these areas, there may be no higher slopes to which they can retreat. But even the presence of hills or mountains does not guarantee the survival of a species.

"It is like an escalator to extinction. As a species is forced upwards and its elevation range narrows, the species moves closer to extinction," said Şekercioğlu.

Şekercioğlu emphasized that birds are indicators of environmental health and if we are losing large portions of any group, this points to the collapse of an ecosystem. "It is not going to be just birds. The same dynamics are likely to affect insects, mammals, reptiles and amphibians," he cautioned, adding: "Climate change will likely have more destructive effects on these groups than birds."

The US Center for Biological Diversity has recently announced that the American pika, a rodent that lives in mountains of the American West, is being threatened by global warming. The center has petitioned the government to list the pika as endangered as a result of climate change. The pika is known to be intolerant to heat; experiments in the 1970s showed that just a few hours in 27 degrees Celsius temperatures can kill them.

The case of harlequin frogs in the mountains of Costa Rica is even more complex. They are clearly becoming extinct in a pattern that matches changes in global climate. A current hypothesis is that they fall prey to a fungus which benefits from complex changes in the microclimate. The fungus explodes in their range, thanks to ideal growth conditions caused by climate change, including cloudiness, day time cooling and night time warming.

Şekercioğlu noted that in some instances, species can expand their ranges, which he considered in his study. "If warming is limited by a rise, let's say, of 1 or 2 degrees Celsius, certain species may adapt and only the upper limit of a species' elevation range might rise. As warming continues, however, the lower limit is likely to rise, as well," he said.

The scientist stressed that rising temperatures and other environmental factors will cause a change in the characteristics of birds, along with a decline in their number. "As birds will no longer be able to live in their ideal habitat, they will be under stress, and this can affect their cycle of reproduction. There will also be conflicts between species because those which try to adapt to a new ecosystem at higher elevations can threaten other species which they have never encountered before."

Şekercioğlu stated that additional threats include interactions between the rising temperatures and other environmental factors, noting that the climate change will help tropical contagious diseases to spread in countries with temperate climates, including Turkey. Noting that the cases of malaria and leishmaniasis have increased in the last 20 to 30 years in southeastern Turkey, he said: "The cases of Crimean-Congo hemorrhagic fever and cholera have also been on the rise in Turkey for the last few years and warming temperatures will not help matters. Various climate models suggest that Turkey, in the near future, may develop a partially subtropical and humid climate, with parts of the Mediterranean coast becoming arid like the Sahara desert. By 2050, Turkey could resemble some African countries in terms of climate and temperatures. This will certainly bring with it significant problems in fields of health, agriculture and socio-economic development."

For example, as mountains in Hawaii get warmer, mosquitoes carrying avian malaria, to which most native bird species have no immunity, are moving upslope, invading the last refuges of birds already on the brink of extinction. In Costa Rica, toucans normally confined to lower elevations are colonizing mountain forests, where they compete with resident species for food and nesting holes and prey on eggs and nestlings of other bird species.

In addition, plant species that currently share a habitat may not all react the same way to temperature and moisture changes. Some species may be forced upslope while others are able to linger behind, tearing apart plant and animal communities even if all species survive. Differences in soil composition can further disrupt plant communities. If soils at higher elevations are inhospitable to some plant species, those species will be wedged between a fixed upper limit and a rising lower limit until they are squeezed out of existence.

"To effectively monitor the rate of change as warming progresses, especially in the species-rich tropics, we need a lot more data on birds' distributions and on the speed and extent of birds' elevation shifts in response to climate change," Şekercioğlu said.

Noting that perhaps the most worrisome finding is that each additional degree of warming will have increasingly devastating effects, Şekercioğlu

stressed that an increase of 1 degree Celsius from present temperatures will trigger roughly 100 bird specie extinctions. "But, if the global average temperature were to rise 5 degrees Celsius, from that point on an additional degree of warming, to 6 degrees Celsius, would be expected to cause 300 to 500 more bird extinctions," he stated.

"This emphasizes the importance of any measure that reduces surface warming, even if we cannot stop it altogether. Even a reduction of 1 degree can make a huge difference," he said, adding: "Giving up the fight against global warming would be the true disaster."

Upon a question over what kind of measures should be taken to protect bird species from extinction, Şekercioğlu said: "The most significant and effective step to be taken to this end would be to prevent climate change from expanding its scope. We should limit the production of greenhouse gases, greatly reduce the usage of coal, stop deforestation, especially in the tropics, and plant more native trees. Stopping deforestation and planting more trees will yield long-term and more effective results. It is encouraging that a recent study listed Turkey among countries where forest cover increased in the past 15 years, so we are on the right track. We should also establish extensive protected areas, such as national parks, that cover a wide range of altitudes and latitudes, in order to allow birds and other creatures to migrate when current conditions are not favorable for them. These protected areas will also be important for providing people with critical ecosystem services, such as watershed protection, ecotourism and carbon sequestration, improving human welfare and further reducing global warming."

23 December 2007, Sunday

BETÜL AKKAYA İSTANBUL

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