Messages from the Islands

Why is Nature's Diversity Dwindling?

Ilkka Hanski

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Overview

*Messages from the Islands i*s a riveting account of the diversity of nature and how new species are born and why old ones disappear. Internationally renowned ecologist Ilkka Hanski ponders environmental changes from an illustrative, general knowledge perspective so the book is also suitable for readers who are not familiar with ecology. The book takes the reader to six islands, from the tiny Haminanluoto Island in the eastern Gulf of Finland to Greenland, the world's largest island. The text is embellished by reminiscences of the young researcher's thoughts and excitement. Why have large species been successful in nature in Finland? How did the Granville Fritillary butterfly from Åland become the model species for population ecology research? Why did researchers become interested in dung beetles from the rain forests of Borneo and Madagascar? What do fluctuations in lemming populations say about the stability of Greenland's biological communities?

Messages from the Islands uses these examples to shed light on even bigger questions: Why do species change. What is the significance of habitat change, global warming and new species? The book helps the reader to understand why nature's diversity is worth protecting.

Reading sample

The Flies of La Gomera

The ferry trip from Tenerife to the island of La Gomera takes less than two hours. I stepped from the ferry into the port of San Sebastian de la Gomera on the afternoon of December 28, 1976. My intention was to make it to the village of Agulo on the other side of the island, 20 km away according to the map, by nightfall. As far as I can recall, the island had no bus routes, and as I remember, I first tried to hitchhike. I do remember finally starting to walk along the road towards the mountainous center of the island and from there towards Agulo.

Why was I on La Gomera in December 1976? As Christmas was drawing closer, I did not feel any particular need to go to Finland from where I had left just a few months prior to start my doctoral dissertation studies in England. My longing was directed at a place where I could do something at least remotely relevant to my upcoming dissertation over the winter. My dream was to go to the East African savannas researched by my dissertation supervisor, Malcolm Coe, to see those mouse-sized dung beetles that Tim Kingston kept in his insect boxes as he was finishing his dissertation. But I didn't have the money or any of the other necessities for a trip like that. I can't remember why I set off for the Canary Islands in particular; maybe I saw an advertisement for a reasonably priced trip. According to the stamp in my old passport, I arrived at the Santa Cruz de Tenerife airport on December 17th. The trip itself was exciting; it was my second time in an airplane.

On December 28th, day was turning to night and I had only made it to the center of La Gomera; I was just below 1,000 meters above sea level. It began to be clear that I was going to spend the night in a sleeping bag, under the stars, because I didn't have a tent – and what would I do with a tent on the Canary Islands anyway? I turned off the road onto a footpath to find a suitable place to sleep, but I couldn't find one immediately. The footpath lead along the side of the mountain, and I was looking for a slightly larger level spot. It started to get dark, and clouds filled the sky – and then it started to rain. It didn't rain hard, but just enough that the night became even darker. I remember how I rushed forward but couldn't find even just a few square metres of level ground by the path; the trail just continued exactly the same, and there was plenty of mountainside. Finally I had to face the cold, hard truth: The night was darkening so quickly that I would have to spend the night where I was standing. The next objective was to find a place on the path that didn't have a puddle or any immediate danger of rolling down the mountain. I suppose it was dumb to set my sleeping bag on the wet ground and crawl into it, but even that felt better than sitting in the rain and dark all night. Early, when it was still dark, I sat up to wait for the sunrise. As dawn was breaking, I was collecting 13 Calliphora spendens flies, 2 males and 11 females, from the laurel tree forest in the middle of La Gomera Island.

I was already familiar with the world of blowflies from my master's thesis in Helsinki. Calliphora flies are big, much bigger than normal house flies, and they have metallic blue abdomens. You can see them if you leave a little bit of fish on the ground in the shade for a day (setting the fish out in the open will attract more of the smaller flies of the genus Lucilia, which are gold and yellow in color). I had never seen a Calliphora splendens before, but there was no danger of misidentification. Calliphora splendens are the nobility of the genus,

worthy of their name – splendid – very large, very metallic and very beautiful. And it only lives in the laurel tree forests in the mountains – a great choice of habitat! The same forests house two relatives of the wood pigeon, the Palma dove and the Canary dove, both species native to the Canary Islands. To further develop the Finnish nomenclature for blowflies, I christened Calliphora splendens as the Canary blowfly right there and then. The Calliphora vomitoria and vicina flies that are common in Finland also live on the Canary Islands, and I wanted to find out in what kinds of habitats these three species and other blowflies lived. Calliphora vicina was abundant everywhere from the seashore to the top of the mountains, but it was particularly plentiful in open habitats. The Canary blowfly was the dominant species in the laurel tree forests of the mountains and Calliphora vomitoria was found in few numbers here and there.

How did these species end up on La Gomera? La Gomera became an island after a volcanic eruption some 10 million years ago, but the conditions were probably quite inhospitable for a long time for plants and animals to exist, so it was probably around 1-2 million years ago before a relatively large group of species was to be found on the island of La Gomera. Flora and fauna had spread through chance and their natural dispersion capacity; the blowflies could have flown in from the older island of Tenerife, which is just 20 km away.

The Canary blowfly is present on the islands of La Palma, Tenerife and La Gomera, and nowhere else in the world. Still, just by looking at it, its close relation to other blowflies is evident. What presumably happened was that an original blowfly form spread to the Canary Islands a long time ago and evolved over time into the Canary blowfly. At a later stage, the widely distributed relatives C vomitoria and vicina also found their way to the Canary Islands. By this time, however, the Canary blowfly had already developed into

a species of its own that could no longer cross-breed with its related species. It is also noteworthy that these days the endemic species is the most specialized in terms of its habitat, as the Canary blowfly only lives in mountainous laurel tree forests, as I already mentioned before. The relatives that appeared later are more generic and less picky in their choice of habitat.

Similar situations have been observed in many other groups of organisms as well. In the pine tree forests of the mountians of Tenerife and Gran Canaria lives the odd-looking Blue Chaffinch whose male is the same size and shape as our own domestic finch but is blue all over. The Canary Islands are also home to the ordinary finch, which inhabits all other types of habitats other than the habitats taken by Blue Chaffinch. It is very likely that an original form of finch spread to the Canary Islands sometime long ago, then specializing and adapting to the pine tree forests and mountains as the the Blue Chaffinch. Later the finch colonized the Canary Islands again, and thus there are now two closely related species on the islands. It is also possible that the ordinary finch that came later has overtaken the Blue Chaffinch in the competition for habitats everywhere else except in the pine tree forests. A pioneer in the fields of sociobiology and biodiversity research, Edward O. Wilson, called the colonization-specialization-development of the species the "taxon cycle," which can perhaps be more simply expressed as the "species cycle." The last stage of species cycle is the driving of the original species into such a small habitat due to competition from a later arrival that the original species goes extinct.

The natural spreading of species to the islands of the ocean, their evolution on the islands into more specialized species, competition with later arrivals and finally disappearance under competition, or the aforementioned species cycle, provides us with an indication of what happens when humans either purposefully or unintentionally transfer invasive species and they moved into new areas. Those spe-

cies that are less ecologically specialized and particularly the generic species that succeed in areas where human actions have had a dramatic effect on the habitat are precisely the species which most easily move from one area to another. And these sorts of species are also most likely to succeed in new areas – precisely because they are not demanding in terms of their habitat. Each area's set of native species typically contains more ecologically specialized species, which for this reason are more vulnerable to changes in their habitats as well as to competition from invasive species.

The globalization of humanity increases the globalization of other species, a species cycle on a global scale, which is only speeding up as the generic species' opportunities to spread to new areas increase. An important difference compared to the natural species cycle, however, is that large scale change in habitats speeds the human-caused species cycle and favors invasive species, and all this happens so quickly that there isn't enough time for new species to develop and replace those species that disappear during the species cycle. Just as the globalization of mankind results in the standardization of economies and cultures, the globalization of organisms results in a standardization of species: A certain group of species flourishes and spreads to more and more new areas, whereas the original, more ecologically specialized, less widespread species of each area suffer and then go extinct one after another. The number of species living in any given place does not necessarily decline, and can even grow, but the set of species in different areas becomes more similar and thus over larger areas and overall around the world the number of species is reduced. I will mention one example. These days there are some 1,400 species of vascular plants in the West Berlin area, which is a remarkably high number, but some 40 percent of these are invasive species, whereas 60 percent of the domestic species are now endangered. The reasons are precisely those I just explained. The city represents just such an environment dramatically changed

by humans, where generic species have the best chances of survival, including many invasive species.

About the Author

Professor Ilkka Hanski leads a top unit in meta-population biology at the University of Helsinki. He is one of the most scientifically accomplished ecologists in the world and is one of Finland's best known researchers. He previously authored a book entitled The Shrinking World: the Ecological Consequences of Habitat Loss (Excellence in Ecology 14, International Ecology Institute 2005). The Royal Swedish Academy of Sciences awarded Hanski the 2011 Crafoord Prize, also known as the "mini Nobel."

The photo of Ilkka Hanski: Tapio Vanhatalo.