Deforestation and its effect on birds and bird-related phenomena

Essay in Wildlife Ecology by Kim Pettersson

In my essay, I focused on effects of the deforestation upon avian wildlife.

Deforestation is the removing or clearing away the trees from a forest. Deforestation is usually done to clear the land for agricultural purposes or for logging. More focused onto the domain of birds, it means the removal of trees from a forested area without adequate replanting or natural regeneration. This result in damage to habitat and biodiversity loss. Therefore, the goal of many researchers is to analyse these effects in order to formulate a conservative plan to avoid this unwanted damage.

Brooks et al. did a study in fragmented tropical forests to find out how long the process of faunal relaxation will take. They used mathematical relationships between the size of an area and the number of species it contains, coupled to decay constants and assuming declination in species. The results were presented as relaxation index (I) plotted againt the time (t) since the isolation occured of the forest fragment.

The scientists found that fragment size is positively related to longer half-lives of species. Not too surprising perhaps, but the study still has important implications. After all the calculations were made, the scientists state that in the first 50 years of its isolation, a tropical forest fragment of 1000 ha will suffer approximately half of the total number of extinctions that are likely to occur. This result therefore sets the timelimit of when humans must take consertvative action in order to ensure biodiversity loss is avoided to its highest possible extent.

My second analysed article focused on birds as seed dispersers in fragmented forests. It is known that some birds have specialised habitats or food requirements making them an important ecological element. For example can be mentioned nectar-feeding birds who act as pollinators, as well as frugivorous birds that disperse the seeds of plants. A co-dependant relationship therefore exists between certain birds and plants.

However, in the article by Garcia et el, we can read in the introduction that there actually is a lack of knowledge concerning the impact of seed-dispersal in areas fragmented by human activities. It is important to collect such knowledge to be able to formulate a plan for taking conservative actions regarding the flora and fauna in fragmented forests. The authors acknowledge the need of answers to whether the abundance of frugivorous animals is an effective way of spreading of seeds in such areas. Therefore the pupose of the study of Garcia et al. was to adress how human-caused landscape heterogenity affects the seed dispersal sevice supplied by birds.

The experiments were carried out in temperate regions, where seed dispersal by frugivorous birds are a crucial factors for plants, since other frugivores such as bats are missing. The study concerned three systems: Cantabrian forest of northern Spain, Mediterranian shrubland of southern Spain, and Patagonian forest of southern Argentina.

The sampling consisted of recording habitat feautures, abundance of fruits, abundance of frugivorous birds, and the magnitude of seed dispersal across long-distance transects. For collecting data about abundance of frugivorous birds, Garcia et al. performed bird censuses, where they travelled along a transect of the investigated area at a constant speed while recording the number of individuals of different frugivorous species seen or heard. For collecting seed dispersal data, the scientists systematically recorded the presence of seeds dispersed on ground level by the birds.

Finally, to make a statistical analysis of the relationship between bird abundance and seed dispersal, Garcia et al. used structural equation modeling (SEM).

The results showed that the studied systems in fact differed strongly in habitat feautures, abundance of fruits availiable to frugivores, abundance of birds, and magnitude of seed dispersal. However the occurence of frugivorous birds was high in all three. The scientists could conclude that proportion of samples with seeds and the number of seeds per ground-unit were greater where woody cover was present as well as where high fruit densities existed. However, some seeds were deposited even in the most affected parts of the landscape.

In cantabrian forest, it was shown that abundance of birds depended on fruit abundance and forest cover. In medeterranian shrubland similar results were obtained. Lastly, in Patagonian forest, birds were also more abundant in fruit-rich patches. In all studied systems, SAR models showed the existance of positive and significant effects of bird abundance on seed dispersal, as well as the relative effect of forest and shrub cover and fruit abundance.

Further observations were that there were affected pathes across the landscape that were still intensively visited by birds and therefore recieved dispersed seeds. These degraded patches perhaps are in proximity to parts that are unaffected.

My third analysed article deals with the effect of deforestation in relation to changes in bird infectious disease status. Countless bird species are affected by anthropogenic activities such as urbanisation, hunting and deforesting. These activities causes a disturbed environment for avian wildlife and this leads to reduced species biodiversity and fitness. As a consequence of this, EIDs, emerging infectious diseases, have increased during recent decades. Within the field of deforestation disease ecology, scientists want to know how deforestation in particular is affecting the risk of increased suseptibility to these infectious disease among wild birds.

Deforestation causes both biotic and abiotic factors to change and in turn whole ecosystems, which come to affect the transmission of diseases. As trees are removed, the open spaces formed provides increased levels of sunlight which have shown to have a positive influence on the population of anopheline mosquitos, the vectors of Plasodium falciparum. This is of importance for human health, because studies have shown increased feeding on humans by anopheles moquitoes following forest clearing, therefore deforestation is a threat to man as well. Besides malaria, deforestation increase the risk of humans getting infected by other human vector-borne diseases as well, for example leishmaniasis, lyme disease, onchocerciasis and SARS.

On the contrary, other studies showed that Plasmodium species where found in a higher representation among avain species in pristine forests rather than disturbed forests. Explanations to this finding includes among others that pristine forests are better for the reproduction of vectors compared to disturbed sites or that vectors have altered feeding preferances in disturbed forests, choosing humans rather than avian hosts.

Birds can act as reservoirs for numerous zoonotic pathogens and deforestation can result in increased human contact with wildlife, increasing the exposure to these pathogens.

Deforestation effect on avaian infectious diseases will perhaps not be clearly separatable from other damaging environmental effects such as global climate change (but this is in part a result from deforestation!).

Still, potentially damaging effects include altered flyways that would result in increased inter-species contacts and transmission of pathogens. Deforestation could have effects on the fitness of avian populations, and less genetic diversity can contribute to a decreased immune health of birds.

Sources:

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