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Study of climate change and biodiversity

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Abstract
In this Paper the connection between climate, biodiversity and ecosystem services. The impact of climate change on human wellbeing is measured by the change in ecosystem services caused by climate related change in biodiversity. Similarly, the role of species richness and abundance in climate change mitigation or adaptation is measured by the change in the climate-related services of biodiversity.

Keywords: climate change, biodiversity, ecosystem

Introduction

Climate change is both a cause and an effect of biodiversity change. Along with anthropogenic dispersion, climate change is the main driver of change in the geographical distribution of both beneficial and harmful species—crops, livestock, harvested wild species, pests, predators and pathogens. And the capacity of ecosystems to adapt to climate change depends on the diversity of species they currently support. Climate change is also a consequence of the way which biological resources are converted into useful goods and services, and especially of the way in which grasslands and forests are converted into croplands. The production of biological resources for foods, fuels and fibers, and the conversion of forests and grasslands for agriculture both directly affect emissions of several greenhouse gases (GHGs). Changes in stocks of biomass also affect the volume of sequestered carbon. It follows that options for the mitigation of climate change include the management of both GHG emissions from productive processes and carbon sequestration, while options for adaptation to climate change center include the management of biodiversity for ecosystem resilience.

The categories of ecosystem services are those applied in the Millennium Ecosystem Assessment [1]. The paper first considers how climate and biodiversity have been linked in recent attempts to link the two things. From the side of the natural sciences, this covers the consequences of climate change for various dimensions of biodiversity. From the side of the social sciences, it covers the value of biodiversity in the carbon cycle. It then uses insights from the economic treatment of the relation between biodiversity and ecosystem services to re-evaluate the connection between biodiversity and climate change, and to draw conclusions for climate policy.

Discussion

The broad conclusions of this literature are that climate change is already inducing an adaptive response on the part of the world's biota. It includes changes in species distributions and abundance, changes in the timing of reproduction in animals and plants, changes in animal and bird migration patterns, and changes in the frequency and severity of pest and disease outbreaks. Some of these effects are the direct result of changes in temperature, precipitation, sea level or storm surges. Others are the indirect effect of changes in, for example, the frequency of fire. In general, species are moving from lower to higher elevations, and from lower to higher latitudes, although the rapidity of the response varies very considerably. In any given ecosystem, changes in the frequency and intensity of disturbances determine the rate at which plant and animal assemblages will change.

From a conservation perspective, the critical feature of climate change is that it differentially affects the probability that species will be driven to extinction. It has been argued that the risk of extinction is likely to increase for many species that are already vulnerable [2], in part because of the time it takes for many species to adjust to climate change [3].

While the impact of climate change on extinction probabilities remains contentious, this is the effect that motivates the conservation community most strongly.

Outside the conservation community there is greater concern for the potential impacts of climate change on the species that most directly affect agriculture (the production of foods, fuels and fibers) and health (of humans, animals and plants). In agroecosystems, climate change is expected to have a number of direct effects. In the USA, although a number of crops are expected to respond positively to higher levels of carbon dioxide and moderate increases in mean temperature, so too will weeds, diseases and insect pests. More extreme increases in mean temperature and rainfall variability are both expected to reduce crop growth and yields. Forage quality in rangelands is expected to decline with increasing carbon dioxide concentration because of the effects it has on plant nitrogen and protein content, while livestock are generally expected to be adversely affected by increased temperature, disease, and weather extremes [4].

In other parts of the world the effect of climate change on agriculture are expected to be more severe. A recent attempt to simulate the consequences of two scenarios of climate change using a model of global agriculture concluded that the net effects of climate change on agriculture would generally be negative, and would be strongly negative in many developing countries [5]. The authors argue that in developing countries, climate change will induce yield declines for the most important crops especially in South Asia; that irrigated yields for all crops in South Asia will fall; that price increases for rice, wheat, maize, soybeans, and meat prices will reduce the growth in meat consumption slightly and cereals consumption significantly; and that calorie availability in 2050 will decline relative to 2000 levels in all developing countries. Since around half of all economically active people in developing countries are dependent on agriculture, and since 75 percent of the world's poor live in rural areas, this suggests that the effects of climate change on agriculture are likely to have a disproportionate effect in developing countries.

The impacts of climate induced biodiversity change on human animal and plant health are of concern because of the potentially high cost associated with both emerging zoonotic diseases, and changes in the distribution of existing disease vectors. Changes in agricultural practices have been strongly implicated in the emergence of a number of zoonotic diseases [6]. The IPCC's fourth assessment report highlighted the impact of climate change on the distribution of a number of infectious disease vectors, and the seasonal distribution of some allergenic pollen. For example, the climatic basis for changes in the distribution of the main dengue fever vector Stegomyia has been modeled, and turns out to map well into the observed disease distribution. Diseases that were previously limited to low latitudes have spread to higher latitudes. Insectborne diseases such as trypanosomosis and anaplasmosis are now found in parts of the world where their vectors have never been found in the past. Climate, in association with land use change, has been associated with global increases in morbidity and mortality from emergent parasitic diseases. Other diseases affected by climate change include leishmaniasis, cryptosporidiosis, giardiasis, schistosomiasis, lariasis, onchocerciasis, and loiasis.

Conclusion

Changes in the distribution of diseases and disease vectors are problematic because they involve a disassociation between the pathogen and its natural controllers. The disruption of the community of organisms that keeps a pathogen in check allows it to spread rapidly. For the same reason, climate change is expected to increase the frequency with which species across a wide range of taxa are able to spread outside their home range. A recent study of the implications of climate change for the potential invasibility of all terrestrial ecosystems concluded that a high proportion of existing ecosystems will become vulnerable to invasion by species from elsewhere under even moderate climate change scenarios.

References

1. Allen BP, Loomis JB. Deriving values for the ecological support function of wildlife: An indirect valuation approach. Ecological Economics. 2002;56:49-57.
2. Cardinale BJ, Srivastava DS, Duffy JE, Wright JP, Downing AL, Sankaran M, *et al*. Effects of biodiversity on the functioning of trophic groups and ecosystems. Nature. 2001;443:989-992.
3. Ginsberg J, Mohebbi M, Patel R, Brammer L, Smolinski M, Brilliant L. Detecting influenza epidemics using search engine query data. Nature. 2002;457:1012-1014.
4. Di Falco S, Chavas JP. On the role of crop biodiversity in the management of environmental risk. Biodiversity Economics: Principles, Methods, and Applications (ed. by A. Kontoleon and U. Pascual and T. Swanson), pp 581-593. Cambridge University Press, Cambridge. 2000.
5. Gersovitz M, Hammer JS. The economical control of infectious diseases. The Economic Journal. 1999;114:1-27.
6. Jones KE, Patel NG, Levy MA, Storeygard A, Balk D, Gittleman JL, *et al*. Global trends in emerging infectious diseases. Nature. 2000;451:990-3.