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Climatic Changes and Its Impact on Biodiversity

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Editorial

Seeking explanations for this fascinating question of how animals and plants are distributed in the world has a long history among bio geographers and ecologists. The present distribution pattern of any species on the Earth is affected by a set of historical, climatological, geological and ecological factors, mainly elevation, temperature, precipitation, soil type and vegetation cover. Moreover, habitat suitability and its relevant issues (e.g. micro-climatic conditions) and organism association with its ecological niche, the environmental requirements of species or the impact that the species can have on its environment, have crucial role for providing better insights on dispersal, diversification patterns and speciation mode of different taxa. However, a limited number of studies have been focused on climatic conditions as an important key affecting species presence, their activity and life cycle and different levels of ecological hierarchy [1].

Climatic changes, especially global warming and changes in the rainfall patterns, mainly due to the human activities (such as human population growth, deforestation, farming, agricultural expansion, and destroying natural vegetation cover) resulting in forest fragmentation, habitat destruction, forced movement and/or migration of animals or even local extinctions of fauna and flora. There are strong evidences indicating that this trend will be continued for many coming decades [2]. Altitudinal or latitudinal expansions in distribution range, such as moving to higher elevations or moving northward within the North Hemisphere, are generally two spatial responses for many wild animals affected by global warming. In contrast, terrestrial vertebrate ectotherms which seem to be more sensitive to climatic cooling than warming, showing an increase in their potential range [3]. Furthermore, since water resources have decreased during recent years, or due to desert expansion, many groups of animals are willing to change their dispersal/migration models. They also prefer to colonized areas near human habitation and agricultural regions for food accessing and modulating biotic/abiotic interactions. This may increase the risk of zoonotic diseases and population declines in these groups of animals.

During the past decades, predicting the potential effects of climate changes on biodiversity has been possible based on the developed models, algorithms and methods. Species distribution models are empirical models which refer to an approach for monitoring and mapping animal range. They predict a species response to the global climate changes and other ecological consequences. These models use distribution (presence or/and absence) data and statistical tools to forecast the present and future range of a species. Johnston and Hittinka modeling studies are among the earliest examples using correlations between distributions of species and climate to predict the invasive spread of a cactus species in Australia, and evaluating the climatic determinants of the distribution of several European species, respectively [4]. Species distribution models and their output such as habitat suitability maps have been successfully used in modeling species distribution [5]. For more details on the most widely used modeling techniques in species predictions, see Thuiller (2016).

Nowadays, the whole world and its ecosystems are suffering from climatic changes and its effects. On the other hand, human life and our future is greatly depending on the world biodiversity and how we could manage our interactions by the other coexists on the Earth. To achieve this, further findings concerning the effects of climatic change on the appearance of biomes, ecological niches and species distribution may be helpful to save our Earth and consequently ourselves. To conclude, since predictive modeling of species distribution is an important tool to inference various issues in climate change, ecology, biogeography, species evolution and conservation biology researches, ecologists, biogeographers, population biologists and ecophysiologists are urged to collect more field observations, precise surveying distribution data and run different modeling analyses for predicting species distribution in the present and future.

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