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Editorial Note: Climate Impact on Natural Ecosystems and Human Society

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Global warming and associated changes in the hydrological cycle and sea-level rise are expected to cause serious negative impact on natural ecosystems, human health, and economy. It is predicted that climate change will disrupt ecosystems and will result in loss of species diversity, as many species will be not be able to adapt to rapidly changing environmental conditions. Some ecosystems, such as tropical montane, mangrove forest, and Arctic ecosystems, are likely to disappear because warmer climate or sea-level rise will not support them. In the high latitudes, warming will cause degradation of permafrost and an increase of methane release from wetlands. Because methane is the next important greenhouse gas after CO2, this will also amplify global warming.

Simulations with coupled climate model indicate that during twenty-first century soil moisture in summer will decrease considerably over the large portion of Europe and United States. This could have potentially serious negative impact on natural vegetation and agriculture, and lead to an increase of forest fire frequency. Combination of warming and changes in hydrological cycle will have serious impact on water resources in many regions. Already now one-third of global population is living in water-stressed countries. Unmitigated global warming will considerably increase the number of people exposed to water stress. At the same time, increased probability of extreme weather events, such as catastrophic floods, heat waves, and more devastating hurricanes, are expected to increase the death rate associated with natural disasters.

Sea-level rise will have a profound negative socio-economic impact by increasing the risk of coastal flooding and causing the loss in coastal wetlands. In particular, the estimates show that unmitigated global warming could increase annual number of people in coastal storm surges by factor 10 already in the year 2080. Another potential health impact of global warming is related to the increase of the area where climate is suitable to malaria transmission. Currently, distribution of malaria is limited to the Tropics but global warming could considerably extend this area, which will lead to an increase in the number of people exposed to malaria.

Among recently recognized aspects of rising of atmospheric CO2 concentration is the acidification of the ocean. The observation and modeling results indicate that carbon dioxide emission from human activity has already led to a reduction of the averaged pH of surface seawater of 0.1 units and pH will fall additionally by 0.5 units by the year 2100. This could lead to mass extinction of coral and some plankton species causing disruption of the entire marine food chain.

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