Why responses to dramatic climate change are important?

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Climate change is proceeding at an unprecedented pace with global temperatures and sea-levels setting new records almost every year (IPCC, 2007). While these changes are worrisome due to effects on all biological systems and hence also on humans, even more problematic changes may be in the waiting, because not only is the climate changing, but it is also becoming more extreme. Extreme temperatures, rainfall, droughts, storms and fires are already becoming more common with severe consequences for humans, their crops and domestic animals and all wild organisms. For example, the severe heat wave in 2003 caused an excess mortality of 2,600 humans in France alone (INSERM, 2003), and primary production was suppressed across Europe (Ciais et al. 2004).

There is a long history of biological studies of extreme events going back to Bumpus’ (1895) study of mortality and selection on house sparrows *Passer domesticus* during a severe snowstorm. Extreme climatic events are poorly studied simply because they are rare, and such events have been defined to happen less than 5% of the time relative to the expected distribution (http://www.emc.ncep.noaa.gov). This lack of studies of the biological consequences is highly problematic because we know very little about the ability of plants and animals to adapt to such extreme situations.

Here a number of specialists reviewed the scattered literature on effects of extreme climate change. Møller starts by analyzing the behavioral effects of extreme climatic events, while Wingfield et al. review the physiological underpinnings of such behavioral responses. Next, Moreno & Møller review the demographic and life-history consequences of extreme climatic conditions, showing that fecundity and survival are dramatically reduced. Dolenec et al. analyze a case study of response of a bird species to extreme climatic conditions. Martinez & Merino provide an overview of the parasitological consequences of extreme climate and review the consequences for domestic animals and humans. Finally, Jiguet et al. provide a review of the consequences of extreme climatic events on communities of animals.

This special section on biological effects of extreme climate change raises many questions and provides guidelines for future studies in this area of major significance.

References

Bumpus HC, 1899. The elimination of the unfit as illustrated by the introduced house sparrow *Passer domesticus*. Biological Lectures of the Woods Hole Marine Biological Station 6: 209–226.

