

CORE AND PERIPHERAL POPULATIONS AND GLOBAL CLIMATE CHANGE

URIEL N. SAFRIEL,^{a,b,*} SERGEI VOLIS,^{b,c} AND SALIT KARK^{a,b}

^a*Department of Evolution, Systematics and Ecology, Alexander Silberman Institute of Life Sciences, The Hebrew University of Jerusalem, Jerusalem 91904, Israel*

^b*The Mitrani Center for Desert Ecology, Jacob Blaustein Institute for Desert Research, Ben-Gurion University of the Negev, Sede Boker 84993, Israel*

^c*Institute for Applied Research, Ben-Gurion University of the Negev, P.O. Box 1025, Beer Sheva 84105, Israel*

ABSTRACT

Environmental conditions outside the periphery of a species' distribution prevent population persistence, hence peripheral populations live under conditions different from those of core populations. Peripheral areas are characterized by variable and unstable conditions, relative to core areas. Peripheral populations are expected to be genetically more variable, since the variable conditions induce fluctuating selection, which maintains high genetic diversity. Alternatively, due to marginal ecological conditions at the periphery, populations there are small and isolated; the within-population diversity is low, but the between-population genetic diversity is high due to genetic drift. It is also likely that peripheral populations evolve resistance to extreme conditions. Thus, peripheral populations rather than core ones may be resistant to environmental extremes and changes, such as global climate change induced by the anthropogenically emitted "greenhouse gases". They should be treated as a biogenetic resource used for rehabilitation and restoration of damaged ecosystems. Climatic transition zones are characterized by a high incidence of species represented by peripheral populations, and therefore should be conserved now as repositories of these resources, to be used in the future for mitigating undesirable effects of global climate change. Preliminary research revealed high phenotypic variability and high genetic diversity in peripheral populations relative to core populations of wild barley and the chukar partridge, respectively.

INTRODUCTION

GLOBAL CLIMATE CHANGE AND ECOLOGY

An Intergovernmental Panel on Climate Change (IPCC) scientific assessment states that emissions resulting from human activities are substantially increasing the atmospheric concentration of "greenhouse gases", which will cause an increase of global mean

* Author to whom correspondence should be addressed.
Received 8 December 1994.

