Climate change adaptation for biodiversity

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Introduction

- Global biodiversity is in trouble.
- Climate change will increasingly impact on biodiversity.
- Biodiversity conservation needs to take account of climate change (adaptation).
- Some suggest adaptation will require a paradigm shift in conservation.
- Others, that existing conservation approaches can still be applied.
- We provide urgently needed policy and practical guidance on what conservation adaptation should look like.

Kate Risely

Climate-smart conservation actions

Existing conservation measures which will also be useful in a changing climate (climate-smart actions) should be prioritised in the short-term.

These include actions to reduce climate change impacts (Box 1):

- Hydrological management.
- Soft-engineering to control coastal and terrestrial erosion.
- Management of fire regimes and vegetation succession.
- Control of potential competitor, predator or parasitic species.
- Enhancement of prey populations and food resources.

Other generic actions will always be beneficial (Box 2):

- Establish protected areas in areas of high environmental heterogeneity (e.g. mountains, ecotones).
- Create coherent networks of protected areas.
- Reducing the severity of existing threats to species.

Box 1. Climate-smart action

Golden plovers are characteristic of northern peatlands. Here, superabundant craneflies provide a key food source, but are killed by summer drought. Management to raise water levels by blocking drainage ditches increases cranefly abundance and improves the resilience of the system to climate change. The control of increasing generalist predators may also compensate for climate change impacts on plovers.

Pearce-Higgins et al. 2010 Global Change Biology 16: 12-23, Pearce-Higgins 2011 Ibis 153: 345-356, Carroll et al. 2011 Global Change Biology 17: 2991-3001





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Novel conservation actions

Increasing severity of climate change will mean more novel conservation actions should be considered.

These are less well understood and may be more costly and risky than building adaptation on existing actions. They should be priorities for research now.

Novel actions include:

- Soft (e.g. tree planting) or hard (e.g. deepen waterways) engineering options to reduce temperature.
- Emergency intervention (e.g. shading or pumping cold water) to counter severe climate change events.
- Assisted colonisation of species to new areas which become climatically suitable.
- Tolerate non-native species where they provide functional surrogates of other species vulnerable to climate change.
- Promote hybridisation, genetic engineering or selective breeding to increase the resilience of populations to change.

Box 2. Site protection in a changing climate

The Cape Floristic Region of South Africa is one of the most floristically diverse parts of the globe, but is threatened by climate change. Models project significant future changes in the distribution of many plant species which if realised, would reduce the effectiveness of the current protected area network. These models can be used to identify priority areas for further protection. Boundary zones between different rock-types should also be targeted for conservation action as they are focal areas for ecological and evolutionary processes.

Hannah *et al.* 2005 *Bioscience* 55: 231-242, Pressey *et al.* 2007 *TREE* 22: 583-592 Odette Curtis, Renosterve<u>ld Project Co-ordinator / FF</u>

Conclusions

Conservation organisations should:

- Focus conservation effort on existing actions which are climate-smart.
- Develop robust monitoring and research climate change impacts on populations, species, habitats and ecosystems.
- Reduce exposure, and increase resistance of vulnerable species, to negative climate change impacts.
- Undertake research and test novel options to increase their feasibility and reduce their risk when required in the future.
- When climate change exceeds the capacity for resilience, shift to measures which accommodate and manage for change.

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