New Approach and Conservation
Climate change requires a new conservation paradigm. We can no longer just consider those factors that have already altered the physical environment; we must also consider the shape of things to come with a threat that is global in nature. Climate change will result in the loss of available habitat (such as sea ice in the Arctic), rising temperatures, altered precipitation patterns, sea level rise, acidification of the oceans and a host of other related effects. Traditional conservation approaches afford some buffer from these challenges but they may prove insufficient if we do not start considering what global, regional and local changes lay ahead.

The Problem
We know that climate change is already altering the boundaries, phenology and physiology of species and changing the land and seascape. We see melting glaciers that change regional water supplies. Sea temperatures are increasing, bleaching coral on an almost annual basis in some areas. Migratory species are arriving earlier and traveling farther. Flowers are blooming earlier. Species are appearing in areas where they have never been seen before. Some species are disappearing from parts of their historic range. Our traditional approaches to conservation may not be far-reaching or flexible enough to respond to climate change.

The Approach
WWF is working to develop solid approaches to increasing the resilience of our ecoregions to climate change with basic information on the concept of climate resilience and by demonstration studies to test methodologies. In 2003 WWF wrote *Buying Time: A User's Manual for Building Resistance and Resilience to Climate Change in Natural Systems*. This book provides insight into the vulnerabilities of various habitat types to climate change and overviews the types of approaches that might increase resilience in ecosystems. The approaches are predicated on four basic tenets:

1. Protect Adequate and Appropriate Space
Conservation has long relied on reserves and other protected areas. Climate change will require that we not only think about what species need now but what will they need as the ecosystem changes with the climate. Can we identify locations that are natural climate refugia? Can we hedge our bets, selecting locations with high heterogeneity (genetic, taxonomic and physical), including buffer zone, latitudinal, altitudinal, depth and other climatological gradients? Can we create corridors to allow species to move as they need to in response to climate change?
The Approach (continued)

2. Limit All Non-Climate Stresses

Climate change is not occurring in a vacuum. There are myriad stresses affecting our ecoregions, including habitat fragmentation, overharvest, invasive species and pollution. A limited body of research on interactions between climate and non-climate stresses exists and the bulk of the findings indicate that the interactions are negative. Therefore, to support ecosystem resilience you must reduce the number of simultaneous insults faced by an ecosystem. Fortunately many stresses are more locally controllable than climate change. Reducing these other stresses is not easy, but limiting overall stress can increase resilience.

3. Use Adaptive Management to Test Strategies

Given uncertainty about the exact nature of ecosystem impacts from and response to climate change, effective management will require a proactive and flexible approach. The efficacy of various conservation approaches should be continually reassessed, and approaches adjusted as new information becomes available. We have enough information to begin implementing “do no harm” approaches. We run a greater risk of doing nothing and having windows of conservation opportunity close, leaving no options to protect ecosystems.

4. Limit the Rate and Extent of Climate Change

For some ecosystems it is not clear what actions can be taken to increase resilience. Loss of arctic sea ice, upslope migration of alpine meadows, rapid climate change on the edge of continents, all seem insurmountable for the species that live in these habitats. Even for other habitats we know that climate change above a 2°C global average will be a hard challenge to meet. The best hope for all systems is that we act quickly to limit the rate and extent of climate change.

Field Projects

Our aim is to have every ecoregion incorporating climate change into its conservation planning, and monitoring the effectiveness of adopted strategies. However many practitioners still feel at a loss for how to approach climate change. In order to provide further guidance we are steadily developing field projects. Our longest running study is in the south Pacific examining what factors may increase coral resilience to bleaching, looking primarily at limiting secondary stressors such as nutrient run-off. We are working to expand this approach to additional coral reef ecoregions. We are beginning a mangrove restoration and protection project as a response to climate change. This project has multiple field sites around the planet and aims to produce a generalizable method that can be adopted in a wide variety of mangrove ecosystems to convey resilience. We are working to develop freshwater projects in the Himalayas and East Africa, and a marine project in the Barents Sea. We also want to work on places with some of the world’s highest biodiversity like the Amazon, which are not immune to climate change. We aim to have field projects around the globe formalizing WWF’s commitment to meet this dire conservation challenge.

For More information

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(c) WWF / KLEIN & HUBERT
Indian tiger (Panthera tigris tigris) Kanha National Park, Madhya Pradesh, India.

(c) WWF-Canon / Edward PARKER
Waterfall in Atlantic forest near Ilheus, Bahia, Brazil.

(c) WWF-Canon / Jürgen FREUND
Reforested mangrove.