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Defending Nature Against Climate Change

Adapting Conservation in WWF's Priority Ecoregions

The Climate is Changing

The climate models are no longer just projecting the future – they are confirming impacts of climate change here and now. These are not abstract changes either. They are changes that we can see in our everyday lives and that threaten the success of WWF's conservation mission.

WWF is Responding

In 2006, WWF hosted Climate Camp, a week-long opportunity for our field staff to learn more about climate change and what they can do about it. The goal of the week was to develop strategies to address climate change in priority places, from coastal regions to alpine mountains to tropical forests, where climate change can already be seen. Responses ranged from learning more about the vulnerability to climate change in the places they work, to recording the stories of those affected by climate change through an approach called Climate Witness, to redesigning protected areas to incorporate species movement due to climate change, to trying to minimize all of the additional stresses that can reduce the resilience and resistance to climate change of the places they work.

This folder presents the project designs developed over the course of that week. Projects like these are crucial to ensuring that WWF's conservation efforts can respond as the climate continues to change. They are part of the response we must mount to this global crisis, which must also include reducing the greenhouse emissions that cause climate change. However, changes are already afoot, so while it is paramount that we address the root cause of climate change, we must also implement these approaches to respond to the effects.

We invite you to explore the array of projects presented and consider how you can get involved. Climate change demands that we revisit what we had hoped were conservation victories, because every place we work is facing this new global challenge.

Lara Hansen
WWF Chief Climate Change Scientist

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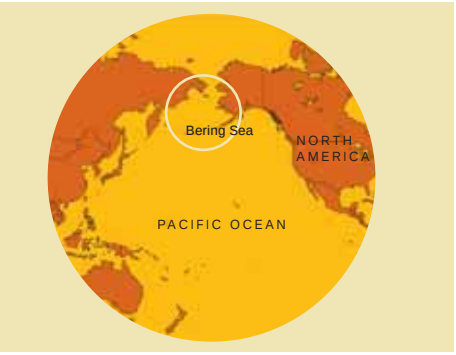
Bering Sea and Northeast Pacific Coast:

A Coastal Community Climate Witness Network for Salmon



Brown bear eating salmon in July in a river, Katmai National Park, Alaska, USA

Covering almost 2.6 million km^2 of arctic and sub-arctic waters, the Bering Sea supports huge populations of fish and shellfish, birds, whales, dolphins, porpoises, walrus, sea lions, polar bears, and seals. More than 50% of the United States and Russia's annual fish catch come from the Bering Sea. However, steep declines in some marine mammal populations, fluctuations in seabird populations, and the reduction or collapse of certain commercially important crab and fish stocks are a major cause for concern. The major threats include fisheries mismanagement, introduction of non-native species, pollution, and climate change.

The complex shoreline of the British Columbian coast includes island archipelagos, deep fjords, shallow mudflats, estuaries and inlets, kelp and eelgrass beds, strong tidal currents and massive upwellings. Canada's Pacific waters harbor kelp forests which grow many meters high and are home to fish, lobsters, crabs, sea stars and many other species. Seven species of salmon native to B.C. hatch in freshwater and migrate to spend their adult lives in the northern Pacific Ocean, the Bering Sea and the Arctic Ocean. Populations of grey, minke and humpback whales, orcas, dolphins and porpoises also make their home along the coast.

Objective: To develop a network of monitoring and reporting, through stories and quantitative data, that records past and present information on changes in the local environment and, in particular, salmon. Furthermore, it is hoped that this work will set the stage for discussions around local climate change adaptation plans.

Citizen Science and Climate Witness spread climate change information

- **Citizen Science** engaging aboriginal groups and school children in monitoring to educate and empower.
- **Climate Witness** gathering stories about the changes that are going on in the environment and with salmon
- **Gathering evidence** data gathering to illustrate the magnitude of the impact, the speed of change and to provide hard evidence to guide policy decisions and assist with adaptation planning.

Bering Sea, Alaska, USA. Unisea Pollack processing plant Dutch Harbor Unalaska Island, Aleutian Islands, Alaska, USA

PROJECT DESIGN

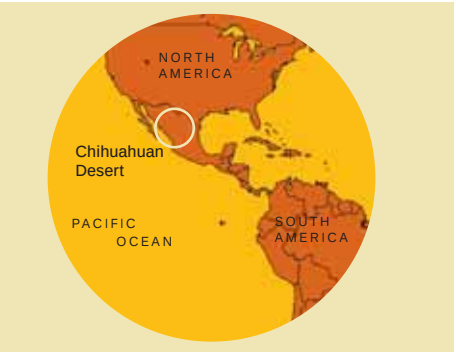
- **5-10 fishing communities located** along a North-South gradient from British Columbia to northern Alaska
- **Training of community members** in data gathering (qualitative and quantitative techniques)
- **Build on existing programmes:** "Coastal Communities for Science" programme (WWF-US) and Prince Rupert Community engagement project (WWF-Canada)
- **Establish partnership** with other organizations in the United States and Canada (e.g. EMAN in Canada)
- **Train the trainer:** develop a network of informed trainers who can set up their own initiatives in a growing number of communities
- **Use Google Earth** to allow others to project information (data, pictures, stories, etc.)

BENEFITS

- Gather new evidence of climate change impacts on salmon, a keystone species
- Improve cross-border conservation efforts, with a potential to expand to Russia
- Evidence for improved fisheries management (adapted to climate change)
- Citizen empowerment and education opportunities for youths and adults
- Generate national and international media interest

Mexico and USA:

Adapting to Climate Change in the Chihuahuan Desert



Yucca shrubland in the Chihuahua Desert near Coahuila, Mexico. Changes in precipitation threaten many species in this harsh environment.

Most of the Chihuahuan Desert – the largest in North America, covering almost 322,000 km^2, about 79.6 million acres of land – lies south of the international border that divides México and the United States, covering more than 15% of México's total area. In the US, it extends into parts of New Mexico, Texas and Arizona. The Chihuahuan Desert is characterized by a myriad of life forms that show incredible adaptations to the desert's water scarcity and harsh weather. Its biological heritage is threatened by poorly planned human activities, which add on to the natural stresses that have driven the evolution of life in this ecoregion. Human activities in the Chihuahuan Desert have historically lacked adequate protection or proper management of its rich natural resource base. Poor range management, overuse of both surface and groundwater for intensive agricultural production, and urban expansion are the most serious causes of biodiversity loss in the region. Climate change driven processes would add to the existing threats, increasing stresses on a system that evolved to survive on the edge.

A view of the Rio Conchos in the dry season close to Delicias which is close to Chihuahua City in central state. Chihuahua Desert, Mexico

STRATEGIES

Creating a baseline to understand climate change in the Chihuahuan Desert Ecoregion

- Predict effects of climate change on four biodiversity targets in the 2007-2012 conservation plan, using existing models and field data.
  - Big Bend complex
  - Freshwater ecosystems of the Rio Grande/Bravo basin
  - Priority grasslands and wetlands of the Northern Chihuahuan Desert
  - Rare native plants and reptiles
- Produce a vulnerability analysis at an ecoregional level to determine if climate change will undermine other conservation efforts or important biodiversity targets outside of WWF's scope, focusing on species, landscapes and processes.
- Mitigation strategy

Communications

- Use current information to engage decision makers and other stakeholders in climate change discussions
- Refine message using baseline data
- Strengthen existing arguments to invest in increased resilience:
  - EFA (Environmental Flow Assessment)
  - Water use efficiency, especially among agriculture users
  - Headwaters forest protection (soil and water conservation practices, forest rehabilitation/restoration)
  - Protection, restoration and rehabilitation of wetlands and riparian areas

NEXT STEPS

- Incorporate climate change into current conservation planning process (2007-2012).
- Create a mitigation strategy (link with Legal Action Center Climate Change team)
  - Baseline for current carbon dioxide emissions throughout the ecoregion in order to devise appropriate mitigation strategies
- Increase resilience
  - Develop ways to facilitate and finance watershed management practices (such as soil and water conservation, riparian area protection, restoration and rehabilitation) that increase resilience
- Develop a communications strategy
  - Short term: press release, headline story for local press
  - Mid term: Climate Witness programme

Mexico:

Conserving the Gulf of California in the Face of Climate Change

California Sea Lion (Zalophus californianus), pair swimming in the Gulf of California

The Gulf of California programme aims to support an abundant, diverse and resilient habitat to better sustain valuable processes and species in the face of climate change.

This will be achieved by integrating climate change into development planning and conservation efforts so as to maintain habitat, ecological processes and globally significant biodiversity, as well as to provide evidence in support of mitigation strategies.

A Seri Indian woman. One of six indigenous peoples that live within the Gulf of California Mexico

Juan Carlos Barerra stands in an empty reservoir that should serve the city of Hermosillo with its water. Near Hermosillo, Sonora Gulf of California, Mexico

The Gulf of California in northwest Mexico has a total area of approximately 283,000 km^2, includes a complex archipelago containing 922 islands and smaller islets, and is home to some 6000 macrofaunal species, 770 endemic species, 39 marine species in The World Conservation Union's Red List, and vaquita, totoaba, sharks, rays and five species of sea turtles. Some of the climate change impacts the ecoregion has witnessed include:

- Increased seasonal and inter-annual climate variability
- Slow changes in conditions such as mean sea water level, air temperature and precipitation rates
- Frequency of extreme events such as hurricanes
- Increased saltwater intrusion into freshwater resources
- Stress on the marine environment, potentially causing abrupt changes in ocean temperatures
- Increased risk of large storm surges, which cause higher levels of coastal erosion
- Shifts in planktonic species and change in pelagic ecosystems
- Reduced resilience of coastal ecosystems
- Property losses
- Dislocation of human populations

Possible Adaptation Strategies

- Model climate change vulnerability in the region
- Incorporate resilience in Marine Protected Areas
- Adjust coastal development: use regulations
- Adjust fisheries and management plans
- Mangrove protection and reforestation
- Adjust regulations on the use of pesticides, pollutants and agriculture/ aquaculture practices
- Policy regulations on tourism and transport
- Complete a socio-economic evaluation of implications of climate change, including adaptation strategies

Photographie: WWF-Canon E. PARKER

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Wider Caribbean:

Adaptation Strategies for Hawksbill Turtles

Climate change is the worst threat of modern times to life on the planet. Endangered marine turtles are an indicator of our relationship with the oceans.

Hawksbill turtle (Eretmochelys imbricata) laying eggs on a beach above high water mark. Seychelles. Sea-level rise threatens marine turtle nesting sites around the world.

WWF's Latin America and Caribbean Programme and the Climate Change Programme have designed a research project to quantify the impacts that climate change will have on the global population of hawksbill turtles, which will provide a model for assessing future climate change impacts to other marine turtle species, and begin to shape how we develop conservation strategies to protect hawksbill turtles in the face of climate change. The first stage of this project targets the Caribbean region. This study will identify the location of known hawksbill nesting areas and their susceptibility to climate change; it will provide clear management prescriptions so that conservationists can reduce the vulnerability of hawksbill turtles and increase their resilience to climate change. When completed, WWF will provide tools such as a map highlighting current nesting areas and key habitats and migration paths that are potentially threatened by sea level and temperature rise, so that managers and conservationists can prioritize their efforts. WWF is currently looking for partners to embark in this program of work.

Carlos Drews, WWF's LAC Marine Turtle Coordinator, prepares a hawksbill turtle (Eretmochelys imbricata) for release, after it was confiscated from illegal hunters close to Playa Chiriqui, Panama.

Hawksbill turtle (Eretmochelys imbricata), female heading back to the sea after laying eggs. Seychelles.

Climate change effects on marine turtles can include:

1 Loss of nesting and feeding habitats due to sea-level rise
2 Increased sand temperatures, which can lead to changes in gender ratios or potentially result in mortality
3 Increased ocean temperatures, which can lead to coral bleaching and other damage to turtle feeding habitat
4 Changes in ocean currents, which can modify migration paths and feeding patterns
5 Extreme rainfall events, which can increase the potentially lethal transfer of sediment to coral reefs and raise water tables, thereby flooding nests

Understanding the consequences of climate change

- A loss of nesting sites from sea level rise is estimated and the vulnerability of nesting sites will be assessed and likely refugia identified.
- A loss of feeding grounds is estimated and the vulnerability of coral reefs will be assessed and likely resistant and resilient reef areas identified.
- Changes in ocean currents will be modeled and their effect on hawksbill migration paths assessed.
- The effect of increasing ambient temperature on egg development will be estimated and the correlation function between surface and egg chamber temperature determined (and the effect on sex ratios and mortality established)

Adapting to the consequences of climate change

- Conservation plan for refugia of turtles and feeding grounds designed and implemented, including restoration of beach vegetation to provide shady nesting options
- Mitigation of current threats to strengthen the populations and habitats

Contributing to mitigation of emissions

- This work will provide illustrative stories for advocacy materials used to lobby for emission reduction and adaptation support

Photos: WWF-Canon M. HARVEY (front), WWF-Canon C. DREWS, M. HARVEY (back)

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Mexico, Belize, Guatemala, Hounduras:

Developing a Response in the Mesoamerican Reef

Laughing Bird Caye National Park. Aerial view of coral reef from 6,000 ft. Belize 1991

The Mesoamerican Reef Ecoregion extends for 1000 km along the Caribbean coast through Mexico, Belize, Guatemala, and the Honduran Bay Islands. It boasts an abundance of diverse and productive ecosystems including coral reefs, of which there are various forms (barrier, atolls, fringing, patch, and far), extensive sea grass beds, and mangrove forests. These comprise critical habitat for commercial fish stocks, as well as a number of threatened species, including West Indian manatees, saltwater crocodiles, green and hawksbill sea turtles, and Nassau and goliath groupers.

Vision: Under a changing climate, our vision for the Mesoamerican Reef is to foster the longevity of a beautiful and biologically healthy reef that can sustain the socio-cultural factors and livelihood aspects that are dependent upon it.

Miskito woman with her little girl, in village destroyed by Hurricane Mitch. La Mosquitia, Honduras. November 1998

Red mangrove (Rhizophora mangle) shallow water coral reef meets the mangrove island Belize coastal zone, Pelican Cays, Belize

What are we doing about climate change?

A number of activities are currently underway to alleviate human-induced threats (e.g. investigations into linkage of toxic chemical bioaccumulation in reef species to agricultural activities, working with companies and local farmers to reduce toxic chemical usage, working with fishermen to adopt alternative livelihood methods, and collaboration with pertinent groups to strengthen the Marine Protected Area (MPA) network). However, climate change is adding additional stresses such as acidification of the ocean, species migration, sea level rise, coral bleaching and increased frequency and intensity of storms – all of which will exacerbate current adverse impacts on the Mesoamerican Reef.

In response, WWF highlights the following project objectives and activities:

Assess the current Marine Protected Area (MPA) network and determine whether it is sufficient to help the system respond to climate change

Conduct comprehensive regional reef surveys to identify reefs that appear to be resistant (those that do not bleach) and resilient (those that bleach but are able to recover) to bleaching events

To ensure long-term protection of resistant/resilient reefs through incorporation in the MPA network or special management relating to fisheries or tourism

To identify reefs that are most vulnerable to coral bleaching and, in particular, the vulnerable reefs upon which fishermen depend for their livelihoods. On these vulnerable reefs we will:

- Devise adaptation techniques such as reef seeding with more temperature-tolerant corals, reef shading, increasing herbivore abundance, etc.
- Advocate for stricter regulations, such as the use of only or mainly line fishing rather than nets (which often catch herbivores).
- Conduct habitat representation analysis to place at least 30% of each representative habitat under protection (seagrass, mangroves, all types of reef, etc.).

Photos: WWF-Canon B. RATH (front), WWF-Canon Ni. DICKINSON, B. RATH (back)

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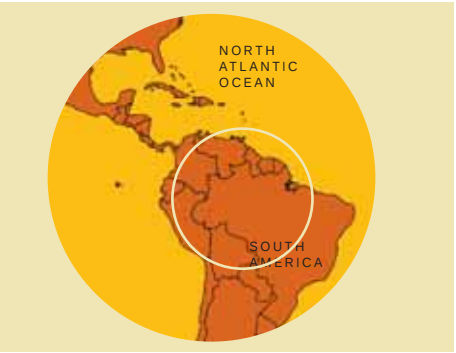
Brazil, Bolivia, Colombia, Ecuador, French Guiana, Guyana, Peru, Surinam, Venezuela:

The Amazon Biodiversity at Risk from Climate Change



El Nino. Forest fires. Amazon, Brazil, Roraima, west of Boa Vista towards Yanomami territory. Aerial photograph from plane, showing burning peasant land and tropical rainforest. March 1998

The Amazon contains a staggering amount of the world's biodiversity, supports millions of people through agriculture and silviculture, and provides the world with commodity and non-commodity products such as building supplies and medicine. The Amazon River is the largest single source of freshwater runoff on Earth, representing some 15 to 20% of global river flow. Subsequently, the Amazon's hydrological cycle is a key driver of global climate, and global climate is therefore sensitive to changes in the Amazon. Climate change threatens to substantially affect the Amazon region, which in turn is expected to further alter global climate and increase the risk of biodiversity loss.

Projected climate change includes warmer temperatures, decreased precipitation during already dry months, more severe droughts (like the one seen in 2005), and substantial changes in seasonality. Associated effects include increased erosion, degradation of freshwater systems, loss of ecologically and agriculturally valuable soils, loss of biodiversity, decreased agricultural yields, increased insect infestation, and spread of infectious diseases.

Aerial shots showing deforestation along the Rio Branco River. Brazil

Tropical rainforest after fire. Roraima state. Spring 1998. Amazon, Brazil

Protecting the Amazon from climate change means:

- Reduce deforestation
- Improve forest management
- Improve agricultural practices
- Incorporate traditional knowledge in management
- Build resilience (strengthen ecosystems and social systems)
- Monitor changes

To do this WWF will:

- Build on existing conservation projects
- Integrate with other partner institutions
- Initiate transdisciplinary integration (earth and water, biodiversity, climate and socio-economic)
- Identify and prioritize pilot projects (vulnerability, country plans, field presence, synergies, replicability)
- Develop measurable indices to monitor success
- Communicate and share results (Climate Witness)

How will this be achieved?

1 Pilot project on water use and allocation with an ecosystem services valuation
2 Evaluation of ecosystem services and commodity uses
3 Community workshop training to build knowledge of climate change
4 Develop alternative sources of income compatible with new climate conditions and with equitable distribution
5 Floodplain management to build resilience to droughts – modelling exercise at basin level
6 Improve protected area and forest management

OUTCOMES

- This project furthers existing conservation projects:
  – Enhances biodiversity conservation
  – Reduces deforestation
  – Alleviates poverty
- Integrates climate change and conservation
- Advances basic understanding of climate-forest-social interactions

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Colombia, Ecuador, Peru, Venezuela:

Life and Livelihoods Changing in the Andes

Cotopaxi Volcano: Highest active volcano on earth at 5987 meters. Andes Mountains, Ecuador

The Northern Andes provide home and livelihood to more than 40 million people from Venezuela, Colombia, Ecuador and Northern Peru, with nearly 70% of the human population in Colombia and Ecuador living and depending on the environmental goods and services provided by its biodiversity-rich mountain forests and high elevation grasslands ecosystems.

These ecosystems are fragile and vulnerable to the effects of climate change given the already considerable degree of habitat conversion and deterioration. These trends will lead to significant environmental and socio-economic impacts for local communities and downstream water users that depend on these critical ecosystem functions.

Project Goal: Develop and implement on a pilot basis adaptation strategies for forest and páramo ecosystems to climate change, with the aim of ensuring the maintenance of biodiversity and key environmental services for human populations.

Giant frailejones in paramos Chiles Volcano area, bordering the Awa Reserve La Planada Nature Reserve, Colombia

Mr Carranza picking sweet passion fruits (organically grown) from his orchard, which is developed under sustainable agriculture concepts.
Semillas Natural Reserve, Central Andes, Colombia. Northern Andes Ecoregional Programme

TACTICAL APPROACHES

Analysis and Capacity Building

WWF, working together with stakeholders and local and national institutions, will carry out analyses of vulnerability and modelling of montane forest and grassland ecosystems to different climate change scenarios thereby developing adaptation strategies. Special consideration will be given to climate change scenarios within the contexts of the current protected areas systems in selected parts of the Northern Andes. The methodological approach to this analytical phase will include technical capacity building processes.

Land use and management, protected areas and ecosystem restoration

Based on analyses and modelling, WWF will promote the development of land use management plans and restoration actions on a pilot basis in priority areas of the Northern Andes. This will include concrete management alternatives that provide both livelihood and food security benefits while potentially reducing vulnerability of natural ecosystems to climate change. Protected areas coverage will be increased including areas that will be destined for ecosystem restoration as part of an adaptation strategy.

Building upstream and downstream agreements for integrated water management

Implement a water management strategy, planning for climate change, for main agricultural systems and downstream urban water users.

Build public awareness

Increase public awareness of the threats posed by climate change to the ecological integrity of Andean ecosystems, to the livelihoods of local communities and to regional economies which depend on the environmental services provided by montane forests and páramos.

Photos: WWF-Canon K. SCHAFER (front), WWF-Canon P. CORRAL, D. M. GARCES (back)

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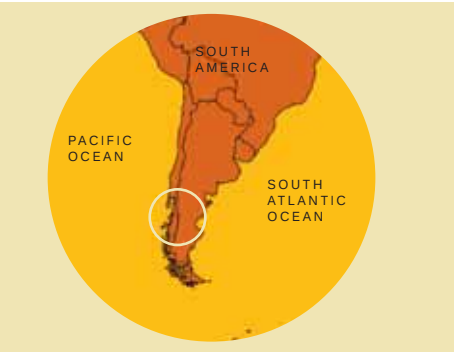
Argentina and Chile:

Valdivian Temperate Rain Forests Changing Fast



Temperate rainforest turned into agricultural land. Near Valdivia, Chile

The Valdivian temperate rainforests of Chile and Argentina harbour an incredible wealth of biodiversity, including unique species like the alerce tree, one of the planet's longest-living tree species; the world's largest woodpeckers; and a small tree-dwelling marsupial considered by scientists to be a living fossil. Climate change is already accelerating glacial melting and break-up not only in the Valdivian Ecoregion, but along the whole Chilean Andean Range. Models project a warm, drier future in the region. Due to the large number of endemic species with narrow climatic requirements, climate change means extinction risks are very high.

Pehuenche children selling seed cones of Monkey puzzle tree along roadside to passing tourists Araucanía Region, Chile

Pine nuts from the Monkey puzzle tree in the hands of a Pehuenche Indian. Araucanía Region, Chile

Photographie: WWF-Canon E. PARKER

Adaptation Planning Objectives:

- To enhance the understanding and capabilities to address climate change
- To evaluate the vulnerability of the ecoregion's biodiversity and human populations to change
- To raise public awareness through a communications campaign

PLAN OF ACTION

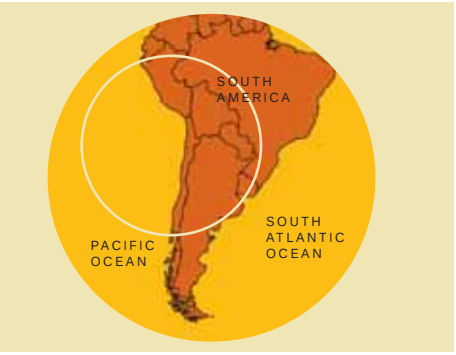
- Conduct a literature review to assess what is already known about climate change in the region.
- Convene a stakeholder workshop with research institutions, government agencies, and NGOs to define the scope and characteristics of the ecoregional vulnerability assessment.
- Collaborate with partners to complete an ecoregion vulnerability assessment. WWF Chile will commission a specialized partner to produce a vulnerability assessment, providing Geographic Information Systems (GIS) data and support as well as overall guidance. WWF's Global Climate Change Programme will provide guidance and evaluation of the process at mid and final points. The assessment will include the following steps:

– **Determining large-scale vegetation shifts:** Model expected broad-scale vegetation shifts using DIVA software or similar model using climate data, exposure, slope and vegetation belts/forest types, and derive GIS layers. This will provide an overall view of areas where current and projected vegetation overlap in order to identify potential climate refugia.

– **Implement "Science and Stories" Communications Campaign,** launched by a bilingual report supported by the Chilean government and disseminated by WWF Chile. "Valdivian Ecoregion at Risk from Climate Change" will implement communications tactics, such as developing a press release, arranging a press conference and otherwise keeping the mass media engaged. We will also ensure placement of three emblematic climate change stories in the media during moments of high climate change interest, beginning with the November 2006 Conference of the Parties to the Convention (COP) 11 United Nations Framework Convention on Climate Change (UNFCCC) meeting in Nairobi. We will produce a bilingual web site and release electronic bulletins about project progress.

Chile, Ecuador, Peru:

The Humboldt Current and a Changing Climate



Fish caught in crates brought to port near Tumbes, on the North coast of the largest fishing nation. Peru

How will climate change affect the Humboldt Current Ecoregion?

- Stronger, more frequent and earlier annual El Niño Southern Oscillation (ENSO), resulting in more rains in the north, more runoff and high sediment load, which impacts benthic communities close to the coast and results in higher incidence of toxic algal blooms
- ENSO may become the normal condition, shutting off crucial upwelling and reducing the input of deep water nutrients and production of anchovy – having drastic impacts on local economies
- Sea level change will impact coastal wetlands and seabird migration, as well as increase coastal erosion.
- Increased rainfall will result in lower salinity and higher sediment load, which will impact benthic communities (shellfish die-offs)
- Increased ocean acidification is possible, which may have ecosystem-wide, pervasive impacts on biodiversity function and structure
- Increase in SST would have ecosystem wide, pervasive impacts, which would at least cause shift of fish, shellfish, birds, seals to the south of their current range. Changes in the structure of the main pelagic and benthic communities
- Species population declines of guano bird and pinnipeds, which may face even greater reduction of their populations

Goal: Through climate-informed design and implementation of an optimized mix of management areas and Marine Protected Areas (MPAs), we aim to improve the livelihoods of artisinal fishermen and reduce their vulnerability to climate change.

In 1970, Peru caught 14 million tons of anchovies. A few years later an El Niño arrived and the anchovy population declined. Thirty years later, it has just begun to recover. Climate change is likely to cause more intense and frequent El Nino events in the future.

Galapagos sea lion Zalophus californianus wollebaeki
Galapagos Islands, Ecuador.

OBJECTIVE 1

- Create a climate-smart Marine Protected Area and management area network
- Determine current areas important for artisanal fisheries on a national scale
- Determine important areas from a conservation perspective and climate change resilience (e.g. representativity, connectivity, source sink dynamics, and resilience/refugia)
- Design an MPA/management area network after a prioritization of conservation targets and resource use areas, including areas resilient to climate change using optimization models
- Work towards policy – national and regional policies to create an MPA/management area network
- Raise public awareness (through Climate Witness stories) about the need for climate change impact mitigation

OBJECTIVE 2

- Reduce the vulnerability to climate change of artisanal fisherman families
- Initiate pilot management schemes for benthic communities with artisanal fishermen, including shellfish farming and local no-go zones (marking potential refugia), aiming toward a diverse and dynamic mix of climate resistant species and incorporating species which migrate into the area in response to climate change
- Capacity building for fisheries management and organizational skills including the incorporation of ENSO forecasts into planning, disaster management, disease, food security and port maintenance
- Improve artisanal fisheries' capacity to reach appropriate credits and markets and organize rescue funds for bad years

OBJECTIVE 3

- Share lessons and expand impact of climate change knowledge
- Work with local partners to disseminate, adapt and apply nationwide strategies to cope with climate change impacts in the Humboldt Current
- Establish synergies and opportunities with Peruvian and Chilean stakeholders
- Incorporate climate change into the WWF ecoregional vision and the Nature Conservancy's priority setting and vulnerability analysis for the region
- Apply learned management strategies and climate resilient technologies to other areas used by artisanal fishermen integrating different climate change scenarios.

Photos: WWF-Canon Canon E. PARKER (front), S. WASSMER, WWF-Canon M. HARVEY (back)

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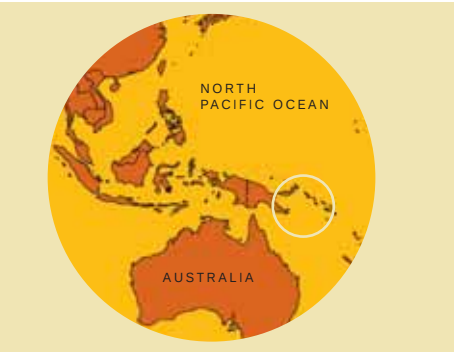
Bismarck, Indonesia, Papua New Guinea, Solomon Islands:

Solomon Seas Ecoregion Climate Change Project

Making the marine environment of the Bismarck Solomon Seas Ecoregion (BSSE) healthier and more resilient to the impacts of climate change



Aerial view of deforested land and reefs. Guadalcanal, Solomon Islands.

Bound to the north and south by deep ocean trenches, the Bismarck-Solomon Seas contain numerous small islands. In close proximity to both the Great Barrier Reef and the highly diverse East Indian region, these waters contain unique and complex species assemblages, including a number of endemic species. Widespread logging activities and associated sedimentation, unregulated cutting of mangroves and clearing for coconut plantations, light industry residues and sewage discharge, illegal dynamite fishing, hunting of crocodiles and turtles, increase in tourism activities and its associated impacts – all constitute major threats to the integrity of this ecoregion.

- Make **Marine Protected Area** networks resilient
- Protect **turtle nesting beaches** from sea level rise
- **Increase coral reef resilience** to increasing sea surface temperatures
- Use **Climate Witness** projects to build awareness and support for action on climate change

The Solomons Islands are made up of 6 large islands, 20 medium-sized and numerous smaller islets, reefs and atolls

Island boy playing among dead corals. Honiara, Solomon Islands

Gilbertese fishermen at Ghizo, Solomon Islands

CLIMATE CHANGE IMPACTS

1 Economic (fisheries and tourism) and human population: Impacts of human population (eg. water and food security issues) will put additional human pressures on natural resources

2 Impacts on coastal habitats

- Increased sand temperature is a potential threat to turtle gender ratio.
- Increased ocean temperatures impact food sources (fisheries, coral reef, sponges).
- Sea-level rise and erosion threaten key nesting sites and this may lead to other predators (eg. crocodiles).
- Increased severe rain fall events threaten nesting sites (flooding) and feeding areas.

3 Impacts on coral reefs: Increased risk of coral bleaching in addition to other non-climate stresses such as pollution and non-sustainable fishing practices

ACTIVITIES

Building resilience measures into BSSE Marine Protected Areas work, turtle work and coral reef habitats

- Assess vulnerability to both climate change and other threats.
- Select key sites that contain turtles and coral reefs for Climate Witness awareness rising.
- Include climate change monitoring in existing turtle monitoring programmes and survey methodologies.
- Include climate change impacts on turtles in existing government/community advocacy communications to show increased threats and the urgent need to address turtle conservation.
- Conduct climate change awareness and include climate change impacts as a reason to conserve coral reefs in existing coral reef advocacy programmes in order to build support to address non-climate change related stresses.

CLIMATE WITNESS

- Conduct a Climate Witness Project in at least one key project site/community.
- Work with local communities to develop an adaptation action plan which sets out how the community can address key threats identified in the Climate Witness project.
- Share Climate Witness stories in existing advocacy strategies.

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Indonesia, Malaysia, Philippines:

Development, Climate Change Impacts and Mitigation Work in the Sulu-Sulawesi Marine Ecoregion

Kaju Bulan coral reef at low tide. Taka Bonerate Archipelago, Sulawesi, Indonesia

Recently recognized as a marine hotspot, the Sulu-Sulawesi Marine Ecoregion (SSME) is a tropical marine system, ranging from atolls and fringing reefs to some of Southeast Asia's largest and most intact stands of mangroves. Biodiversity is extremely high with over 2000 species of marine fish, at least 400 known species of marine algae, 16 species of sea grass, 33 species of mangroves, at least 400 species of corals, five of the world's seven species of sea turtles, and at least 22 species of marine mammals.

Vision: Provide resilience to climate change throughout the Sulu-Sulawesi Marine Ecoregion

Goals: Reduce the vulnerability to climate change impacts and lower greenhouse gas emissions using multi-stakeholder and synergistic approaches to climate change mitigation and adaptation

Trawler catch. Borneo/Malaysia

Shrimp fishermen with push nets at sunset. Bicol/Philippines

SPECIFIC OBJECTIVES

- Assess the vulnerability of key marine ecosystems, including fisheries and coastal communities, in the Sulu-Sulawesi Marine Ecoregion to climate change impacts and design resilience-building strategies and adaptation plans through a combination of in-depth scientific research and local community participation
- Assess existing management areas and management strategies for resilience and/or vulnerability to climate change and other factors, proposing changes and adaptation plans where necessary
- Integrate a climate change vulnerability assessment and formulate an adaptation strategy in development planning and marine/coastal resource management
- Improve the environment of host communities and contribute to global efforts to prevent dangerous climate change by reducing pollution and the emission of greenhouse gases from the power sector

PROPOSED PROJECTS

1 A Integrated Approach to Climate Change, Development and Coastal/ Marine Resource Management in the Sulu-Sulawesi Marine Ecoregion

- Complete a vulnerability assessment of the marine ecosystems, with particular attention to fisheries
- Integrate climate change resilience building strategies into protected coastal area and resource management plans
- Engage in policy work on mitigation and adaptation

2 Understanding Climate Change Impacts on the Migration of Whale Sharks and its Associated Community-Based Ecotourism

- Determine temporal and spatial distribution patterns of whale sharks in the Sulu-Sulawesi Marine Ecoregion
- Research on climate change effects on upwelling patterns and whale shark migration
- Study potential impacts on community-based whale shark tourism
- Engage in policy work on mitigation and adaptation

Photos: WWF-Canon A. COMPOST (front), WWF-Canon J. FREUND (back)

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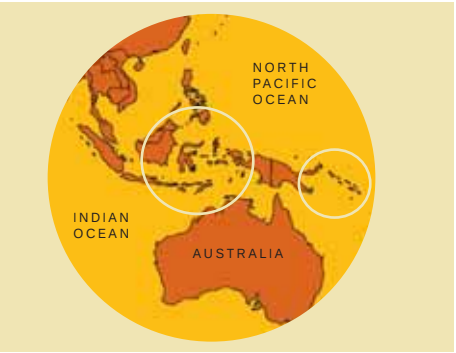
Fiji, Indonesia, Philippines:

Coral Triangle: Better Reefs for Better Lives under a Changing Climate



Featherstar, Lamprometra sp. Indo-Pacific Ocean.

GOALS

- Communicate climate impacts on coral reefs
- Increase the resilience of coral reefs

Increase the resilience and resistance of Marine Protected Areas (MPAs) by incorporating climate change adaptation strategies within the MPA network.

- Develop management strategies to help reefs cope with climate change impact by working together with scientific community, local people, and stakeholders
- Implement the strategies that incorporate climate change in selected Marine Protected Areas (MPAs) with possible replication for other MPAs
- Support the development of an MPA network with the WWF network and partners
- Provide climate change impact stories from local communities for other communities (Climate Witness)

Corals become «bleached» when water temperatures rise too high and are sustained for too long.

STRATEGY

1 **Resilience Building:** Monitor coral reefs before, during and after bleaching events to understand how to build and increase reefs' resilience against future bleaching events in the Asia-Pacific Region and to raise awareness of the climate change impact, across 15 sites in five ecoregions in the Asia Pacific

2 **Advocacy and Outreach:**

- Advocating the importance of developing and implementing adaptation strategies for coral reefs
- Providing high quality communications products and raw materials on coral bleaching to the global WWF network in order to demonstrate the impacts of climate change on coral reefs in the Asia-Pacific region.

DELIVERABLES

- A global protocol monitoring coral bleaching
- Lessons Learned documents from all of our objectives, in particular Climate Witness and resilience building studies
- Impacts reports for the Asia-Pacific Region that can be used by both reef managers and in national/international negotiation for mitigation and adaptation

Australia:

Adapting to Climate Change in Southwest Australia

Farmland lies dry and lifeless as a result of land clearing and extreme drought conditions. Condoblin District, Western NSW.

Geologically and climatically isolated from the rest of the Australian continent, and the world, Southwest Australia has long basked in a Mediterranean climate – with mild temperatures, winter rains and summer drought. This stable climate, coupled with relatively infertile soils has given rise to high numbers of indigenous species with very high levels of endemism. It has the second-richest Mediterranean plant community in the world. Habitat loss through land clearing, changed hydrology, salinisation, altered fire regimes, invasives, climate change and negative impacts from agriculture and other land management practices, all pose threats to the native biota.

Objectives:

1 To build resistance and resilience to climate change, and minimize threats in order to ameliorate adverse impacts within the Southwest Australia Ecoregion

2 To advocate mitigation of greenhouse gases within the Ecoregion, state, nation and globe – in conjunction with adaptation strategies.

Forest underbrush is burnt to help prevent forest fires as a general forest policy. Australia

Stromatolites Hamelin pool West Australia

Adaptation Project Phase 1
Building a Foundation for Climate Change Response in Stages

1 Conduct a literature review which will produce a report and summary document, containing key existing data and information gaps.
2 Design and implement a research project in order to fill information gaps about climate change impacts in the Southwest Australia Ecoregion and release a report and summary document.
3 Conduct an adaptation workshop to present findings from Stages 2 and 3, develop an adaptation strategy and create a monitoring program.
4 Develop a communications strategy.

Adaptation Project Phase 2
Climate Change Adaptation Strategy Implementation

CORE OBJECTIVES

- To establish a baseline monitoring project to facilitate monitoring and evaluation of ongoing climate change and effectiveness of adaptation projects.
- To begin implementing adaptation strategy priorities identified through Phase 1 of the project.
- To raise the funds required to implement adaptation strategies.

ACTIVITIES

- Identify climate change impacts, threatened species and communities, and sites that can act as natural refugia.
- Retain, protect and restore existing habitat, i.e. make it more resilient (preserving the current intact natural habitat is the cheapest and most effective biodiversity conservation action).
- Reduce physical barriers to migration and dispersal and increase flexibility in reserve design and management, with broader networks to allow species' movement across bioclimatic gradients.
- Implement more drought-resistant land management practices, especially in regard to farming.
- Advocate further mitigation to reduce greenhouse gas emissions.

Photos: WWF-Canon E. PARKER (front), WWF-Canon F. MERCAY (back)

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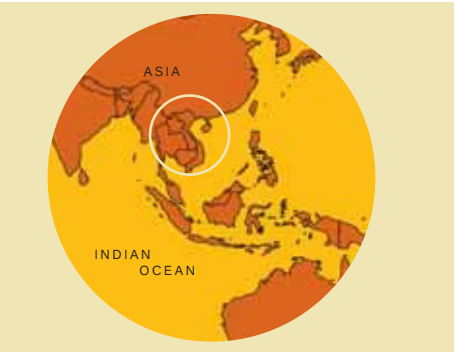
Cambodia, China, Laos, Myanmar, Thailand, Vietnam:

Building Climate Change Action in the Greater Mekong River Basin



Children with a basket full of Mekong freshwater herring «pa mak pang» or Laotian shad (Tenualosa thibaudeaui), formerly one of the most abundant species, which has almost disappeared, Tonle Sap River, Cambodia Flood season October, 2002

The forests of the lower Mekong consist of four of the world's most important ecoregions. But this natural wealth is threatened by large-scale logging, hydro-electric development, and the pressures of an impoverished population, which, combined, have dramatically reduced the forest canopy. Home to a diverse range of precious plants and animals, the protection of these ecosystems is essential for the planet's diversity. Our goal is to improve our understanding of climate impacts in order to inform ongoing landscape planning and feed into adaptive management of Ecoregion Action Plans.

The upper reaches of the Mekong (called the Lancang here) winds through Baimaxueshan Nature Reserve. Deqin County.
Deqing Tibetan Autonomous Prefecture, Yunnan Province, China

ACTION

1 Conduct two parallel studies

a Examine changes in temperature, precipitation and water flow due to current infrastructure and land use planning and projected climate change in the region.

b Conduct an assessment of how projected climate impacts will affect forest cover and species movement within the region.

- How is climate change going to impact ecological transitioning?
- Which areas do we think are possible refugias in the case of climate change or climate variability?
- Which species do we anticipate as most vulnerable?
- What are the tipping points from a species and habitat perspective?
- How resilient is the protected area network across the 3 ecoregions? Do we have protected areas that need to be more prioritized? Is there particular connectivity that needs to be built in?

2 Communicate current and future actions

3 Financing – explore both internal and external

4 Strategic Partnerships

- WWF Climate Change Programme
- WWF Global Freshwater Programme
- WWF US Conservation Science Programme
- Mekong River Commission
- International Rice Research Institute
- Local and regional universities and expertise

STOPPING CLIMATE CHANGE

The Living Mekong Programme aims to:

- Transform energy management regimes in the Mekong Basin from centralized to decentralized approaches by 2010
- Support national govenments' adoption of a decision-making process for developing sustainable electricity generating capacity by 2010

Protecting the Mekong from Climate Change:

- Maintain and enhance conservation corridors through effective management and restoration
- Develop and test climate change adaptation strategies, such as rehabilitation of degraded forests and watersheds, to enhance biodiversity and provide alternative livelihoods
- Ensure corridor effects of the river system and related riverine vegetation
- Monitor change at a landscape scale
- Build capacity for adaptive management

Photos: WWF-Canon C. LIOU (front), WWF-Canon Z. HOGAN (back)

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China:

Yangtze River Basin Climate Change Project

Fisherman Zhai Shihui tending fish cages. Dongting Lake, Hunan Province, China.

At a length of 6300 kilometers, the Yangtze is the third longest river in the world. Today, the Yangtze is a centre for agriculture, industry, and tourism. The river and the lakes that it feeds are also where diverse species of fish, birds, and mammals have lived for centuries. Fish farming, deforestation, cultivation of surrounding land for farming and grazing, pollution, oil drilling, industrialization, urbanization, and introduced diseases from domestic waterfowl pose widespread threats to this ecoregion. The most pressing and severe threat is construction of dams and dykes on the Yangtze and its tributaries, which alter the natural flow regime, block migratory routes, and sever the connection between the rivers and their floodplain habitats. Climate change is an additional threat the Yangtze does not need.

Air and water pollution in Jiangjiazui Town, West Dongting Lake, Hunan Province, China

Coal heaps on the banks of the Yangtze river, being loaded into freight ships. Hubei Province, China.

Assess the vulnerability of the Yangtze River Basin to both climate and non-climate stresses

- Complete a climate change literature review
- Identify information gaps related to climate change
- Determine climate change effects on forests, freshwater and grasslands
- Convene a workshop for stakeholders to identify information gaps and steps forward
- Identify potential partners
- Identify Geographic Information Systems (GIS) and climate change modelling capacity
- Assign responsibility for future steps and identify a timeline

- **Adaptation strategy** – Identify non-climatic stresses that can be minimized or eliminated, potential protected areas, and corridors
- **Facilitating outreach** – Identify audiences, develop materials, identify opportunities, and participate in outreach and education events.

ADVOCACY

- Promote comprehensive mitigation strategy (energy efficiency and renewable energy, etc.)
- Establish an adaptation strategy demonstration project (identify key partners, help them to develop adaptation strategy, formulate a learning process which is able to link ground actions to national and local adaptation strategies)

RESULTS

- Leverage government funding to support rural energy development in communities in panda habitat, including the WWF demonstration of various new energy technologies in Minshan, China
- Complete vulnerability assessment for the Yangtze River Basin
- Design an adaptation strategy to build resilience and resistance in vulnerable sectors
- Greater community involvement with natural resource management

Photos: WWF-Canon C. DOOLE (front), WWF-Canon Y. ZHANG, C. DOOLE (back)

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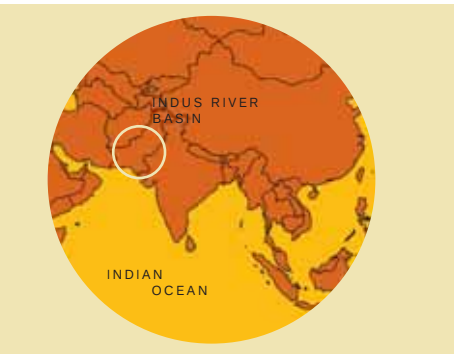
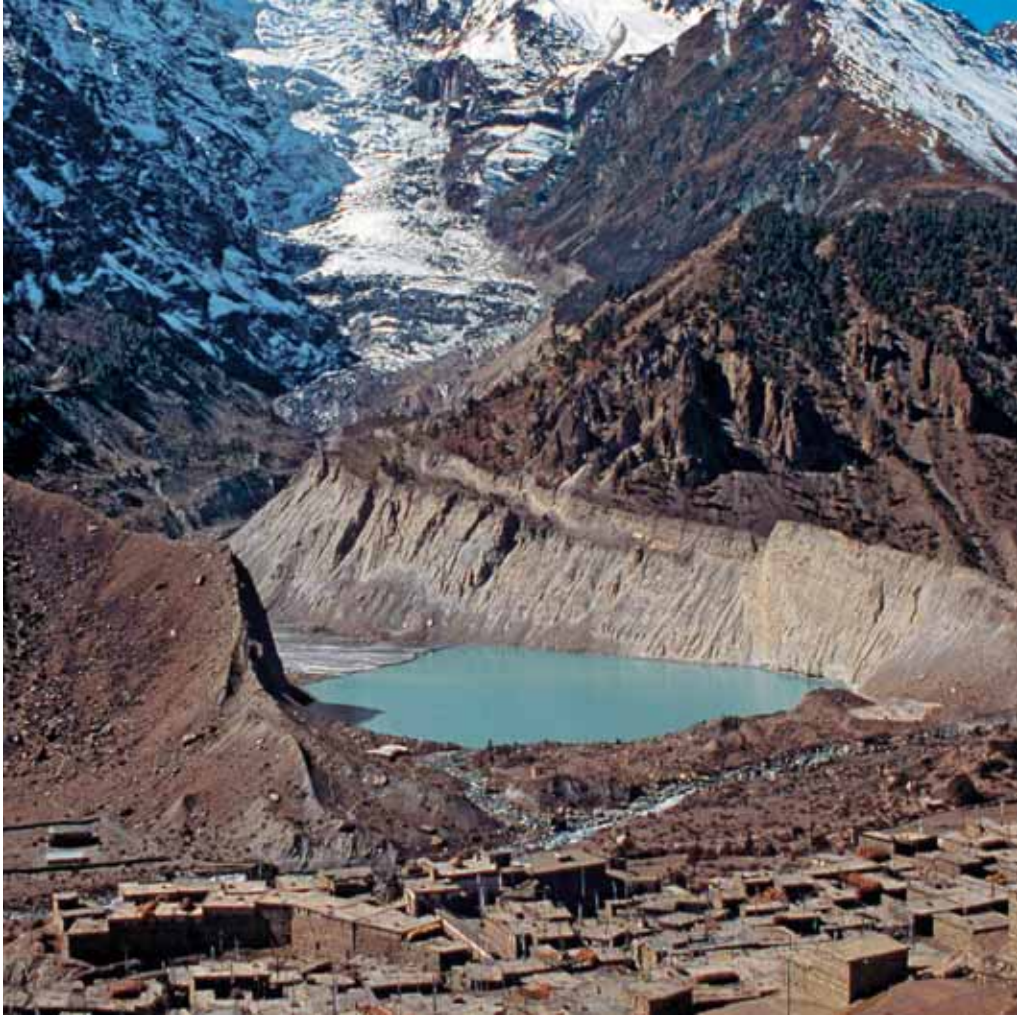
India, Pakistan:

Climate Change Effects on the Indus River



The Indus River, near Tarbella hydro dam site, Pakistan

The Indus River originates from the Tibetan Plateau and runs for 3000 km before it pours into the Arabian Sea. Its delta is approximately 40,000 km^2 and is one of the largest mangrove deltas in the tropical zone. This area has high levels of freshwater biodiversity including keystone species, such as the Indus freshwater dolphin. Seventy percent of the basin's water supply comes from Himalayan snow and glaciers. More than 120 million people live in the Indus River Basin, of which approximately 70% depend on the Indus River waters for their livelihood.



View over the village of Manga to the Gangapurna (7485 m) with the Gangapurna Glacier and glacier lake. The Gangapurna is part of the Annapurna mountain range, one of the highest massifs in the Himalaya and in the world. Annapurna region, north central Nepal.

Climate change impacts in the Indus River Basin:

- A steady rise in mean annual daily maximum temperatures, rising more (2.35 °C) than the mean annual daily minimum (0.54 °C)
- Increased glacial melt

These impacts combine to threaten the landscape and its communities in the following ways:

- Creation of glacial lakes and increased river flows
  - River flows have increased by 40 % of the yearly average and 76 % of the winter average in the past decade compared to the last 30 years of data.
- Increased threat of glacial lake outburst flood and other flooding
  - Of 5,218 glacial lakes, 52 lakes are identified as potentially dangerous.
  - From 1991-2000, the death toll from flooding was 4000 people and the economic loss was US$ 1.8 billion

PROJECT VISION

This project is part of a larger Himalayan Climate & Freshwater Programme, which strives to enhance the livelihoods of communities and conserve freshwater biodiversity in the face of climate change.

The Project will be made up of four modules:

1 Research/monitoring of climate change and its impact

2 Field activities to develop adaptation plans

3 Communication/awareness strategy

4 Policy and advocacy framework

Photos: WWF-Canon S. K. CHNG (front), WWF-Canon NEYRET & BENASTAR (back)

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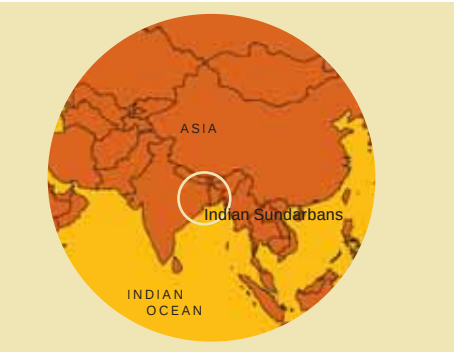
India:

Adaptive Strategies for Tigers, Mangroves and People in the Indian Sundarbans



Mangroves at low tide. Nosy Be, North Madagascar

WWF-India has been active in the Sundarbans Ecoregion for more than three decades. Conservation of the ecoregion is important for a number of reasons:

- It is the **largest mangrove ecosystem** in the world with very high biodiversity,
- It buffers Calcutta from extreme weather events,
- It is a **UNESCO World Heritage Site** and a priority ecoregion for WWF,
- It is the only **mangrove tiger habitat** in the world,
- It is a **nursery** for finfish and shellfish of the Bay of Bengal,
- It supports a human population of more than four million.

Unfortunately, climate change is affecting the Sundarbans now, with relative sea level rise at 3 mm a year, accelerated coastal erosion, biodiversity loss, and increased extreme weather events. WWF-India has developed a strategy to adapt to climate change, with vision for Sundarbans communities and economy, as well as ensuring that plants and animals are able to survive climate change.

Tiger pug marks in the mangrove swamps of Sundarbans Tiger Reserve. Ganges Delta. India. .

Panthera tigris tigris, Indian tiger. Six week old cub. Endangered species. Dist. Asia, but extinct in much of its range.

PROJECT GOAL

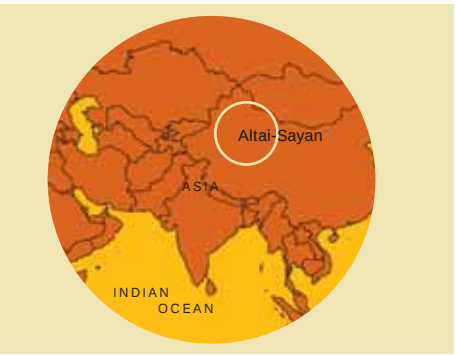
To identify refugia for maintaining biodiversity and initiate climate change adaptation measures by 2015 for the Sundarbans communities.

PROPOSED PROJECT ACTIVITIES

- **Conduct field research and increase understanding** of climate change impacts in the Sundarbans Region
- **Identify and plant *climate-smart* mangrove species** that can keep pace with rising sea levels
- **Monitor climate change impacts of the people, mangroves and tigers**
- **Research and identify salt-tolerant rice paddy varieties and demonstrate their viability** – Increased salinity in the region has hit agricultural practices on more vulnerable islands, heightening the need for more effect response measures to climate change impacts.
- **Identify refugia sites for biodiversity** – Almost all of the 102 islands in the Indian Sundarbans face the threat of inundation due to sea-level rise but some could serve as refugia. We would like to identify these and mitigate the impacts of climate change on selected sites.
- **Build capacity of the community to cope with increased extreme weather events** – An increase in extreme weather events has led to the vulnerability of human communities, and their dependence on and use of their local natural resources. Building the capacity of local communities will increase their ability to cope with climate change.
- **Encourage green energy within the ecoregion** – The Sundarbans are characterized by high unmet energy demand and there is opportunity to dramatically increase affordable green energy options.

Kazakhstan, Mongolia, Russia:

Protecting Water and Wildlife from Climate Change in Altai-Sayan



Tolbo Lake at about 1600 m onTsambagarov Mountain with glaciers in the back (4165 m). Altai Tavn Bodg Special Protected Area, Mongoiia (Altai-Sayan Ecoregion)

Drought is already affecting the region (1999 – 2001)

- 4.3 million livestock died
- 12,100 thousand households lost all of their animals

Local herders see climate change:

- Dust storms are more frequent and droughts are more common
- Plant height and cover are reduced
- Plant species composition is changing
- Animals can't gain enough weight and fat, so animal body size is decreasing

Target: Water – Due to warming temperatures in the region, the glacial area in the Altai Mountains has decreased by 11% during the last 60 years, while the volume has diminished by 25%.

Altai onion Allium altaicum, endemic to the Altai, grows on southern slopes in the forest steppe and sub-alpine zone. Endangered due to over-harvesting. Sold in rural markets. Altai Tavn Bodg Special Protected Area, Mongolia (Altai-Sayan Ecoregion)

Kazakh herders on their summer pastures in the high Altai, solar power for television and radio. A new development, shows improving living standards. Altai Tavn Bodg Special Protected Area, Mongolia (Altai-Sayan Ecoregion)

GOAL 1

Improve sustainable water resource use and prepare for future climate change impacts through introducing Integrated River Basin Management (IRBM) principles in a pilot Khovd River Basin.

Desired Outcomes:

- Adaptive management plan incorporating climate change for the river basin
- Increased public participation in basin management through improved knowledge and sustainable livelihood options
- Fully functional governance structure at entire basin level

Target: Argali wild sheep – the largest species of sheep on Earth

Threats:

- Competition with domestic animals for dwindling habitat
- Unsustainable trophy hunting (i.e. poaching)
- These threats further reduce the potential for sheep populations to become resilient to climate change.

Drivers:

- Climate change
- Human impacts (change in seasonal movement pattern of herders, high profit, lack of incentives, weak enforcement, etc.)

GOAL 2

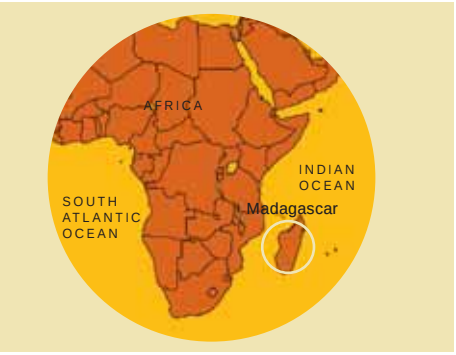
Stop the dramatic decline of the Argali population in the Mongolian Altai, increase the Argali population by establishing a community-managed game reserve large enough to compensate for climatic changes to vegetation, with appropriate corridors to allow for movement between populations.

Desired Outputs:

- Design a community-managed game reserve with stakeholders, which incorporates projected changes in vegetation
- Create a management plan for the area with full participation and involvement of communities
- Establish an anti-poaching unit in order to strengthen law enforcement
- Reduce competition with livestock via better range management
- Provide corridors to allow population movement in response to climate change

Madagascar and its Changing Climate

Madagascar ratified the Climate Change Convention in December 1998 and the Kyoto Protocol in September 2003. But the vast biodiversity of this island is still at risk from the effects of climate change



Ruffed lemur, Varecia variegata variegata. The Ruffed lemurs are threatened by habitat loss through logging and development in Madagascar, they seem to be particularly susceptible due to their high dependence on large fruiting trees for food in primary forest. They are also at risk due to extensive hunting on the island for meat and for sale as pets. Analamazaotra Special Reserve, Madagascar

Spiny Forest's vegetation, Madagascar

Sunset over the spiny forest. The spiny forest is home to a wealth of endemic plant species and provides 75% of the medicinal plants used in Madagascar.

OBJECTIVE

Integrate climate change factors into current conservation plans

TO DO THIS

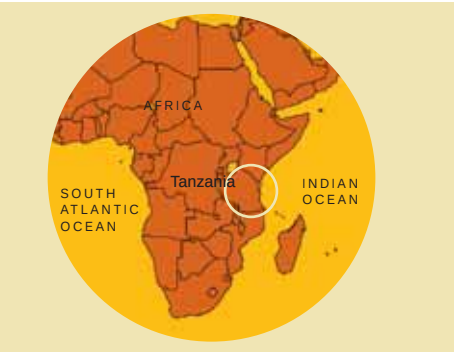
- Assess and implement climate change initiatives in spiny and moist forest ecoregions of Madagascar
- Address carbon sequestration in the spiny and moist forest ecoregions of Madagascar
- Tackle natural system (biodiversity) and human vulnerabilities in spiny and moist forest ecoregions of Madagascar

Implementation Actions

- Develop a meteorological and climate database
- Establish permanent plots in spiny and moist forest ecoregions to assess biological and spatial variability
- Share results with climate change experts, both regionally and globally
- Extend activities in other priority areas (West, Southwest, North-eastern forests, Eastern lowland forests)
- Lead the process of new protected area designation that include climate change effects
- Decrease synergistic local stressors by promoting alternatives to:
  - Slash and burn cultivation
  - Urban consumption of forest products, such as charcoal
- Educate stakeholders and support implementation of local fire committees
  - and reinforcing fire management

Coastal East Africa:

Spearheading Tanzania's Defense Against Climate Change



Green turtle in corals. Mafia Island, Tanzania. Project TZ0057 – Mafia Island Marine Park

The East African Coastal Forests have a long history of climatic stability. Abundant rainfall carried by warm Indian Ocean winds has created an ideal environment for a wide diversity of species, many of which are found nowhere else on Earth. Most of this area has experienced heavy human settlement for many years, and as a result, only a few fragmented islands of forest remain isolated throughout the ecoregion. Local people have cleared much of the region's forests in the search for fuel wood and to clear space to grow crops.

Scenery from Mlola coastal forest beach Mafia Island, Tanzania

Fisher with boat provided through sustainable livelihood loan. Mafia Island, Tanzania. Project TZ0057 – Mafia Island Marine Park

The social and environmental impacts of climate change in East Africa threaten to decrease food security, increase conflicts, and increase poverty through:

- Inundation of mangroves, beaches, mudflats.
- Coastal erosion
- Coral bleaching
- Species migration and extinction
- Increased pests and diseases
- Increased wildfires
- Changes in plant phenology
- Changes in river flows
- Alteration to ground water recharge

WWF is already working to respond to climate change in East Africa by:

- Reducing non-climate change stresses
- Establishing representative networks of protected areas
- Restoring degraded habitats

WWF is initiating a regional effort to more effectively address the threats of climate change.

To do this we must:

- Build capacity for climate change work in the region, both scientific and organizational.
- Sensitize governments and stakeholders through programmes like Climate Witness
- Conduct climate change vulnerability assessments and prepare adaptation strategies
- Conduct scientifically vigorous climate change impact monitoring of key habitats and social variables
- Build social resilience to climate change

Photos: WWF-Canon J. RUBENS (front), WWF-Canon S. MBANEFO OBIAGO , P. DENTON (back)

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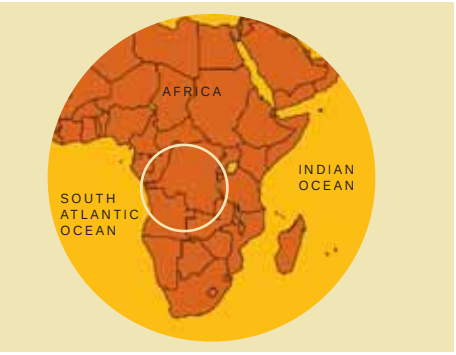
Angola, Democratic Republic of Congo, Republic of Congo:

Resilience and Adaptation to Climate Change in the Congo Basin



A logging truck is being checked by forest guards in south-east Cameroon. Logging trucks are often used to transport illegal bushmeat to the countrY's major cities.

The forests of the Congo River Basin play an important role in regulating local rainfall and climate. They also absorb carbon dioxide, a gas emitted mainly from burning fossil fuels and the major driver for global climate change. Forest loss and degradation in Central Africa (including the Congo River Basin) are likely responsible for the release of more carbon to the atmosphere than any other land use practice on the continent. But what happens when these forests are lost?

Loxodonta africana cyclotis, Forest elephant. Sub-adults play fighting. Dzanga Bai. Dzanga-Ndoki National Park, Central African Republic (CAR)

Western lowland gorilla, Congo

BaAka subsistence hunters and gatherers in the forest. La trinationale de la Sangha (TNS) is a unique collaboration between the countries of Cameroon, Central African Republic and Republic of Congo.

GOAL

To build a strategy promoting the Congo Basin's long-term forest resilience and facilitate its adaptation to climate change

STRATEGY

To build on existing projects to address climate change impacts. Some of those existing projects include:

- Effectively managing protected areas for climate change
- Creating new protected areas to facilitate habitat changes and migration
- Maintaining connectivity within landscape through landscape and urban planning design and sustainable forest management and community-based natural resource management activities, allowing biodiversity the flexibility needed to respond to climate change
- Strengthening forest governance and institutions to promote greater resilience to change

TACTICS

- Expand the current mid-size Global Environmental Facility project to assess the vulnerability of Gulf of Guinea coastal areas and explore adaptation options to climate variability and potential extreme events
- Expand the current permanent inventory plots at Lope to other priority landscapes to help predict the response of plants and wildlife to climate change and a fragmented landscape
- Analyze the impact of deforestation and dam construction and explore Payment for Ecosystem Services schemes
- Assist Council of Ministers for Forests of Central Africa (COMIFAC) countries to factor in climate change features into the Regional Conservation Plan and help them create a successful post-2012 Kyoto Protocol Regime

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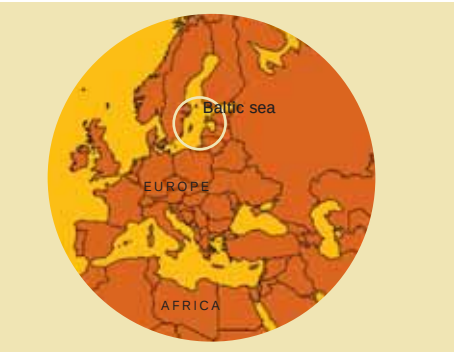
Northern Europe:

Climate Change Vulnerability in the Baltic Sea



Coastline and chalk cliffs. Jasmund National Park. Rügen Germany

The warming trend from 1861-2000 for the Baltic Sea basin has been a bit more than the global average of 0.08°C/decade. Based on available regional modelling studies, a warming of the mean annual temperature on the order of 3°C to 5°C is projected for the total basin during this century, which may likely result in greatly reduced ice cover, more intense algae blooms, lower oxygen levels near the sea-bed of coastal waters in summer, expansion of warm-water fish at the expense of other species, and a greater risk of alien species from more southerly water establishing themselves in the Baltic. Warming may lead to greater precipitation in winter, which could lead to both greater leaching of nutrients from farmland and reduced salinity in the Baltic, thus risking the elimination of key species such as ringed seal, bladderwrack, common mussel, eider and cod from parts of the sea. These are just a few potential implications, all of which will have a significant impact on our conservation goals in the region.

Background: WWF's Baltic Ecoregion Programme is comprised of WWF and partner organizations in the nine countries bordering the Baltic. The action-plan agreed by these partners includes integrated land and coastal and marine activities to strengthen the local and regional capacity to achieve sustainable eco-system-based management of the Baltic Sea's resources.

The Baltic Sea Ecoregion is unique as the world's largest brackish-water ecosystems, highly sensitive and located in one of Europe's most economically dynamic regions with a long tradition of environmental stewardship. If the popula-tions around the Baltic can solve their environmental problems, they serve as an example to the rest of the world.

Coastline and chalk cliffs. Jasmund National Park. Rügen Germany

PROPOSED PROJECT

Given the substantial threats posed by climate change to the marine environment of the Baltic Sea, particularly to fisheries and protected areas, it is essential that we:

- **Incorporate climate change into conservation planning and activities.** This requires a better understanding of the specific effects of climate change in the Baltic Sea, its potential interactions with non-climate stressors, and a comprehensive and robust approach to building resistance and resilience to climate change into regional ecosystems.

- **Conduct a preliminary vulnerability assessment of the Baltic Sea Ecoregion** with respect to the potential impacts of climate change and directly relate this to how it will affect our Baltic Ecoregion Conservation Action Plan and conservation goals.

- **Convene a workshop of delegates with substantial scientific and stakeholder expertise** from a broad range of relevant disciplines and, over a two-day period, consider the key potential impacts will be as well as discuss how groups around the Baltic Sea can work together more effectively to address this threat in the region. In doing so, develop an inventory of existing organizations, individuals and activities engaged n climate change work in the region. In addition, compile a prioritized list of possible adaptation activities. The workshop will create a network of engaged and educated stakeholders who can be the basis for implementation of adaptation and mitigation in the region.

- **Take inventory of the range of climate change activities currently ongoing in the region**, including research, resilience/adaptation, and mitigation so we can explore synergies and leverage limited resources.

- In the longer term, the results from this work will inform the **development of an adaptation strategy,** to build upon natural resistance and resilience.

Photos: WWF-Canon M. RAUTKARI (front), WWF-Canon M. EDWARDS, F. PÖLKING (back)

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The WWF Mission

WWF's mission is to stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature, by:

- conserving the world's biological diversity
- ensuring that the use of renewable natural resources is sustainable
- promoting the reduction of pollution and wasteful consumption.

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