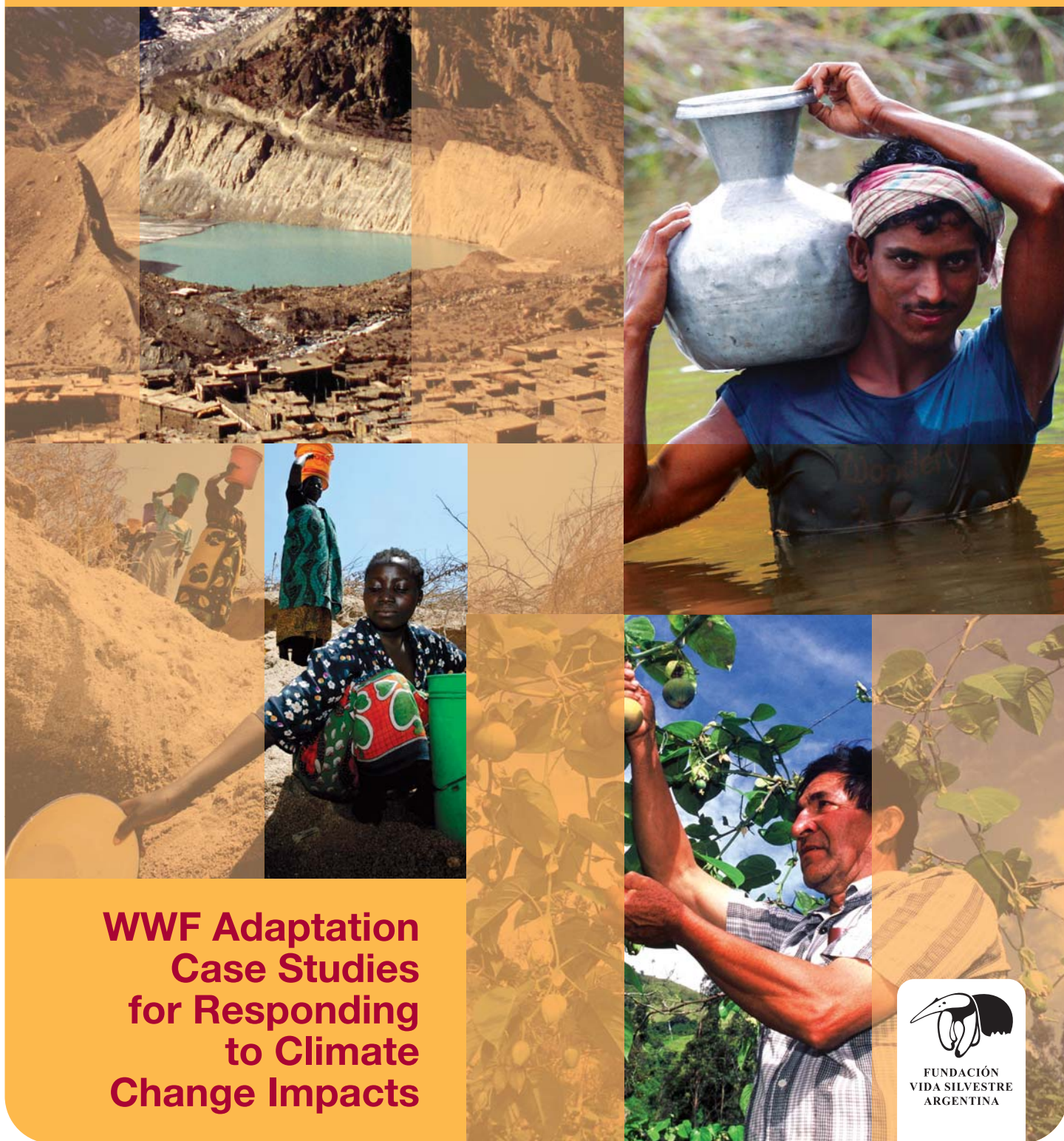




for a living planet®

2°C IS TOO MUCH!



**WWF Adaptation
Case Studies
for Responding
to Climate
Change Impacts**



2°C is too much, we must act now

The Intergovernmental Panel of 2000 of the world's most prominent Climate Change scientists, IPCC, has established that human-caused climate change is real, beyond any scientific doubt. **The global average increase in temperature is now 0.8°C**, compared to 100 years ago, caused mainly by the burning of fossil fuels and land-use changes, which have released carbon dioxide and other greenhouse gases into the atmosphere since the beginning of the industrial revolution in the 1750s.

Every year, climate change leaves over 300,000 people dead, 325 million people seriously affected and economic costs of US\$ 125 billion.

At an average global temperature of 2°C - 3°C, compared to pre-industrial levels, dangerous and irreversible impacts are projected:

- **Water shortage** risk for 1-3.2 billion additional people caused mainly by droughts and melting glaciers;
- **Hunger risk** for 400 million people and 75% African crop failure caused mainly by higher evaporation rates from more intense droughts in Africa and elsewhere;
- **Health impacts** including with 300+ million more people at risk from malaria, low-income countries at severe risk from diarrhea and malnutrition and worldwide health costs doubling;
- **Flooding risk** of coastal areas for 180 million people including a 25% increase in flooded area in Bangladesh and complete loss of some low-lying islands due to sea level rise from land-ice melt and more intense storms;
- **Effects on biodiversity** including 35% of terrestrial species at or near extinction by the year 2050, loss of most tropical coral reefs and 30% of coral communities of the reefs that remain.

Industrialised countries, as the historical polluters, have an unquestionable responsibility to respond to current and future damage in developing countries which have a low adaptive capacity, including because of limited choices and resources to cope with climate change impacts.



“Loss of 30% of coral communities of the reefs that remain”

New paradigms for finance, development and nature

Arresting global warming at a 2°C increase since pre-industrial times now requires large reductions in greenhouse gas emissions. In turn, massive trading of carbon emissions must quickly secure the role of natural forests and soils to store and sequester carbon dioxide, whilst supporting sustainable development, including clean energy transformation, in developing countries.

Action to Adaptation

Equally as urgent and important, is that the Earth's average temperature will continue to grow by 0.5°C or more, even if greenhouse gas emissions were immediately cut, with warming far greater on land and far higher at the poles in the Arctic and parts of Antarctica. Reducing the burden of climate change also requires a great amount of adaptation.

Definition of Adaptation

IPCC defines adaptation as any adjustments in natural or human systems to respond to expected stimuli or their effects, which moderates harm or exploits beneficial opportunities.

1. The Greater Mekong



Thailand, Vietnam, Cambodia, Laos, Myanmar, Tibetan Autonomous Region and Yunnan Province (China)

2°C Threat: Widespread flooding and increased salinity of freshwater systems including impacting the world's largest inland fishery which provides livelihoods for 60 million people.

WWF Adaptation Project: Vulnerability assessments of key ecosystems, integration of climate change vulnerability and implications for future provincial

economic development planning in Krabi and Ca Mau Provinces; maintaining or restoring natural habitats including dunes, wetlands and coastal mangrove forests to buffer against storm surges, improve water quality and regulate water flow.

Ecosystem Services Value: US\$ 200,000 - US\$ 900,000/km²/year for the role of mangroves in coastal defense and fisheries productivity.

2. Caucasus



Armenia, Azerbaijan, Georgia, the north Caucasus portion of the Russian Federation, north-eastern Turkey and part of north-western Iran

2°C Threat: Threatened by droughts, floods, forest fires and the reemergence of malaria, where livelihoods are highly dependent on farming and forests.

WWF Adaptation Project: Identifying the extent to which the new Protected Area system will mitigate carbon and adapt to climate change impacts such as more frequent and severe floods and droughts; identifying financial incentives for local communities to introduce immediate adaptation activities.

Ecosystem Services Value: Carbon sequestration and regulation of water flow and quality by forests, where flood and drought costs have been more than US\$ 175 million during the last few years.

3. The Eastern Himalayas



Nepal

2°C Threat: Glacier retreat combined with fragmented habitats leading to landslides, flooding and acute freshwater shortages.

WWF Adaptation Project: Research on glacial retreat, glacial lake outburst floods and installation of automatic weather stations; establishing flexible systems to manage freshwater resources with increasing uncertainty; increasing the understanding of land use and land management to respond to climate change impacts; raising awareness of forest fires; including climate change adaptation measures in national policies and local development planning; local community climate change centres and civil society networks; climate change manuals for farmers.

Ecosystem Services Value: Glacial retreat supplies water for one billion people or more across the region.

4. The East African Coast



Kenya, Tanzania and Mozambique

2°C Threat: Mangroves are threatened by sea level rise combined with agricultural expansion, charcoal and timber industry, and urban growth and coral reefs and fisheries threatened by rising sea temperatures, acidification, overfishing by large industrial fleets and destructive coastal fishing practices.

WWF Adaptation Project: Income diversification based on sustainable use of natural resources, eg.

tourism, to enhance ecological and social resilience; mangrove restoration using more climate resilient species; research on socio-economic opportunities for sustainable harvesting, alternative fuels and building materials in context of terrestrial forest; from the marine side research on effects of future sea-level rise on mangroves, and the importance of mangrove/ coral reef interactions for climate change resilience.

Ecosystem Services Value: US\$ 200,000 - 900,000/km²/year for mangroves and US\$ 100,000 - 600,000/km²/year for coral reefs for their role in coastal defense and fisheries productivity. When combined with appropriate socio-economic activities, reduced poverty and healthier environments.

5. The Northern Andes



Colombia, Ecuador, Venezuela

2°C Threat: Water stress on indigenous communities and small scale farmers for this water source of the Amazon river and world centre for plants cultivated for food, medicine and industry.

WWF Adaptation Project: Scaling down climate models to produce reliable data for agricultural land and water management; selection of areas for protection which have been historically resistant to climate change and can act as reference areas.

Ecosystem Services Value: Important contribution to water supply and flow of this region and the entire Amazon basin.

6. The Central Yangtze



China

2°C Threat: Massive flooding affects over 400 million people.

WWF Adaptation Project: Reconnecting lakes to the river mainstream for managing increased flooding and droughts and clear urban water supplies, restoration of wetlands habitat for fish and freshwater dolphins and working with local communities and resource managers to create sustainable fisheries and crop production.

Ecosystem Services Value: Flood capacity management of wetlands (75%=2.8 Bm³). Better access to clean water by partial restoration of natural water flow.

7. The Danube



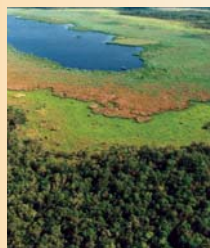
19 Countries including Hungary, Romania, Bulgaria, Ukraine, Moldova

2°C Threat: Severe flooding impacting the 83 million people which live in the river basin, highly dependent on agriculture for their livelihoods.

WWF Adaptation Project: Dyke removal and restoration of floodplains for flood control, replacing monoculture with diversified incomes based on sustainable use of natural resources (tourism, fishing, grazing, fibre production, recreation).

Ecosystem Services Value: Diversified income US\$ 50/ha., total ecosystem services defined as natural resources of pledged 2236 km² restored: US\$ 140 million/year.

8. American Gran Chaco



Argentina, Bolivia, Paraguay and a small part in Brazil

2°C Threat: Drought and desertification, also from deforestation, in the west of the region as the agricultural frontier has advanced and pushed vulnerable rural and indigenous communities northwards.

WWF Adaptation Project: Workshops to incorporate local knowledge in adaptation planning; protecting upland wetland and water flow, areas historically resistant to climate changes and buffer areas for wetland migration; capacity building in effective water management, including rainwater capture and storage; fire prevention training; diffusion of educational materials to combat mosquito-born diseases.

Ecosystem Services Value: Carbon capture where Argentine CO₂ emissions by deforestation were 20,875 GgC/año from 1996-2005 - 75% by deforestation of Gran Chaco. Wetlands and forests regulate water flow and quality already affected by higher evaporation rates which has also caused ground water pollution of nutrient and agrochemicals. Vegetation cover to protect soil where erosion by water and wind has caused 40-60% reduction in original soil cover in Chaco-Salteño.

WWF Global Adaptation Case Studies

WWF presents Adaptation Case Studies that link, through economic or household impacts, with more than 20% of the worldwide population. These cases span at least 10 million km² of land and 40 million km² of marine areas, and they describe vigorous climate change adaptation activities undertaken by WWF and our partners.



Natural Solutions

The WWF Case Studies also identify “Natural Solutions”, which are often an essential contribution to cost effective climate change adaptation and mitigation. They emphasize the role of natural systems for regulating water flow, improving water quality, reducing disaster impacts, protecting soil, sustaining fisheries productivity and sequestering and storing carbon.

9. The Meso-American Reef



Mexico, Belize, Guatemala and Honduras

2°C Threat: Acute sea level rise, coral reef bleaching through temperature rise and acidification, loss of tourism attractions and fishing ground for livelihoods highly dependent on fisheries and tourism.

WWF Adaptation Project: Stakeholder capacity building to monitor and protect natural coastal defenses and fish nurseries such as coral reefs and mangroves (communities and local tour guides);

integration of adaptation into national and local coastal development planning; legislation for mangrove protection; better enforcement including with "local watchdogs"; testing feasibility of coral nurseries for restoring reefs.

Ecosystem Services Value: Coral reef and mangrove related tourism US\$150 - 196 million to the national economy in 2007 (12-15 % GDP); economic benefits from reef and mangrove dependent commercial fisheries are estimated at between US\$14 - 16 million per year; reefs and mangroves also play an extremely significant role in protecting coastal communities from erosion and storm surges, providing an estimated US\$231 - 347 million per year in avoided damages. For the Caribbean region generally, the mean forecast of the worth of reefs and mangroves is US\$ 26 billion/ year 2050-2100 or greater than 10% GDP.

10. The Coral Triangle



Indonesia, Philippines, Malaysia, Papua New Guinea, Solomon Island and Timor Leste

2°C Threat: 100 million people are supported directly by the coastal resources, most importantly fisheries are highly threatened by combined coral bleaching, coastal development and flooding of low lying areas.

WWF Adaptation Project: Build capacity for adaptation planning; rehabilitation (especially in abandoned fish ponds), protection and sustainable management of natural sea defenses and fish nurseries such as mangroves and coral reefs; improved community water management.²

Ecosystem Services Value: Ecosystem Services Values: US\$ 200,000 -900,000/km²/year for mangroves and US\$ 100,000 - 600,000/km²/year for coral reefs for their role in coastal defense and fisheries productivity; US\$ 2.4 billion/year for specific value of coral reef fisheries; US\$ 1.6 billion/year for economic benefits of coral reefs in Indonesia and US\$ 1.1 billion/year in the Philippines; other important natural systems and ecosystem services include nutrient cycling and passage between mangroves and reefs and carbon sequestration by mangroves and inland forests.

11. The Southern Ocean



Encircles the entire Antarctic Continent

2°C Threat: Reduction in winter sea ice by 10-15% and 30% in some areas will in turn reduce sea ice dependent species such as krill which feed on plankton that congregate under the ice and are the base of many key Southern Ocean food chains.

WWF Adaptation Project: Highly precautionary and spatially evaluated krill & other fishery quotas that incorporate future impacts from climate change; implement spatial protection and management to

provide valuable scientific reference areas of climate change impacts free from other forms of human activity to inform future adaptation responses and to provide areas for fish stocks to grow and remain healthy.

Ecosystem Services Value: Fisheries US\$ 1 billion; surrounding the vast Antarctic Continent with its associated spiritual and cultural values which are invaluable.

12. Donaña



Spain

2°C Threat: Increased desertification with higher than global average temperatures, intense impacts such as decrease in annual rainfall, and huge increase in evaporation rates.

WWF Adaptation Project: Investigations of the consequences of climate change for the natural and socio-economic system; capacity building of professionals for climate change response planning and management; control of natural risks, such as fires, produced by climate

change; efficient and balanced fresh water-use; regeneration of degraded areas for coastal defense.

Ecosystem Services Value: Important tourism income to the Doñana National Park; cultural and spiritual values which include hunting and fishing; coastal wetlands for coastal defense and natural vegetation to help prevent soil erosion.

13. Sundarbans



West Bengal

2°C Threat: A habitat on the edge, the Sundarbans are highly threatened by river bank flooding and sea level rise, being home to 4 million people and 10% of the remaining Bengal tiger population.

WWF Adaptation Project: Restoring and maintaining mangroves; employing artificial banks, saline resistant paddy varieties, pond sand filters, community based early warning systems; incorporating climate change response mechanisms in a 'Delta Vision', such as the role of conserving mangroves for coastal defense and planning for managed retreat.

Ecosystem Services Value: Building 2,200 km protective storm and flood embankments US\$ 294 capital investment plus US\$ 6 million/year maintenance, which is much more than mangrove conservation for flood retention and the reduction of coastal erosion.

14. The Ruaha Basin



Tanzania

2°C Threat: Water scarcity, particularly in the dry season, which will also increase food stress, cholera and other infectious diseases due to freshwater shortages.

WWF Adaptation Project: Implementation of Integrated Water Resource Management; supporting research and analysis e.g. hydrological monitoring and determining environmental flow rates to inform water allocations; supporting water governance

institutions to monitor water use and enforce water policy and by-laws; removal of water thirsty trees such as Eucalyptus near water sources; training in irrigation efficiencies, reducing dependency on agriculture through livelihood diversification such as training in saving/credit management, environment and water conservation measures, business selection and planning, bee keeping, running pharmacies and restaurants; rainwater harvesting and boreholes, supporting environmental tradeoffs such as the Lugoda dam providing there are multi-benefits and mal-adaptation is avoided.

Ecosystem Services Value: Water from the Ruaha river, for agriculture, provides income for 80% of Tanzania's people and accounts for 45% of GDP, Tanzania's GDP could decline by 0.6%-1% by 2030 and 68% by 2085; dams currently supply 50% of electricity.

15. Altai-Sayan



Russia, Mongolia, Kazakhstan and far north-western China

2°C Threat: Enhanced warming, already at 1.5°C during the last 60 years, massive melting of glaciers, catastrophic floods and prolonged droughts impacting livelihoods that are largely dependent on farming.

WWF Adaptation Project: Downscaling data to determine where and how climate changes will take place and comparing with conservation and

development activities; integrated water resource management project of the Great Lakes Basin in western Mongolia; building community capacity and resilience for with- standing climate change such as limiting grazing in key habitats during breeding season.

Ecosystem Services Value: Water flow and quantity which has already been altered by climate change so that related drought has already killed 4.3 million livestock and over 12,000 households have lost their animals.

16. Fiji



2°C Threat: Natural defenses, coral reefs and mangroves, severely threatened by climate change and development pressures.

WWF Adaptation Project: Vulnerability assessment on 3 mangrove sites to support effective planning at the provincial, municipal and community level; identifying climate refugia; capacity building to engage communities in project implementation.

Ecosystem Services Value: It is estimated that mangroves provide Fiji a natural coastal protection value of between US\$ 38-96 million/ha./year.

WWF is calling for unprecedented and urgent global cooperation set in a legally binding agreement for:

Mitigation:

Stabilizing concentrations of greenhouse gases in the atmosphere at a level that would prevent dangerous climate change.

Adaptation:

Developed countries to provide support for developing countries of:

- at least **US\$ 25 billion** channeled through the existing Kyoto Adaptation Fund, as “early start” funding for the 2010-2012 period.

This funding is for the implementation of urgent adaptation needs in vulnerable developing countries, including implementation of National Adaptation Programmes of Action (NAPAs) for Least Developed Countries (LDCs) and the development, revision and implementation of National Adaptation Plans (NAPs) and other urgent adaptation actions for non- LDCs.

- at least **US\$ 63 billion annually from 2013-2017** for the post 2012 UNFCCC Adaptation Fund which is under the authority and guidance of Conference of Parties (COP).

This funding is to fulfill developed country commitments under the UNFCCC to support all vulnerable developing countries' adaptation needs.

- scaled up support to at least **US\$ 100 billion annually by 2020.**

This support should be based on a regular review of country needs assessments, new science on climate change impacts, the degree of adaptation actions implemented and future mitigation scenarios.

Establishment of an Adaptation Action Framework (AAF) to meet the adaptation needs of vulnerable countries, communities and ecosystems. The AAF includes:

- an Adaptation Action pillar to enhance the resilience of communities and ecosystems against the adverse impacts of climate change;
- a Risk and Insurance pillar to address risk of climate related extreme weather events;
- a Compensation and Rehabilitation pillar to deal with loss and damage from the adverse impacts of climate change that cannot be supported under the previous two pillars and which require extreme measures, such as migration and resettlement of people, to assist affected communities.

All adaptation finance shall be new, sustainable, predictable, adequate and additional to the existing 0.7% Overseas Development Aid commitment target, accessed easily and directly by vulnerable countries, and provided on a grant basis, not loan basis, as a legally binding commitment from developed countries to developing countries. The governance of adaptation funding shall be fair, effective, efficient and transparent, be comprised of an equitable geographic representation, and be under the authority and guidance of, and be fully accountable to the Conference of Parties. The existing Kyoto Adaptation Fund fulfills these governance criteria and should be the basis for the future agreement.

For further information www.panda.org/climate, www.vidasilvestre.org.ar

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