ECONOMIC STRESS

Many economic sectors are sensitive to climate, just as many diseases are. While in the short to medium term some regions will reap benefits from warmer weather, overall, the additional stress of climate change will harm economic output and growth. It will also contribute to worsening global inequalities, since the economic impacts of climate change are, in general, most disadvantageous to the poor and most advantageous to the wealthy. The primary sectors of the economy are most sensitive to climate change, in particular agriculture, crops, livestock, and fisheries. Valuable environmental assets such as coral reefs, alpine rainforests, and species are also impacted negatively by global warming.

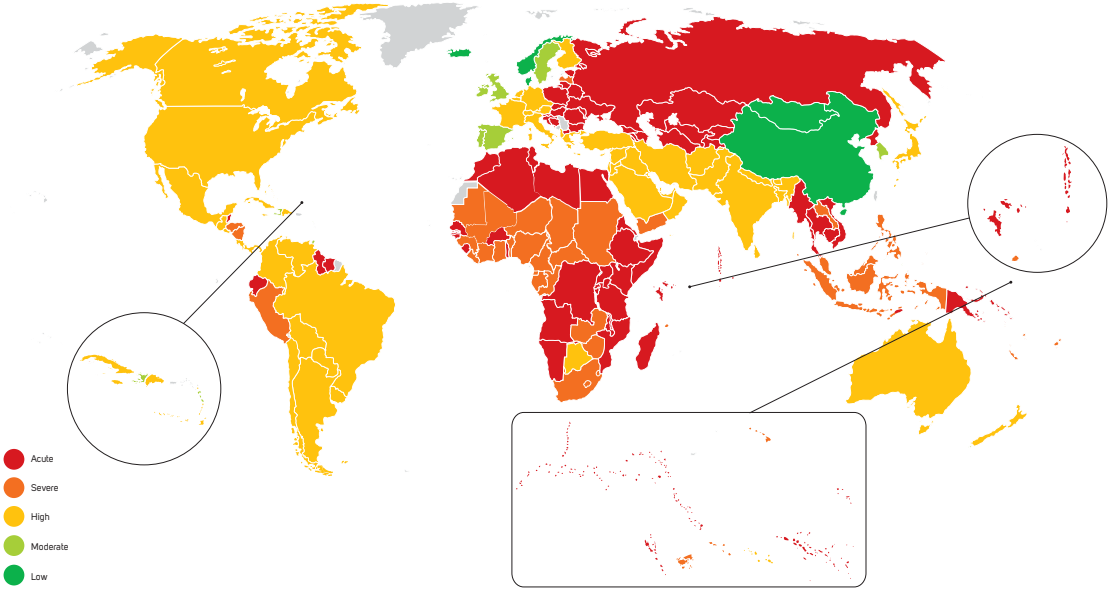
2010
CLIMATE EFFECT TODAY
65 BILLION DOLLAR IMPACT PER YEAR

2030
CLIMATE EFFECT TOMORROW
160 BILLION DOLLAR IMPACT PER YEAR

FINDINGS

GLOBAL VULNERABILITY TO CLIMATE ECONOMIC STRESS

Countries by overal climate vulnerability for economic stress



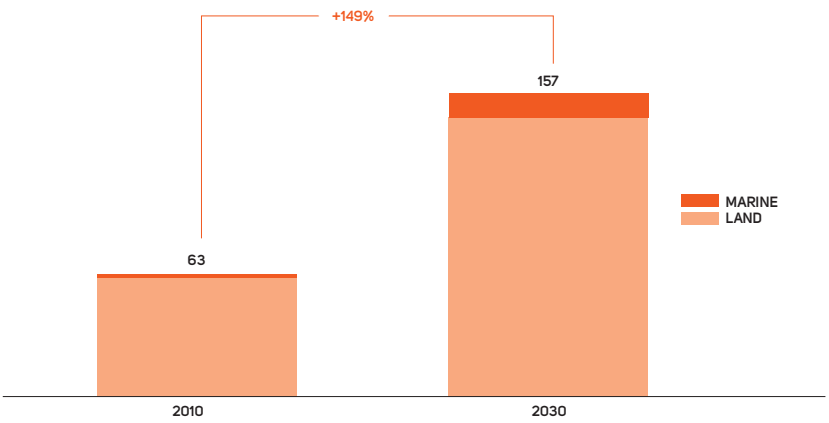
This section focuses on the incremental economic stresses climate change is placing on productive sectors in the economy. These economic losses occur in addition to the climate change impacts described in other chapters of this report, such as the immediate damage costs of extreme weather and economic losses due to sea-level rise.

These economic stresses are set to significantly widen the gap between wealthy and poor. In most cases, the economic impacts of climate change are actually making the rich richer, for example in some sectors of Northern Europe. The worst losses are being felt in countries that are already poor, especially in Africa, Central Asia, and Southeast Asia.

Globally, estimated economic stresses due to climate change point to losses of USD 63 billion each year today. This impact will rise by more than 100% to USD 157 billion each year by 2030.

GLOBAL CLIMATE ECONOMIC STRESS IMPACT BURDEN

The change in the scale of global climate-related economic losses from 2010 to 2030
Additional Economic Losses (billion USD PPP)



The economic stress due to climate change captured in this report is primarily based on primary sectors such as fisheries, forestry, and other agricultural losses or gains. It is to a great extent driven by water resource impacts and climate effects on biodiversity.

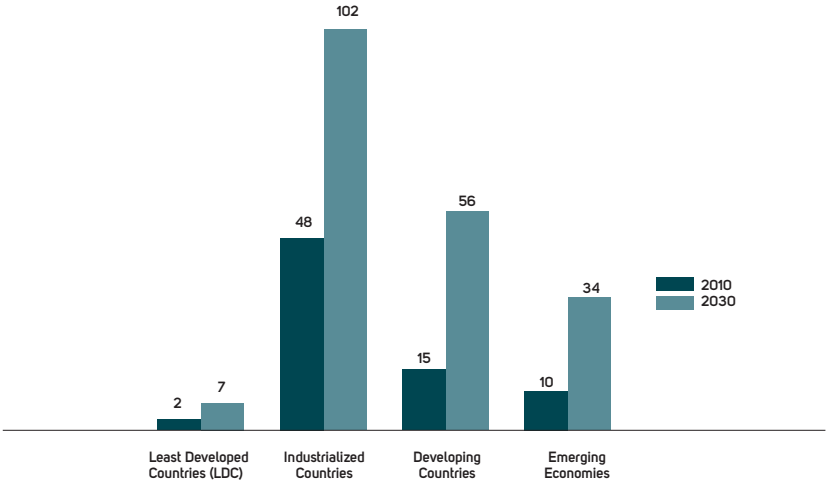
The estimates of economic stresses expressed here provide only a partial picture. Other important economic sectors are likely to be affected by climate change, including energy, tourism, and other service sectors, but good estimates are not yet available for many countries. The national and regional estimates provided here also often fail to capture the exposure of communities within countries that are particularly impacted by climate change. There is an urgent need to study these impacts in greater detail, particularly in developing regions that currently have the poorest access to such information. Still, the available projections provide a good barometer for economic impacts that will also be felt across other sectors of the economy.
More than half the total losses due to economic stresses brought on by climate change will be in industrialized countries. Large developing countries will also bear a significant burden. Least developed countries experience much harder impacts relative to the size of their economies, but since the GDP of lower-income countries is by definition much smaller, their impacts also contribute less to overall global losses. Projected economic losses are set to grow significantly between 2010 and 2030, both due to the increasing impacts of climate change and due to the projected underlying economic growth. Roughly half of the projected increase of 150% is explained by climate change and the rest by the underlying economic growth.

MORE THAN HALF THE TOTAL LOSSES DUE TO ECONOMIC STRESSES BROUGHT ON BY CLIMATE CHANGE WILL BE IN INDUSTRIALIZED COUNTRIES. LARGE DEVELOPING COUNTRIES WILL ALSO BEAR A SIGNIFICANT BURDEN

THE SPREAD OF IMPACT: ECONOMIC LOSSES

The distribution of climate-related economic losses by socio-economic group in 2010 and 2030

Additional Economic Losses (billion USD PPP) average per year



IMPACT DYNAMICS

The climate is changing. Temperatures are higher, rainfall is decreasing in some places, increasing in others, and the atmosphere carries more energy and humidity, bringing more wind and more uncertainty.[149] These changes will stress communities around the world in ways that impact economic values. Some communities will benefit overall, some will suffer overall, but all communities are likely to experience stresses that reduce economic growth as the environmental change brought about by global warming intensifies.

PEAK IMPACT ECONOMIC STRESS ▲

1999-2001	Iran	Drought	37 million affected- $3.3 billion in damages[150]
2000	Australia	Locust Infestation	Largest outbreak recorded - $120 million in damages[151]
2002	India	Drought	300 million affected - $910 million in damages[152]
2002	United States	Drought	$3.3 billion in damages[153]
2004-2005	Brazil	Drought	$1.65 billion in damages[154]
2006	China	Drought	18 million affected- economic damage of $2.9 billion[155]

Our planet's climate has changed dramatically over its billions of years of existence. In the last 650,000 years, there have been seven distinct ice ages – two since the emergence of people (homo sapiens) some 200,000 years ago. The last ice age ended around 10,000 BCE. Modern civilization emerged during the interglacial (or warmer) period since then, and for much of this time a relatively stable climate has been the norm.[156] The rapid

warming in global temperatures by almost 1 degree Celsius or 1.8 degrees Fahrenheit since the 1900s represents a pace of change on a level that is unusual in nature and completely unprecedented for human civilization. And this rate of change is rapidly accelerating as we continue to pollute the earth's atmosphere.[157]

Over long time periods, the earth would adapt to the changes thrown at the environment. Coral reefs may die out in the warmest waters but grow in colder -- warming -- waters, which might present a more favourable habitat. Water may drain from one part of the world and accumulate elsewhere.[158] However, the costs of such fundamental transformations are likely to be very high to the generations that live through them.[159] In today's world, entire nations or economies cannot reasonably be expected to uproot, nor does the life of a human being last long enough in most cases to see long-term regenerative transformations realized in nature. This report's focus on today and the near future means that many of the potential long-term gains, such as new farmland in remote uninhabited pre-Arctic regions, are unlikely to be reaped to their full potential.[160] Likewise, technological solutions yet to be developed should not be counted on to face off or counteract negative impacts in the near future.

Some economic sectors are more dependent on environmental conditions than others. Agricultural productivity is highly dependent on temperature and precipitation.[161] Water supply is dependent on how precipitation patterns and evaporation rates change.[162] The catch potential in fisheries is dependent on water temperatures and the acidity level of oceans, which is rising in large part due to climate change.[163] Researchers have built complex economic models to estimate projections for economic stresses due to climate change in these sectors.[164]

Economic models can also estimate economic impacts on non-market sectors.[165] The stresses described in this chapter include projections for the economic impacts on natural ecosystems, for example. Climate change is projected to have irreversible effects such as the loss of species and the deterioration of complex natural ecosystems.[166]

Climate change is also projected to result in added costs to other sectors. For example, more extreme temperatures will have a significant impact on the costs of energy for heating and cooling.[167] But these costs are usually regarded as adaptation costs rather than direct economic stresses, so they are excluded from the estimates in this chapter.

Agriculture is sensitive to climate change in a variety of ways, not all negative. In mid- to high-latitude regions, particularly in the northern hemisphere, moderate increases in temperature and rainfall changes are expected to lead to a small gain in crop yields and livestock production.[168] Increasing concentrations of CO_2 in the atmosphere may also benefit crop yields, making crops grow faster and more efficiently, although the extent to which this is the case is still debated.[169] Common weeds, for example, are found to benefit most from the CO_2 effect, which is one key factor counteracting its potential benefits.[170]

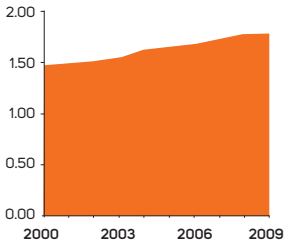
Low-latitude regions are expected to experience negative yield impacts for major cereals such as wheat and rice. The loss of water resources in areas that already experience high levels of water stress and low precipitation can have significant negative effects on agriculture. We expect that these effects will be compounded by the increased frequency of extreme weather events such as drought, flooding, and fires. These impacts are expected to affect vulnerable groups in the poorest countries the most. Smallholder and subsistence farmers are particularly vulnerable. The national statistics presented in this report often do not sufficiently convey the vulnerabilities of these communities.[171]

However, we expect that forestry as a sector will not suffer overall heavy economic losses in the near term. The outputs of forest products are also projected to enjoy some benefits from increased CO_2 concentrations. But forestry will suffer some of the same challenges as agriculture, particularly where water is scarce and where the frequency of extreme weather events increases.[172] Over time, some trees will no longer be suited to a warmer climate, while other trees will become more relevant.

ENTIRE NATIONS OR ECONOMIES CANNOT REASONABLY BE EXPECTED TO UPROOT, NOR DOES THE LIFE OF A HUMAN BEING LAST LONG ENOUGH IN MOST CASES TO SEE LONG-TERM REGENERATIVE TRANSFORMATIONS REALIZED IN NATURE

GLOBAL AGRICULTURAL PRODUCTION

Billions of Dollars (Gross)

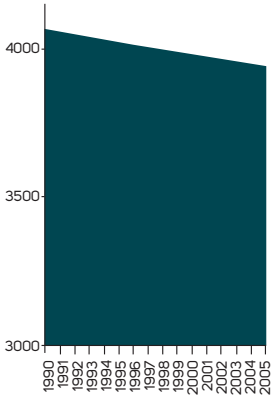


Source: FAO

Agricultural production is expanding around the world, due mainly to increases in living standards in developing countries, particularly in Asia, but also because of continued global population growth. In the short term, the impacts of climate change on agriculture, in particular, food production will be worst on a local level. But in time the global impact on agriculture will worsen around the world.

FORESTS

Hectares (millions)

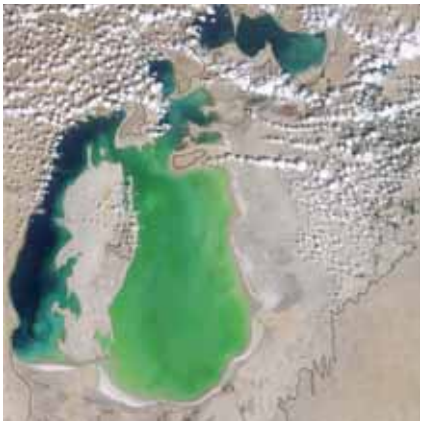


Source: FAO Global Forest Resources Assessment 2005 (FRA 2005)

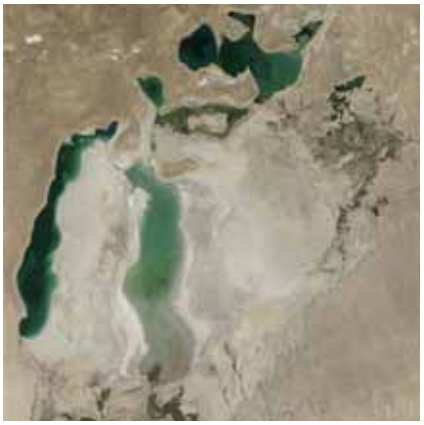
A drop in the land area of forests is mainly due to deforestation to make way for additional agricultural production for food, bio-fuels and other non-forestry purposes. The slash and burn tactics used in many cases to remove forests is also a major contributor to global emissions of greenhouse gases.

Water supply is expected to decrease due to climate change around the world but particularly in regions already affected by water stress such as Central Asia, North Africa, and Sub-Saharan Africa.[173] Widespread glacial melt is causing local surges in water in some cases, but the overall trend is depletion, which already stresses local water supplies in mountainous or mountain-fed countries affected by the phenomenon.[174]

Aral Sea year 1989



Aral Sea year 2000



Aral Sea year 2010

Source: NASA

The Aral Sea is one of the most striking examples of environmental degradation on the planet today. One of the four largest freshwater lakes in the world some 50 years ago, it has now almost completely vanished. Unsustainable exploitation of the Aral Sea's water stocks for commercial purposes is the main cause of its dramatic disappearance. However, some climate models do point to higher temperatures and less rainfall on the east coast of the Caspian Sea in the region of the Aral Sea. Any role of climate change is difficult to disaggregate, but clearly rapidly rising temperatures and lowered rainfall will only exacerbate existing water resource mismanagement. Time will tell if more stringent measures will allow the lake to regenerate with the same speed as it disappeared.

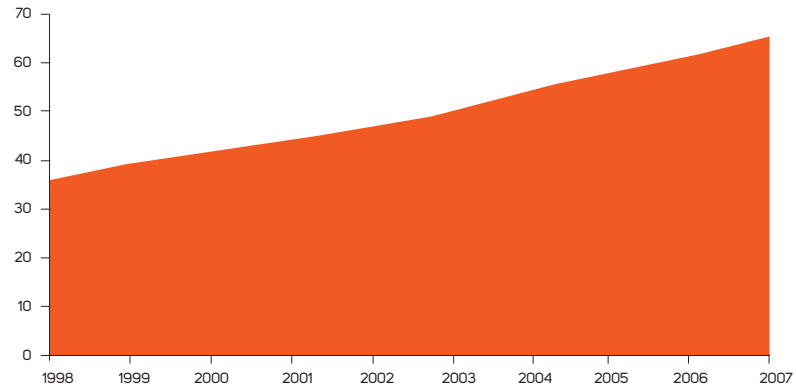
Economic stresses affecting natural ecosystems are expected to have significant costs already today and in the near term.[175] For example, higher temperatures are especially affecting alpine species whose habitats are rapidly disappearing. Boreal forests will completely disappear in some places, to be replaced by more temperate species.[176] Mountainous countries of Asia and South America are particularly impacted, since temperature increases are felt more strongly in alpine climates.[177] Sea-level rise is also damaging coastal wetlands inundated by salt water. Wetlands of this kind are among the most diverse habitats for species of all kinds – birds, insects, fish, and mammals.[178] Their decline is a tragedy for the planet similar in scale to the almost inevitable disappearance of the world's coral reefs.[179] The loss of species is a particularly dramatic effect of this environmental degradation. Indigenous populations that rely on the strength of the biodiversity of their local environment are particularly vulnerable to ecosystem damage of this kind.[180]

The latest studies of the impact of climate change on fisheries point to a dramatic redistribution of the global maximum catch potential between different parts of the world. The tropics are projected to suffer a drop of up to 40% in catch potential by 2055, while high-latitude regions are projected to see a 50% increase in the same period.[181] Overall, though, the expected impact of climate change on fisheries is negative. This dynamic is taking place against a background in which many of the world's fish stocks are facing depletion or are already in decline due to unsustainable fishing practices that continue to increase production and catch but are eating away at the world's fish stocks.[182] Warmer waters favour disease in fish and growth of toxic algae that kill fish and the aquatic life they feed from.[183] Higher temperatures are also fatal to coral, whose bleaching effect is greatly accelerating around the world. But warming northern seas and the disappearance of ice covering the Arctic seas will bring about a large increase in fish stocks in these areas, although not enough to compensate for losses elsewhere. This is particularly bad news for the one sixth of the world's population, mainly living in developing countries close to or within the tropics, that relies on fish as a principal food source.[184] And the impacts on fisheries are not limited to the world's oceans.[185] The second largest body of fresh water on the planet, Lake Tanganyika, an East Africa great lake, has become warmer, increasingly stratified, and less productive over the past 90 years. The problem of

freshwater fish stock depletion over and above unsustainable fishing is comparable to that of stock depletion in the warming oceans. However, there is insufficient scientific basis and data available for the Monitor to take into account the impact of climate change on freshwater fish stocks. This is an area that merits urgent research given that many river delta countries, and communities relying on large lakes like Lake Victoria, derive significant proportions of their agricultural economy and also their diet from freshwater fish.[186]

FISHERIES PRODUCTION

Tons (millions)



Global fishery production has been expanding rapidly but at highly unsustainable rates that are depleting fish stocks around the world.

The impacts of climate change on these primary sectors are likely to result in a significant shift in production from low-latitude to medium- and high-latitude regions.[187] These impacts add increased pressures on the food security of the poorest communities, which will face colossal health impacts of malnutrition, especially in children, as is estimated in the Health Impact chapter in this report.

It is also possible to calculate the share of disease burden attributed to climate change in economic terms as lost productive output due to sickness or death. This report has not included such calculations in its assessment of economic stresses. However, the Report of the Commission on the Macroeconomics of Health calculated, for instance, that in 1999 HIV/AIDS was costing Sub-Saharan Africa between 5.8 and 17.4 percent of GNP potential every year.[188] At the time of estimation, HIV/AIDS was estimated to be responsible for 36 million disability-adjusted life years (DALYs) or years of active life foregone due to injuries/illnesses, including premature death. In 2000, the WHO estimated that climate change was responsible for 5.5 million DALYs. The amount for 2010 would be more than double that given that this report estimates climate-related mortalities are now over 350,000 per year, compared with the 150,000 estimated by the WHO for one decade ago.[189] That figure could potentially more than double once more by 2030, with an economic impairment that is difficult to calculate, but potentially very large.

The prices of basic foodstuffs net of any influence from climate change are already expected to rise by 2050 in real terms by between 39 and 72 percent, depending on the foodstuff, as a result of expected demand shifts, population growth, and competition with biofuels for land.[190] In a situation of such extreme scarcity, the expected decline in agriculture due to climate change could force a tripling of the price of wheat based on estimations by the International Food Policy Research Institute.[191] The 2007-2008 global food crisis led to widespread civil unrest and outbreaks of hunger when a spike in oil prices, drought, and other factors dramatically inflated food prices.[192] If that is any indication of how such outcomes might affect the world's poorest communities, the impact of further surges in food prices could have devastating consequences.

THE EXPECTED DECLINE IN AGRICULTURE DUE TO CLIMATE CHANGE COULD FORCE A TRIPLING OF THE PRICE OF WHEAT

LINKS FROM CLIMATE CHANGE TO IMPACT INDICATORS

CLIMATE CHANGE EFFECTS	PHYSICAL CHANGES	VULNERABILITIES	IMPACT INDICATORS
• Rising surface temperatures • Changes in local rainfall • Increased CO_2 in atmosphere	• Land degradation and desertification • Water pressure • Loss of soil fertility • Landslides and erosion	• Reduced crop yields • Loss of livestock productivity • Loss of income for farmers	Agriculture sector loss/gain • Described as the economic value of impacts on the agriculture sector due to climate
• Rising surface temperatures • Changes in local rainfall and river run-off patterns	• Loss of forest and wetland ecosystems • Loss of soil fertility • Landslides and erosion • Changes in coastal morphology	• Loss of forest and wetland ecosystems • Energy insecurity and deforestation (biomass)	Forestry sector loss/gain • Described as the economic value of impacts on the forestry sector due to climate change
• Rising surface temperatures • Changes in local rainfall and river run-off patterns	• Sediment pollution • Desertification • Salinization of fresh water resources • Melting glaciers • Precipitation and evaporation rates, including flooding and drought	• Decreased accessible water stocks	Water resources loss/gain • Described as the economic value of impacts on water resources
• Loss of biodiversity and ecosystem services	• Gradual environmental degradation	• Accelerated species extinction rates • Species migration • Loss of ecosystem services	Species/ biodiversity loss/gain • Described as the economic value that people are assumed to place on the impact of climate change on ecosystems, biodiversity, species, landscape, etc
• Rising ocean temperatures • More acidic oceans	• Fish habitat changes • Salinization of freshwater aquaculture/fish farms	• Shift in species distribution • Loss of marine and freshwater fish stocks • Increased vulnerability to intense fish stock exploitation • Loss of income for fishery workers	Fisheries sector loss/gain • Described as climate change impact on the value of fisheries sector exports

THE GREAT BARRIER REEF THREATENS TO TURN INTO A GARDEN OF SEAWEED AT JUST ONE MORE DEGREE OF WARMING

The economic stresses, as captured in this report, are by no means exhaustive. They reflect the limitations of the current research on economic impacts, particularly in the developing world.

Tourism is an example of a service sector industry that will be heavily affected by climate change but for which no established method exists to quantify the impact. And so the effect is not included here. Mountain ski resorts

and unique island paradises are nonetheless expected to be worst hit by rising heat and sea-levels. The world's largest coral sea, the Great Barrier Reef, which threatens to turn into a garden of seaweed at just one more degree of warming, could not be replaced as a tourist destination.[193] The effects will be worst in lower-income communities, such as for small island developing states including the Maldives, Mauritius, Seychelles, and dozens of other countries in the Caribbean and the Pacific.

There are other economic sectors dependent on natural conditions that will experience economic stress, but we have not measured those impacts here. Water supply, for example, will impact the agricultural processing industries (such as food processing, brewing, and textiles) and other industries with high water consumption (such as extractive industries and chemicals).[194] And transportation is likely to be increasingly disrupted as a result of extreme weather and the short-term costs linked to a potential shifting of trade routes.[195]

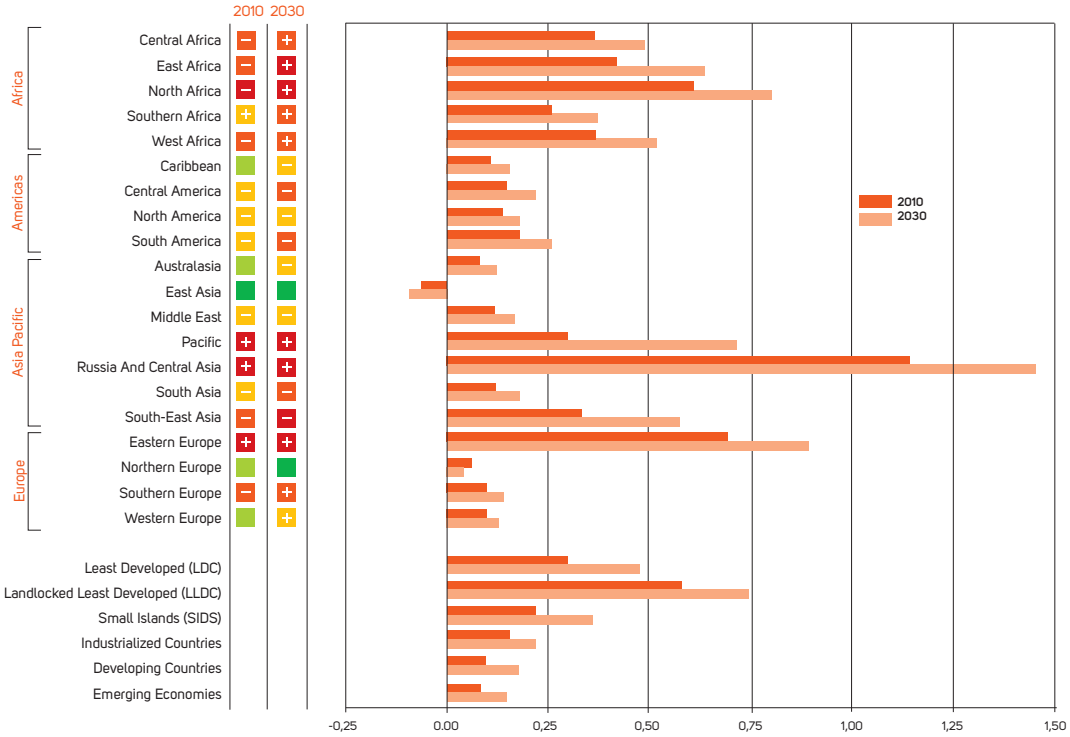
WHO SUFFERS?

The largest economic stress impacts by 2030 due to climate change are projected to be in Central Asia and Russia, and in Eastern Europe, the Pacific, and large parts of Africa. These are significant impacts of sometimes 1% or more of GDP in regions already plagued by the effects of water scarcity and challenging agricultural markets.

However, North Africa, regions of Sub-Saharan African, Pacific island states, and Southeast Asia also bear significant burdens of around 0.5% of GDP. While the absolute losses are much smaller, the human impact of economic stresses is likely to be felt acutely in regions that already suffer high rates of poverty and have very large vulnerable populations. Particularly in the somewhat longer term of 2050 and 2080, it is expected that South Asia and Sub-Saharan Africa will experience significant challenges due to falling crop yields because of rising temperatures.[196]

IMPACTS AROUND THE WORLD

The regional and socio-economic distribution of climate-related economic losses relative to gdp in 2010 and 2030
Additional Economic Losses (percent of GDP)



The countries projected to face the worst impacts of climate change are predominantly Pacific island states, due to negative impacts on fisheries in tropical waters, and Central Asian countries, due to loss of water resources.

The region most resilient to the economic stress impacts of climate change is Northern Europe. Denmark and Norway are the only countries projected to experience an improvement in gains over the period from today to 2030, progressing from Moderate to Low vulnerability. Iceland is also projected to retain Low vulnerability. These regions stand to benefit due to their high latitudes, where an increase in temperature is expected to benefit their fishery outputs, in particular.

East Asia, China, Mongolia, and North Korea are also projected to maintain a Monitor factor of Low due to overall economic stresses. However, these countries are projected to experience significant negative impacts in other areas. The overall positive economic stress impacts in these countries could mask significant negative effects in subregions of these countries.

The largest developed economies in the world, including the US, Japan, and Germany are among the worst affected in absolute terms. But large developing economies such as Russia, Brazil, and India, as well as Egypt in North Africa and Thailand and Indonesia in Southeast Asia also face significant burdens. Overall, the 10 countries bearing the largest burdens will collectively face 75% of economic losses in absolute terms.

THE 10 COUNTRIES BEARING THE LARGEST BURDENS WILL COLLECTIVELY FACE 75% OF ECONOMIC LOSSES

WORST HIT AND LEAST HIT (2030)

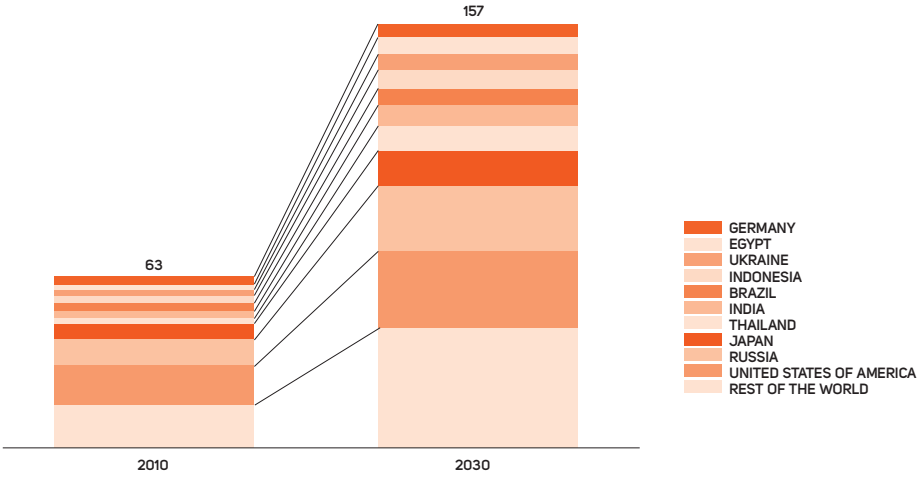
The top 10 countries worst and least affected by habitat loss related to climate change in 2030 relative to their size

WORST	LEAST
VANUATU	ICELAND
SEYCHELLES	NORTH KOREA
MARSHALL ISLANDS	MONGOLIA
MALDIVES	CHINA
GEORGIA	NORWAY
KAZAKHSTAN	DENMARK
MOLDOVA	CYPRUS
TAJIKISTAN	SWEDEN
RUSSIA	MALTA
KYRGYZSTAN	SPAIN

HOTSPOTS: ECONOMIC LOSSES

Countries with the largest total climate-related economic losses

Additional Economic Losses (billion USD PPP)



THE IMPACT TOMORROW: 2030

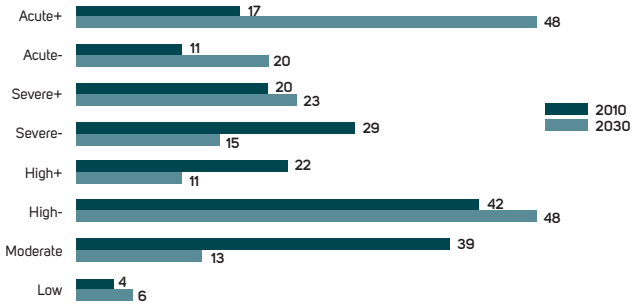
The three regions experiencing the fastest progression in economic stress impacts are the Pacific islands states and Southeast Asia, primarily due to negative impacts on fisheries, and Sub-Saharan African regions, particularly due to negative impacts on water supply.

The number of countries with Acute climate vulnerability factors more than doubles to almost 70 between 2010 and 2030. At the same time, a small number of countries are projected to experience an improvement from Moderate to Low vulnerability.

VULNERABILITY SHIFT

The change in the number of countries by each Vulnerability Factor between 2010 and 2030

Number of Countries by Vulnerability Factor

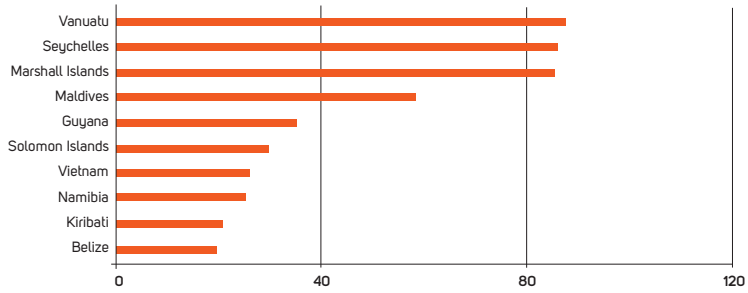


Small island developing states like Maldives, Marshall Islands, Seychelles, and Vanuatu all face fast progressions in economic losses. This is also the case for Vietnam in Southeast Asia and for Namibia in Southern Africa. Negative impacts on fisheries play an important role in the acceleration of negative impacts for these countries between 2010 and 2030.

HIGH SURGE VULNERABILITY

Countries with the fastest growing climate-related economic losses between 2010 and 2030

Percentage increase in climate-related economic losses



SPOTLIGHT: SUPER DROUGHT

Many of the worst types of climate change impacts come from the synergistic interaction between existing degradation or depletion of natural resources and shifts in climate that reinforce these. Depleted water stocks, rainfall changes, heat, drought, and the agricultural and human consequences of these combined effects form danger-prone environment in poorer communities where resource management is insufficient. Northern India, for example, is generally becoming drier due to shifts in the Indian monsoon in areas where water resources are increasingly scarce as a result of non-sustainable pumping of groundwater.[197] The combination of unsustainable resource use and climate stress on the resource could lead to super-droughts with potentially catastrophic human and ecosystem impacts for the region.

India is home to about 16% of the global population but has only 4% of the total water resources, with the irrigation sector consuming 83% of India's. The main water source of water replenishment in India consists of precipitation within Indian territory.[198]

In 2009, the poor monsoon season caused severe drought impacts in 40% of districts. The northwestern and northeastern parts of the country were worst affected amid one of the weakest monsoon seasons for almost 40 years.[199]

Between August 2002 and October 2008, three northwest Indian states lost a volume of water from underground supplies equal to more than twice the capacity of Lake Mead (1 1/4 trillion cubic feet of water), the US's largest reservoir.[200] Evidence points to the pumping of water from wells for irrigation as highly damaging to India's resources. Without measures to curb demand, further climate stresses on dwindling groundwater supplies could cause serious drinking-water shortages and erode crop production in a region inhabited by over 100 million people.[201]

THE ASSESSMENT

The Economic Stress impact area is calculated by using a set of variables indicating the projected economic losses in different sectors as a share of GDP due to climate change. Estimates for four economic sectors are based on the FUND (2.8n) model.[202] The model links exogenous population and per capita income scenarios with simple models of technology, economics, emissions, atmospheric chemistry, climate and sea-levels in order to estimate impacts such as migration, disease burdens and economic effects on a sector basis.

In addition to reliance of FUND, economic losses in fisheries are calculated using Cheung et al. 2010 estimates.[203] Cheung et al. estimate the change in maximum catch potential due to climate change.

FUND offers national level economic loss estimates but many of its parameters are at the level of 16 regions meaning country effects encapsulate the average effect across a sub-region leading to inaccurate assessment results. For instance, Spain (High-/High-) is an example of a country that we expect to be worse impacted than Western Europe -- its model home sub-region, one also incorporating Northern Europe. Spain is affected in relation to water resources, an anticipated increase in temperatures (and plant evapotranspiration) and a decrease in rainfall, by 5%-10% to up to 20%-22% by the end of the 21st century.[204] Northern Europe on the other hand may be set to gain in agricultural production due to climate change.[205]

The Baltic states (Acute+/Acute+) are examples of countries that we expect to be less impacted than countries from the former Soviet Union on average.

The key variable driving the findings on economic stress are water resources. A large part of the water resources impact concerns the agricultural sector, although other key sectors drawing heavily on water are also concerned.

The finding that stands out from the model is that Central Asia, Russia and Eastern Europe face significant water resources impacts.[206] This includes for example Russia (Acute+/Acute+), Kazakhstan (Acute+/Acute+) and Poland (Severe+/Acute-). The key explanation for this is that these regions have continental climates (as opposed to coastal). They are projected to face high temperature rises and their water resources are sensitive to the changes (particularly due to “evapotranspiration”).

Countries in South Asia on the other hand stand out for relatively low vulnerability, for example Afghanistan (Moderate/High-), India (High-/High-) and Pakistan (High-/High-) regardless of expected continued high temperatures. These countries bear a high health burden among children due to causes related to nutrition and water access. They are also projected to be among the hardest-hit by declining crop yields in the longer term.[207]

The key to understanding why the Economic Stress assesses only a Moderate/High factor to the South Asian countries is that the worst impacts globally in the near term (our 2010/2030) are related to water resources rather than temperature. The majority of South Asia is not expected to suffer significant water stresses as a result of climate change -- although major water stress issues prevail for other reasons. Shifts in precipitation/evaporation/river flows drive the “early” results, while projected temperature impacts on yields follow by 2050/2080, since water impacts have a proportionally higher impact on agricultural yields for instance than higher temperatures. This is why Central Asia/Russia and North Africa experience impacts sooner than South Asia.[208]

A number of Small Island States, such as the Maldives (Severe-/Severe+), the Marshall Islands (Acute-/Acute+) and other Pacific countries are to be found near the top of the list due to fisheries impacts, in particular related to the expected destruction of coral reefs, which are much more moderate for instance for the rest of South Asia.

Division and Wall Street in Colfax, Iowa in August 2010. Waters are receding from record flooding. Source: FEMA/Jace Anderson.