G20 CLIMATE RISK ATLAS

Impacts, policy, economics

CHINA

With the scientific contribution of Enel Foundation

How to read the Atlas: graphs, colours and scenarios.

The maps used in this Atlas are taken from **The World Bank Official Boundaries** - ***https://datacatalog.worldbank.org/search/dataset/0038272*** (accessed on May 28, 2021). For the section Energy, the maps are based on Panoply Data Viewer ***https://www.giss.nasa.gov/tools/panoply/credits.html***

Each sector of this Atlas contains data and information on various climate scenarios.

When reported in graphs, the **colour black** indicates data and information referring to the current state, the past or the baseline.

When the authors refer to **RCP (Representative Concentration Pathways)**, the 3 colours used across the factsheet refer to 3 scenarios, which are 3 different development options with different levels of greenhouse gas emissions, **respectively low emissions (green), medium emissions (orange), and high emissions (red)**. The same colour code is used when RCPs are associated with Shared Socioeconomic Pathways (SSP).

In some cases, the authors refer to global warming scenarios. In these cases, the 3 colours used refer to a temperature rise of **1.5°C (green), 2°C (dark green), and 4°C (red)**.

When the authors refer exclusively to **Shared Socioeconomic Pathways - SSPs** (Population affected by river floods in the section: "Water"), data related to **SSP3** - that encompasses, among other things, slow economic growth, material-intensive consumption, and persisting or worsening inequalities – **are reported in a lighter shade**; **SSP5** – which refers to social and economic development that is coupled with an energy-intensive lifestyle and the abundant exploitation of fossil fuel resources – is shown using a **middle shade of the colour**, whereas data related to **the present** conditions **are represented in a dark shade**.

Further details on scenarios, methodologies, and the full list of references are available at: **www.g20climaterisks.org**

Concept and graphic design by element6.eu

CHINA CLIMATE

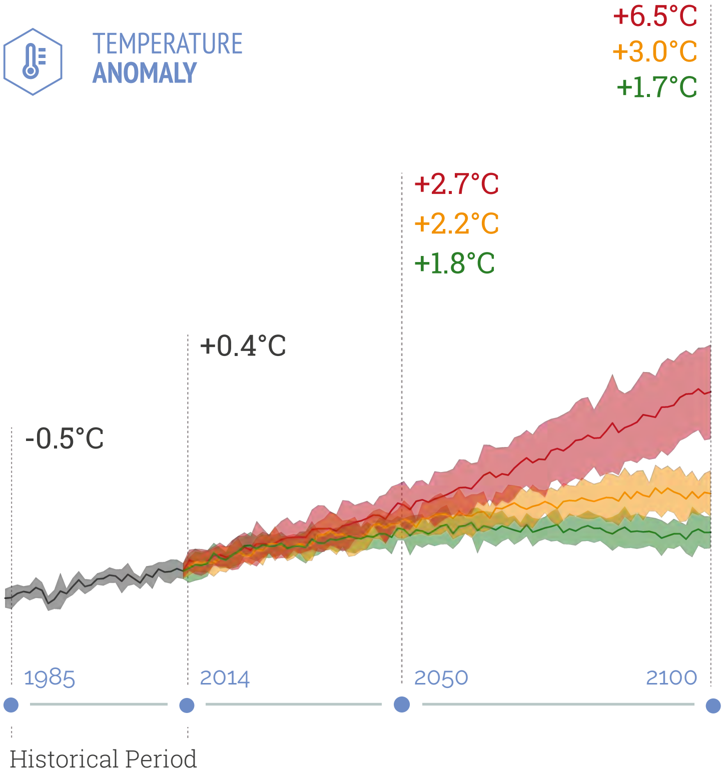
OVERVIEW

China presents a great variety of climates due to its size. The north has a temperate climate whereas the south is subtropical, with very hot summers and mild winters. In the summer, monsoons play an important role in determining weather and climate features throughout the country, blowing huge rain showers in from the east. In winter, dry and cold winds come from the northwest.

TEMPERATURE PROJECTIONS

Under a low emissions scenario projected temperature variations will remain contained at around +1°C, both by 2050 and 2100.
Under a high emissions scenario, with no reduction in GHG emissions, much greater temperature anomalies are expected by both 2050 and 2100.

TEMPERATURE ANOMALY



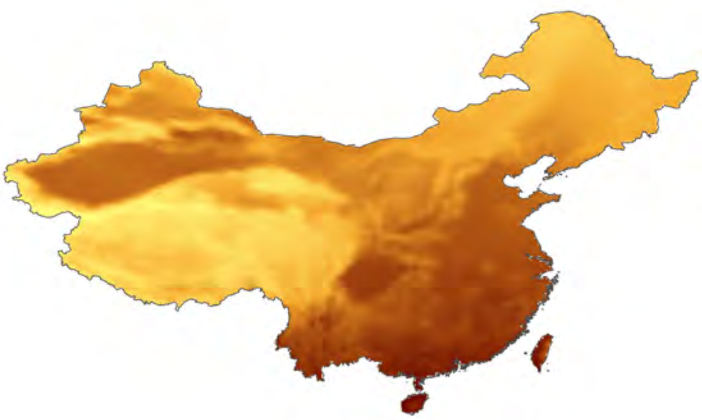
TEMPERATURE

China's temperature regime is quite heterogeneous with higher values along the east coast where the largest cities are located. The lowest temperatures are in the west of the country along the Tibetan plateau.

MEAN TEMPERATURE

-18 26

Celsius degrees / Over 1991-2020



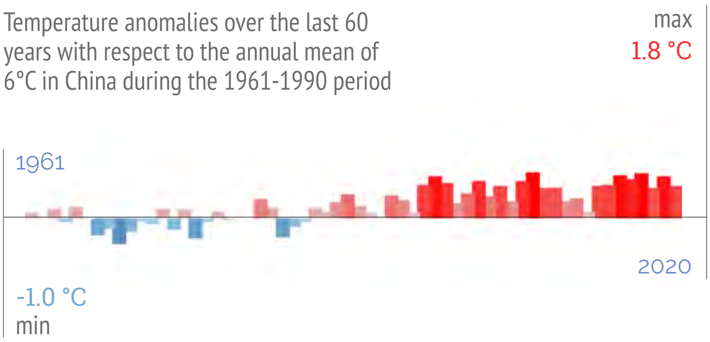
EXPECTED VARIATION FOR TEMPERATURE AT 2050

The indicators show variations in selected temperature characteristics for a thirty-year period centred on 2050 (2036-2065) with respect to the reference period 1985-2014.

Annual Mean Temperature	Max Temperature of warmest month	Min Temperature of coldest month
+2.6°C	+2.7°C	+2.8°C
+2.0°C	+2.0°C	+2.3°C
+1.7°C	+1.8°C	+1.8°C

TEMPERATURE TREND

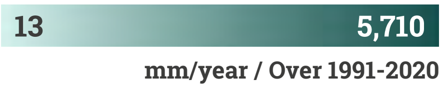
Temperature anomalies over the last 60 years with respect to the annual mean of 6°C in China during the 1961-1990 period



PRECIPITATION

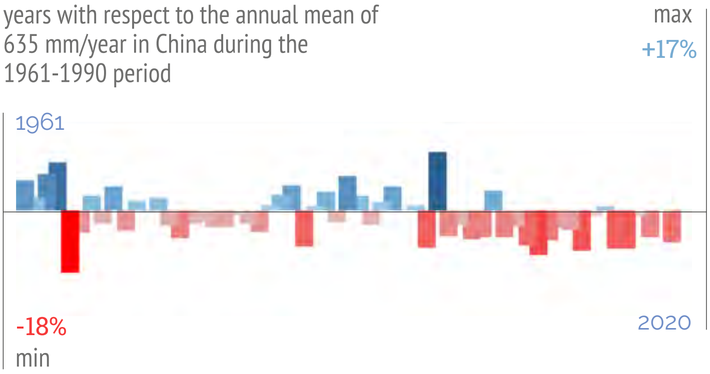
The precipitation regime in China varies depending on location and time of year, with the East Asian monsoon playing a significant role. The east, south and southwest are generally warm, humid and rainy, whereas the north is usually dry and windy.
During the summer, the rain belt moves gradually from south to north reaching the hot and humid climate in eastern China.
Some years, rainfall causes severe floods, whereas in others there is too little rain to support agriculture.

MEAN PRECIPITATION



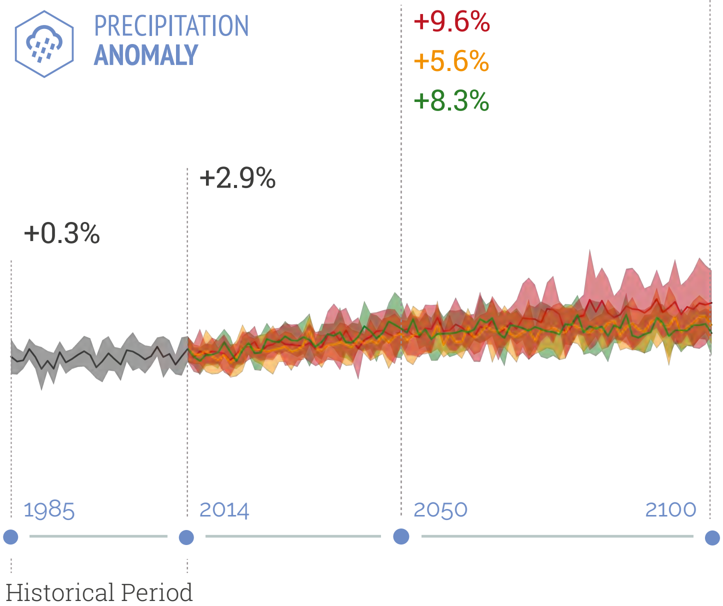
PRECIPITATION TREND

Precipiation anomalies over the last 60 years with respect to the annual mean of 635 mm/year in China during the 1961-1990 period



PRECIPITATION PROJECTIONS

Precipitation trends show a clear tendency to increase, under all emissions scenarios, with a large variability among the involved models and with respect to the reference period. Increase in precipitation is much greater under a high emissions scenario and longer time ranges.



EXPECTED VARIATION FOR PRECIPITATION AT 2050

The indicators show variations in selected precipitation characteristics for a thirty-year period centred on 2050 (2036-2065) with respect to the reference period 1985-2014.

+8.4%
+6.5%
+8.8%
Annual total precipitation

+8.7%
+6.9%
+8.5%
Precipitation of wettest month

+4.6%
+3.6%
+5.6%
Precipitation of warmest quarter

VARIATION OF SPECIFIC CLIMATE INDICATORS

Climate indicators variation showing impacts of climate change on sectors such as agriculture, health and water. Analysis considers 3 threshold average temperature increase: **+1.5°C**, **+2°C**, **+4°C**.

+22%
+12%
+10%
Agricultural drought proportion of time
% of time

+13%
+9%
+8%
Hydrological drought proportion of time
% of time

+1,563%
+232%
+79%
Heatwave duration
% of time

+20%
+7%
+2%
Runoff increase
% of area

+45%
+23%
+18%
Agricultural drought frequency
% of change

+9%
+8%
+10%
Hydrological drought frequency
% of change

+86%
+32%
+18%
Heatwave frequency
% of change

+28%
+10%
+5%
Runoff decrease
% of area

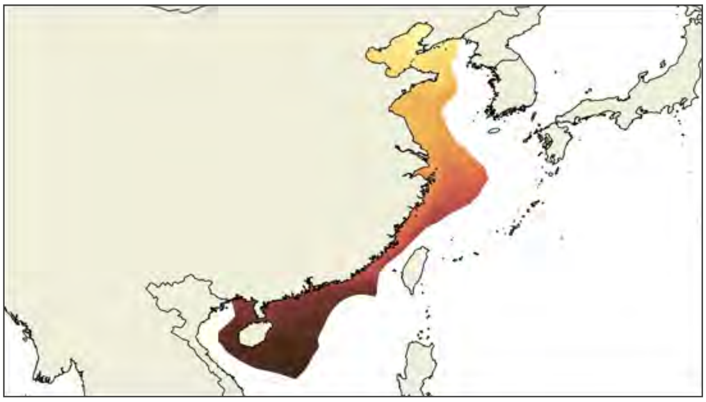
CHINA OCEAN

OCEAN IN CHINA

China's marine exclusive economic zone (EEZ) is characterized by cold temperate to subtropical coastal waters, which host a large variety of ecosystems such as mangroves, coral reefs, and seagrass beds. In particular, coastal systems can be divided into three main areas: Yellow Sea, East and South China seas.

CURRENT CLIMATE CONDITIONS

Mean sea surface temperature reflects the different climate regimes, from the colder waters of the Yellow Sea to the subtropical ones on the southern coasts.

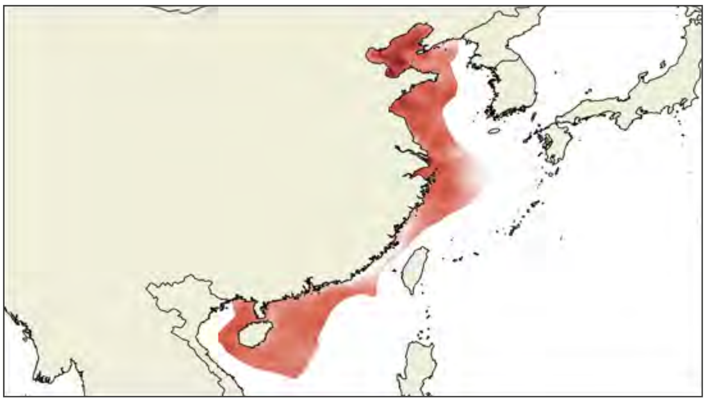


10 30 **MEAN**

SEA SURFACE TEMPERATURE

Celsius degrees / Over 1991-2020

0 0.4 **TREND**



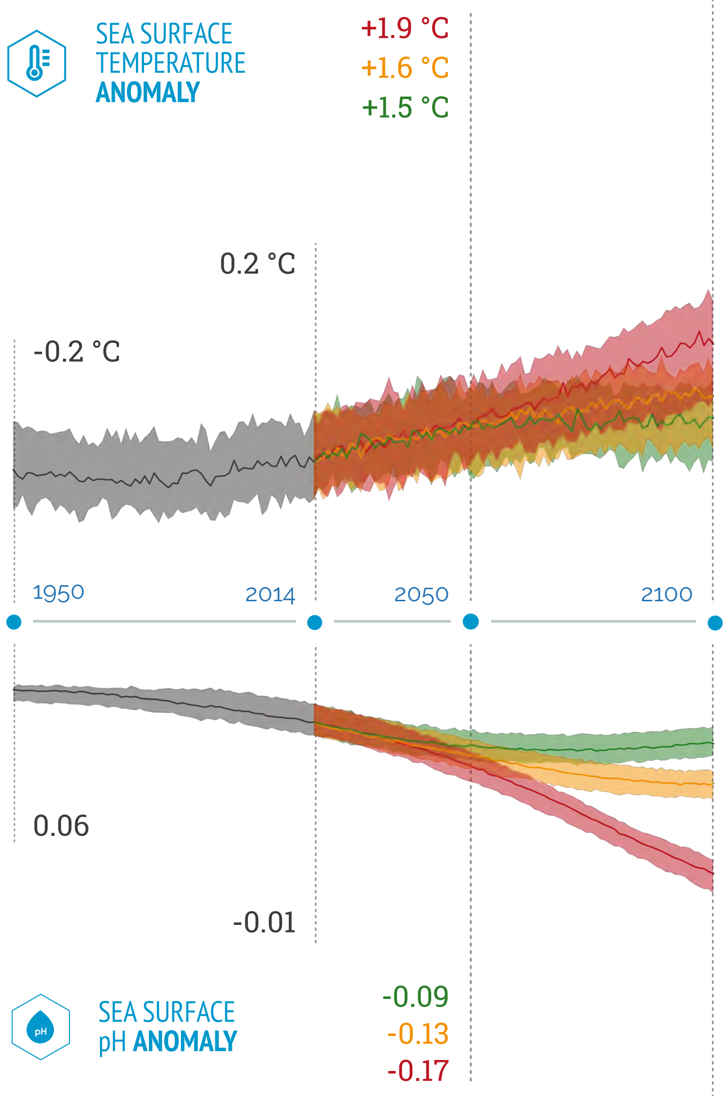
Surface temperature trends indicate a general warming of 0.2°C per decade in all marine areas, with increased gains in northern regions.

FUTURE PROJECTIONS

Projected annual changes within the marine EEZ for the two most significant marine indicators of climate change: sea surface water temperatures and pH.

Seawater temperature changes are in line with the definitions of each scenario, with maximum values close to +4°C under a high emissions scenario in 2100.

+4.4 °C
+2.7 °C
+1.7 °C



Seawater surface pH becomes more acidic in all scenarios, closely reflecting rising atmospheric CO_2 concentrations, and only a low emissions scenario leads to a stable condition by 2100.

-0.09
-0.2
-0.41

ECOSYSTEM INDICATORS AT 2050

Regional changes in key marine ecosystem indicators under projected future scenarios by mid-century (2036-2065) with respect to present climate conditions (1985-2014).

East China Sea

South China Sea

Yellow Sea

Temperature regulates the metabolism of marine organisms determining which habitats remain suitable. Excessive warming will likely push ecosystems beyond tolerance thresholds.

pH represents the acid/base status of marine waters, where a decreasing pH reflects the acidification of the ocean due to increased absorption of atmospheric CO_2.

Oxygen is fundamental to sustain marine life and its reduction can have a large impact on coastal ecosystem services including fisheries and aquaculture.

Chlorophyll is an indicator of the biomass available at the base of the marine food web supporting all ecosystem productivity.

	East China Sea	South China Sea	Yellow Sea
Temperature	20.14°C; +2.05 °C / +1.6 °C / +1.5 °C	26.36°C; +1.58 °C / +1.4 °C / +1.27 °C	13.87°C; +2.56 °C / +2.59 °C / +2.42 °C
pH	8.12; -0.17 / -0.14 / -0.1	8.08; -0.16 / -0.12 / -0.09	8.06; -0.18 / -0.14 / -0.11
Oxygen	240.44 $mmol/m^3$; -4.03 % / -2.74 % / -2.76 %	210.39 $mmol/m^3$; -2.65 % / -2.15 % / -1.69 %	278.37 $mmol/m^3$; -4.84 % / -3.2 % / -2.92 %
Chlorophyll	0.39 mg/m^3; -12.31 % / -11.79 % / -18.46 %	0.25 mg/m^3; -15.32 % / -14.52 % / -12.5 %	0.29 mg/m^3; -3.75 % / -5.8 % / -8.53 %

FISH CATCH POTENTIAL

Fish catch potential is an estimate of the maximum fish catch achievable given the marine resources available over a sustained period. It is linked to the concept of maximum sustainable yield, meaning the maximum amount of fish that can be extracted from a system without causing a collapse in fish populations.

It is a characteristic of the natural system, which is substantially different from realized catch, and a direct result of the fishery policy in place.

Fish catch percentage change

2050

-7.9%

-5.3%

ANALYSIS DETAILS

All datasets were analysed using only data from within the marine EEZ and therefore excluding overseas territories, detached islands and any disputed or joint territories with other nations. In the assessment of current climate conditions, seawater surface tempereature data was obtained using satellite observations distributed in the framework of ESA Climate Change Initiative.

Future projections of marine indicators are represented by the combined analysis of results from 15 different Earth System models participating in the Coupled Model Intercomparison Project Phase 6 (CMIP6). These models include new and better representations of physical and biogeochemical processes, compared to previous IPCC assessment reports.

Fish catch potential data was obtained using the FAO's technical report and refers to the best and worst case climate scenarios from the Fifth IPCC Assessment Report. These mean estimates are subject to substantial uncertainties as discussed in the original work.

CHINA COASTS

OVERVIEW

The Chinese coastline covers around 30,000 kilometres, stretching across tropical, subtropical and temperate zones. More than 70% of large Chinese cities are located in the coastal areas, and coastal development contributes over 55% to national gross domestic productivity. Vast areas of China's densely populated and highly productive regions are located on the coast, including the Pearl River Delta with the city of Guangzhou and the Yangtze River Delta with the city of Shanghai.

Shoreline Length: 30,017 km

Sandy Coast Retreat at 2050: -15.9 m

CLIMATE CHANGE HAZARDS

Coastal hazards such as erosion, storm tide inundation and permanent flooding, can have strong adverse impacts on coastal regions, with loss of sandy shores, damage to settlements, infrastructure and ecosystems. Climate change can exacerbate these impacts due to rising sea levels and increasing impacts of waves and storms. A large proportion of the Chinese shoreline is already experiencing coastal erosion and increasing flood risk, which is expected to be exacerbated in the future by rising sea levels and possible increases in the intensity of large storms and typhoons in the East and South China Sea.

SEA LEVEL RISE

Relative sea level rise has been observed over the past century in China, with an average increase of 2.18 millimetres per year during the past century and approximately 3.4 millimetres per year since 1995. The latest IPCC projections indicate that, by 2050, global sea levels may rise between 0.18 metres, under a low emissions scenario, and 0.23 metres, under a high emissions scenario.

Observed and projected sea level rise at 2050: 2.18 mm/year; 0.23 m; 0.18 m

EXTREME SEA LEVEL

Extreme sea levels are expected to increase in line with sea level rise, increasing the frequency of damaging high water level conditions. Under a medium emissions scenario, one in 100 year extreme sea level events in China are expected to rise from 3.93 metres at present day to 4.11 metres by 2050.

Current and projected extreme sea level at 2050: 3.93 m; 4.21 m; 4.11 m

OBSERVED STORMS

Large parts of China are exposed to storms, with the southern and south-eastern regions experiencing seasonal typhoons. Large storms have been reported in the past, with three extreme tropical cyclone events in 1956, 1969 and 1994 being associated with devastating damage and losses to the Chinese coastal areas.

FUTURE STORMS

Most modelled projections suggest a reduction of tropical cyclone frequency, but an increase in the proportion of very intense tropical cyclones over the western North Pacific in the future. However, some individual studies project an increase in Western Tropical Cyclone frequency. Most studies agree on a projected increase of Western Tropical Cyclone intensity over the 21st century.

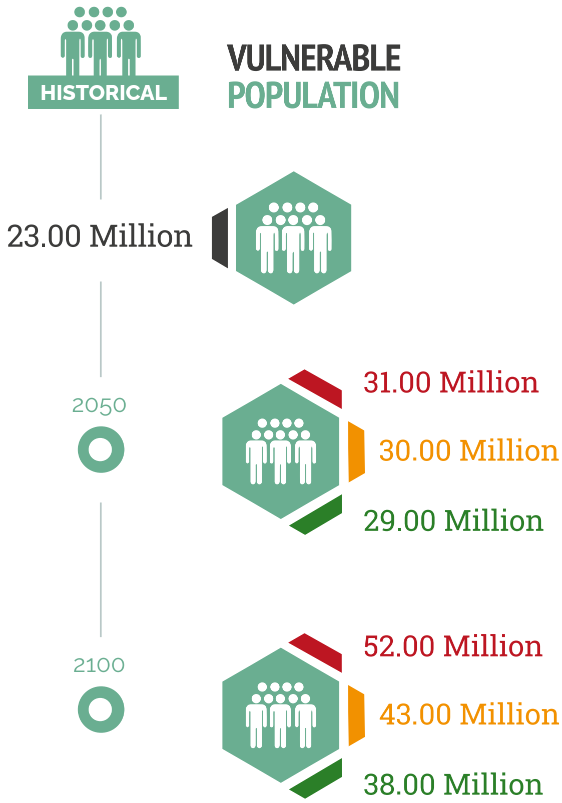
VULNERABILITY AND RISK

China's coasts, in particular its industrialised and heavily populated delta megapolis, are at high risk from sea level rise and storm surges. With urban settlements typically located and developed along shorelines and river estuaries, these are at high risk from flooding, particularly during the wet season.

The Chinese coast is densely populated, and the Pearl River Delta and the Yangtze River Delta are both some the most exposed areas and home to approximately 300 million people and a GDP of 3.4 trillion USD.

In Guangzhou, the biggest city of the Pearl River Delta, 6% of the population currently live within 0.5 metres of sea level. The city is recognised globally as one of the most vulnerable to rising sea levels by the middle of the 21st century, with estimated losses of 254 million USD per year considering a sea level rise of 0.2 metres.

Climate change and sea level rise is increasing the probability of coastal flood occurrence, vulnerability and risk. Under a medium emissions scenario the total population exposed to the annual coastal flood level is expected to increase from 23 million to 30 million by 2050.



INFLUENCE OF SEA LEVEL RISE ON EXTREME SEA LEVEL

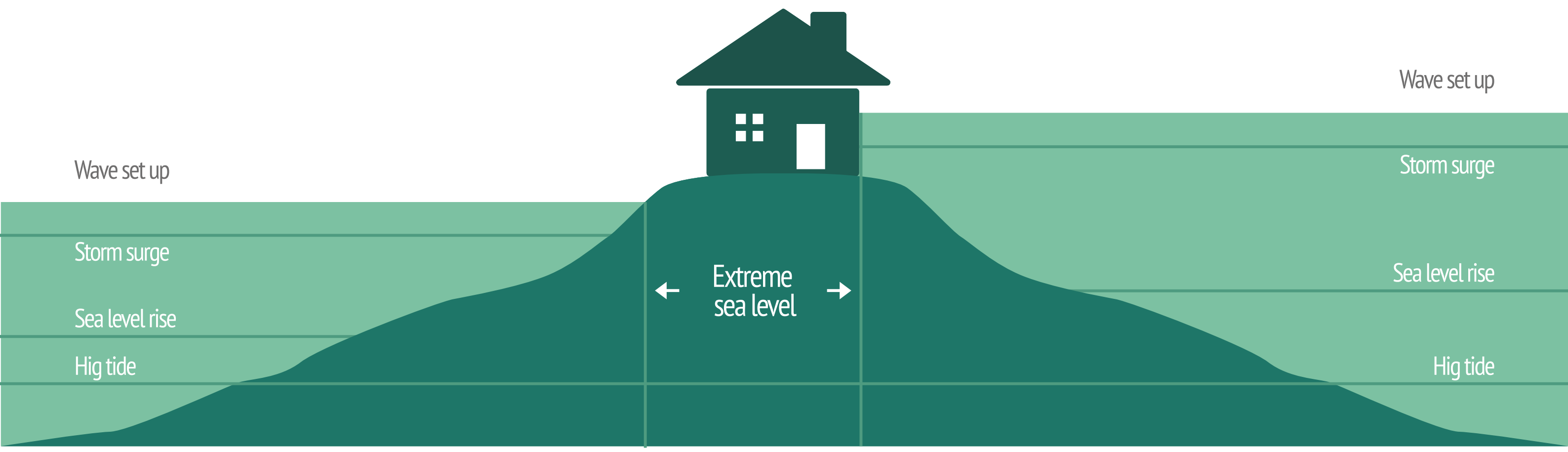
Present and future sea level rise are a consequence of carbon induced global warming causing melting ice and ocean expansion due to heat accumulation.

The extreme sea levels reported here are based on the 100-year storm surge + wave set up + sea level rise + high tide indicators. The first two parameters (storm surge + wave set up) are based on the 100-year value for the event; sea level rise is its projected value at 2050; and high tide is the absolute value of the highest tide calculated for a given locality, which won't be influenced by climate change.

+ **Wave set up** refers to the accumulation of water near the shore due to the presence of breaking waves.

+ **Storm surge** is an occasional increase in sea level driven by shoreward wind-driven water circulation and atmospheric pressure.

+ **High tide** is usually the highest tide reached in a given location based on tide records.



Present sea levels have risen globally by approximately 20 centimetres over the past century.

Future sea level rise is a projection based on different global warming scenarios, at approximately 100 centimetres by the end of 2100, with consequent inundation during extreme sea level events.

CHINA

WATER

OVERVIEW

China has some of the largest water reserves in the world. However, per capita water resources are below 2,100 cubic metres, only 25% of the global average, making China one of the most water scarce countries in the world.

Water resources in China are distributed very unevenly, with substantial intra-annual and inter-annual variations. Whereas southern China has abundant water, the north is very short of water resources.

In fact, areas north of the Yangtze River Basin account for 63.5% of the national territory, yet only have access to 19% of the nations water resources.

Renewable internal freshwater resources: 2,813 billion m^3

Renewable internal freshwater resources per capita: 2,029 m^3

In China, about 60% of the 669 largest cities are facing water shortages at a rate of about six billion cubic metres per year, affecting the daily lives of over 40 million urban resident. In the water-scarce North China Plain, the annual water deficit is up to 36 billion cubic metres and may reach 56 billion cubic metres by 2050.

CLIMATE CHANGE HAZARDS

Climate change can affect water resources through increasing temperatures, higher rates of evapotranspiration and altered rainfall patterns. This leads to changes in the water cycle, including decrease of snow and ice coverage, alterations of surface runoff and groundwater storage, as well as drought and flood occurrence. The occurrence of consecutive wet or dry years exposes China to frequent disastrous climatic events. A growing and increasingly wealthy population, coupled with agricultural and industrial development, is bound to increase future water demand. Many northern areas, including the Yellow River, may experience decreasing per capita amounts of available fresh water.

KEY POINT RUNOFF

Compared to the 1960s, the observed mean annual runoff in the 1990s increased by 12.6% and 9.6%, respectively for the Pearl River and the Yangtze river. During the same period, the runoff for the Yellow River and the Songhua river decreased by 30% and 12.6%, respectively.

Hydrological models driven by climate simulations predict an overall increase of river runoff for China between 7.5% and 10%. In the Yellow River basin, annual runoff is expected to increase between 5% and 11%, depending on the emissions scenario considered. At a country scale, instead, an average increase in surface runoff by approximately 17% and 3% is expected respectively under a low and medium emissions scenarios for the 2045-2055 period compared to 2015-2025.

If temperatures rise by 1.5°C, 2°C or 4°C, 5%, 9.6% or 28% of the area of the country will likely experience an increase in runoff, while 2%, 6.9% or 20% of the surface of the country will likely experience a respective decrease in runoff.

2050

Changes in annual runoff
% of change

+3.4%

+17.0%

2050

Runoff increase
% of area

+28.0%

+5.0%

KEY POINT DROUGHTS

Drought is one of the most severe manifestations of climate variability in China. It is a source of concern for agriculture and human life, given that the country is already quite dry (3.32 x 106 square kilometres of drylands). Over the past six decades, very severe droughts hit China in the 1960s, in the late 1970s and early 1980s, and in the late 1990s. Recently, northeastern China has suffered particularly from drought while, surprisingly, arid regions of northwestern China have enjoyed less severe droughts.

Future regional patterns in China are heterogeneous with contiguous areas presenting increases and decreases in water scarcity. In addition, while the growing seasonal mean precipitation may increase, southern China is more likely to experience higher drought intensification rates.

2050
Severe drought likelihood increase
% of change
+21.1%
+12.7%

2050
Hydrological drought frequency
% of change
+9.0%
+7.0%

2050
Groundwater Recharge
% of change
-6.4%
+5.1%

KEY POINT GROUNDWATER

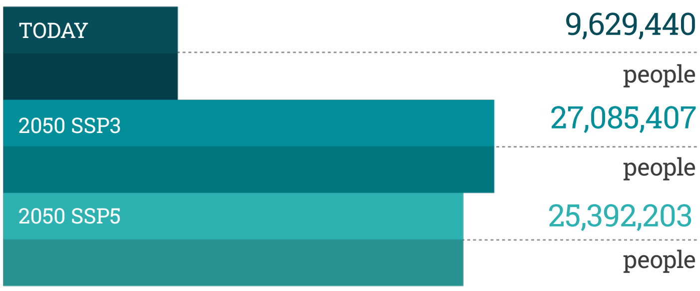
As a reliable source of water supply, groundwater plays an important role in ensuring water security. In China, groundwater provides drinking water for more than 400 cities. In northern China, two thirds of drinking water, half of industrial water, and a third of irrigation water is supplied from groundwater sources. In 2011 there were an estimated 53.8 million groundwater extraction wells in China.

Only 23 years earlier, that number was just 4 million. In addition, groundwater overexploitation has caused severe land subsidence, sea water intrusion and ecological damage in eastern China. Between 1959 and 2013, for example, the eastern city of Tianjin subsided by an estimated 3.44 metres, and hundreds of earth fissures have been observed in the Hebei Plain and Fenwei Basin. Many studies have explored the potential trend of groundwater at a regional scale, showing significant decreases in large areas such as, among others, the Heihe and the Naoli river basin. At the country level, a +5%, +0.3% and -6.5% change of the annual groundwater recharge for the period 2045-2055 compared to the timeframe 2015-2025 is expected respectively under low, medium and high emissions scenarios.

KEY POINT FLOODS

Floods in China cause huge losses to the national economy. Trends in heavy rainfall events causing floods show high spatial heterogeneity. These extreme events seem to become more frequent over northwestern China and the mid-to-lower reaches of the Yangtze River, but less frequent in northeastern China and the northwestern Yangtze River. Changes in the population exposed to river floods are expected, with an increase from around 9,630,000 in the present day to 27,000,000 under SSP3 and 25,400,000 under SSP5 by 2050. As such, potential impacts related to river floods might increase.

POPULATION AFFECTED BY RIVER FLOODS

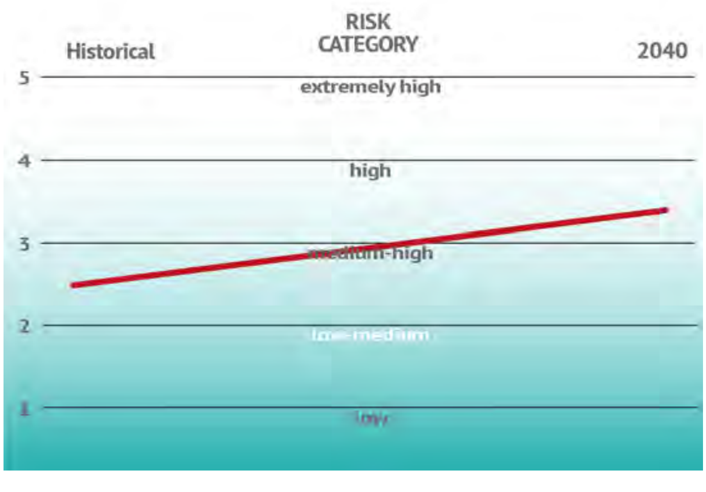


RISK INDICATORS

The water stress index summarises current and future water related vulnerabilities and risks at the global level. Scores are based on the ratio of total water withdrawals, including agriculture, industrial and human consumption, to available renewable surface and groundwater supplies.

WATER STRESS

China's water stress level is considered medium-high for the recent past (1960-2014 average), and it is expected to increase in the near future (2030-2050) based on climate change projections.



CHINA
AGRICULTURE

OVERVIEW

China's agricultural sector is a vital economic component and crucial to support a population with increasing food security requirements.

Rice is the dominant crop in the south; wheat is found in most provinces, but particularly in eastern regions; maize cultivations are found from the northeast to the southwest; and sugarcane extends mainly over southern to central regions. Other crops include potatoes, sugarbeets, and various other vegetables and fruits. Major cash crops include mandarins in the south and apples and pears in the north. Food crop production helped keep undernourishment levels below 2.5% of the total population in 2018. However, water withdrawal for agriculture is substantial and accounted for 64.4% of total water withdrawal in 2015, in a country where water stress is estimated to stand at 43%.

257.3 Mt
Maize

131.4 Mt
Wheat

214.1 Mt
Rice

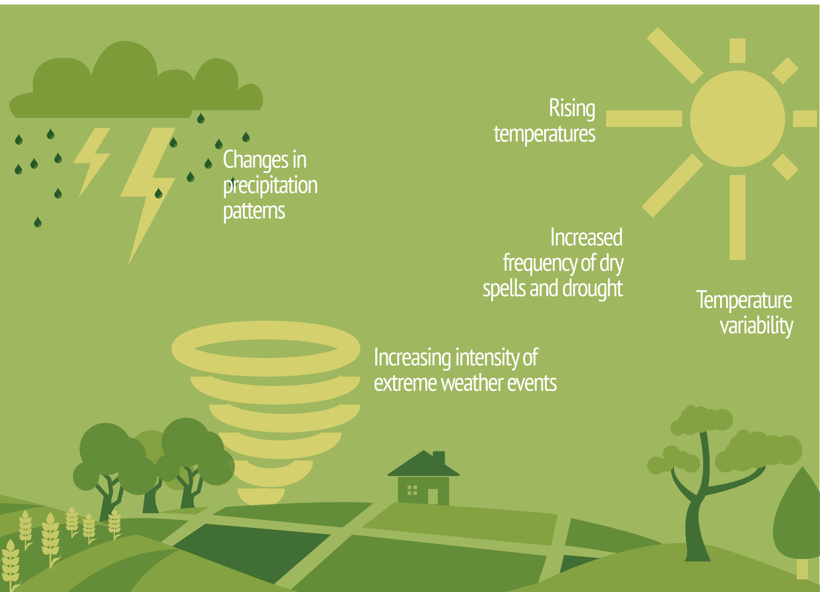
108.7 Mt
Sugarcane

42.5 Mt
Citrus

	Added Value of Agriculture, Forestry and Fishing	Share of Agriculture Value added in Total GDP	Agricultural land	Area Equipped for Irrigation
2000	529,523 USD Million	17.9 %	130,897 Thousand HA	54,201 Thousand HA
2018	1,073,100 USD Million	7.8 %	135,695 Thousand HA	74,160 Thousand HA

EXPECTED IMPACTS ON AGRICULTURE PRODUCTIVITY

Rising temperatures, reduction in average annual precipitation, and intensification of extreme events such as heat waves and drought, affect production variability with a tendency towards yield reduction for many cultivated species, accompanied by a probable decrease in food quality. Crops respond to increases in temperatures with changes in duration of the growing season, early appearance of phenological phases and potential shifts of cultivation areas toward higher latitudes and altitudes for better growing conditions. However, impacts vary significantly depending on the geographical area and specific crops in question.

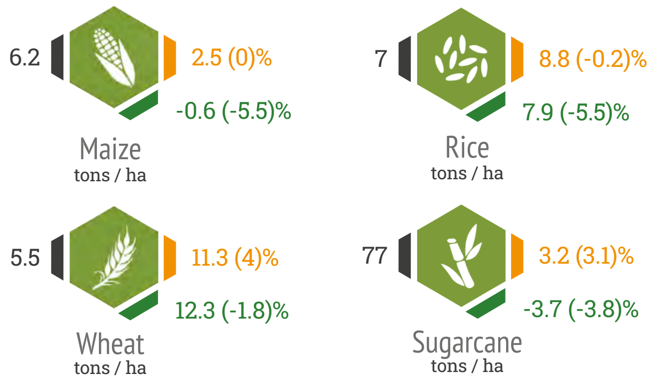


CROP PRODUCTIVITY

Crop productivity refers to the harvested yield of a crop per unit of land area. It is strongly influenced by climate and other environmental and management factors.

Climate change is expected to have an impact on the productivity of several major crops, although this may in part be offset by the fertilizing effect of higher CO_2.

Impacts are estimated using a range of model projections based on low to high emission scenarios and reported as percentage changes between the 30-year average around the historical period and the 30-year average around 2050.

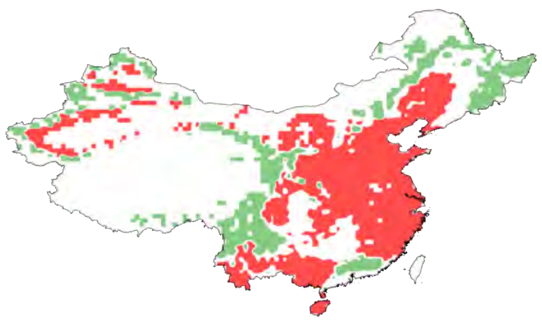


2050

Productivity change with (without) the CO_2 fertilization effect. Estimates assume sufficient water and nutrient supplies, and do not include impacts of pests, disease,s or extreme events.

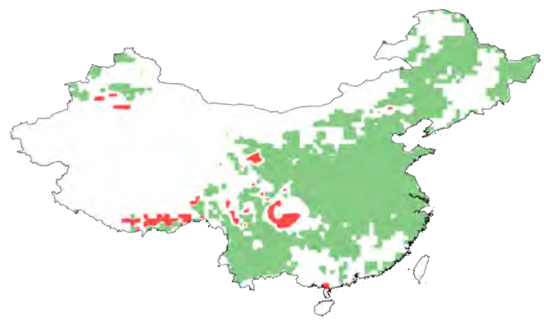
CHANGE IN MAIZE

− = +



CHANGE IN WHEAT

− = +



The magnitude of change in crop productivity for main cereals in China commonly varies between + and - 20%. General increases in wheat productivity are expected throughout China, with the largest gains in the eastern plains. Similar gains in productivity are projected for rice, although these will not be as pronounced as for wheat. Most positive increases in rice productivity are expected in northeastern China, whereas decreases are expected in central China.

A general decline of productivity is projected for maize in East and Central China, and for sugarcane throughout most of its growing region. Increased occurrence of severe droughts would double drought-related yield losses under a high emissions scenario. Widely cultivated fruit and tree crops such as citrus will witness climate related risks to productivity increasing from southeast to northwest, with yield losses mostly associated with seasonal water shortages.

ADAPTATION IN AGRICULTURE AND WATER RESOURCES

Climate change may have some positive benefits to some of the most widely used crops, but higher temperatures will generally require higher agriculture water demand due to higher plant evapotranspiration and expansion of irrigated areas. A 20% to 40% increase in water demand is expected, exerting significant stress on available water resources.

Expansion of irrigated agriculture in China has contributed to the depletion of rivers and groundwater, particularly in the northern regions. Cereal production in 2050 would need to be approximately 70% higher than it was in 2006, which is expected to increase the gap between water supply and demand.

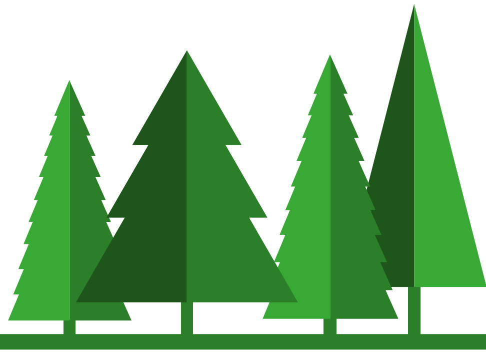
CHANGE IN WATER DEMAND

− = +

2050

Introducing adaptation practices, such as the use of water efficient crop varieties, changing cropping partners, and investment in irrigation infrastructure, can moderate the negative effects of climate change on grain production and preserve water resources.

CHINA
FORESTS



FORESTS IN CHINA

China is home to most forest types, from tropical and evergreen broadleaf forests in the south, to evergreen or deciduous coniferous in the north, as well as temperate ones in the east. In mountainous areas there are also large portions of boreal forests.

This wide variety, including strips of primary forests (5%), make up an invaluable biodiversity heritage.

FORESTED AREA AND CARBON STORAGE

25% of China is covered in forests with a strong increase in recent decades. In forest ecosystems, not considering shrublands, over 40 gigatonnes of carbon are stored, making them a crucial sink for the country. Each year over 163.4 teragrames of carbon are removed from the atmosphere by Chinese forests. Furthermore, data shows that with appropriate management this value could increase.

1990

157 Mln ha
Million hectares
Forested area

37 Tons/ha
Tons of Carbon per hectare
Carbon stock

2020

220 Mln ha
Million hectares
Forested area

45 Tons/ha
Tons of Carbon per hectare
Carbon stock

2050

Productivity anomaly
Tons of Carbon per hectare per year

+0.58

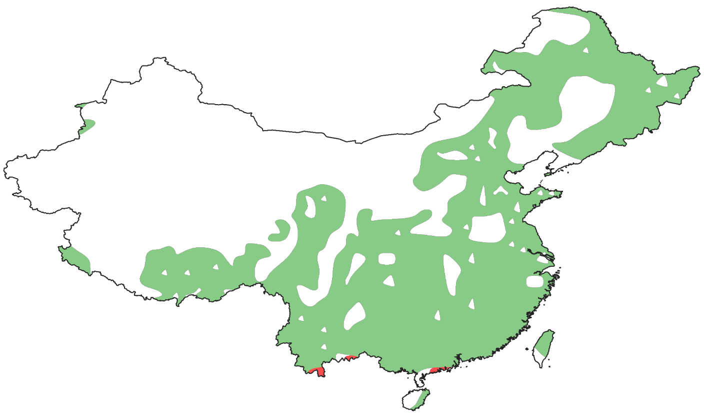
+0.44

FOREST PRODUCTIVITY

Forest productivity or Net Primary Production is the net carbon captured by plants. It is the difference between the carbon gained by Gross Primary Production - net photosynthesis measured at the ecosystem scale - and carbon released by plants' respiration. It is expressed per unit land area.

Slight increase particularly in the most forested areas
+ Fertilizing effect of increasing atmospheric CO_2

No areas with an expected decrease in forest primary production
+ Rising temperature and increasing risk of drought stress



KEY SPECIES UNDER CLIMATE CHANGE

THREATENED
TROPICAL FORESTS
Southern tropical forests may be affected negatively by increasing drought

VULNERABILITY
SUBTROPICAL-BROADLEAF
Higher vulnerability for subtropical mixed broadleaf forests

VULNERABILITY
TEMPERATE-DECIDUOUS
Higher vulnerability for temperate mixed deciduous forests

VULNERABILITY
TEMPERATE-MONTANE
Higher vulnerability for temperate and cold-temperate mountains needleleaf

FIRES IN CHINA

Fire is a structural ecological process that provides several types of ecosystem services and impacts on socio-ecological systems, including human health, carbon budgets, and climate change. Changes in global fire activity are influenced by multiple factors such as land-cover change, policies, and climatic conditions. Fire also releases large quantities of greenhouse gases into the atmosphere, contributing to a vicious cycle.

During the last two decades the total land area affected by fire was approximately 3.75 million hectares of which 41% involved forests.

BURNING
3.75 MILLION HECTARES

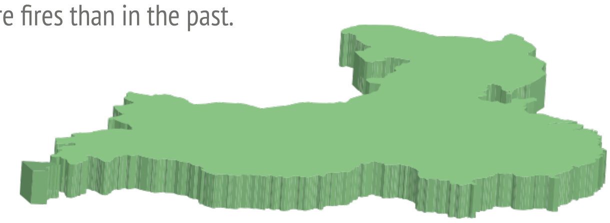
EMITTING
22 TERAGRAMMES OF CARBON PER YEAR

FOREST FIRE EMISSIONS CONTRIBUTED TO 41% OF TOTAL FIRE RELATED CARBON EMISSIONS

WHERE DO FIRES OCCUR?

Natural forests are abundant in the Daxing'an Mountains and the area is currently experiencing less frequent but more severe fires than in the past.

Forest plantations dominate the Fujian and Zhejiang provinces. Forest fire frequency is higher than in Northeast China.



The three main hotspot regions for fire density are: the Daxing'an Mountains in the northeast, the Yunnan and Guizhou provinces in the southwest, and the Fujian and Zhejiang provinces in the southeast.

The Yunnan and Guizhou provinces are characterised by evergreen broadleaf and coniferous forests. Southwest provinces have the highest fire occurrence.

FUTURE BURNED AREA

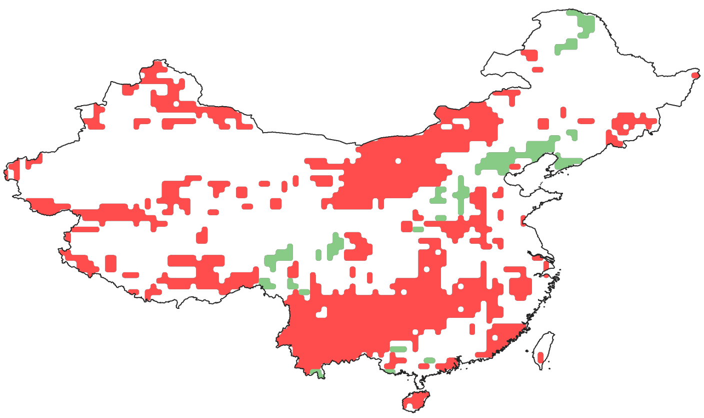
Under a low emissions scenario, models project that by 2050 a generalized increase in burned area might occur across subtropical southern forests and northern shrubland areas. Some western areas might also suffer a large increase in burned area. This trend is accentua- ted under a medium emissions scenario, particularly in northern areas.

Burned Area
km² per year

2050

+1,774

+1,673



Decrease in burned areas for a low emissions scenario

Increase in burned areas for a low emissions scenario
+ Prolonged fire season due to rising temperature
+ Prolonged drought and warming periods.

VARIATION OF SPECIFIC FIRE INDICATORS

max % of change
Fire occurrence probability in Northern Boreal forest

2041-2060

+99.8%

+99.6%

max % of change
Fire occurrence probability in Subtropical Evergreen Broadleaf forest

2041-2060

+89.6%

+84%

FUTURE FIRE EMISSIONS

Fire emissions follow a similar spatial pattern to burned area, with northern and southern areas projected to experience the greatest change under both low and medium emissions scenarios.

Fire Carbon emission
Teragrams of Carbon per year

2050

+26.5

+17.7

CHINA URBAN

OVERVIEW

China's urbanization rate has seen a sharp rise from 16.2% in 1960 to 61.4% in 2020. Now, growth of urbanization rates and of absolute size of urban population is gradually slowing down, with urbanization rate expected to reach 80% by 2050. Urbanization is fuelled by high rates of migration. Climate change induced migration to cities may ocurr due to those for whom farming becomes an unviable livelihood.

Just over 10% of the population is living in one of the six megacities with more than 10 million inhabitants, and a quarter of the population lives in urban areas between 1 and 5 million inhabitants. While the share of population living in cities with more than 1 million inhabitants is expected to grow further, smaller cities, and in particular those with less than 300,000 inhabitants, will decrease slightly.

Growth rates of urbanization rates and of absolute size of urban population is gradually slowing down, with urbanization rate expected to reach 80% by 2050. Built up areas cover 2.66% of China (248,533.59 square kilometers), although densities along the coastline and in the north-eastern plain are much higher.

Population in Urban Areas

2020: 875,075,919

2050: 1,091,948,003

Graphs refer to data provided by United Nations, Department of Economic and Social Affairs, Population Division (2018). World Urbanization

Urbanization Rate

2020: 61.4%

2050: 80%

OVERVIEW OF KEY CLIMATE IMPACTS IN URBAN AREAS

The vulnerability of China's urban areas to climate impacts is driven by their high level of exposure, in particular to flooding and heat stress. Both types of vulnerabilities are exacerbated by the fast and massive urbanization process of the past century.

HEATWAVES AND HEAT STRESS

Urban areas are particularly vulnerable to heat due to the urban heat island effect. With increasing annual mean temperatures and more frequent heatwaves in China, the urban heat island effect could further increase heat stress and heat related mortality in cities. Increases in excess mortality during heatwaves are found in cities such as Shanghai, where an excess mortality of 0.027% in the central urban area was estimated for a 1998 heatwave, and a peak of 453 additional deaths were registered on a single day during a 2003 heatwave.

Rising temperatures will increase heat stress and heat-related mortality across the country and particularly in large urban areas, with 37,800 excess deaths per year estimated under a high emissions scenario between 2041 and 2060, and 25,800 heat related deaths in urban areas under a low emissions scenario. Cities such as Guangzhou, Shanghai, and Beijing are expected to suffer from significant levels of chronic heat stress.

2050 — Cooling Degree Days
% of change

+120.4%
+43.4%
+26.8%

2100 — Heatwave frequency
% of change

+85.5%
+31.8%
+18.3%

2050 — Heatwave duration
% of time

+1,563%
+232%
+79%

UHI CHANGING REGIONAL CLIMATE

In urban areas, buildings, streets, parking lots etc. accumulate energy from solar radiation due to their material and release this energy during the night. In the Beijing–Tianjin–Hebei metropolitan area, the urban heat island effect has raised regional temperatures by more than 1°C. In Chinese urban agglomerations, high levels of pollution combined with rising air temperatures aggravate health impacts.

2017

Population exposed to air pollution

100.0%

COASTAL FLOODING

Several important urban areas in China are situated in coastal zones vulnerable to sea level rise. Without further protection measures, a 100-year high tide event would affect over 100,000 square kilometers of coastal land and the urban centres.

Projected sea level rise

2050

0.23 m

0.18 m

2100

0.77 m

0.38 m

EXTREME PRECIPITATION EVENTS

Indicators for intense precipitation events show an increasing level in the past decade, and in particular the southern part of China is affected by flooding with waterlogging and typhoons hitting the country regularly. Flash floods occur regularly in Chinese cities. In 2011 flash floods in Beijing caused 79 deaths and approximataly 1.86 billion USD in direct economic losses.

Flash floods in the Beijing, Tianjin and Hebei area left one person dead and 277 million USD in damages in 2017. High end flood risk will increase from between 18 and 34 milion people to 46 and 69 milion affected people in the 2030s and 2040s. Risk from river flooding is expected to increase by at least 20%. Well protected cities like Hubei will also face a 10-fold increase, from between 0.1 and 1 milion people to between 2 and 4 million if protection levels are not increased significantly. The most affected regions are close to Shanghai, although the city itself is well protected.

2050

Runoff increase

% of area

+28%

+10%

+5%

SURFACE SEALING AND FLOODS

Heavy precipitation in cities is problematic due to the high level of sealed surfaces. Soil sealing increases run off and reduces the amount of water absorbed by soil. Where there are large amounts of impervious ground cover, short duration extreme rainfall events can lead to increased flooding, even resulting in flash floods.

URBANIZATION OF FLOOD PLAINS

Urbanization is contributing to rising flood exposure, mainly in the east of the country. Future urbanization is expected to increase the rate of exposure to floods by 54% by 2050.

The trend towards impermeabilization of surfaces has a potentially higher impact on the development of urban flood risks than the projected increases in precipitation due to climate change. 4% of total urban land in China was situated in flood plains in 2015, and future urbanization is expected to increase urbanization of floodplains by 54% by 2050.

2010

% of urban population

Population living in slums

24.6%

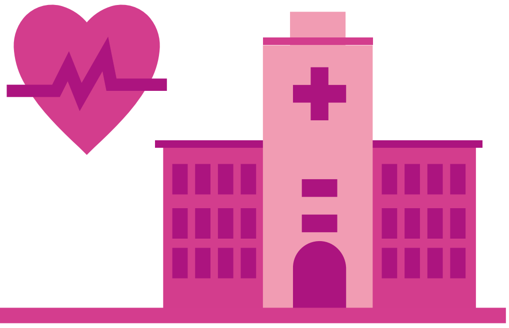
2018

% of total population

Urban population living in areas where elevation is below 5 meters

4.2%

CHINA
HEALTH



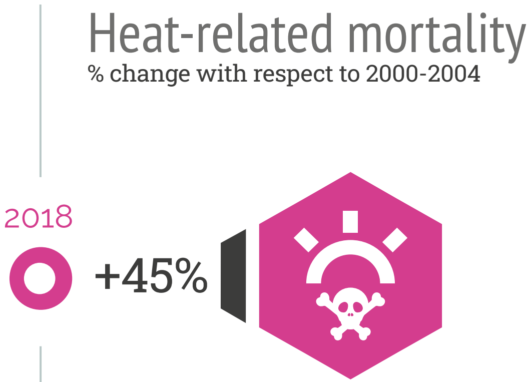
OVERVIEW

Progress in population health and social development in China are likely to be threatened by the impacts of climate change, including coastal and inland river flooding, increased heat stress, water and food insecurity, and changes in the occurrence of climate-sensitive diseases. Health impacts of climate change in China will be heterogeneous across the regions. Rising temperatures, floods, droughts, and frequent cold spells are the major health threats in the northeast. In north China, the most important health-climate factors are increasing temperatures and droughts, whereas in the northwest, drought is the major climate threat to health. In eastern China, heat waves, intensified precipitation, and frequent floods will increase the risk of water-borne diseases. In central China, increasing frequency and intensity of heat waves, and precipitation shifts are expanding the scope and duration of parasitic infections. In the south, increased precipitation and sea-level rise are likely to increase the spread of dengue and malaria.

HEAT RELATED MORTALITY

Heatwave-related mortality increased by a factor of four from 1990 to 2019, with 26,800 deaths in 2019. Future high temperatures will cause larger numbers of heat-related deaths among people living in China's southern, eastern, central, and northern areas. Under a high emissions scenario, heatwave-related excess deaths will increase by 92%.

Under a medium emissions scenario, the increases in heatwave-related excess mortality will be around 87%. In 2018, there was a 45% increase in heat-related deaths, compared to the 2000-2004 baseline period. 21.3% of heat-related mortality in China from 2003 to 2008 can be attributed to human-induced climate change.

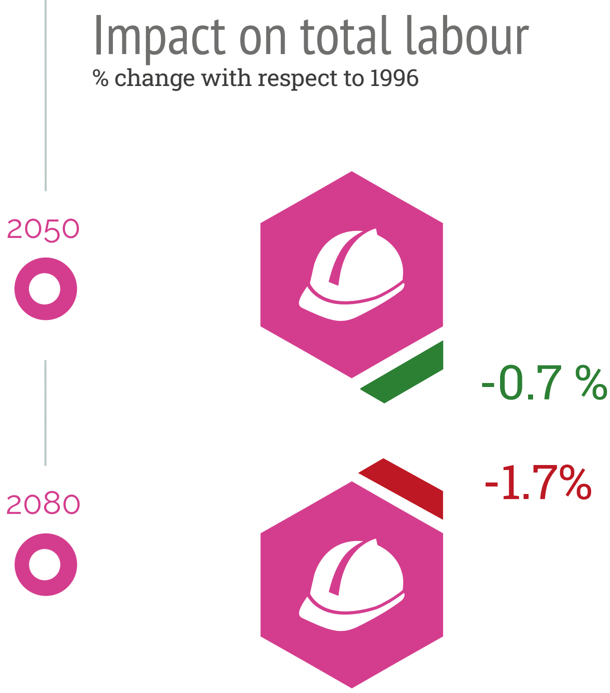


IMPACTS ON LABOUR

Labour is directly affected by changes in environmental conditions. Warming affects both the number of hours worked (labour supply) and on the productivity of workers during their working hours (labour productivity). Both labour supply and productivity are projected to decrease under future climate change in most parts of the world, and particularly in tropical regions.

Parts of sub-Saharan Africa, south Asia, and southeast Asia are at highest risk under future warming scenarios. Future climate change will reduce global total labour in the low-exposure sectors by 18 percentage points and by24.8 percentage points in the high-exposure sectors under a 3.0°C warming scenario

In 2019, the potential total work hours lost in China were 4.8% higher compared to 2000. Total labour is expected to decline by 0.68% under a low emissions scenario, and by 1.7% under a medium emissions scenario.



CLIMATE CHANGE AND DENGUE

Dengue has spread throughout the tropical world over the past 60 years and now affects over half the world's population. Globally, vectorial capacity for both dengue vectors (A. aegypti and A. albopictus) has been rising steadily since the 1980s, with nine of the ten highest years occurring since 2000.

Climatic stressors are one important driver of the current distribution and incidence of dengue. Climate change is likely to expand the geographical distribution and suitability of several vector-borne human infectious diseases including dengue. The risk of dengue transmission is increased by warming climates, as the growth and development of mosquitoes are significantly influenced by temperature, precipitation, and humidity.

Dengue suitability

% of population at risk

CLIMATE CHANGE AND ZIKA

Zika virus has spread to at least 49 countries and territories since 2013. Climate change impacts on transmission suitability risk have increased over the years and future warming over 1.3 billion additional people could face suitable transmission temperatures for Zika by 2050.

Zika suitability

% of population at risk

DENGUE AND ZIKA: POPULATION AT RISK

Under a medium emissions scenario, 95% of the population will be at risk of transmission-suitable mean temperature for dengue by 2050, whereas 98% will be at risk under a high emissions scenario. In the case of Zika, 90.3% of the population will be at risk of transmission-suitable mean temperatures by 2050, under a medium emissions scenario, whereas 91.7% will be at risk under a high emissions scenario.

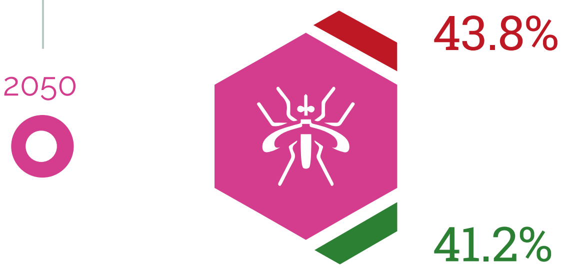
Under a medium emissions scenario, 95% of the population will be at risk of transmission-suitable mean temperature for dengue by 2050, whereas 98% will be at risk under a high emissions scenario. In the case of Zika, 90.3% of the population will be at risk of transmission-suitable mean temperatures by 2050, under a medium emissions scenario, whereas 91.7% will be at risk under a high emissions scenario.

CLIMATE CHANGE AND MALARIA

Despite advancements in vector control and socioeconomic development, climate suitability for malaria is expected to increase in China. 41.2% of the Chinese population will be at risk of malaria under a low emissions scenario in 2050, whereas 43.8% will be at risk under a high emissions scenario.

Malaria suitability

% of population at risk



POLLUTION AND PREMATURE MORTALITY

Air pollution and its adverse effects on public health remain a considerable problem in China, although policies have been implemented to improve the situation. Overall, the age-standardised death rate attributable to air pollution decreased by 60.6% (55.7 to 63.7) between 1990 and 2017. Since China's population is increasing and ageing, the number of PM2.5-related premature deaths is estimated to increase by 84 to 102 by 2020 and by 191 244 by 2030, indicating that the health benefits induced by air quality improvements could be offset by the effect of the population increasing in size and ageing.

CHINA ENERGY

ENERGY SYSTEM IN A NUTSHELL

China is a very energy-intensive economy, due to the sheer size of its population and its manufacturing sector, and the transportation needs within its huge territory and for international trade.

Coal has traditionally been used to meet energy demand, but renewables have undergone a very rapid increase in the last decade.

0.15
ktoe/US$
Energy intensity

9.8%
AC Share in electricity consumption

22%
Import dependence ratio

CLIMATE CHANGE TODAY

BLACKOUT

Prolonged heat in Chinese cities has caused electricity demand to spike, sometimes forcing cuts in power supply, such as in Guangdong in May-June 2021.

WATER

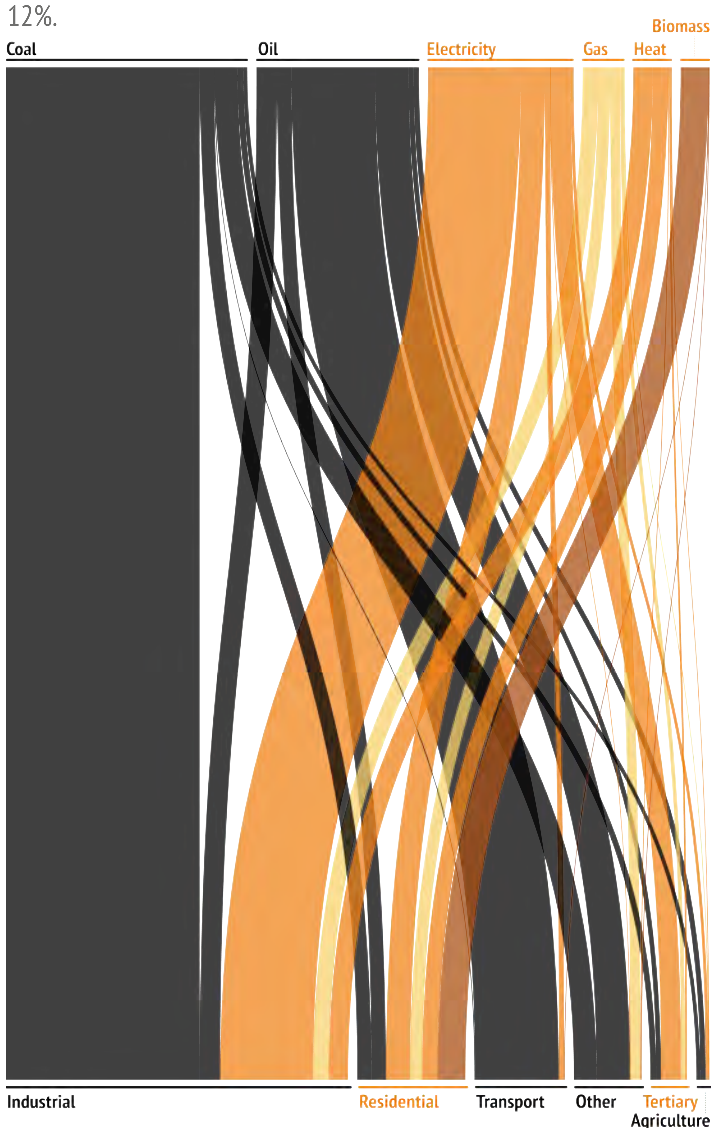
The water-energy nexus has been frequently under strain both due to prolonged periods of drought in Southern China, resulting in water shortages affecting hydropower and thermal power generation, but also due to heavy floods threatening dams and causing overflows.

HEAT

21 out of the 30 most-populated Chinese cities hit 30°C at least three days earlier than average in the last 20 years compared to the 1980 to 2000 period.

ENERGY SUPPLY

Fossil fuels dominate China's total primary energy supply, with coal claiming the lion's share (62% in 2018). 50% of industrial demand is covered by coal and 32% by electricity (which has a 78% share of coal in its mix). Oil (19%) is mainly used for transport, followed by industrial uses. Despite the need for foreign oil, import dependence is low, as most other energy sources are domestic. Electricity grew ten-fold since 1990, with coal and renewables gaining shares. Renewables grew faster - by 50% - since 2000, while coal grew by only 12%.



ENERGY DEMAND

Most energy consumption is claimed by industry (55% in 2018, including 7% of total demand for non energy uses), followed by residential (17%), transport (16%), agriculture (7%), and tertiary uses (4.5%). Air conditioning accounts for 10% of residential electricity demand (2015). Industrial and residential demand doubled in the last decade. The increase in residential demand points to improving household incomes and availability of money for purchasing applian-ces, including heating and cooling systems.

FUTURE ENERGY DEMAND

A recent study finds that the decrease in heating demand is going to be more than compensated by the increase in cooling needs, resulting, by the end of the century, in a net increase of electricity demand of 16,603 PJ (or 4612 billion KWh) in 2050 under a medium emissions scenario.

Net change in energy demand due to changes in HDD/CDD
Billion KWh

2050

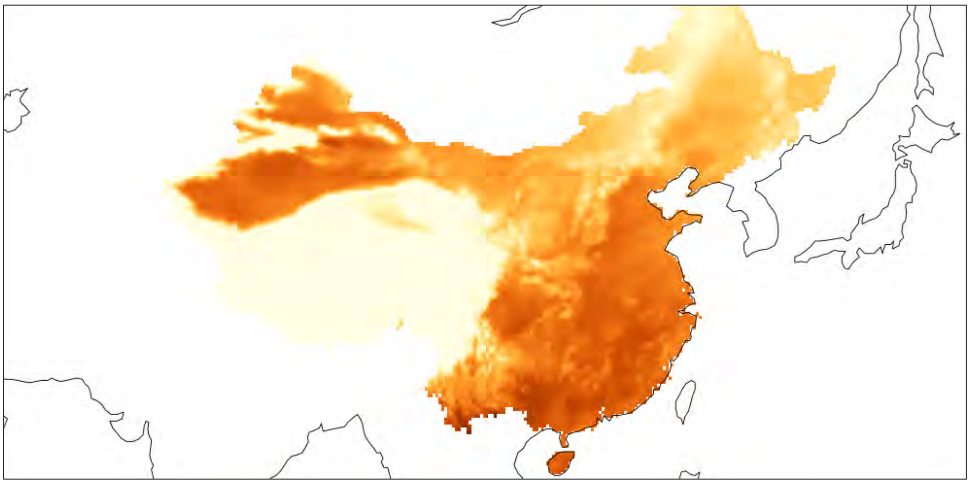
+ 4,612.08

COOLING NEEDS

The highest increases in cooling degree days will occur in the south (Hainan, Hong Kong and the Pearl River delta) and on the coast (Fujian, Zhejiang, Shangai, Jiangsu) but also in desert areas in the west (Xingjiang), where they do not affect a large population.

COOLING DEGREE DAYS

0 600



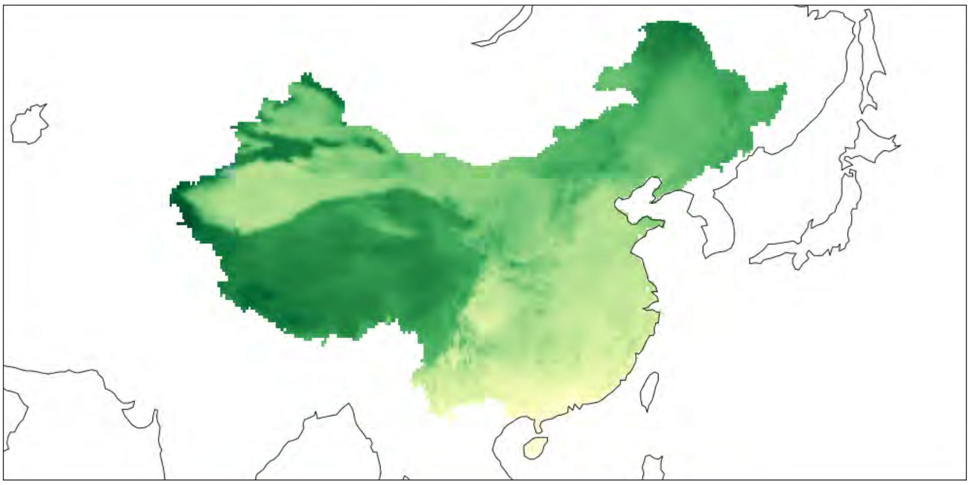
HEATING NEEDS

The pattern is reversed compared to cooling degree days: Substantial drop in heating needs in cold and not very densely populated areas such as Tibet and northern provinces.

Significant decreases in Beijing, moderate ones in densely populated south and east coast, fading to negligible in the extreme south (Hainan, Hong Kong and Pearl River Delta).

HEATING DEGREE DAYS

-971 0



FUTURE ENERGY SUPPLY

The future configuration of the Chinese energy mix is likely to be determined by the evolution of climate mitigation policies and hence is outside the scope of this report. China has committed to peak its emissions by 2030 and to full decarbonization by 2060. This is likely to result in fossil fuels and their vulnerabilities keeping their relevance for the next decade, while carbon free sources and their vulnerabilities will prevail in the second half of the century.

Change in Hydropower generation
% of change

2050

-4.88%

-3.54%

EXPECTED IMPACTS OF CLIMATE CHANGE

The share of energy infrastructure at risk of being unable to operate due to climate change is estimated at 7.1% under a low emissions scenario, 10.8% under a medium emissions scenario, 11.5% under a high emissions scenario and 14.2% under the highest emissions scenario.

The risks are highest in Xinjiang and Inner Mongolia, and lowest in Tibet and Hainan. A modest reduction in hydropower potential is expected overall. Large hydropower (e.g. the Three Gorges Dam) may face increasing operational complexity, and hence increasing uncertainty for the future of local communities and ecosystems.

CHINA
ECONOMY

OVERVIEW

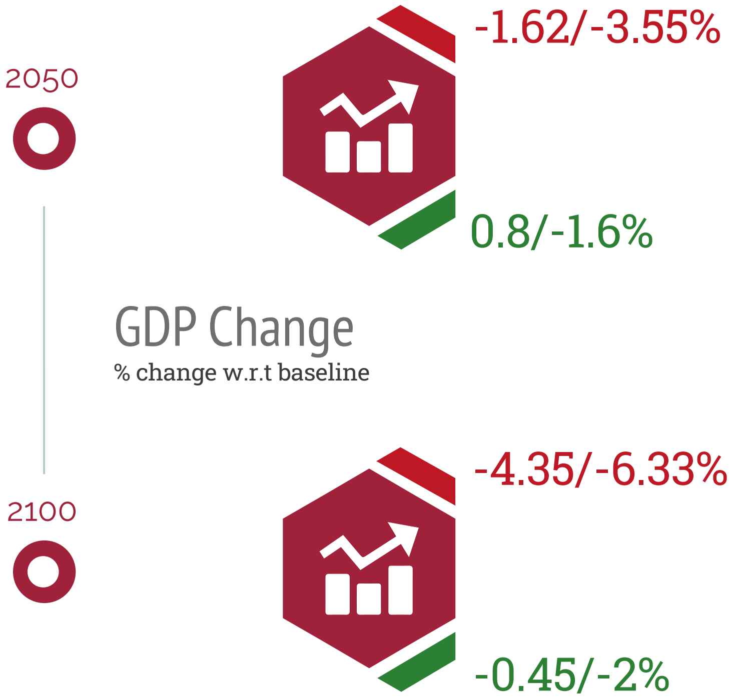
China is the third largest economy of the G20 group and the one showing the highest GDP growth rates.

IMPACTS ON GDP

In a vast area like China, economic impacts from climate change can be extreely different from region to region. Thus the national average clearly provides only a very aggregated view of climate change costs.

This said, under more moderate climate change scenarios like a low emissions scenario, some net gains may occur. Indeed by mid century, economic effects range from a potential gain of 98 billion EUR (0.8% of GDP) to a loss of 195 billion EUR (1.6% of GDP).

However, potential gains vanish with time and, in the second half of the century, China is expected to experience a net loss also under a low emissions scenario. Under a high emissions scenario GDP effects are unambiguously negative and could reach a loss of 772 billion EUR (or more than 6% of GDP).



SECTORAL ECONOMIC IMPACTS

IMPACTS ON INDUSTRY AND INFRASTRUCTURE

China's extensive manufacturing industry produces 12% of global exports and accounts for 32% of national GDP. By mid-century, climate change is predicted to reduce production in the manufacturing industry by 12% if no adaptation measures are implemented. This translates to a loss of about 33 billion EUR and a 4% decline in annual GDP.

As temperatures increase, and in the absence of any further adaptation measures, more people will be exposed to flooding risks, and the economic costs are projected to increase drastically. China is particularly vulnerable to damages from the flooding of its river basins.

The North China Plain and the Middle-Lower Yangtze Plain will suffer the largest losses, followed by the eastern part of the Loess Plateau, the Guanzhong Plain, and the Sichuan Basin.

IMPACTS ON AGRICULTURE

The agricultural sector accounts for approximately 10% of China's GDP. Economic losses in the agricultural sector caused by droughts are already large in China, estimated at 7 billion USD (5.8 billion EUR).

These costs are projected to increase exponentially as temperatures rise. Under a high emissions scenario, by the middle of the century they are expected to reach 30 billion USD (24.8 billion EUR).

IMPACTS ON ENERGY

As with all other economic sectors, energy supply and energy networks in China will undergo more intense stress from extreme weather events. Economic impacts of shifts in household and firm energy demand (see chapter on energy) are difficult to predict and will mostly lead to redistribution effects. In the case of China, the increase in cooling needs will definitely prevail, bringing about a likely increase in household and firm energy bills.

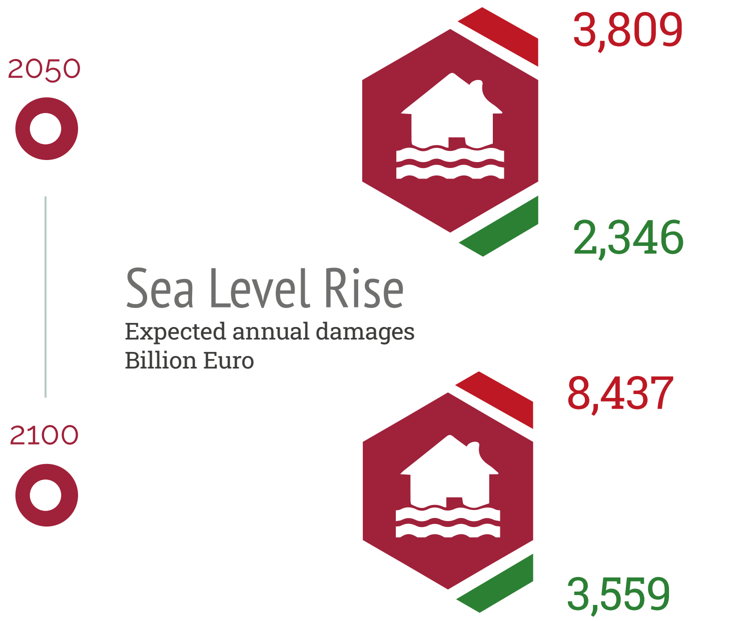
A recent study evaluates (under a high emissions scenario by 2100) the economic value of energy infrastructure assets at risk because of climate change at 1,741 billion yuan, about 258 billion USD.

This amounts to 14.2% of the total electricity assets and 2.1% of the 2017 Chinese GDP. The largest economic value of assets at risk pertain to Xinjiang and Inner Mongolia, whereas Tibet and Hainan are affected the least.

SEA LEVEL RISE DAMAGES

China is expected to face significant costs from coastal flooding. Expected annual damages can range from 2,346 billion EUR under a low emissions scenario to 3,809 billion EUR under a high emissions scenario, by 2050.

By the end of the century losses are projected to be 3,559 billion EUR under a low emissions scenario and reach 8,437 billion EUR under a high emissions scenario.

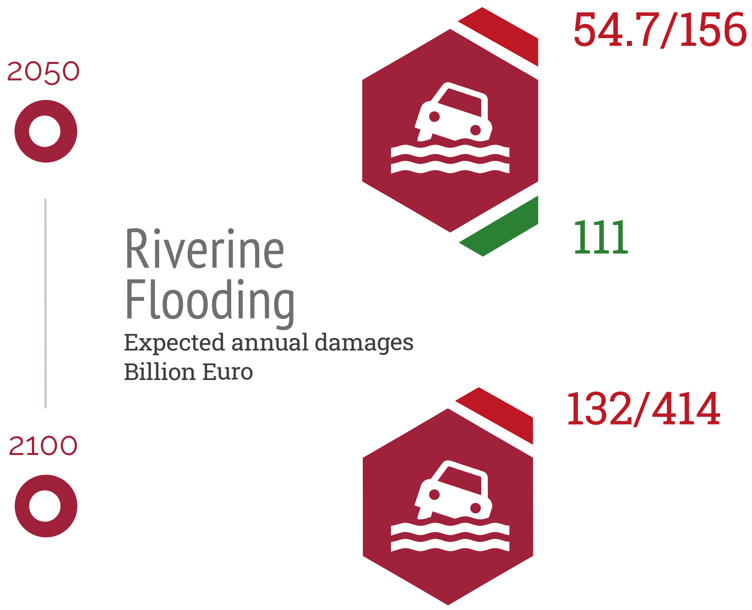


RIVER FLOODING DAMAGES

Current economic losses from river floods are estimated at around 12 billion USD. China is predicted to experience the largest losses globally from fluvial flooding. These will be particularly concentrated in the eastern and coastal regions of Jiangsu Zhejiang, featuring high density of population and economic activity.

By 2050, the expected annual damages from river flooding are projected to 111 billion EUR under a low emissions scenario and in the range of 54.7 billion to 322.5 billion EUR under a high emissions scenario.

By the end of the century, losses are projected to reach 414 billion EUR under a high emissions scenario.



IMPACTS ON TOURISM

Tourism in China has been growing significantly in recent years, contributing 352.4 billion EUR or 3.3% of national GDP in 2017; the same year China's domestic tourism market became the largest in the world, with domestic tourism consumption reaching 697 billion EUR. Comfortable climatic conditions and seasonality are important for the Chinese tourism sector, and could be affected by climate change.

Nonetheless, there are no figures available for the economic impacts of climate change on the tourism sector and only qualitative inferences can be made.

Increasing temperatures will leave some locations less favourable for tourists, and others more attractive. Tourism in the Eastern Qinghai-Tibet Plateau has benefited from warming in recent years, where the number of comfortable days for visitors increased from 5 to 20. In other regions, northern Northeast China and eastern Inner Mongolia Plateau, the comfortable days have decreased, negatively impacting the tourism sector. There is an increasing demand in China for holidays in locations with lower temperatures, in order to escape summer extremes in the majority of regions, and climate change could reduce the availability of these locations, resulting in economic losses. Winter tourism will be negatively impacted.

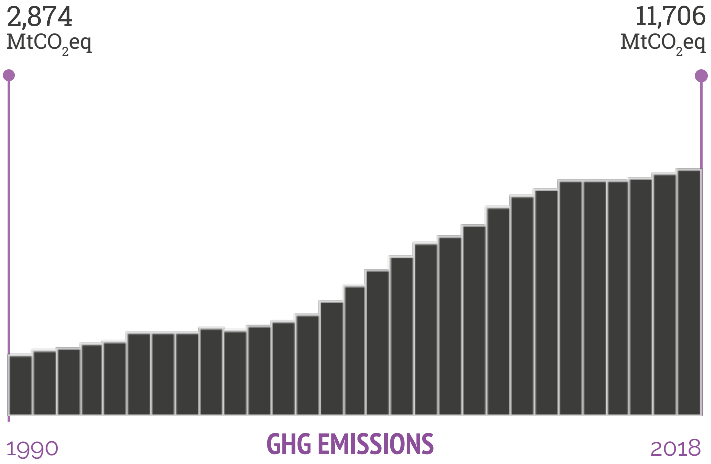
Changing climatic conditions will leave 16% of ski resorts unsuitable for use in the future. Glacier based tourism is the main attraction to visitors in the Qinghai-Tibetan Plateau region (one of China's most popular tourist destinations).

Rising temperatures are causing the glaciers to melt, making them thinner and dirtier, which reduces their aesthetic value and will in turn affect tourism in the area. Income for local communities dependent on glacier tourism will be negatively affected.

CHINA
POLICY

OVERVIEW

China is both the most populated country in the world and the largest single emitter. Emissions are currently growing, even though the rate of increase has slowed in recent years.



INTERNATIONAL COMMITMENTS

The national target for the Paris Agreement is to reach peak emissions by 2030. To do so, China commits to reduce the carbon intensity of each unit of GDP by 60%-65% (with reference to 2005), increase to 20% the share of non-fossil fuel in energy consumption and increase forest stock by 4,5 billion cubic metres.

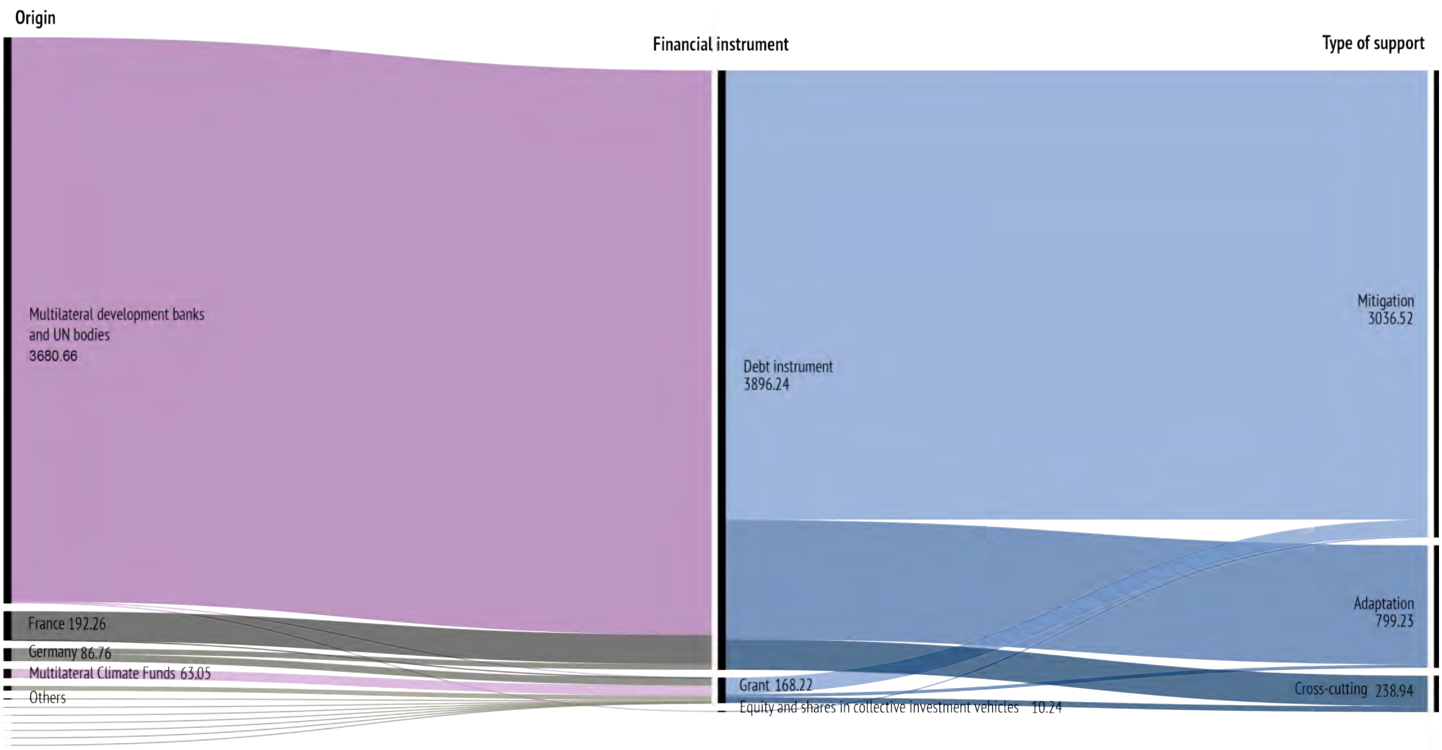
CLIMATE POLICY COMMITMENTS CHRONOLOGY

2002 — **KYOTO PROTOCOL - 1ST PERIOD**
No target

2016 — **PARIS AGREEMENT - 1ST NDC**
Peak in GHG emissions by 2030. 60%-65% reduction in GHG emissions per unit of GDP by 2030, with respect to 2005 levels. 20% increase in non-fossil fuel primary energy consumption by 2030. 4.5 billion m^3 increase in volume of forest stock, with respect to 2005 levels

INTERNATIONAL CLIMATE FINANCE ASSISTANCE

According to OECD DAC's climate-related development finance data, in 2017-2018 China received 4.1 billion USD, mainly from multilateral institutions as debt instruments. The main bilateral donor is France. Mitigation is the main expenditure item.



SUSTAINABLE RECOVERY POLICY

According to the Global Recovery Observatory, in 2020 China invested more than 400 billion USD in post-covid recovery, almost 20% of all public expenditure. More than 48 billion USD, 11,9% of recovery expenditure, was dedicated to sustainable investments in the energy sector and green infrastructure.

2,072.34 billion $	406.57 billion $	48.5 billion $
Total Spending	Recovery Spending	Green Spending

DOMESTIC ADAPTATION POLICY

China adopted an adaptation Strategy in 2013. No national Plan is expected, but rather sectoral plans (urban planning, forestry, etc.) and sub-national plans. China has no commitments for adaptation in its NDC.

- ○ Domestic Adaptation Policy
  - ○ Inclusion of Adaptation in NDCs
  - ○ Integrated Adaptation & Mitigation Policy
  - ● Dedicated Adaptation Strategy
  - ○ Dedicated Adaptation Plan
- ● Subordinate Adaptation Policies
  - ● Sectoral Adaptation Plans
  - ● Subnational Adaptation Plans

○ Policy not in place ● Active policy

ADAPTATION POLICY HIGHLIGHTS

TRANSNATIONAL INITIATIVES

Lancang-Mekong Cooperation Mechanism (LMCM)

The LMCM is based on the multilateral mechanism of the Association of South East Asian Nations (ASEAN) and serves to coordinate water sharing among all of the Lancang-Mekong River riparian states: China, Myanmar, Laos, Thailand, Cambodia and Vietnam

NATIONAL INITIATIVES

Sponge City Program (SCP)

SCP was put forward 2014 to relieve the flood inundation and water shortage situation. The SPC program implements not only the concept and practices of low impact development but also comprehensive urban water management strategies. 16 pilot cities received special financial support for the development of SPC

Integrated big data application platform for emergency management

Based on the national data sharing system, the platform aims to make best use of big data, cloud computing and IoT to achieve online monitoring, warning and forecast in advance for major risks

Action Plan for Forestry to Adapt to Climate Change

The Action Plan aims to strengthen the sustainable management of forests, control forest disasters, promote a virtuous cycle of grassland ecology and improve the network of nature reserves

SUBNATIONAL INITIATIVES

Agricultural adaptation in Ningxia

The project sought to understand the impact of climate change on crop yields and the national cereal production, including an assessment of options, implementation, demonstration and monitoring-evaluation

ENERGY TRANSITION

The overall Energy Transition indicator for China is well below the average. This is an expected result in relation to the traditional low performance in Emissions and Fossil Fuels, respectively 13 and 11 points below average. In addition,

Efficiency contributes negatively (more than 13 points below) due to a high energy intensity and a low use of clean cooking. Renewables penetration is increasing and in the future will play a more and more important role.

The Electrification performance, well above the average, is one of the highest in the G20, reflecting the importance of electricity as the main energy vector in the future in all key sectors including transport, industry and buildings.

	G20 AVERAGE	COUNTRY
Energy Transition	58.7	52.9
Fossil Fuels	45.3	34.0
Renewables	19.7	19.8
Efficiency	84.9	71.4
Electrification	70.8	79.5
Emissions	72.9	59.7

G20 AVERAGE COUNTRY

Only actively pursuing an energy transition based on decarbonization and electrification – from policy and regulation, to health and education – will enable countries to benefit the most from future opportunities and fight climate change whilst ensuring an equitable distribution of wealth.

The Energy Transition indicators were developed by Enel Foundation in cooperation with SACE, and provide a retrospective analysis based on historical data.