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The 1.5 degree climate target and the difference it can make to Africa

Human activities have [already caused](#) about 1.0°C of global warming¹ but if emissions continue temperatures will continue to climb. The risks to natural and human systems are higher for global warming of 1.5°C than at present, but lower than at 2°C. This report highlights example of how different a 1.5 and 2 degree world for specific regions, drawing from recent² scientific publications and the [special report on global warming of 1.5](#) published by the Intergovernmental Panel on Climate Change (IPCC) in 2018 - the UN body for assessing climate change. Impacts to Africa are summarised, along with the current climate pledges of South Africa, based on the analysis tool [Climate Action Tracker](#).

South Africa

South Africa's NDC is [rated](#) by Climate Action Tracker as "highly insufficient" - well below what is needed to reach the 1.5 degrees celsius temperature target contained in the Paris Agreement. Current South African climate pledges are consistent with the world warming by 3-4 degrees celsius.

- South Africa has ratified the Paris Agreement, and pledged to keep domestic emissions to 17-78% by 2030, on 1990 levels.
- South Africa has a long-term goal to stabilise emissions over 2025-2035 followed by a decline in emissions to 212-428 MtCO₂ equivalent by 2050

Projected impacts across the African continent

With 1.5 degrees celsius of global warming:

- In today's climate, the average African region [experiences](#) one to three heatwaves per [year](#). Under 1.5 degrees celsius of warming, this number could more than double by 2050.
- Compared to now, megacities like Lagos in Nigeria will be more vulnerable to heat stress, with perhaps twice as many becoming affected by the middle of the century, meaning more than [350 million people](#) exposed to potentially deadly heat.
- Rising temperatures, drought, and unstable weather patterns have serious implications for global food production. Every degree of global temperature rise [reduces](#) global yields of wheat by 6.0%, rice by 3.2%, maize by 7.4%, and soybean by 3.1%. Some regions are more affected than others - for example in West Africa, wheat yields could fall by up to 25% if temperatures rise 1.5°C.³

With more than 1.5 degrees celsius of global warming:

- Globally, agricultural yields [fall rapidly](#) between one and three degrees celsius of warming. Once local temperatures reach three degrees celsius above pre-industrial levels, all crops are negatively affected, wherever they are in the world - including in temperate regions.⁴ Fish species go locally extinct, with serious impacts on fisheries.⁵
- By the end of the century, 29% of the global population face '[beyond tolerable](#)' risk in at least two out of the three main sectors - water, energy and food, and environment. More than nine out of ten people exposed and vulnerable people are in Africa and Asia.

¹ Above pre-industrial levels - defined by the IPCC as: "The multi-century period prior to the onset of large-scale industrial activity around 1750. The reference period 1850–1900 is used to approximate pre-industrial Global Mean Surface Temperature."

² This report was originally written in December 2018, so publications since are not included. The NDC targets have been updated as of September 2019.

³ Differential climate impacts for policy-relevant limits to global warming: the case of 1.5C and 2C ([Earth System Dynamics, 2016](#)), p.337.

⁴ IPCC, AR5, WGII, Chapter 7, p.497.

⁵ IPCC, AR5, WGII, Chapter 7, p.508.

- Without immediate global cuts in carbon dioxide emissions, average temperatures in Africa will rise more than [two degrees celsius above pre-industrial levels](#) by 2050. By this time, heat extremes never experienced before by humans in this part of the world could affect [15%](#)⁶ of sub-Saharan Africa's land area in the hot season, causing deaths and threatening farmers' ability to grow crops.
- This part of the world is likely to warm faster than the global average. If global temperatures rise by two degrees celsius, summer temperatures in the [Middle East and North Africa region](#) could increase by more than double that. The region is currently home to more than 500 million people. By 2050, daytime temperatures could [rise to](#) 46°C on the hottest days. Temperatures of 30-40°C can be [deadly](#) and this could make parts of the region [uninhabitable](#) because of [extreme heat](#). Rising temperatures are also likely to lead to water shortages. In North Africa, a three degree celsius temperature increase could cause rain fed maize yields to drop by 15-25% by 2080.⁷
- Under 3.5 degrees celsius of warming, people in sub-Saharan Africa would be at higher risk of Malaria.⁸
- Under four degrees celsius of warming, the subtropical region of North Africa is likely to experience a rise in monthly summer temperatures of more than six degrees celsius.⁹
- 35% of cropland is expected to become unsuitable for cultivation with four degrees celsius or more of warming.¹⁰
- Under a [high emissions scenario](#) (RCP8.5) where temperatures rise four to six degrees celsius by the end of the century, sub-Saharan Africa could see about 53.5 million climate migrants by 2050. This is about 3% of the current population.¹¹

Benefits of limiting temperature rise to 1.5 degrees celsius:

- 55 million fewer people in African countries would be at risk of hunger, compared to a two degrees celsius future.¹²
- By 2100, [90% of the world's population](#),¹³ particularly poor countries in Africa, Asia, and Latin America, would be likely to experience reduced economic damages compared to those at warming at two degrees celsius.

⁶ Turn down the heat: Climate extremes, regional impacts, and the case for resilience (2013), The World Bank, p.xxvi.

⁷ UNDP-GEF report: Climate Change Adaptation in the Arab States, p.26.

⁸ Turn down the heat: why a 4°C warmer world must Be avoided (2012), The World Bank, p.56.

⁹ Turn down the heat: why a 4°C warmer world must Be avoided (2012), The World Bank, p.38.

¹⁰ Turn down the heat: why a 4°C warmer world must Be avoided (2012), The World Bank, p.62.

¹¹ Groundswell: Preparing for Internal Climate Migration, (2018), World Bank Group, p.111.

¹² Clements, R. (2009). The Economic Cost of Climate Change in Africa.

¹³ Large potential reduction in economic damages under UN mitigation targets (208), Nature, p.552.

The 1.5 degree climate target and the difference it can make to Asia

Human activities have [already caused](#) about 1.0°C of global warming¹ but if emissions continue temperatures will continue to climb. The risks to natural and human systems are higher for global warming of 1.5°C than at present, but lower than at 2°C. This briefing highlights examples of how different a 1.5 and 2 degree world would be, drawing from recent² scientific publications and the [special report on global warming of 1.5](#) published by the Intergovernmental Panel on Climate Change (IPCC) in 2018 - the UN body for assessing climate change. Impacts to Asia are summarised, along with the current climate pledges of some of the major economies, based on the analysis tool [Climate Action Tracker](#).

Global impacts of warming will severely affect Asia. For example, rising temperatures, drought, and unstable weather patterns have serious implications for global food production. Global agricultural yields [fall rapidly](#) between one and three degrees celsius of warming. Every degree of global temperature rise [reduces](#) global yields of wheat by 6.0%, rice by 3.2%, maize by 7.4%, and soybean by 3.1%. Once local temperatures reach three degrees celsius above pre-industrial levels, all crops are negatively affected, wherever they are in the world - including in temperate regions.³ Fish species go locally extinct, with serious impacts on fisheries.⁴

Projected impacts across South Asia

India

India's NDC is [rated](#) by Climate Action Tracker as “2 degrees celsius compatible” - If all government targets were within this range, warming could be held below 2 degrees celsius, but temperatures will still be too high for the 1.5 degrees celsius limit set in Paris.

- India has ratified the Paris Agreement, and pledged to reduce domestic emissions intensity by 33%–35% below 2005 levels by 2030, increase the share of non-fossil based energy resources to 40% of installed electric power capacity by 2030.
- India has a long-term goal of keeping per capita emissions below those of the developed world.

Impacts

With more than 1.5 degrees celsius of global warming:

- Under a two degree celsius temperature rise, Kolkata in India could experience temperature conditions equivalent to its [deadly 2015 heatwaves](#) every year.
- Under two degrees celsius of temperature rise, annual runoff in the Ganges river basin is expected to decrease by about 20%.⁵
- Up to 30% of humid tropical forests in central Sumatra, Sulawesi, India, and the Philippines could be threatened by climate induced loss under four degrees celsius of warming.⁶
- Glaciers in the high mountains of Asia play an [important role](#) in supplying water to millions of people living downstream. [800 million people](#) are at least partly dependent on meltwater from glaciers.

¹ Above pre-industrial levels - defined by the IPCC as: “The multi-century period prior to the onset of large-scale industrial activity around 1750. The reference period 1850–1900 is used to approximate pre-industrial Global Mean Surface Temperature.”

² This report was originally written in December 2018, publications since have not been included. The NDC targets have been updated as of September 2019.

³ IPCC, AR5, WGII, Chapter 7, p.497.

⁴ IPCC, AR5, WGII, Chapter 7, p.508.

⁵ Turn down the heat: why a 4°C warmer world must Be avoided (2012), The World Bank, p.xvi.

⁶ Turn down the heat: why a 4°C warmer world must Be avoided (2012), The World Bank, p.51.

Around a [third](#) of the ice stored in these glaciers will be lost by the end of the century under two degrees celsius temperature rise.

- Under a [high emissions scenario](#) (RCP8.5) where temperatures rise four to six degrees celsius by the end of the century, Bangladesh could see about 6.7 million climate migrants by 2050. This is about 3.4% of the current population.⁷
- Under a [high emissions scenario](#) (RCP8.5) where temperatures rise four to six degrees celsius by the end of the century, and unequal development practices⁸, South Asia could see about 35.7 million climate migrants by 2050. By the middle of the century, climate migrants are predicted to make up about 23% of all internal migrants in South Asia.⁹
- If emissions continue to rise, we will see close to [1m](#) of sea level rise¹⁰ by the end of this century and massive storm surges that cause coastal floods will become more [intense and common](#). The gradual loss of land, punctuated with extreme events, will push people away [from their homes](#). For example, in Bangladesh it is estimated that [18 million people](#) will be displaced by sea level rise alone by 2050.
- But if four degrees celsius temperature rise is reached, this could lead to sea level rise of [nearly nine metres](#) over several hundred years as it triggers melting of the Antarctic and Greenland ice sheets. This level of sea level rise would [inundate](#) all the world's coastal cities. [470 to 760 million](#) people currently live in at-risk areas, including 145 million people in China. India, Bangladesh, Vietnam, Indonesia, Japan, the Philippines, Thailand, and Myanmar all have more than 10 million people living in areas at risk.

Benefits of limiting temperatures to 1.5 degrees celsius:

- 4.5% of the population in [Asian river basins](#) will have [better water availability and greater food security](#), compared to higher levels of temperature rise.
- By 2100, [90% of the world's population](#),¹¹ particularly poor countries in Africa, Asia, and Latin America, would be likely to experience reduced economic damages compared to those at warming at two degrees celsius.

Projected impacts across East Asia

China

China's NDC is [rated](#) by Climate Action Tracker as "highly insufficient" and "not at all consistent" with holding temperatures to 2 degrees celsius by the end of the century as promised by the Paris Agreement, let alone the 1.5 degrees celsius limit. China's current pledges are consistent with the world warming by up to 4 degrees celsius by 2100.

- China has ratified the Paris Agreement, and has an unconditional target to peak its carbon emissions latest by 2030., Aas well as reduce the carbon intensity of GDP to 60-65% below 2005 levels by 2030 and increase its share of non-fossil based energy by 20% in 2030.
- With current policies, China is on track to meet its 2020 pledge and its NDC targets, but this will still be slightly higher current emissions levels.

⁷ Groundswell: Preparing for Internal Climate Migration (2018), World Bank Group, p.148.

⁸ Unequal development: "inequality remains high, leaving developing regions highly vulnerable to climate change and with limited adaptive capacity. Urbanisation rates are also high across low and middle income countries." - Groundswell: Preparing for Internal Climate Migration (2018), World Bank Group, p.9.

⁹ Under the pessimistic reference scenario - Groundswell: Preparing for Internal Climate Migration (2018), World Bank Group, p.89.

¹⁰ The UN body for climate change (the IPCC) put business-as-usual rise at [0.78m, range \(0.54-0.98m\)](#), compared to 1986-2005, by 1996 global sea levels had risen about [16-17cm](#) from their pre-industrial level. The new IPCC report will likely have a new estimate based on recent research.

¹¹ Large potential reduction in economic damages under UN mitigation targets (208), Nature, p.552.

Japan

Japan's NDC is [rated](#) by Climate Action Tracker as “highly insufficient” - well below what is needed to reach the 1.5 degree celsius temperature target contained in the Paris Agreement. Current Japanese climate pledges are consistent with the world warming by 3-4 degrees celsius.

- Japan has ratified the Paris Agreement, and pledged to reduce domestic emissions by 26% below 2013 levels by 2030, which translates to a 158% below reduction from 1990 levels.
- Japan has a long-term goal to reduce emissions, 80% by 2050 (base year not specified).

South Korea

South Korea's NDC is [rated](#) by Climate Action Tracker as “highly insufficient” - well below what is needed to reach the 1.5 degree celsius temperature target contained in the Paris Agreement. Current South Korean climate pledges are consistent with the world warming by 3-4 degrees celsius.

- South Korea has ratified the Paris Agreement, and pledged to reduce domestic emissions by 37% below Business As Usual (BAU) by 2030.

Impacts

With 1.5 degrees celsius of global warming:

- Coastal areas in China - home to [12 million people](#) - are at risk of permanent inundation as a result of sea level rise.
- The average annual runoff from the catchment of Yiluo River, a tributary of the Yellow River will decrease by about [a fifth](#), impacting the 7.7 million people that rely on the water source.
- [46 million people](#)¹² currently live in areas that are at risk of permanent inundation from sea level rise if temperatures rise by 1.5°C, equivalent to about [70% of the number](#)¹³ of people currently displaced from their homes globally by war, instability or human rights violations. About half of this at-risk [population](#) is in China, Vietnam or Japan.
- Glaciers in the high mountains of Asia play an [important role](#) in supplying water to millions of people living downstream. [800 million people](#) are at least partly dependent on meltwater from glaciers. Around a [third](#) of the ice stored in these glaciers will be lost by the end of the century under two degrees celsius temperature rise.

With more than 1.5 degrees celsius of global warming:

- Under four degrees celsius of warming, [maize](#) and wheat production in China is expected to decrease by 8% and 3% respectively for every degree rise in global temperature.
- More than [20 million people](#) in Shanghai currently live in areas that are likely to be flooded as a result of sea level rise under a four degrees celsius temperature rise.
- By the end of the century, 29% of the global population face ‘[beyond tolerable](#)’ risk in at least two out of the three main sectors - water, energy and food, and environment. More than nine out of ten people that are exposed and vulnerable are in Africa and Asia, with about half in [south Asia alone](#).

¹² These are median estimates. The ranges are 31.87–68.83 for 1.5°C and 31.99–78.38 for 2C. The estimates are based on the 2010 population.

¹³ By the end of 2016, 65.6 million people had been displaced from their homes as a result of persecution, conflict, violence, or human rights violations. <http://www.unhcr.org/5943e8a34.pdf>

Projected impacts across South-East Asia

Indonesia

Indonesia's NDC is [rated](#) by Climate Action Tracker as “highly insufficient” - well below what is needed to reach the 1.5 degree celsius temperature target contained in the Paris Agreement. Current Indonesian climate pledges are consistent with the world warming by 3-4 degrees celsius.

- Indonesia has ratified the Paris Agreement, and it includes a unilateral reduction target of 29% below BAU emissions by 2030, plus a conditional target of up to 41% reductions below BAU with sufficient international support.

Impacts

With 1.5 degrees celsius of global warming:

- Even with 1.5 degrees of warming, the intensity of heavy rainfall in urban areas in South-East Asia could increase [7%](#) by 2100.
- By the end of the century, [nine out of ten](#) of coral reefs are at risk from severe degradation from 2050 onwards. If warming is limited to 1.5 degrees, this declines to 70% by 2100 - meaning that some coral reefs have a chance of survival. At the moment, coral reefs [provide](#) about US\$30 billion annually to the world economy, in coastal protection, building materials, fisheries and tourism. The coral reefs in South East Asia are the most threatened in the world with almost half in the high and very high threat categories, according to the [World Resource Institute](#).

With more than 1.5 degrees celsius of global warming:

- By 2040, per capita crop production in South-East Asia could [fall by one third](#) under two degrees celsius of warming.
- Under two degrees celsius of warming, the intensity of heavy rainfall in urban areas of South-East Asia could reach [10%](#) over the 21st century.
- If temperatures rise to two degrees celsius, [virtually all](#) the world's tropical coral reefs are at risk of severe degradation and [collapse](#). Coral reefs account for [10 to 12%](#) of the fish caught in tropical countries, and 20 to 25% of the fish caught by developing nations.¹⁴ They provide food, income and protection from storms for millions of people along [coastal areas](#).
- Up to 30% of humid tropical forests in central Sumatra, Sulawesi, India, and the Philippines could be threatened by climate induced loss under four degrees celsius of warming.¹⁵

¹⁴ IPCC, AR5, WGII, CC Boxes, p.99.

¹⁵ Turn down the heat: why a 4°C warmer world must Be avoided (2012), The World Bank, p.51.

The 1.5 degree climate target and the difference it can make to Australia

Human activities have [already caused](#) about 1.0°C of global warming¹ but if emissions continue temperatures will continue to climb. The risks to natural and human systems are higher for global warming of 1.5°C than at present, but lower than at 2°C. This briefing highlights examples of how different a 1.5 and 2 degree world would be, drawing from recent² scientific publications and the [special report on global warming of 1.5](#) published by the Intergovernmental Panel on Climate Change (IPCC) in 2018 - the UN body for assessing climate change. Impacts to Australia and the Pacific are summarised, along with the current climate pledges, based on the analysis tool [Climate Action Tracker](#).

Australia

Australia's NDC is [rated](#) by Climate Action Tracker as "insufficient" to reach the 1.5 degrees celsius target contained in the Paris Agreement. Current Australian climate pledges are consistent with the world warming by up to 3 degrees celsius.

- Australia has ratified the Paris Agreement, and pledged to reduce emissions 26–28% below 2005 levels by 2030, including emissions from land use (LULUCF).
- Australia's current policies would mean it misses this target, with emissions increasing by 0.4% a year.

Projected impacts across Australia and the Pacific

With 1.5 degrees celsius of warming:

- The amount of freshwater available in rivers and lakes could decrease by [10% in Australia](#).³
- The number of [El Niño events in the Pacific](#) is expected to double, potentially [boosting temperatures](#) during the years when the event occurs.
- Rising temperatures, drought, and unstable weather patterns have serious implications for global food production. Every degree of global temperature rise [reduces](#) global yields of wheat by 6.0%, rice by 3.2%, maize by 7.4%, and soybean by 3.1%.
- By the end of the century, [nine out of ten](#) of coral reefs are at risk from severe degradation from 2050 onwards. This declines to 70% by 2100 - meaning that some coral reefs have a chance of survival. At the moment, coral reefs [provide](#) about US\$30 billion annually to the world economy, in coastal protection, building materials, fisheries and tourism.

With more than 1.5 degrees celsius of warming:

- Under two degrees celsius of temperature rise, annual runoff is expected to decrease by about 30% in the Murray Darling river basin.⁴
- If temperatures rise to two degrees celsius, [virtually all](#) the world's tropical coral reefs are at risk of severe degradation and [collapse](#). Coral reefs account for [10 to 12%](#) of the fish caught in tropical countries, and 20 to 25% of the fish caught by developing nations.⁵ They provide food, income and protection from storms for millions of people along [coastal areas](#).

¹ Above pre-industrial levels - defined by the IPCC as: "The multi-century period prior to the onset of large-scale industrial activity around 1750. The reference period 1850–1900 is used to approximate pre-industrial Global Mean Surface Temperature."

² This report was originally written in December 2018, publications since have not been included. The NDC targets have been updated as of September 2019.

³ Differential climate impacts for policy-relevant limits to global warming: the case of 1.5C and 2C, (2015), Earth System Dynamics, Table S4.

⁴ World Bank report: Turn down the heat: why a 4°C warmer world must be avoided, p.xvi.

⁵ IPCC, AR5, WGII, CC Boxes, p.99.

- With three degrees celsius of warming, groundwater levels will fall, with [the rate at which groundwater is replenished](#) predicted to fall to perhaps half of 1990 levels by 2050 in some parts of Australia.⁶

⁶ IPCC, AR5, WGII, Chapter 3, Table 3-2.

The 1.5 degree climate target and the difference it can make to Europe

Human activities have [already caused](#) about 1.0°C of global warming¹ but if emissions continue temperatures will continue to climb. The risks to natural and human systems are higher for global warming of 1.5°C than at present, but lower than at 2°C. This briefing highlights examples of how different a 1.5 and 2 degree world would be, drawing from recent² scientific publications and the [special report on global warming of 1.5](#) published by the Intergovernmental Panel on Climate Change (IPCC) in 2018 - the UN body for assessing climate change. Impacts to Europe are summarised, along with the current climate pledges, based on the analysis tool [Climate Action Tracker](#).

European Union

The European Union submitted a joint Nationally Determined Contribution, which Climate Action Tracker [rates](#) as "insufficient" to reach the 1.5 degree celsius target contained in the Paris Agreement. Current EU climate pledges are consistent with the world warming by up to 3 degrees celsius.

- The EU has ratified the Paris Agreement, and pledged to reduce domestic emissions at least 40% by 2030 on 1990 levels, with no use of carbon trading credits.
- The EU has a long-term goal to reduce emissions 80-95% by 2050, on 1990 levels.
- [Three EU](#) countries, the UK, Sweden and France, have put more ambitious net-zero targets in law as of September 2019. The UK and France aim for net-zero by 2050, while Sweden's target is net-zero by 2045.

Projected impacts across Europe

With 1.5 degrees celsius of global warming:

- The amount of freshwater available in rivers and lakes could decrease by 9% across the [Mediterranean](#) region.³
- [86%](#) of Europe's population could be affected by flood, compared to [93%](#) under two degrees celsius of temperature rise.
- Rising temperatures, drought, and unstable weather patterns have serious implications for global food production. Every degree of global temperature rise [reduces](#) global yields of wheat by 6.0%, rice by 3.2%, maize by 7.4%, and soybean by 3.1%.

With more than 1.5 degrees celsius of global warming:

- Globally, agricultural yields [fall rapidly](#) between one and three degrees celsius of warming. Once local temperatures reach three degrees celsius above pre-industrial levels, all crops are negatively affected, wherever they are in the world - including in temperate regions.⁴ Fish species go locally extinct, with serious impacts on fisheries.⁵
- Under two degrees celsius of temperature rise, the number of temperature-related deaths could increase by [15-22% every summer](#) in European cities compared to conditions under 1.5 degrees celsius of warming.

¹ Above pre-industrial levels - defined by the IPCC as: "The multi-century period prior to the onset of large-scale industrial activity around 1750. The reference period 1850–1900 is used to approximate pre-industrial Global Mean Surface Temperature."

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³ Differential climate impacts for policy-relevant limits to global warming: the case of 1.5C and 2C (2015), Earth System Dynamics, Table S4.

⁴ IPCC, AR5, WGII, Chapter 7, p.497.

⁵ IPCC, AR5, WGII, Chapter 7, p.508.

- Southern Europe is [particularly vulnerable](#) to climate change, and likely to be more affected than other parts of Europe. A two degrees celsius temperature rise could lead to summer rain [decreasing](#) by 20%. Water availability in the region could [decrease](#) by 9% if temperatures rise by 1.5 degrees celsius, and 17% if they rise by two degrees celsius. As temperatures rise, droughts are likely to become [increasingly frequent](#) and severe. Multiple [sectors](#)⁶ - tourism, agriculture, infrastructure, energy and health - could be affected. If temperatures rise by more than four degrees celsius, much of [southern Spain](#)⁷ could become a desert by the end of the century.
- Almost [half](#) of the plants and animals and more than half of the habitats protected by the EU Habitats Directive occur in the Mediterranean region. If temperatures rise by 1.5 degrees celsius, Mediterranean ecosystems may survive, but if temperatures rise by two degrees celsius or more, they will [change](#) more dramatically than at any point in human history.
- 27% of native species in England would be at medium or high risk of decline by the 2080s under two degrees celsius of temperature rise.⁸
- Changes in snowfall are expected to reduce [ski tourism](#) overnight stay numbers by 10 million people in Austria, France, Italy, and Switzerland under two degrees celsius of warming.
- Under two degrees celsius of warming, the number of people in England at risk of flooding could hit [1.7 million by the middle of next century](#). Under four degrees celsius of warming, this could rise to 2.2 million, assuming no population growth.⁹ While under a two to four degrees celsius temperature rise, countries will experience an average increased risk flooding of:
 - 48% in [Northern Ireland](#)¹⁰ with expected damages costing an average £10 million annually,
 - 35% in [Wales](#)¹¹ with damages costing an average £37 million annually,
 - 15% in [Scotland](#)¹² with damages costing an average £48 million annually
 - 30% in [England](#)¹³ with damages costing an average £275 million annually.
- In Scotland, damages from coastal flooding are expected to increase by about 450% four degrees celsius of temperature rise¹⁴ and under two degrees of warming agriculture land at risk of flooding annually is expected to increase by 21% by the 2080s.¹⁵
- Under two degrees celsius of temperature rise, 142,000 people in Wales would be living in areas at a 1-in-75 or greater chance of flooding in any given year. This could increase to 209,000 people under four degrees celsius of warming.
- Under a scenario where temperatures rise three degrees celsius by the end of the century, heatwaves could increase by a factor of five by the middle of the century. Droughts are likely to become [increasingly frequent](#) and severe in the Mediterranean area, western Europe, and Northern Scandinavia.
- Under 3.5 degrees celsius temperature rise, agricultural yields are projected to drop by 10% by the 2080s, with southern Europe experiencing a 20% decline.¹⁶
- Under four degrees celsius of warming, monthly summer temperatures in the Mediterranean are expected to rise by more than six degrees celsius.¹⁷
- Under four degrees celsius of warming, the whole European continent, with the exception of Iceland, will be [affected](#) by more frequent and severe droughts.

⁶ IPCC, AR5, WGII, Chapter 23, p.1270.

⁷ RCP8.5 emissions scenario.

⁸ UK Climate Change Risk Assessment 2017: Evidence Report (England), p.11.

⁹ UK Climate Change Risk Assessment 2017: Evidence Report (England), p.67.

¹⁰ UK Climate Change Risk Assessment 2017: Evidence Report (Northern Ireland), p.64.

¹¹ UK Climate Change Risk Assessment 2017: Evidence Report (Wales), p.67.

¹² UK Climate Change Risk Assessment 2017: Evidence Report (Scotland), p.78.

¹³ UK Climate Change Risk Assessment 2017: Evidence Report (England), p.86.

¹⁴ UK Climate Change Risk Assessment 2017: Evidence Report (Scotland) p.80.

¹⁵ UK Climate Change Risk Assessment 2017: Evidence Report (Scotland), p.22.

¹⁶ UK Climate Change Risk Assessment 2017: Evidence Report (Northern Ireland), p.75.

¹⁷ World Bank report: Turn down the heat: why a 4°C warmer world must be avoided, p.38.

The 1.5 degree climate target and the difference it can make to Latin America

Human activities have [already caused](#) about 1.0°C of global warming¹ but if emissions continue temperatures will continue to climb. The risks to natural and human systems are higher for global warming of 1.5°C than at present, but lower than at 2°C. This briefing highlights examples of how different a 1.5 and 2 degree world would be, drawing from recent² scientific publications and the [special report on global warming of 1.5](#) published by the Intergovernmental Panel on Climate Change (IPCC) in 2018 - the UN body for assessing climate change. Impacts to Latin America are summarised, along with the current climate pledges of Argentina and Brazil, based on the analysis tool [Climate Action Tracker](#).

Argentina

Argentina's NDC is [rated](#) by Climate Action Tracker as "highly insufficient" - well below what is needed to reach the 1.5 degree celsius target contained in the Paris Agreement. Current Argentinian climate pledges are consistent with the world warming by 3-4 degrees celsius.

- Argentina has ratified the Paris Agreement, and pledged to limit its emissions unit 483 MtCO₂e/a by 2030, including land use, land use change and forestry (LULUCF) emissions (422 MtCO₂e excl. LULUCF). This is equivalent to domestic emissions increase of 35% above 2010 levels. The country has also put forward a conditional 2030 target which requires international support, that is equivalent to an emissions increase of 3% above 2010 levels.

Brazil

Brazil's NDC is [rated](#) by Climate Action Tracker as "insufficient" to reach the 1.5 degrees celsius temperature target contained in the Paris Agreement. Current Brazilian climate pledges are consistent with the world warming by up to 3 degrees celsius.

- Brazil has ratified the Paris Agreement, and pledged to reach 76% above 1990 by 2025 and 5% above 2010 levels by 2025, excluding land use.
- Brazil has a long term goal to shift towards energy systems based on renewable sources and decarbonisation of the global economy by the end of the century. However, President Bolsonaro (elected 1st January 2019) and his cabinet have publicly expressed their opposition to many of Brazil's existing climate policies.

Projected impacts across Latin America

With 1.5 degrees celsius of global warming:

- The amount of freshwater available in rivers and lakes in North-east Brazil could [drop by 7%](#).
- Rising temperatures, drought, and unstable weather patterns have serious implications for global food production. Every degree of global temperature rise [reduces](#) global yields of wheat by 6.0%, rice by 3.2%, maize by 7.4%, and soybean by 3.1%.
- Under a [low emissions scenario](#) (RCP2.6) where temperatures rise 1.3-1.9 degrees celsius by the end of the century, Latin America could see about 5.8 million internal climate migrants³ and Mexico and Central America could see 1.4 million climate migrants by 2050.⁴

¹ Above pre-industrial levels - defined by the IPCC as: "The multi-century period prior to the onset of large-scale industrial activity around 1750. The reference period 1850–1900 is used to approximate pre-industrial Global Mean Surface Temperature."

² This report was originally written in December 2018, publications since have not been included. The NDC targets have been updated as of September 2019.

³ Groundswell: Preparing for Internal Climate Migration, (2018), World Bank Group, p.111.

⁴ Groundswell: Preparing for Internal Climate Migration, (2018), World Bank Group, p.163.

- Rising temperatures, drought, and unstable weather patterns have serious implications for global food production. Every degree of global temperature rise [reduces](#) global yields of wheat by 6.0%, rice by 3.2%, maize by 7.4%, and soybean by 3.1%.
- By the end of the century, [nine out of ten](#) of coral reefs are at risk from severe degradation from 2050 onwards. This declines to 70% by 2100 - meaning that some coral reefs have a chance of survival. At the moment, coral reefs [provide](#) about US\$30 billion annually to the world economy, in coastal protection, building materials, fisheries and tourism.

With more than 1.5 degrees celsius of global warming:

- Agriculture in tropical parts of Central America is likely to be particularly [hard hit](#). Wheat yields [could fall by 25%](#) in some places if temperatures rise by 1.5 degrees celsius. Limiting temperature rise to 1.5 degrees celsius instead of two degrees celsius will mean [less serious implications](#) for food security in many poorer countries.
- Globally, agricultural yields [fall rapidly](#) between one and three degrees celsius of warming. Once local temperatures reach three degrees celsius above pre-industrial levels, all crops are negatively affected, wherever they are in the world - including in temperate regions.⁵ Fish species go locally extinct, with serious impacts on fisheries.⁶
- If temperatures rise to two degrees celsius, [virtually all](#) the world's tropical coral reefs are at risk of severe degradation and [collapse](#). Coral reefs account for [10 to 12%](#) of the fish caught in tropical countries, and 20 to 25% of the fish caught by developing nations.⁷ They provide food, income and protection from storms for millions of people along [coastal areas](#).
- As temperatures rise protected areas start to disappear. In two degrees celsius temperature rise, [25% of the 80,000 plant and animal species](#) in the world's most naturally rich areas, such as the Amazon and the Galapagos, could face [local extinction](#) by the end of the century. Warming temperatures may affect the behaviour of insects and animals, causing a [cascade](#) effect that affects entire ecosystems.
- In Nicaragua, the percentage of days with high heat stress could [increase 5%](#) by the middle of the century under three degrees celsius of warming.
- With 3.5 degrees celsius of temperature rise, the rate of malaria in the region is expected to increase by 50%, compared to pre-industrial levels.⁸
- A three degrees celsius temperature rise increases the [possibility](#) that fragile natural systems like the Arctic or Amazon experience "abrupt and irreversible changes" by melting entirely, or drying out, for example. The risks of these 'tipping points' are moderate from 0 to one degree celsius temperature rise, but "increase disproportionately" as temperature increases from one to two degrees celsius, becoming ["high" above three degrees celsius](#)⁹, according to the IPCC. The [inclusion](#) of these risks in to an economic model raises the social cost of carbon from \$15/tCO2 to \$116/tCO2.
- There are a number of potential '[tipping points](#)' at which abrupt change may occur. The Arctic could become ice-free even in winter, the Amazon rainforest could die off, or the Tibetan Plateau could see the total disappearance of snow and ice cover. It is extremely difficult to know if and when such sudden events will occur - so scientists can only assess changing levels of risk. But in a recent study, half of the potential tipping points identified could be [triggered](#) by a global temperature rise of [two degrees celsius or less](#).
- Under a [high emissions scenario](#) (RCP8.5) where temperatures rise 4.0-6.1 degrees celsius by the end of the century, and moderate development, South America could see about 9.1 million climate migrants by the middle of the century. This is about 1.9% of the population.¹⁰

⁵ IPCC, AR5, WGII, Chapter 7, p.497.

⁶ IPCC, AR5, WGII, Chapter 7, p.508.

⁷ IPCC, AR5, WGII, CC Boxes, p.99.

⁸ Turn down the heat: why a 4°C warmer world must Be avoided (2012), The World Bank, p.56.

⁹ IPCC, AR5, WGII, SPM, p.12.

¹⁰ Groundswell: Preparing for Internal Climate Migration, (2018), World Bank Group, p.109.

- Under three degrees celsius of warming, [tropical rainforests could decline by more than 50%](#). A large proportion of these would be replaced by savanna and grassland.
- Under a [high emissions scenario](#) (RCP8.5) where temperatures rise 4.0-6.1 degrees celsius by the end of the century, and moderate development, Latin America could see about 10.5 million climate migrants by 2050, including 1.2 million internal climate migrants in Mexico.¹¹

Benefits of limiting temperatures to 1.5 degrees celsius of global warming:

- About [3.3 million](#) cases of dengue fever annually in Latin America and the Caribbean could be avoided compared with a no-policy scenario with warming of 3.7 degrees celsius. (An additional [0.5 million per year](#), compared with two degrees celsius.)

¹¹ Groundswell: Preparing for Internal Climate Migration, (2018), World Bank Group, p.111 and p. 163.

The 1.5 degree climate target and the difference it can make to Small Islands States

Human activities have [already caused](#) about 1.0°C of global warming¹ but if emissions continue temperatures will continue to climb. The risks to natural and human systems are higher for global warming of 1.5°C than at present, but lower than at 2°C. This briefing highlights examples of how different a 1.5 and 2 degree world would be, drawing from recent² scientific publications and the [special report on global warming of 1.5](#) published by the Intergovernmental Panel on Climate Change (IPCC) in 2018 - the UN body for assessing climate change. Impacts to the Small Island States (SIDS) are summarised below.

Projected impacts across SIDS

- Small islands are [extremely vulnerable](#) to the impacts of climate change. People living on small islands are very exposed to the weather, often live on the coast, are dependent on fisheries based on corals, and only have limited resources and options for employment available. Extreme weather events demonstrate just how [vulnerable](#) some island states are. For example, in 2017 damage from a hurricane in Dominica equaled [226%](#) of annual GDP. More than [4,600 people](#) died on the island of Puerto Rico as a result of a hurricane in November 2017, which has also triggered a [healthcare](#) and humanitarian crisis.
- As sea levels rise, large waves are also likely to [inundate](#) the low lying islands more and more often, contaminating groundwater supplies of drinking water with salt. In a high emissions scenario where temperatures rise by more than four degrees celsius by the end of the century, this could make these islands uninhabitable by around 2030-40, according to one [study](#). In a scenario where temperature rise is limited to three degrees celsius, they could be uninhabitable by 2055-65. Previous studies are more optimistic, suggesting they could be uninhabitable by the end of the [century](#).

With 1.5 degrees celsius of global warming:

- By the end of the century, [nine out of ten](#) of coral reefs are at risk from severe degradation from 2050 onwards. This declines to 70% by 2100 - meaning that some coral reefs have a chance of survival. At the moment, coral reefs [provide](#) about US\$30 billion annually to the world economy, in coastal protection, building materials, fisheries and tourism.
- Coral reefs in Small Island Developing States (SIDS) could [decline by about 80%](#).
- [Half the annual year](#) is projected to be very warm in the Caribbean.
- Rising temperatures, drought, and unstable weather patterns have serious implications for global food production. Every degree of global temperature rise [reduces](#) global yields of wheat by 6.0%, rice by 3.2%, maize by 7.4%, and soybean by 3.1%.

With more than 1.5 degrees celsius of global warming:

- Globally, agricultural yields [fall rapidly](#) between one and three degrees celsius of warming. Once local temperatures reach three degrees celsius above pre-industrial levels, all crops are negatively affected, wherever they are in the world - including in temperate regions.³ Fish species go locally extinct, with serious impacts on fisheries.⁴

¹ Above pre-industrial levels - defined by the IPCC as: "The multi-century period prior to the onset of large-scale industrial activity around 1750. The reference period 1850–1900 is used to approximate pre-industrial Global Mean Surface Temperature."

² This report was originally written in December 2018, publications since have not been included. The NDC targets have been updated as of September 2019.

³ IPCC, AR5, WGII, Chapter 7, p.497.

⁴ IPCC, AR5, WGII, Chapter 7, p.508.

- By 2150, about [40,000 more people](#) could experience flooding from sea level rise under two degrees celsius of warming compared to warming at 1.5 degrees celsius.
- If temperatures rise to two degrees celsius, [virtually all](#) the world's tropical coral reefs are at risk of severe degradation and [collapse](#). Coral reefs account for [10 to 12%](#) of the fish caught in tropical countries, and 20 to 25% of the fish caught by developing nations.⁵ They provide food, income and protection from storms for millions of people along [coastal areas](#).
- Under four degrees celsius of warming, one metre sea level rise could cost the Caribbean over US\$68 billion from its cumulative GDP.⁶

Benefits of limiting temperatures to 1.5 degrees celsius:

- The difference between a 1.5 to two degrees celsius temperature rise are important for small island states. For several SIDS, particularly across the Caribbean, about [25%](#) of the overall freshwater stress projected under a two degrees celsius temperature rise can be avoided if temperatures only rise by 1.5 degrees celsius.

⁵ IPCC, AR5, WGII, CC Boxes, p.99.

⁶ Turn down the heat: why a 4°C warmer world must Be avoided (2012), The World Bank, p.34.