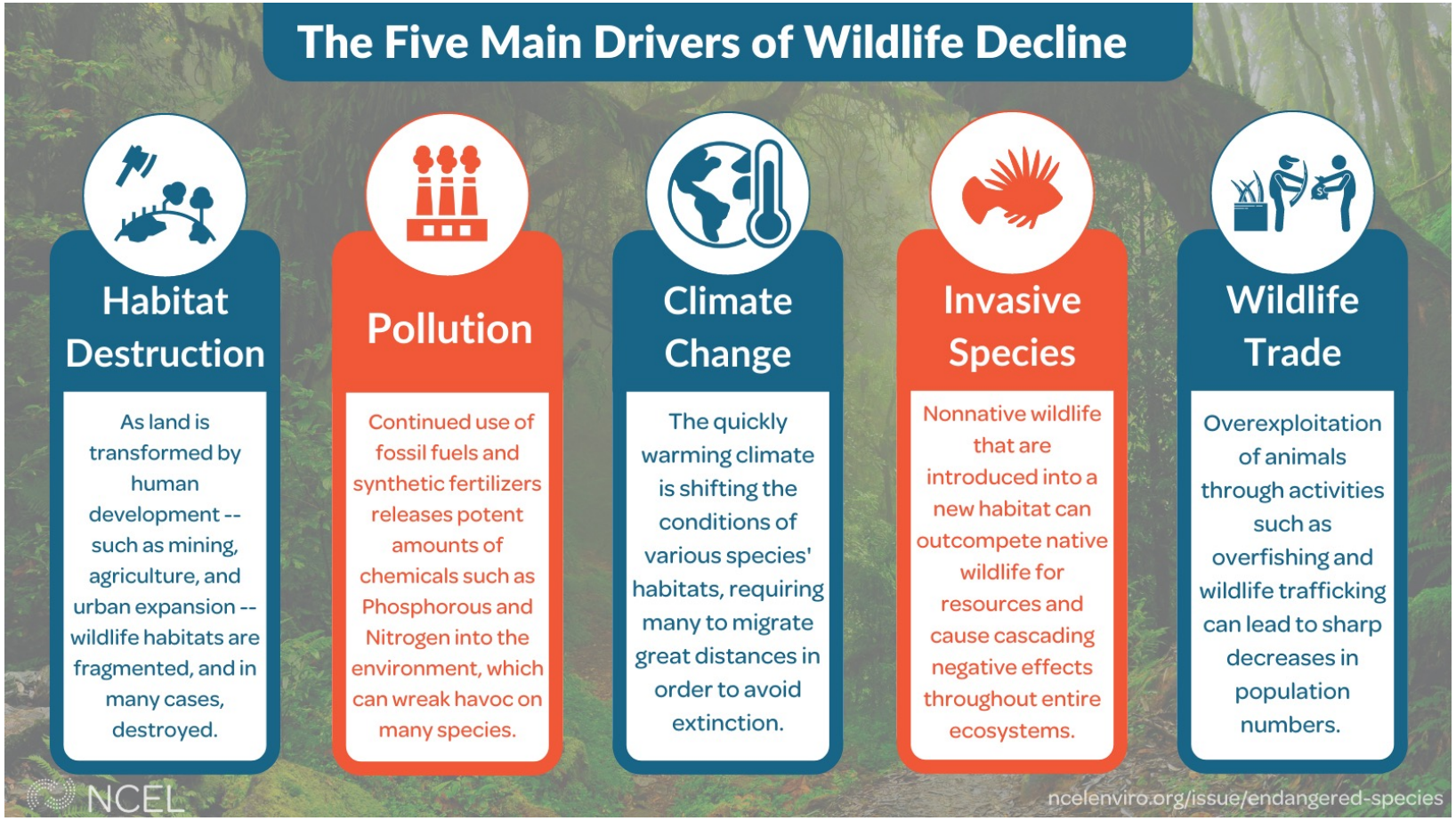
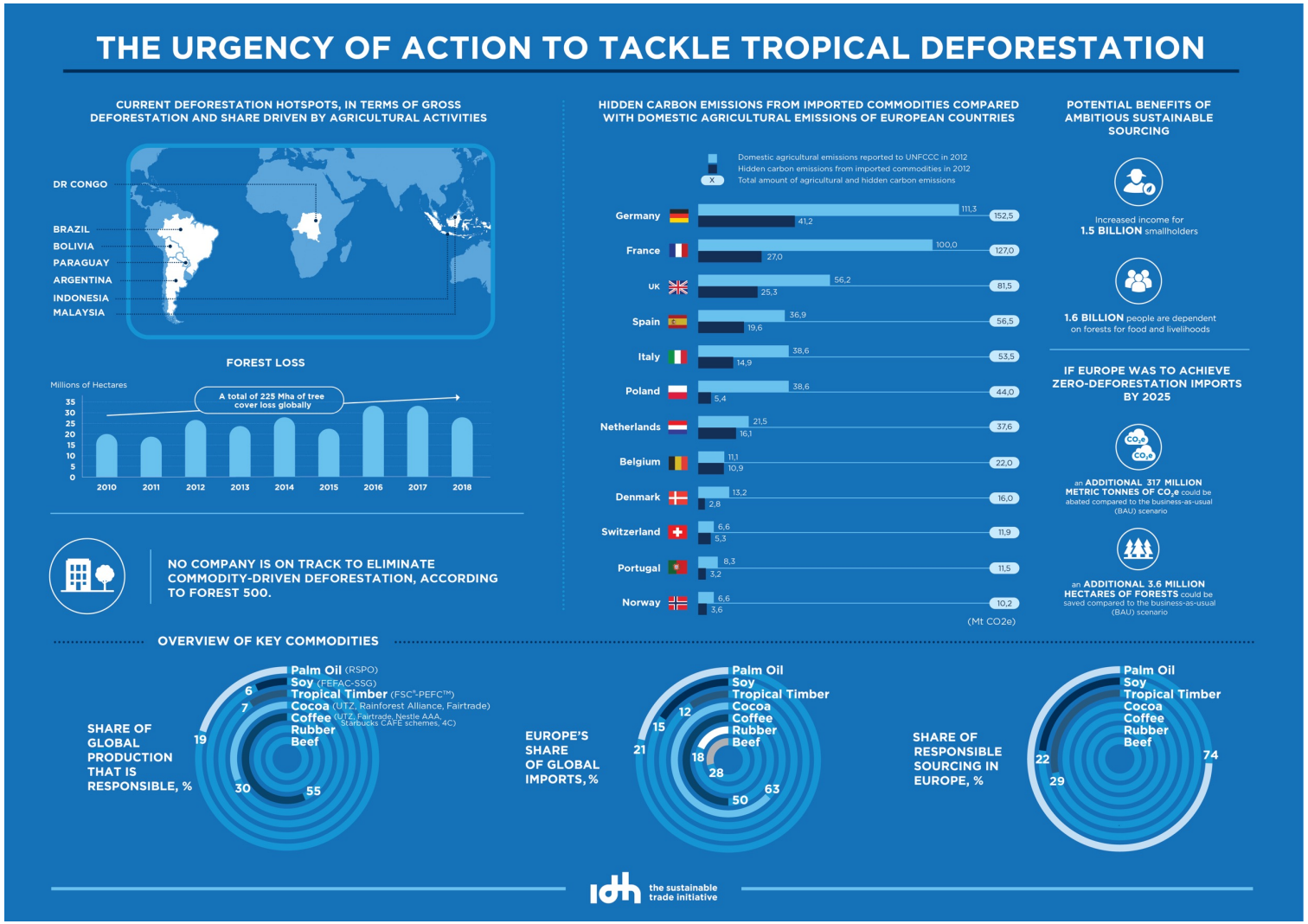
State of the Global Environment

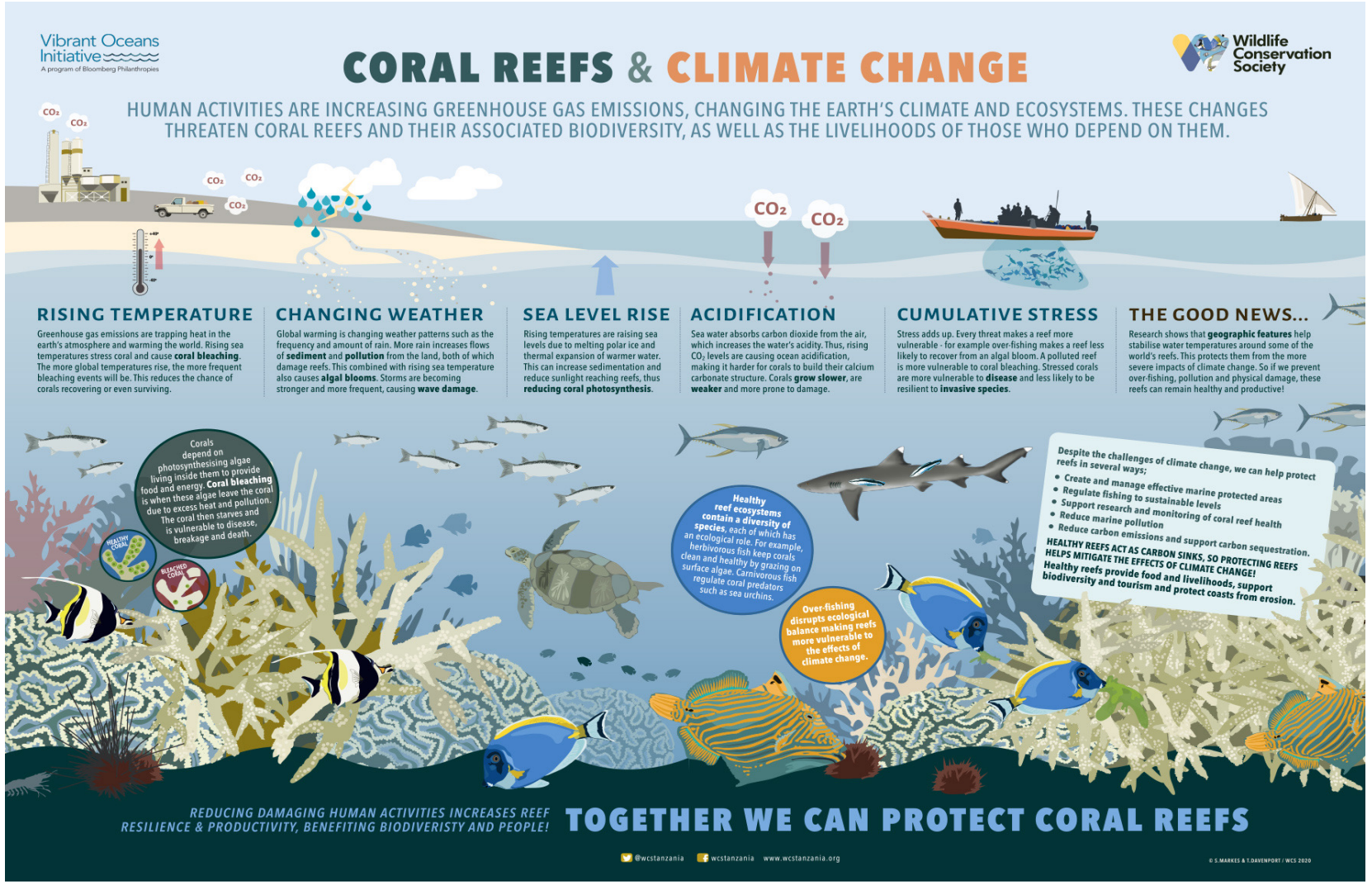
Biodiversity Decline



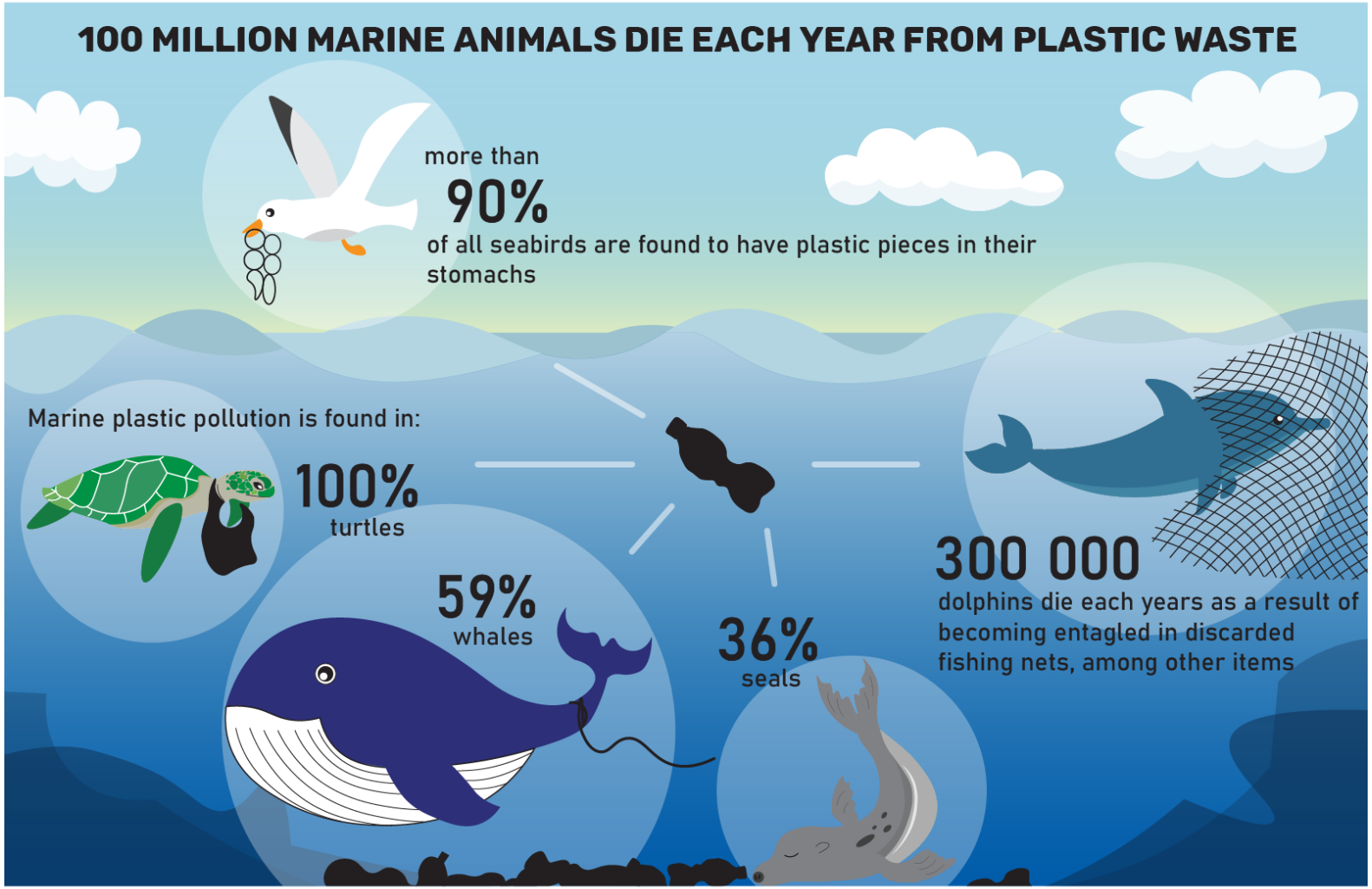
Tropical Deforestation



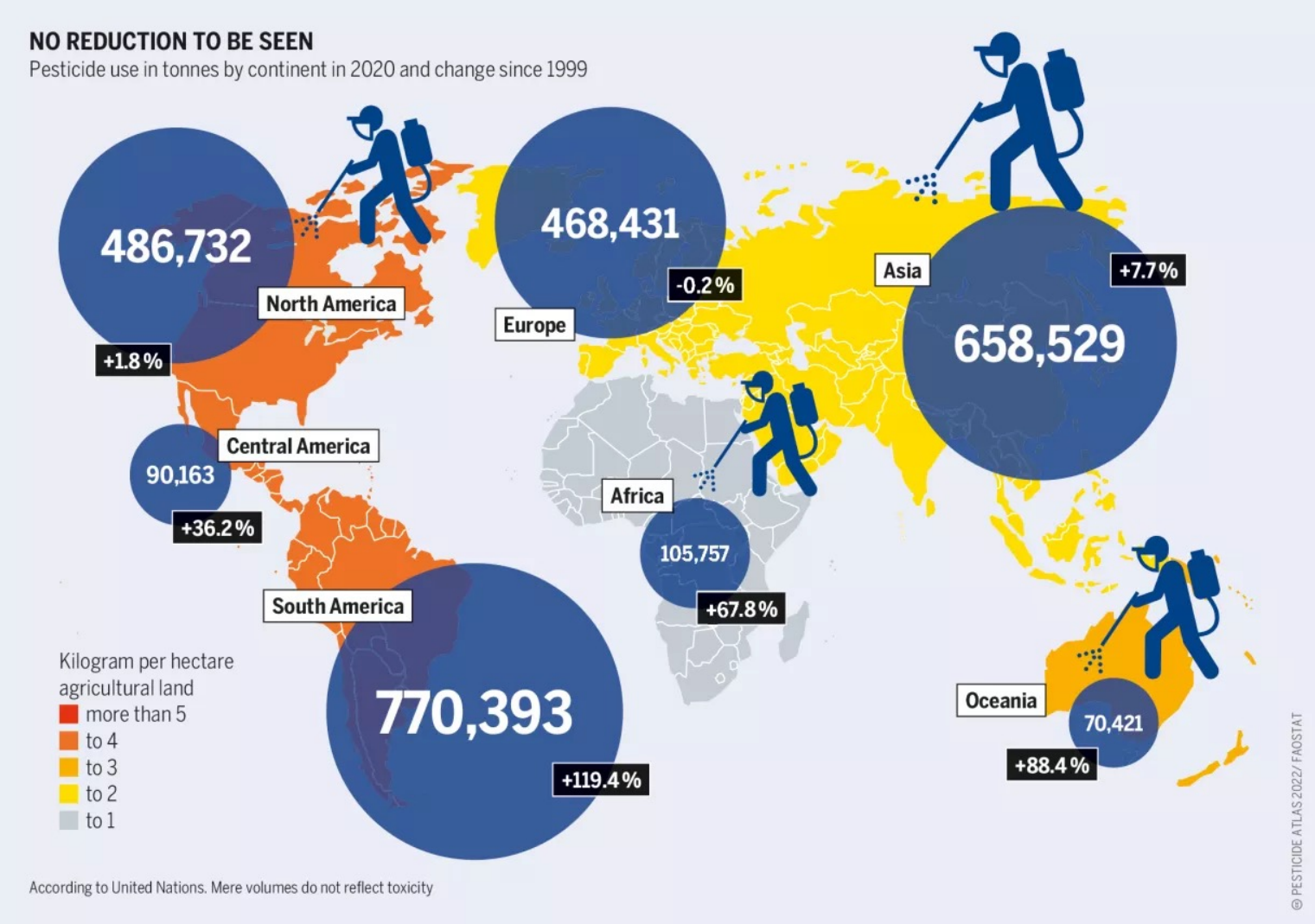
Coral Reef Decline



Plastic Pollution



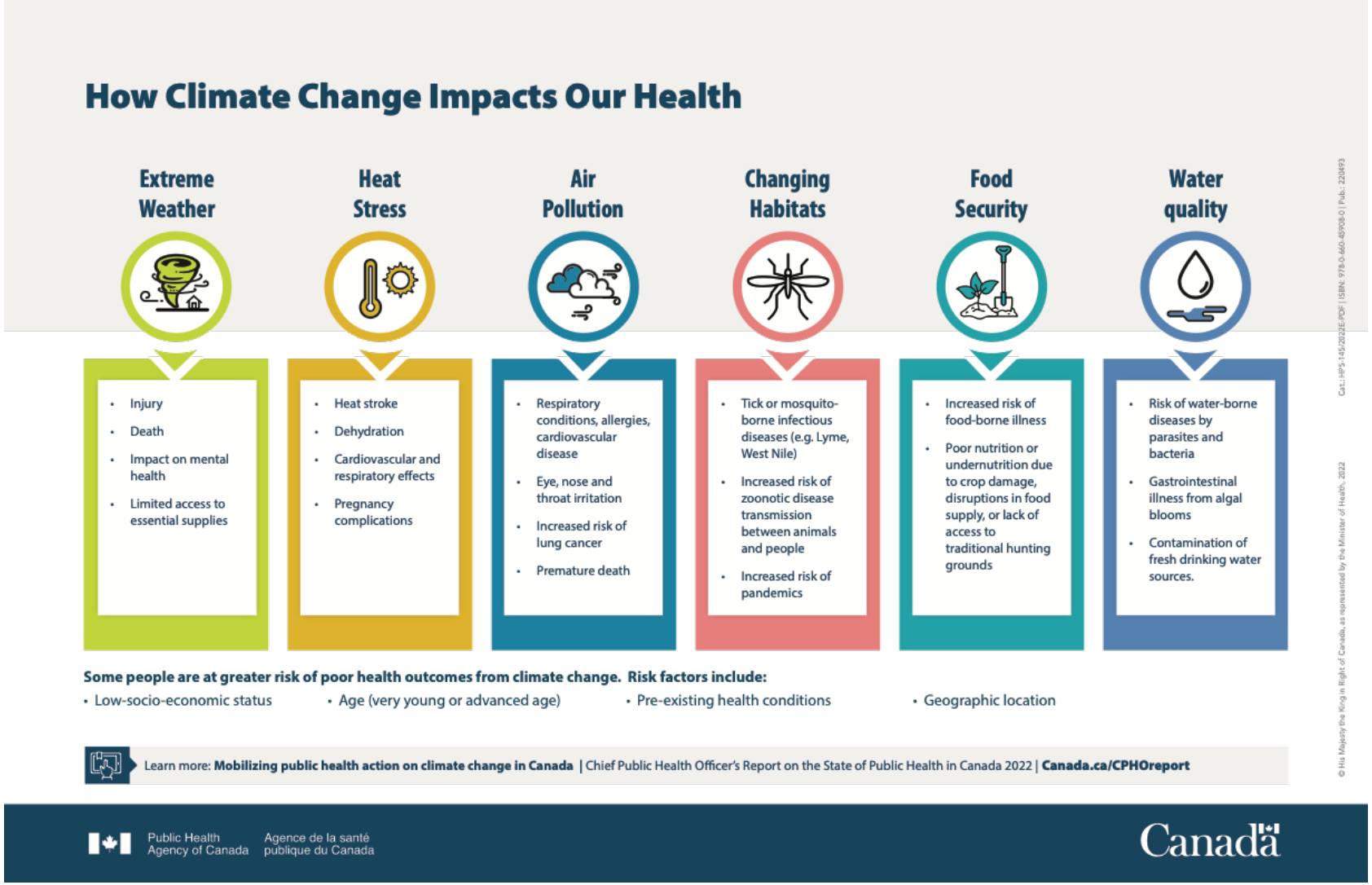
Biocide Pollution



Air Pollution

Climate Change Risks

Climate and Health Impacts



Tipping Points and Climate Change

WHY IS GLOBAL WARMING ABOVE 1.5°C A PROBLEM? [3/3]

Fakta o klimatu

TIPPING POINTS – ATMOSPHERIC & OCEANIC CURRENTS

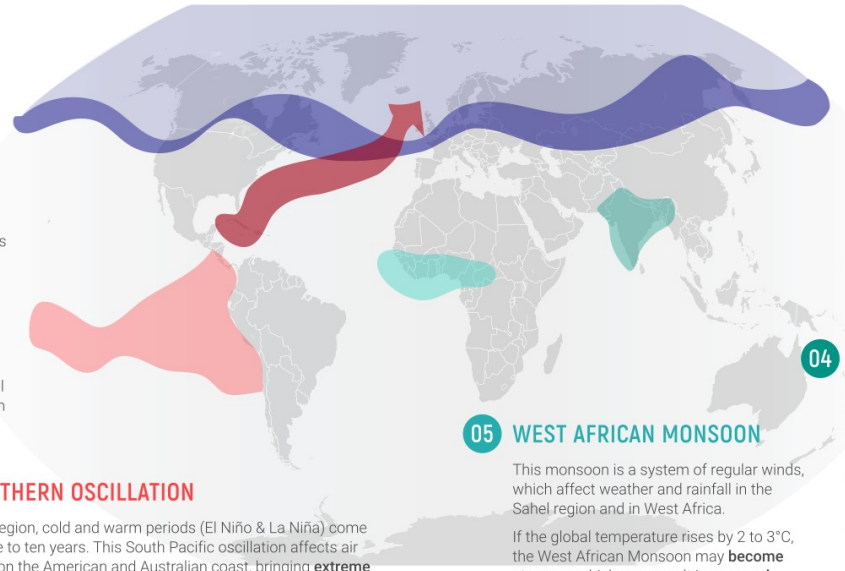
What are tipping points? The Paris Agreement´s long-term goal is "to keep the rise in mean global temperature well below 2°C and preferably limit the increase to 1.5°C". Exceeding "tipping points" is one of the main reasons why this commitment was made. Just like a tree branch can only withstand a certain amount of pressure before it breaks, some planetary systems exposed to climate change impacts may reach their tipping point and change into something different as a result.

Tipping points in atmospheric and oceanic currents. Global warming may disrupt the balance in the system of oceanic and atmospheric currents and lead to significant (and irregular) weather changes on most continents. The position of the atmospheric and oceanic currents on the map is just symbolic: their precise localization is nearly impossible because the mass of water and air moves dynamically.

01 GULF STREAM

The Gulf Stream is a strong warm ocean current which affects the climate in Western Europe and the east coast of North America, making the winters there less severe. It is a part of a global system of surface and deep-water currents (thermohaline circulation), which distributes heat around the planet. Measurements show that the **Gulf Stream** has been **getting weaker** since 1950. It might stop completely in the future, e.g. if a large amount of water is released to the north Atlantic from melting glaciers in Greenland.

The speed of global warming will determine how strong the current will be. Simulations for different emission scenarios predict that it will be **11-54% weaker** by 2100.



02 EL NIÑO – SOUTHERN OSCILLATION

In the South Pacific region, cold and warm periods (El Niño & La Niña) come irregularly every three to ten years. This South Pacific oscillation affects air currents and rainfall on the American and Australian coast, bringing **extreme weather (floods as well as droughts) and having an impact on crops**.

The global warming leads to more frequent and stronger El Niño (if the global temperature rises by 1.5°C, El Niño will occur twice as often).

03 JET STREAM & POLAR VORTEX

Jet stream and polar vortex are two interrelated atmospheric currents, which keep cold arctic air over the North Pole. The jet stream is getting weaker now and meanders more as a result – and so we experience more frequent situations in which cold arctic air goes down towards the equator and very hot tropical air moves the opposite way: towards the pole. This leads to **rapid cooling** for several days or weeks in various regions in Europe, Asia or America (e.g. -30°C in Chicago in February 2019) **or rapid warming** (recent heat waves in Europe).

If the global mean temperature keeps rising, the jet stream will probably grow even weaker and we can expect **extreme temperatures more frequently**.

04 INDIAN MONSOON

The regular Indian monsoon brings up to 90% of precipitation to the region. Global warming, land use changes and the amount of aerosols released to the air may cause the monsoons to be unstable on the Indian subcontinent, sometimes weak and sometimes very strong, which will lead to **extreme floods in some years and severe droughts in other years**.

05 WEST AFRICAN MONSOON

This monsoon is a system of regular winds, which affect weather and rainfall in the Sahel region and in West Africa.

If the global temperature rises by 2 to 3°C, the West African Monsoon may **become stronger**, which may result in **renewed vegetation cover** in the Sahel and in the western Sahara. However, this would also increase the temperature stress, which is why a green Sahara would not be more livable for people.

The temperatures in this infographic refer to global warming above pre-industrial levels. The current warming is approx. 1.2°C.

Read more at **factsonclimate.org**/tipping-points-3

Data sources: IPCC Reports, Nature, Geophysical letters, Potsdam institute for Climate Impact research and others

Tipping Points and Climate Change

WHY IS GLOBAL WARMING ABOVE 1.5°C A PROBLEM? [1/3]

Fakta o klimatu

TIPPING POINTS – ECOSYSTEMS

What is a tipping point? The Paris Agreement´s long-term goal is "to keep the rise in mean global temperature well below 2°C and preferably limit the increase to 1.5°C". Exceeding "tipping points" is one of the main reasons why this commitment was made. Just like a tree branch can only withstand a certain amount of pressure before it breaks, some planetary systems exposed to climate change impacts may reach their tipping point and change into something different as a result.

Tipping points in ecosystems. While coral reefs are the only major ecosystem on Earth for which the 1.5°C warming will be fatal, 2°C is already the tipping point for a number of other ecosystems.

01 CORAL REEFS

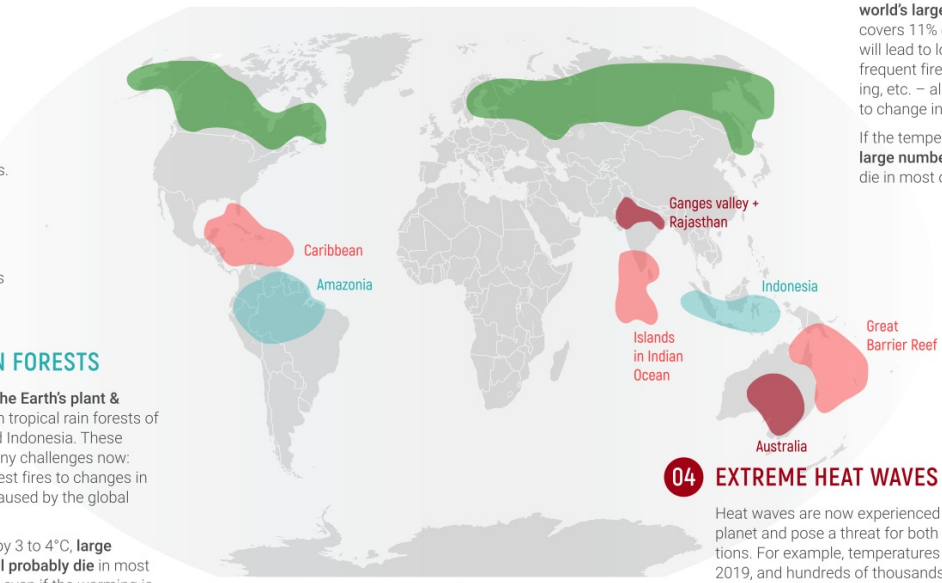
These reefs are characterized by extremely high biodiversity – 25% of all marine species depend on them. They can also effectively protect the coast from sea storms, being able to absorb 97% of energy from the waves. In recent years, 50% of the Great Barrier Reef has died as a result of unusually warm water in the oceans.

If the temperature rises above 1.5°C, almost none of the current coral reefs will survive.

02 TROPICAL RAIN FORESTS

About **two thirds of the Earth's plant & animal species** live in tropical rain forests of Amazonia, Africa and Indonesia. These ecosystems face many challenges now: from logging and forest fires to changes in precipitation levels caused by the global warming.

If temperatures rise by 3 to 4°C, **large numbers of trees will probably die** in most rain forest areas. But even if the warming is less dramatic, the ecosystem may still collapse if approx. 40% of the rain forest area is lost to logging.



The temperatures in this infographic refer to global warming above pre-industrial levels. The current warming is approx. 1.2°C.

03 BOREAL FORESTS

Boreal forests (taiga) are **the world's largest ecosystem**, which covers 11% of all land. The warming will lead to longer droughts, more frequent fires, bark beetle spreading, etc. – all of these causing taiga to change into a steppe.

If the temperature rises by 3 to 4°C, **large numbers of trees** are likely to die in most of the taiga area.

04 EXTREME HEAT WAVES

Heat waves are now experienced in different locations around the planet and pose a threat for both communities and animal populations. For example, temperatures in Australia reached 45°C in January 2019, and hundreds of thousands of megabats died as a result – about one third of their population. Extinction of some species of plants or animals may cause **regional ecosystems to collapse**.

Global warming will lead to more frequent and intense heat waves. If the temperature rises by 2°C, some regions will experience deadly heat waves every year, and if it gets beyond 2°C, large areas of land may become unlivable.

Read more at **factsonclimate.org**/tipping-points-1

Primary data source: IPCC Report

Tipping Points and Climate Change

WHY IS GLOBAL WARMING ABOVE 1.5°C A PROBLEM? [2/3]

Fakta o klimatu

TIPPING POINTS – CRYOSPHERE

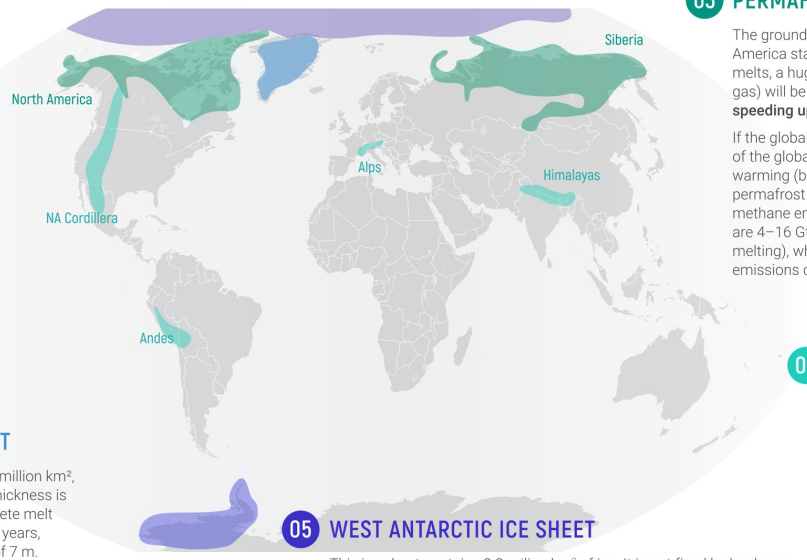
What are tipping points? The Paris Agreement´s goal is "to keep the rise in mean global temperature well below 2°C and preferably limit the increase to 1.5°C". Exceeding "tipping points" is one of the main reasons why this commitment was made. Just like a tree branch can only withstand a certain amount of pressure before it breaks, some planetary systems exposed to climate change impacts may reach their tipping point and change into something different as a result.

Tipping points in cryosphere. Cryosphere is a term for all areas on Earth where water is in solid form. Some mountain glaciers, e.g. in the Alps, have already passed their tipping point and even if the climate doesn´t get any warmer from now, they will disappear. Other major cryospheric systems may exceed their tipping point if the warming gets just a little over 1.5°C. And while it may take decades, even hundreds of years before the cryosphere melts completely, it has worldwide consequences: sea level rise, different albedo values or methane released to the atmosphere. All of these changes will further exacerbate the warming.

01 SEASONAL ARCTIC OCEAN ICE COVER

The Arctic Ocean ice cover is quickly declining – the amount of summer sea ice has dropped in recent years to roughly a third of what it used to be in the 1980s. Melting sea ice **uncovers water surface,** which absorbs more solar irradiation than ice, and thus **exacerbates the warming**.

If the temperature rises by 2°C or more, the North Pole will be ice-free in summer. If the warming doesn´t exceed 1.5°C, it is likely that some ice will remain even during the warm season.



02 GREENLAND ICE SHEET

Greenland ice sheet covers 1.7 million km², roughly 80% of Greenland. Its thickness is generally 2000 m and its complete melt would take several hundreds of years, causing a global sea level rise of 7 m.

If the temperature rises by 1.5 to 2°C, **irreversible melting** of the Greenland ice sheet will probably start, which could result in **a global sea level rise up to 2 m** within the next two hundred years.

03 PERMAFROST

The ground in vast areas of Siberia and North America stays below 0°C for a long time. If it melts, a huge amount of methane (greenhouse gas) will be released to the atmosphere, **speeding up global warming**.

If the global temperature rises by 2°C, 28–53% of the global permafrost will melt. Further warming (between 2 and 3°C) may cause the permafrost to collapse. The estimated annual methane emissions from the melted permafrost are 4–16 Gt CO_2eq (depending on the speed of melting), which is 10–30 % of the annual global emissions caused by human activities.

04 MOUNTAIN GLACIERS

A number of major rivers get their water from glaciers, which are quickly melting in most mountain areas today.

If temperatures keep rising and glaciers grow smaller, large areas of America and Asia **will not have enough water for irrigation**.

05 WEST ANTARCTIC ICE SHEET

This ice sheet contains 2.2 milion km³ of ice. It is not fixed by land very well and it may **"slide" to sea** (marine ice sheet instability). If the West Antarctic ice sheet collapsed, the global sea levels would quickly rise by up to 5 m.

If the temperature increases by 1.5 to 2°C, **irreversible melting** of the West Antarctic ice sheet will probably start.

The temperatures in this infographic refer to global warming above pre-industrial levels. The current warming is approx. 1.2°C.

Read more at **factsonclimate.org**/tipping-points-2

Primary data source: IPCC Report