Climate Centre

Region-level | Climate fact sheet

Eurasia

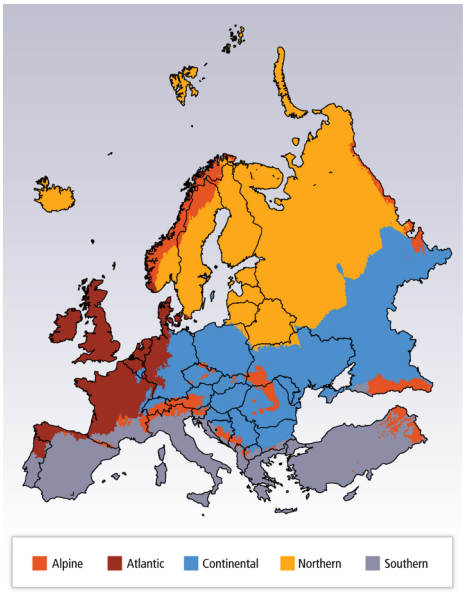
1. Region overview

The Eurasian continent is the sixth largest continent consisting of forty-nine sovereign states and is located in the Northern Hemisphere. It spans 7,455,100 square kilometres (km^2) from the Arctic Ocean in the north-west, Atlantic Ocean to the west, Mediterranean Sea to the south and Asia to the east. The easternmost countries that border the Asian continent are Turkey and Russia (National Geographic 1999). The combined population of the region is approximately 728,642,264 people (United Nations Department of Economic and Social Affairs (UNDESA) 2019), with Russia being the most populous state. Eurasia is the richest region in the world. However, not all countries in the region are equally wealthy. The western region is generally wealthier than the eastern region, which is still emerging from the collapse of the Soviet Union; for example, Luxembourg has a gross domestic product (GDP) per capita of 113,940 US dollars, whereas Moldova – the poorest country in the region – has a GDP per capita of 13,022 US dollars (World Bank 2019). As a whole, Europe's GDP per capita is 21,767 US dollars, according to a 2016 International Monetary Fund (IMF) assessment (IMF 2017).

1.1 Climate

The westernmost part of Eurasia has an oceanic climate that features cool autumn, winter and spring seasons that are frequently overcast. Moving south, the climate transitions to a Mediterranean climate which features hot summers, little rainfall and more sunshine. The central and eastern parts of Eurasia have a continental climate featuring hot summers and cool winters (Poulsen *et al.* 2020).

The latest report from the Intergovernmental Panel on Climate Change (IPCC 2018) divided the area into sub-regions: the Atlantic climate on the very west that is influenced heavily by the jet stream; the continental



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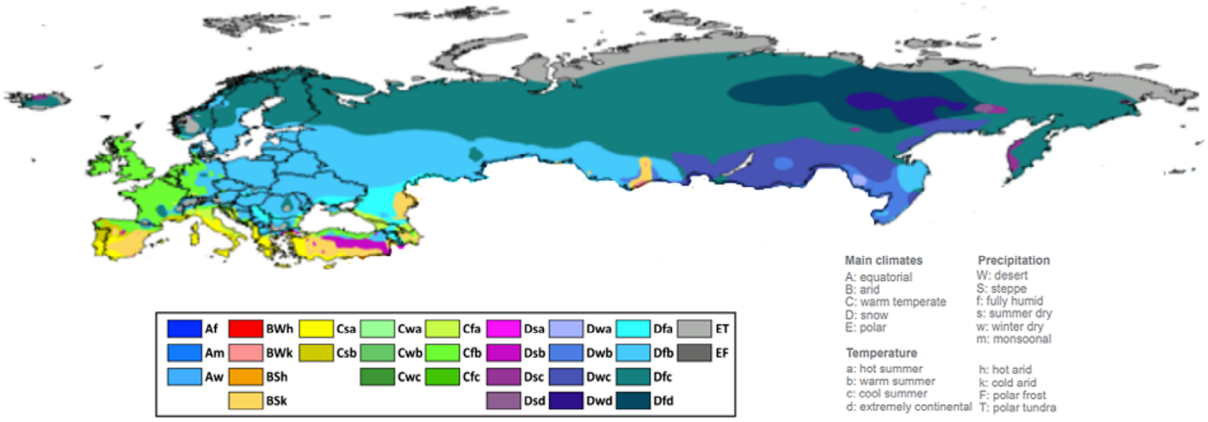

Figure 2 Köppen-Geiger climate classification of Asia Pacific. Source: Beck *et al.* 2018

climate with definite winter/summer seasons; the northern climate with colder temperatures; t he alpine climate on the west coast of Scandinavia; and the southern Mediterranean climate with hot summers and often less rainfall (International Research Institute for Climate and Society (IRI) n.d.).

Temperatures vary highly across the region; Russia experiences the coldest winters with daily temperatures averaging 0°C (32°F), while Spain experiences the hottest summers with daily temperatures averaging up to 36.9°C (98.4°F) (Poulsen *et al.* 2020). As the region is very diverse in climate and topography, it is exposed to a wide range of climate-related natural disasters such as riverine floods, droughts and heatwaves throughout the region, and localized events such as coastal flooding, large-scale wildfires and wind storms (IPCC 2018).

1.2 Climate change

Historical Climate	Projected climate
Temperature	
In Europe, temperatures have risen by almost 2°C in the last century (Copernicus 2018).	In Europe, average and extreme temperatures are projected to continue to rise (IPCC 2018).
Historically, there are large regional differences in observed temperature trends. Northern Eurasia has seen the largest temperature increase in winter, and Iberian Peninsula the largest in summer (IPCC 2018).	The observed regional trends and differences are expected to continue (IPCC AR5 2014), e.g. the Iberian Peninsula temperature may increase up to 5°C by 2071–2100, compared to the projected global rise of 2.4–3.4°C (Stockholm Environment Institute 2013).
Between 1990 and 2005, heat waves doubled in length and almost tripled in duration in Western Europe (Semanza *et al.* 2012). Across the region, high temperature events are more frequent, although regional climate variability remains (IPCC 2018).	Heatwave duration and frequency are projected to increase, while cold extremes are projected to become less frequent (IPCC 2014).

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Precipitation and water

Europe has seen an increase in annual rainfall in Northern Europe and a decrease in parts of Southern Europe. Snow cover has decreased in the north (IPCC AR5 2014).

In Northern Eurasia, rainfall patterns have shifted towards more heavy convective rainfall in the past five centuries and is increasing at a rate of 2-5 per cent per decade (Chernokuslky *et al.* 2017). Throughout Eurasia, winter precipitation is increasing in the northern regions while decreasing in the south, which is for a large part attributable to human activity (Guo *et al.* 2019).

Sea level has increased around Europe, with some areas seeing slightly higher levels than others. The exception is the northern Baltic Sea, which has seen declining sea levels because of the movement of the Earth's crust (IPCC AR5 2014).

Changes in rainfall will vary across Europe, with the northern parts expected to get wetter. There is a potential for increased dry conditions near the Mediterranean. There will be lots of variability in rainfall in the coming century in different places (IPCC AR5 2014).

The maps, below, show broad projections of how yearly rainfall might change by the time the world is 1.5°C and 2°C warmer according to global mean surface temperature (GMST). For the northern part of the Eurasian continent, there is reasonable confidence to expect an increase in mean rainfall (IPCC 2018). This can have different implications in different areas, including more flooding.

Most of the region is expected to experience a higher number of heavy rainfall events as well as an increasing incidence of drought and dry spells (World Bank n.d.; Feyen *et al.* 2020).

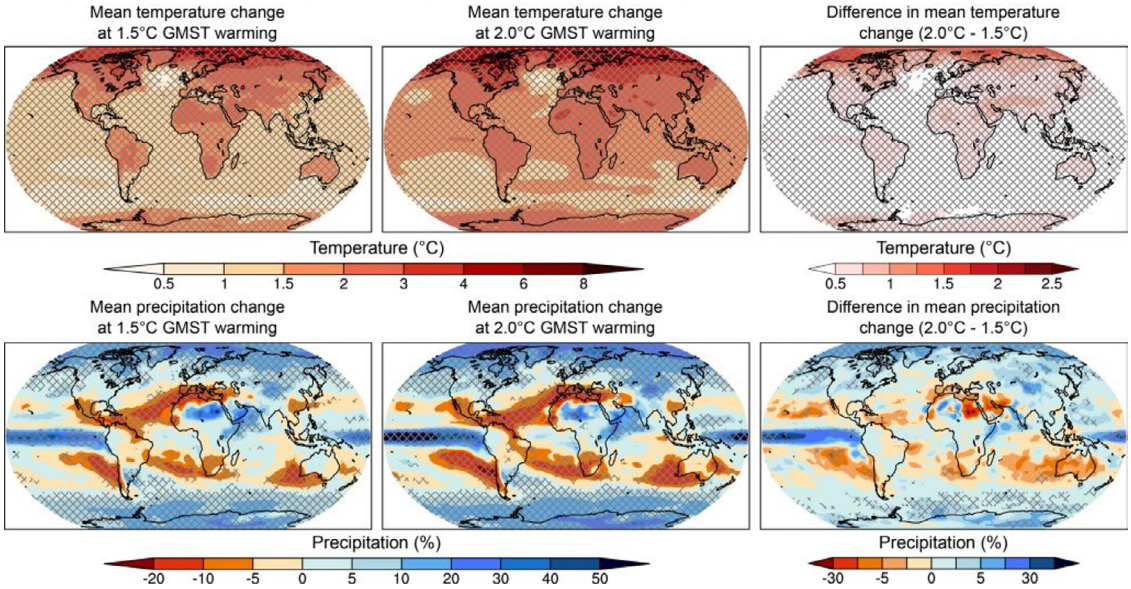

Figure 3: Broad projections of how yearly rainfall might change by the time the world is 1.5°C and 2°C warmer according to global mean surface temperature (GMST) (IPCC 2018)

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1.3 Climate vulnerabilities

This illustration from the IPCC's AR5 report shows widespread impacts attributed to climate change. It indicates that Europe is at high risk when it comes to physical systems (drought/ flooding, coastal erosion and sea level changes), biological systems (wildfires, increased vulnerability of terrestrial and marine ecosystems) and human systems (food access, health and economic impacts) (IPCC AR5 2014). It is important to note that the impacts, below, are already taking place and affecting lives and livelihoods everywhere. Future climate change will exacerbate these risks.

For example, already there have been increases in either the frequency or intensity of heavy precipitation in Europe with some seasonal and/or regional variation. Summer heatwaves are expected to increase substantially in terms of intensity, duration and frequency over all continents, with the largest increases over Europe (Feyen *et al.* 2020).

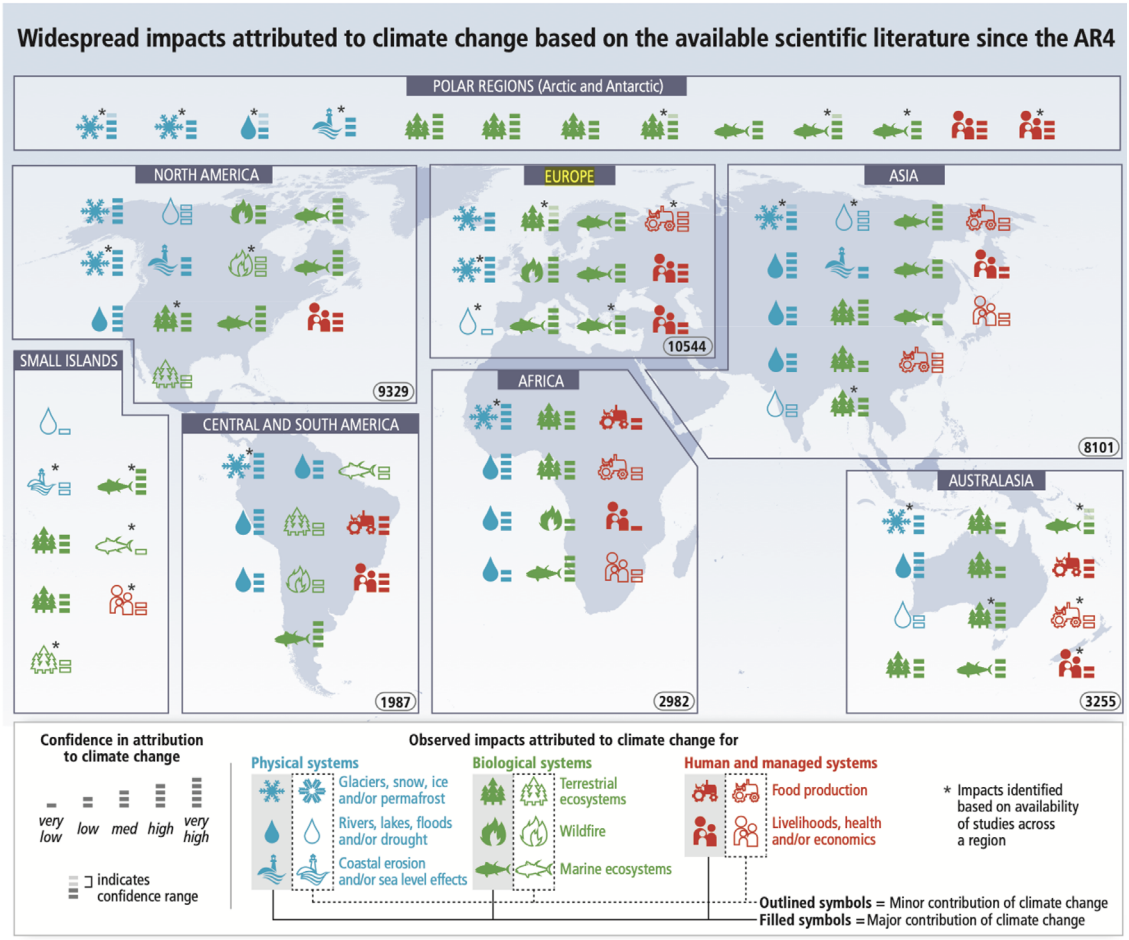

Figure 4: Widespread impacts attributed to climate change based on the available scientific literature since the AR4. Source: IPCC AR5 2014.

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2.Humanitarian sectors and climate change

2.1 Water and habitat

Water supports Eurasia's agriculture sector, energy sector and economic growth; but there are diverse water and habitat-related challenges across the regions including rapid glacier melt, increasing aridity, damage to coastal ecology and sea level rise.

Glaciers are a major source of water, energy generation and tourism in Eurasia. Due to climate change, most of the glaciers in Eurasia are retreating. Approximately 50 per cent of the Alps' glaciers have been lost since 1900, with an increased acceleration seen after the 1980s. European glaciers are expected to experience a further 22–84 per cent decline by 2100. Glacial retreat has also contributed to sea level rise (European Environment Agency (EEA) 2016a).

Sea level rise is another challenge affecting various countries in Eurasia. Globally, sea levels are projected to rise by an additional 20–30 centimetres (cm) by 2050. By 2100, projected sea level rise ranges from 50–200cm, depending on levels of emissions; with at least one study ranging as high as 280cm (Kulp and Strauss 2019). As a result, sea level rise poses a significant threat to coastal communities and infrastructure, and increases the risk of saltwater intrusion. In many places, sea level rise is projected to push the water table further below ground, which can reduce the amount of freshwater available. Fragile ecosystems such as mangroves (and other blue carbon ecosystems) as well as wetlands will likely be lost, threatening unique species of flora and fauna in the region. Contamination of available drinking water, saltwater intrusion and coastal erosion are also major threats (IPCC 2019). Approximately one-third of the global population lives within 50km of a coast. In the European Union (EU), these communities generate over 30 per cent of the total GDP. Sea level rise poses a major threat to Eurasia's economic security (Feyen *et al.* 2020).

More intense and frequent heatwaves are also expected across Eurasia, with implications for human health as well as infrastructure. Increased temperatures affect the durability of construction materials; for example, the asphalt used for roads can buckle during a heatwave if not designed with rising temperatures in mind (Willway 2008). Increased temperature extremes, especially for extended periods, can result in increased morbidity and mortality. This necessitates the promotion of passive cooling strategies in building design and construction. Active cooling strategies (such as air conditioning) will be increasingly important as temperatures rise. This will put an excess strain on energy systems that will need to be prepared for a surge in demand (Singh *et al.* 2019). In parts of Eurasia that experience a drying trend, increased temperatures will increase evaporation and reduce available water resources for cooling.

Changes in water system dynamics and precipitation patterns may lead to water shortages across Europe. Hydroelectric power is the principal energy source in many places across Eurasia. Diminished or erratic water supplies and flow could, therefore, affect energy production significantly (International Waterpower & Dam Construction 2019). On the other hand, in rapidly urbanizing areas, the design of adequate drainage systems is critical for adapting to the increased risk of flood events or more erratic rainfall with climate change. Roads are also susceptible to flood events, and climate change adaptation strategies need to include techniques for permeability and drainage (Willway 2008).

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2.2 Economic security

Eurasia has a versatile economy ranging from agriculture and fisheries to industry and tourism, which will likely be impacted by climate-related changes in their natural resource base.

In contrast to the other regions of the continent, the EU has reported a lengthening of the cropping season, which is projected to increase further due to the earlier onset of growth in spring and a longer growing season into the autumn (European Environment Agency 2021). As a result, northern Eurasia may now be able to plant more warm-season crops. Since new crop varieties may be introduced and areas for crop cultivation may expand, the agriculture sector in some parts of northern Europe may actually benefit from rising temperatures. More frost-free periods and fewer extreme cold events may also help produce higher yields. On the other hand, higher temperatures will likely lead to an increase in pests and diseases (European Environment Agency 2021).

Climate change will most likely disrupt forestry as the incidence of droughts, storms and wildfires are likely to increase. As a result, the biodiversity is expected to change with more drought-tolerant broadleaf species moving northward and less diversity, which increases the risk of pest and disease impacts (EEA 2016b). Furthermore, this will result in a decrease of forest value production between 14 and 20 per cent in this century (EEA 2016b).

The fisheries industry supports many livelihoods in Eurasia. Climate change is expected to cause disruptions in aquatic and coastal systems, severely impacting fisheries populations and aquaculture (Allison *et al.* 2009). Increasing ocean temperatures impact the circulation and contribute to an increasing acidification, severely impacting marine biodiversity (Storjungfrun 2017).

International volatility of food prices due to climate change-related shocks in agriculture producing countries can affect the purchasing power and food access of vulnerable people, who use earned wages to purchase food in the markets.

2.3 Health

Eurasia faces a variety of climate-related health challenges.

Warmer climates often harbour various food-, water- and vector-borne diseases (Semenza *et al.* 2012; European Centre for Disease Prevention and Control (ECDC) 2012). A study carried out in the United Kingdom also found a significant relationship between the incidence of foodborne disease and temperature changes in the month preceding gastrointestinal illnesses (Bentham and Langford 1995).

Vector-borne diseases are also expected to increase across Eurasia due to global warming and international travel. Eurasia – particularly high-altitude regions – is at high risk of dengue fever, tick-borne encephalitis and leishmaniasis (Semenza and Souk 2018). Warming temperatures have enabled disease-carrying insects to adapt and thrive in the region; in the last ten years, dengue fever has been reported in France, chikungunya virus in France and Italy, West Nile fever in south-east Europe and malaria in Greece (Robertson 2019).

Health issues related to heatwaves have also been observed across the region. Increased incidences of heat stroke and other heat-related issues have been reported across the continent.

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In 2019, a major heatwave in Europe killed nearly 1,500 people in France alone. These heatwaves and other related extreme weather events can be attributed to the changing global climate. Extreme heat can increase morbidity and mortality of the most vulnerable such as older people, especially those above 65 years of age; people with pre-existing health conditions, such as heart disease, respiratory illness and diabetes; young children; and people who are homeless or have inadequate housing, such as those living in camp settings (Singh *et al.* 2019).Feyen *et al.* (2020) project that by 2100 in the EU and UK 300 million people would be exposed to heatwaves, resulting in a 30-fold increase in mortality.

Climate change also impacts maternal and child health through food insecurity and undernutrition, in addition to the various health risks outlined above (Women Deliver 2021). Climate impacts such as floods, droughts and desertification negatively affect agriculture and livestock, causing crop failures, decreasing food security and harming human health and nutrition, especially those affected by tuberculosis and HIV/AIDS (Sutton *et al.* 2008).

2.4 Protection

The United Nations High Commissioner for Refugees (UNHCR) projects that in 2020 there are approximately 6,863,000 refugees in Europe and 490,000 people who are stateless (UNHCR 2020).

Internally displaced persons (IDPs) and refugees who are living in formal or informal camps, or are in urban areas, are highly vulnerable to climate shocks. This includes flood events that can quickly destroy limited camp infrastructure, as well as heatwaves that leave people with few options for cooling and shelter. For example, during a major heatwave in France in 2019, civil society mobilized to provide cooling showers and shelter to migrants living in camps around Paris (France 24 2019).

Stateless people are also particularly vulnerable to climate extremes. People who are stateless may have limited or no access to formal identification, may be unable to own a home or open a bank account, and are often unable to access formal employment, education and healthcare. Each of these vulnerabilities raises the risk of negative impacts in the face of climate shocks and stressors. Furthermore, people who are stateless often live in fear of being deported or detained. This can pose a real or perceived barrier to deciding whether or not they want to evacuate to an emergency shelter before a disaster strikes. They are also unlikely to be able to fully access emergency relief and formal social protection systems if they are affected by a disaster (Refugee Studies Centre 2009).

Around the world, people in detention also frequently have heightened vulnerability to natural disasters due to: spatial marginalization resulting from prison locations on hazard-prone land and/or isolation from emergency evacuation services; limited to no connections to social networks, which are crucial aspects to hazard resilience; and political marginalization, including lack of policies and services to prevent disaster impacts on imprisoned populations (Gaillard and Navizet 2012). These vulnerabilities, coupled with more frequent and intense disasters due to climate change, may leave prison populations in especially precarious positions to hazards such as extreme heat, extreme cold, floods and cyclones.

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2.5 Policy

All countries in the Eurasia region have signed on to the 2015 Paris Agreement and all countries, except Turkey, have ratified the agreement. A key process under the Paris Agreement is the development of Nationally Determined Contributions (NDCs). NDCs are developed at a national level by all countries and outline each individual country's commitments to self-determined climate change mitigation and adaptation targets. NDCs are revised and resubmitted every five years with the intention to scale up commitments with each resubmission. The NDC process is outlined in Article 4, Paragraphs 2 and 3 of the Paris Agreement (United Nations Framework Convention on Climate Change (UNFCCC) 2015).

National mitigation commitments around Eurasia focus on energy, transport, industry, land use and agriculture. Adaptation commitments include actions to improve food security; strengthen coastal protection; enhance water resource management; and bolster early warning systems, ecosystem protection solutions, urban resilience measures and health.

NDC commitments for Europe were submitted as a joint block by Latvia and the EU on behalf of all 28 member states. Mitigation priorities include a 40 per cent domestic emissions reduction target by 2030 compared to a 1990 baseline. This target is to be achieved through action in the following sectors: energy, industry, agriculture, waste, and land use change. Europe does not

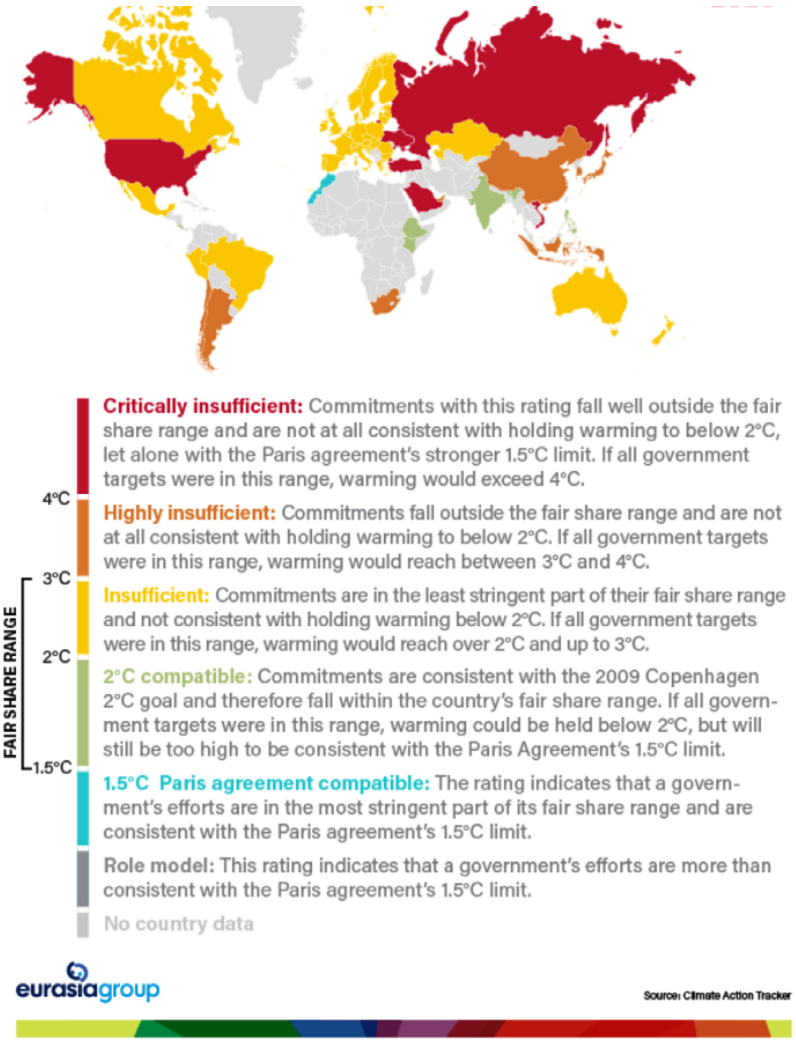

Figure 6: Strength of commitment to holding warming below 2°C by country. Source: Eurasia Group 2019

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outline adaptation priorities in its NDCs. The EU member states rely on other policies and frameworks to address adaptation priorities, such as the 2013 EU Adaptation Strategy.

The UNFCCC maintains an NDC registry where each country's official communication can be accessed (UNFCCC n.d.). All countries are currently working on the next round of submissions for COP 26, which has been rescheduled to late 2021 due to the COVID-19 pandemic.

The illustration on the right, compiled by the Eurasia Group, shows the commitment to holding global warming to below 2°C, by country. The majority of Eurasia is evaluated as showing "critically insufficient" commitment to holding warming to below 2°C.

Another key process under the UNFCCC is the development of National Adaptation Plans (NAPs). NAPs are a process for least developed countries (LDCs) to outline their longer-term adaptation priorities in greater detail. Technical guidelines to develop NAPs were released in 2012 (UNFCCC 2012). Many of these plans have been developed around the region or are currently under advanced development. The UNFCCC maintains a database of submitted NAPs.

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