

Climate change calls for verified mitigation and adaptation measures

Public discourse about climate change intensified after the Paris Agreement was signed and after the IPCC published the report on limiting global warming to 1,5 degrees. The message on the need for mitigation became crystal clear: In order to stop and limit global warming, urgent cuts in emissions from greenhouse gases, especially CO₂, are needed, and mitigation actions are required in all sectors: energy, transportation, land use, businesses, and the way people live their lives. In addition, we need technological developments to capture carbon from the atmosphere and sustainable carbon sinks.

Mitigation does not remove the need for adaptation

Whereas the need for mitigation has become clear, the need for adaptation is less prominent in public discourse. The urgency of adaptation measures increases dramatically, if we fail in climate change mitigation.

Temperatures have risen by over 1 degrees from the pre-industrial levels. In the Arctic areas, warming is faster than elsewhere in the world. According to the recent special report by IPCC, temperatures over land areas have risen by 1.4 degrees.

Climate change impacts our lives already now. According to the IPCC, the effects of climate change on ecosystems have been seen on all continents and in the oceans. Changes are observed on natural terrestrial ecosystems, permafrost and land degradation, desertification, and food security. The frequency and intensity of some extreme weather events has increased.

The warming caused by anthropogenic emissions from pre-industrial times until today will persist for centuries to millennia, and give rise to continuous long-term changes in the climatic systems.

For example, even if the targets set in the Paris agreement are met, the global sea level continues to rise for hundreds of years. Research indicate that we need to adapt to extreme weather events, crop losses, large forest and wildfires, damages in our infrastructures and health effects. Impacts of climate change need to be taken into account in urban planning and land use. The adverse impacts of climate change especially in the world outside of the Nordic countries will lead to increasing problems related to flooding, heat waves, and drought. The impacts on social and economic welfare are seen and they may result in larger numbers of refugees leading to increasing migration.

It is clear that adaptation measures are needed in all sectors of life.

Verifying the impact of mitigation activities

In meteorology and climatology, observations, measurements, verification and scientific methods are the basis for all research and service development.

Long term and reliable measurements are also the key to monitor how our climate changes over time and what is the impact of mitigation measures. For example, through satellite measurements it is possible to get information about the sources of CO₂ emissions and changes in the arctic sea ice. Long and qualitative time series of meteorological parameters, such as air temperature, precipitation, snow depth etc, provide clear indicators of climate change.

Even though no action is too small to be left undone in climate change mitigation, verification helps us to understand how efficient the mitigation measures and political decisions are. The better information we have about the impacts of mitigation measures, the better we can plan the adaptation activities and focus on efforts which have the desired, measurable impact. Preventive mitigation investments are cheaper in the long run, than to take the costs of climate impacts in retrospect.

Understanding the Nordic characteristics of climate change

The Nordic and Baltic meteorological institutes work in close cooperation with each other and the international science community to better understand the complexities of the climate change and its impacts to our lives.

Our task is to conduct research about the special characteristics of the climate and its impacts in the Northern latitudes, so that our societies can build resilience and plan adaptation measures. We have begun a formal cooperation between Sweden, Denmark, Norway, Finland and Spain for the development of a common regional climate model, which will give us more accurate information of e.g. rain, flooding and draughts. The Nordic countries are also developing the first common climate scenarios at really high resolutions. Climate models and scenarios are key tools in understanding the future of our climate.

Climate change will change the conditions where we live today. Increasing attention is being given to hazards due to thinning of lake and river ice cover and permafrost degradation, including slope failure, which calls for increased in situ monitoring and the development of new remote sensing techniques.

The Nordic and Baltic meteorological institutes work every day to make sure that our citizens are warned and stay safe when facing extreme weather events – also in the changing climate.

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Examples from countries – full list (as received by 15th August)

Denmark:

- It has become wetter and significantly warmer in Denmark: The average temperature is 1 degree warmer and the average precipitation has risen with 40 mm in 30 years.
- Weather records draw a clear pattern: Virtually all of our cold records are from "old" days before the 1980s, and all of the heat records have come in the last 30-40 years.
- Summer 2018 in Denmark --> extremely long warm dry period. Due to the heat and lack of precipitation there was:
 - A watering ban: Several of Denmark's 3000 waterworks had major problems with water shortages, therefore a complete or partial irrigation ban was issued in many places.
 - Agriculture lost 4.1 billion kroner compared to a normal year.
 - Record number of natural fires. 2,091 on the country plan for the period May-June-July, which is 3.5 times larger than the average for the same period in the past five years.
- 9 out of the 10 lowest surface mass balance years on the Greenland ice sheet since 1981 have fallen within the last 13 years.

Estonia:

- 2019 June was exceptionally warm with average temperature 17,5°C (normal 14,4 °C). Since the year 1961 there has been a warmer June only once – in 1999 with average temperature 17,7 °C. The warmth was accompanied by thunderstorms with heavy rain and hail in some areas.
- Summer 2018 brought a record – as an Estonian average, climatological summer lasted 137 days.

Latvia:

- Autumn 2017 in Latvia: 1,5 times more precipitation than normal --> Agricultural lands were flooded and roads were washed out. Year 2018 was the driest and the 3rd warmest year on record --> losses due to drought in conjunction with drier first part of year, heat waves and forest fires are approx. 359 million euros [<https://www.zm.gov.lv/presei/zemkopibas-ministrs-janis-duklavs-ar-igaunijas-lauku-attistibas-minist?id=9737>]
- This year in Latvia: drought of 2018 continued till beginning of May, except for most southwest parts of Latvia where severe drought is still observed (beginning of August). June was the warmest month on record (since 1924), while July was second coldest in the 21st century.

Sweden:

- The annual average temperature in Sweden is increasing roughly twice as fast as the average on Earth.
- 2018 was the eighth warmest year for Sweden since 1860, according to SMHI's temperature measurements