Progressively wetter in Norway

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Credit: AI-generated image (disclaimer)

Climate change will make life wetter for most Norwegians in the years to come. A rainier climate is expected nationwide, with the possible exception of southern Norway in the summers.

Norwegian researchers have been working hard to provide answers about the country's future climate. The most likely changes will be higher temperatures and more precipitation. On average, winds will remain

much as they are today, although more days of extreme winds can be expected.

Already more rain – and getting worse

It currently rains nearly 20 % more in Norway than in 1900. The greatest increase has come in winter, and the trend has been most pronounced in Western Norway.

Researchers have determined with very high certainty that this rainier trend will continue. Towards the year 2100 precipitation may increase by five to 30 % in Norway. One estimate – based on multiple climate models – maintains that Norway as a whole will average 18 % more rainfall.

Autumn precipitation is likely to increase most markedly in the coastal areas of Western and Northern Norway. Winters may also bring substantially more precipitation to parts of Eastern Norway and inland areas of Central Norway.

More extreme precipitation

"Another clear-cut finding of our research is that we are headed for more frequent extreme precipitation events," states meteorologist Inger Hanssen-Bauer. "Probably all of Norway will be more prone to heavy precipitation." Dr Hanssen-Bauer has headed key segments of the recent major research activities that have brought forth new answers about Norway's future climate.

More precipitation, and in particular more frequent extreme precipitation events, can have practical consequences for Norwegian communities. Knowledge about such events is also valuable to public

agencies such as the Norwegian Water Resources and Energy Directorate (NVE), the Norwegian Public Roads Administration, and the Norwegian National Rail Administration.

Less water in rivers and streams in summer

A higher frequency of extreme precipitation does not necessarily mean more flooding in rivers and streams in springtime. This is also useful to know.

"A warmer climate means that more of the wintertime precipitation will fall as rain rather than snow," explains Dr Hanssen-Bauer, "so that much of it will run off in winter instead of during the spring thaw. The general outlook will be more water in rivers and streams in winter but less in summer."

Southern European levels

"We calculate that future extreme precipitation events in Norway will be more severe than is the case today, particularly in the summer," Dr Hanssen-Bauer states.

The explanation is quite simple: in a warmer climate the atmosphere holds more moisture, and when all that water is released, Norwegians will be deluged more often with the kind of torrential downpours that Southern Europeans know so well. Southeastern Norway will be especially vulnerable.

The higher incidence of thundercloud build-up entails more risk of rainfall flooding in summer. More streams and tributaries could periodically swell to the size of larger rivers, even in the summer months. As mentioned above, however, streams and rivers in summer

will typically contain less water compared to current levels.

Higher temperatures mean more evaporation

An average of roughly 1 500 mm of annual precipitation falls on Norway; roughly 350 mm of this currently evaporates. But in a warmer Norwegian climate, evaporation from the ground will increase – which means there will be less water in the streams and rivers.

So while a warmer climate will bring more precipitation to Norway, more of that precipitation may be evaporating to the air before reaching the country's rivers.

Winds no greater on average

"Warmer, wetter, wilder" was the forecast from climate researchers a few years ago. Today, equipped with new and enhanced knowledge, they are even more confident that Norway's future climate will indeed be warmer and wetter – but are not so sure that winds will blow any more wildly across Norway than they do now. Some climate models predict slightly stronger winds on average, while others actually forecast that winds will be slightly weaker.

If the latter predictions are correct, it would be a continuation of the trend we have seen emerging in Eastern Norway from the 1960s up to today: gradually fewer and fewer storm-force wind events.

"We researchers don't know as much about wind as we do about temperatures and precipitation," says Dr Hanssen-Bauer. "We have good statistics for how warm it has been and how much rain and snow have fallen dating all the way back to the 1800s. But we have few long time series for wind force here in Norway, which makes our work harder."

While many climate models indicate only small changes in average wind amounts, the researchers also calculate that extreme wind conditions, i.e. wind forces occurring every five years or so, may strike certain parts of Norway more often in the future.

Using global climate models

Research on Norway's future climate is part of the worldwide effort to advance climate research. From a global perspective, it is an important finding that the Earth's warmer climate will mean less precipitation in the southern latitudes (not including tropical regions) while in the northern latitudes, including Norway, more precipitation will fall.

Norwegian climate researchers can now predict the country's future climate with greater certainty thanks in large part to global climate models that have been downscaled for Norway. The researchers apply two different techniques – dynamic downscaling and statistical downscaling – to make forecasts about future climate that can focus very locally, such as the area surrounding Oslo.

"Our findings are still uncertain," cautions Dr Hanssen-Bauer, "and some of them are very uncertain, but for some areas they are also very clear-cut. What we can say with the greatest confidence is that it will get warmer in Norway, particularly in winter."

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