

Why don't politicians want to believe what we know? [Provisional translation]

For more than two hundred years, scientists have known that human progress threatens biodiversity and that life on earth is dependent on the fragile greenhouse effect. But politicians still seem to prefer to keep science at arm's length.

Today, November 10, is World Science Day. More than ever, scientific facts and research are needed to meet our great challenges. This applies not least to the ongoing global warming and the increasingly rapid loss of biodiversity.

World Science Day for Peace and Development is celebrated to strengthen public awareness of the role of science in promoting sustainable development and to pave the way for peaceful societies by fostering scientific exchange between nations. It aims to draw attention to the challenges our society face and the importance of science-based knowledge to meet them.

Ongoing climate change poses a serious threat to billions of people and to life on our entire planet. The latest IPCC report shows that the changes in the earth's climate are progressing at an alarming rate and the extinction of species is happening at a devastating rate - around one million species are threatened with extinction. When biodiversity decreases, there is an impoverishment of important ecosystems that are the prerequisite for welfare and quality of life.

Each year, World Science Day has a specific theme. Last year it was, not so surprisingly, about science and the pandemic. Previous themes include the role of science for sustainable development, open and accessible science for all, science as a human right, and science for global understanding.

This year is about the importance of building climate-prepared communities. Because even if we succeed in limiting the increase in the earth's average temperature to what is stated in the Paris Agreement, we will experience an increasing frequency of extreme heat waves and forest fires, periods of drought, intense storms and torrential rains with subsequent floods, as well as rising sea levels and thus the risk that large areas of the earth will become uninhabitable. This will particularly affect the poorest and most vulnerable, but will also be noticeable to us in the richer part of the world. Adaptation to extreme situations will be necessary at the same time as efforts to reduce emissions need to be intensified.

At the ongoing COP 26 climate conference in Glasgow, it is now being discussed how the Paris Agreement should be implemented and how the worst-case scenarios should be avoided. Biodiversity will be discussed at a separate meeting, COP 15, a bit unfortunate as ecosystems around the world are affected by climate change. COP 15 began with a preparatory digital meeting in October this year, which aimed to agree on a new framework after 2020 to deal with the loss of biodiversity and will continue with a meeting in Kunming, China on 25 April-8 May 2022. Both COP 26 and COP 15 have been delayed by the pandemic caused by the coronavirus, which in itself may be a result of human encroachment on natural ecosystems in untouched landscapes and the devastation of nature, not least the change in the world's forest ecosystem, and thus an increase in the number diseases transmitted from animals to humans.

Politicians and decision-makers now have great opportunities to act. Sweden, like the EU, has committed itself to prioritizing these challenges by adopting the UN Agenda 2030 with

17 global goals for sustainable development. This includes combating ongoing climate change and protecting ecosystems and biodiversity. When governments now meet to discuss these critical issues, their decisions will determine the extent to which we will be able to halt the devastating climate change and slow down the loss of biodiversity, thus protecting our fragile planet.

But do politicians have the insight into complex scientific issues required to make the decisions required? And are they even willing to listen carefully enough to science? Many of the changes required are considered uncomfortable and unpopular and go against other priorities, and decisions are therefore often adapted to satisfy different interests, not least to gather votes in general elections.

In Glasgow, the will to take action is now being expressed. So far, despite the fact that we have long known about the effects of human activities on climate and the environment, political decisions that lead to the adaptation to knowledge have been deficient. During his adventurous travels to different continents more than two hundred years ago, Alexander von Humboldt (1769–1859) warned of the consequences of the already deforestation of forests. He realized that human behavior had a detrimental effect on the climate, with an unpredictable impact on future generations.

The French physicist and mathematician Joseph Fourier (1768–1830) wondered what determines the temperature of the earth's surface. He realized that given how far the earth is from the sun, the earth should be significantly colder than it actually is, provided that it is heated only by the incoming solar radiation and taking into account outgoing heat radiation. He pondered various causes of the observed heat and suggested the possibility that the Earth's atmosphere acts as a kind of insulator. Fourier presented his conclusions to the French Academy of Sciences as early as 1824 and published the results three years later; his article was translated into English in the 1830s, which shows that it was given great importance. His work has been considered to demonstrate the existence of a greenhouse effect, even though he did not use that word.

The person who coined the term greenhouse effect was the Swedish researcher Svante Arrhenius. At the end of the same century, the very first climate model was presented. He knew that carbon dioxide absorbs infrared radiation and that the combustion of carbon causes large emissions of carbon dioxide - carbon burning was abundant in Arrhenius' time. He demonstrated the effect that gases such as carbon dioxide, but also water, can have on the earth's surface temperature and he demonstrated the connection between global warming and increased levels of carbon dioxide in the atmosphere. He made calculations of the effect of the greenhouse effect on the earth's climate and how much the earth's average temperature would increase with a certain increase in the amount of carbon dioxide in the atmosphere. For Arrhenius, however, this was not a problem; he lived at a time before the temperature rises caused the extreme events we observe today. Instead, he welcomed the increased emissions of carbon dioxide and thus a more pleasant climate.

Now the links between human activities and climate change are beyond doubt. Two of this year's Nobel Laureates in Physics are rewarded for developing reliable climate models that have laid a solid foundation for our understanding of the Earth's climate and that definitely show how we humans contribute to its changes. One of these, Syukuro Manabe, studied the interplay between the radiation balance and the transport of air masses and was thus able to show how an increased content of carbon dioxide in the atmosphere leads to higher

temperatures on the earth's surface, and he thus laid the foundation for the development of today's climate models. Another of the winners, Klaus Hasselmann, explained the seemingly puzzling fact that climate models can be reliable even though the weather is varied and chaotic. With the help of his work, it has undoubtedly been possible to show that the increase in atmospheric temperature is due to human emissions of carbon dioxide.

That our knowledge of the climate rests on a solid scientific foundation and is based on rigorous analyzes of observations is shown by the rewarded discoveries. This year's winners have all contributed to us now having a deeper knowledge of properties and changes in complex physical systems.

But despite all this knowledge that we possess today, it has not left clear traces in politics - fairly simple solutions for dealing with both climate change and the loss of biodiversity are well known, but poorly applied. Our governments continue to subsidize fossil fuels and the unsustainable use of biomass. Forests are being destroyed in various parts of the world, and environmentally harmful activities such as over-exploitation of fishing and depletion of natural resources continue, and investment is being made in harmful activities that undermine, rather than protect natural capital and, in the worst case, lead to premature death.

World Science Day was proclaimed in 2001 by the United Nations Educational, Scientific and Cultural Organization (UNESCO) and has been celebrated on November 10 every year since 2002. It was established to each year recall the objectives of the Declaration of Science and the use of scientific knowledge adopted at the UNESCO Science Conference in Budapest in 1999. Today it is celebrated around the world. The celebration has involved governments, intergovernmental and non-governmental organizations, UNESCO national commissions, science and research institutes, professional organizations, the media, science teachers and schools. The day has also generated a number of concrete projects and has also helped to promote collaboration between researchers living in conflict-ridden regions.

The message of the World Science Day is important to pay attention to. It is only through the commitment of citizens and with decisions based on scientific facts that we can meet global challenges and develop viable and sustainable societies, for the sake of current and future generations. Hopefully the participants in Glasgow will realize this and listen to science.

Christina Moberg

Professor em KTH Royal Institute of Technology, President of the European Academies' Science Advisory Council, EASAC, and member of the Royal Swedish Academy of Sciences