Addressing climate change with the help of nuclear science

By Yukiya Amano, Director General, IAEA

More and more countries are using nuclear technology to combat climate change, the biggest environmental challenge of our time. Nuclear power, currently in use in around 30 countries and under consideration in almost as many, is an important source of clean, low-carbon energy. It undoubtedly has a significant role to play in reducing greenhouse gas emissions. However, the damage that climate change has already caused to the environment and the threat it poses to the livelihoods of entire communities also need to be addressed.

Non-power applications of nuclear science and technology are already making an important contribution. To showcase this contribution, as well as the use of nuclear energy, the 2018 IAEA Scientific Forum is devoted to *Nuclear Technology for Climate: Mitigation, Monitoring and Adaptation.*

Mitigation

Mitigating climate change — the ultimate goal — will require policies, approaches and technologies aimed at reducing the concentration of greenhouse gases in the atmosphere. The IAEA actively supports its 170 Member States in determining what benefits nuclear technology may offer as they work to achieve this goal.

On page 8 of this issue, we examine Finland's plans to increase the share of nuclear energy in its overall energy production from a third to a half by 2030, partly in order to meet its climate change-related commitments.

Agriculture is also a major source of greenhouse gases, including through the production and use of chemical fertilizers. Argentina, Brazil and Kenya are among the countries that the IAEA, in cooperation with the Food and Agriculture Organization of the United Nations (FAO), is supporting in the application of isotopic techniques to help farmers reduce their use of synthetic fertilizers by up to 90% (p. 10).

Monitoring

Nuclear science provides valuable data that help scientists better understand climate change. Armed with such data, policymakers are in a better position to adopt appropriate policies to protect the environment, and to monitor the effects of these policies using nuclear and isotopic techniques.

Harmful algal blooms, and the toxins they produce, threaten ecosystems and the livelihoods of communities which depend on the ocean. Previously found only in tropical and subtropical regions, they are increasingly present in temperate climates as well. The IAEA Environment Laboratories work with many countries on the characterization and monitoring of harmful algal blooms (p.12).

Costa Rica is using isotope hydrology to study rainfall patterns and manage underground water resources sustainably in the face of a changing climate (p. 14). The interaction between fast-moving neutrons and water molecules allows scientists to measure the water content in soils over large areas. This helps farmers manage their water resources and enables policymakers to devise appropriate conservation measures (p. 16).

Adaptation

While work on mitigation continues, the world needs to adapt to the consequences of climate change that are already making themselves felt. These include increasing water scarcity, more frequent natural disasters and unseasonably high temperatures, all of which threaten biodiversity and can result in significantly lower agricultural output. In that regard, new agricultural practices could be very beneficial.

In the Philippines, for example, scientists have used radiation to develop a new type of growth promoter that makes rice more robust, enabling it to withstand gusting typhoon winds (p.18). Zimbabwean farmers have been able to cope with drier weather in part thanks to a new cowpea variety developed at the laboratories run by the IAEA and the FAO (p. 20). Drip irrigation, a technique used throughout the world to conserve water, can be made more effective by using an isotopic technique (p. 22).

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