

Nuclear Science and Technology for Climate Adaptation and Resilience



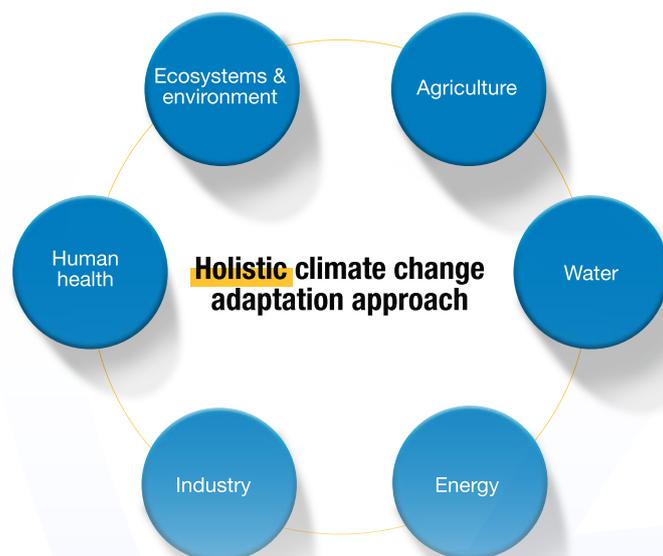
IAEA

International Atomic Energy Agency
Atoms for Peace and Development



The challenge of climate change

Climate change is a key global challenge. Its impact is complex, broad and interdependent – and is already having a severe effect in many parts of the world. To address climate change, multiple interrelated sectors must be taken into account, including agriculture, water, energy, industry, human health, ecosystems, and the environment. The International Atomic Energy Agency (IAEA) has many years of experience in supporting these sectors through the application of tried and tested nuclear techniques.



What does the IAEA offer?

Nuclear techniques complement conventional climate adaptation and climate science technologies and approaches. The IAEA contributes its expertise to climate adaptation and resilience in six thematic areas: sustainable land management, climate smart agriculture, food production systems, analysis of GHG emissions, sustainable water management, and ocean change and marine ecosystems.

Looking forward

The IAEA aims to contribute to climate change adaptation efforts through research and technical cooperation in nuclear science and technology. Its work in the six thematic areas of climate change adaptation contributes to the achievement of global climate goals.

How we deliver

The IAEA carries out research activities in its own laboratories and through extended networks of research institutions, academia and reference laboratories. Once vetted, relevant nuclear techniques can then be transferred to all Member States, especially developing countries, through the IAEA technical cooperation (TC) programme. The TC programme is the IAEA's primary mechanism for helping Member States address key development priorities.

Between 2012 and 2020, the IAEA supported 481 climate change adaptation projects in 102 countries and territories around the world, disbursing some €112 million in support.

Join us

The IAEA looks forward to strengthening and establishing partnerships for synergy, visibility and financing, to support Member States towards the achievement of the SDGs and the implementation of the Paris agreement in areas such as sustainable land use, climate smart agriculture, food production systems, analysis of GHG emissions, water management, and oceans and coastal protection.

1. Sustainable land management

Nuclear techniques are used to assess climate change impacts on soil health and land degradation, and to improve livestock feeding to minimize greenhouse gas emissions.

2. Climate smart agriculture

Nuclear science and technology contribute extensively to climate smart agriculture. They are used to monitor agrochemical inputs to improve food safety, they support the development of innovative land and water management technology packages, and they can enhance carbon sequestration by supporting better land-water management practices.

3. Food production systems

Nuclear techniques such as mutation breeding are used to develop improved drought and heat-tolerant crop varieties, and to enhance existing genetic resistance in crops to transboundary plant pests. Nuclear techniques are also used to control animal pests and disease, to strengthen post-harvest food safety and trade and reduce food waste, and to monitor residues and contaminants in food. The IAEA also supports the development of nuclear and genomic tools for animal breeding and reproduction, and responds to food safety incidents and emergencies.

4. Analysis and measurement of GHG emissions

Nuclear techniques offer substantial advantages over conventional techniques for the precise analysis and measurement of greenhouse gas (GHG) emissions, including from crop and livestock production. The IAEA also provides standards for the calibration of carbon isotope ratios, ensuring comparability of data used for climate change monitoring.

5. Sustainable water management

Isotopic hydrology uses isotopes to track the movement of water through the hydrogeological cycle, to trace the origin of groundwater, and to examine the mixing process between precipitation, surface water and groundwater. Nuclear science is used to monitor shrinking wetlands and the impact on groundwater recharge, to evaluate ground water age and sustainability, and to manage water quality. Isoscapes, which show how water isotopes vary spatially and temporally, offer climate snapshots that support better understanding of climate change. Stable isotopes are used to reconstruct the paleoclimate, show changes in climate over very long periods, and model future impacts.

6. Ocean change and coastal protection

A range of nuclear techniques are used to provide insights into the consequence of climate change and ocean change, and the impact on marine ecosystems and coastal structures. This includes linking land-based activities to degraded marine ecosystems, improving the monitoring and assessment of contaminants in seafood, monitoring and assessing climate change impacts on coastal structures (for example, sediment tracking), and addressing marine plastic pollution that has been augmented by climate change.



Sustainable
land
management



Climate smart
agriculture



Food
production
systems



Analysis of GHG
emissions



Sustainable water
management



Ocean change and
marine ecosystems

#Atoms4Climate

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