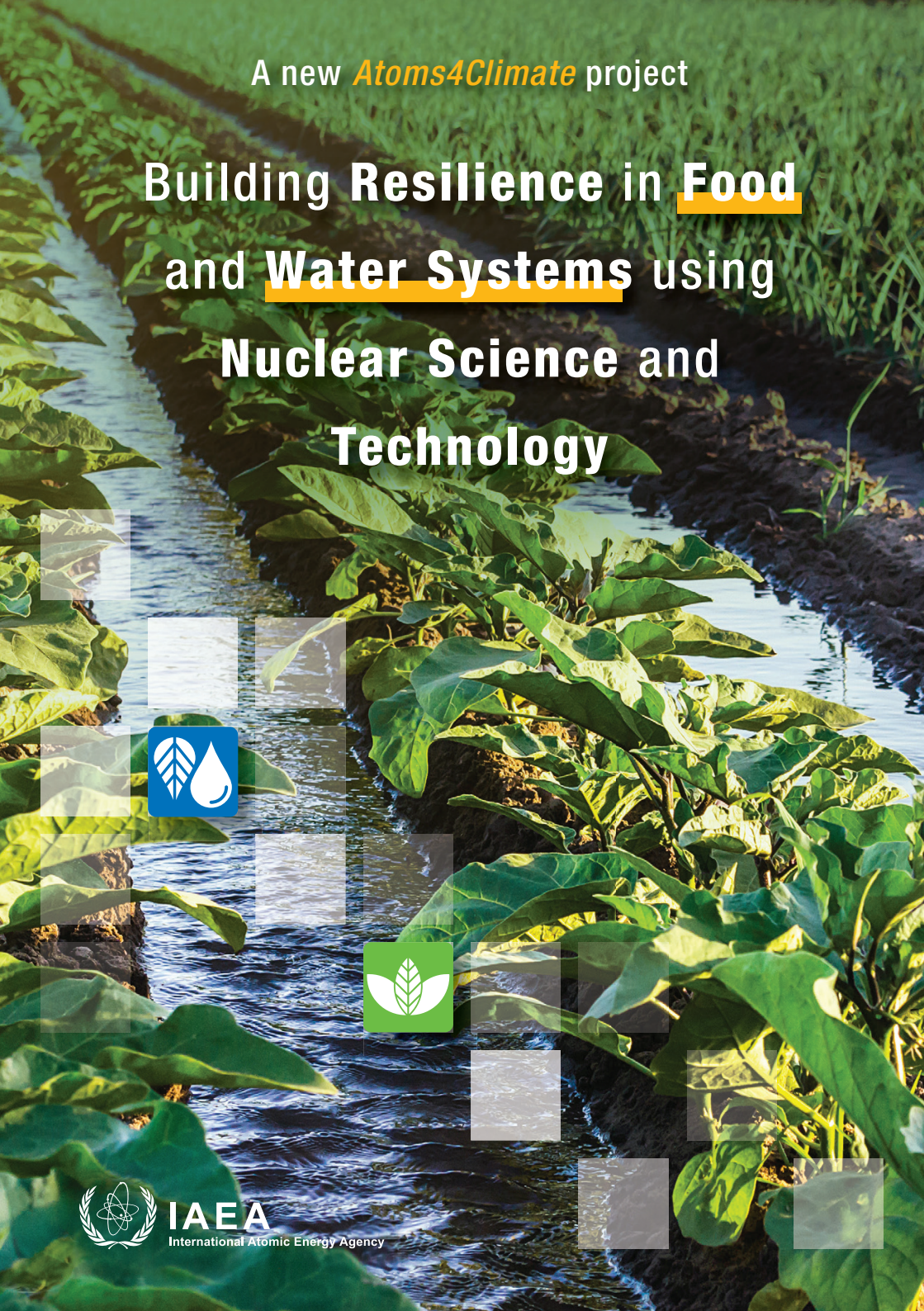
A new Atoms4Climate project
Building Resilience in Food and Water Systems using Nuclear Science and Technology
IAEA
International Atomic Energy Agency

Challenges

23% GHG

of total net GHG emissions are from agriculture, forestry and land use activities

(IPCC, 2022)

1.9 billion people lived in **severely water-scarce areas** in the mid-2010s

(UNFCC)

Approx 1/3 of people worldwide did not have access to enough food in 2020

(FAO)

Successes

Farmers in Namibia are using **80% less water** thanks to cosmic ray neutron sensor data and drip irrigation systems

Since the 1970s, Bangladesh has increased its **rice harvest** **3x** due to new IAEA-FAO crop varieties

5 countries **in the Central American Dry Corridor** have used isotopic techniques to map shared groundwater resources

Project Objective

The *Atoms4Climate* project aims to optimize the IAEA's existing climate adaptation activities by taking a more a systemic approach. The objective of the new global IAEA project is to support countries in their climate adaptation and mitigation efforts using nuclear science and technology with the aim of:

- establishing climate-smart agriculture practices;
- developing sustainable land management practices;
- enhancing food production systems;
- strengthening sustainable water resources management; and
- supporting the analysis of agricultural greenhouse gas (GHG) emissions.

Climate change poses a serious threat to global food and water availability. Increased global temperatures and more extreme weather events, such as droughts, floods and heatwaves, are affecting agricultural systems and water availability around the globe. In many regions, people are already suffering from the social and economic consequences of climate change, with some populations facing severe food and water shortages. Furthermore, agriculture, forestry and other land use activities account for 23% of total net emissions of GHGs from human activities.

Nuclear science and technology provide valuable tools to help countries identify, analyse, monitor and address the effects of climate change. Together with conventional techniques, nuclear techniques can support Member States in strengthening agrifood resilience to climate change, increasing agricultural productivity, ensuring the quality of soil, supporting sustainable water resource management and reducing GHG emissions from agricultural practices.

Areas of Project Support

Building on the IAEA's extensive research and technical cooperation support on nuclear applications for climate adaptation, the project aims to upscale our work and increase capacities in the use of nuclear technologies for:

1. **establishing climate-smart agriculture practices:** Water use efficiency and food safety can be improved by combining innovative land and water management practices with improved soil and nutrient management.
    - Fertilizer and water use efficiency can be determined by measuring crops or soils for the isotopes of key elements like nitrogen, carbon or oxygen. The IAEA has also supported farmers to determine the moisture level in soil in real time for large areas of agricultural land through cosmic ray neutron sensors.
    - Armed with this information, farmers can irrigate crops properly despite irregular weather patterns and use appropriate amounts of fertilizer.
    - Climate-smart agricultural practices also contribute to the mitigation of GHG emissions, by enhancing carbon sequestration
2. **developing sustainable land management practices:** Soil erosion, which is being aggravated by more frequent extreme weather events, can be tracked by measuring particular isotopes in soil samples over time. This information can facilitate improved land management practices and increase agricultural production.

3 **enhancing food production systems:** Crop varieties can be developed that are drought and heat-tolerant or resistant to plant pests and transboundary diseases:

- New crop varieties can be developed using plant breeding techniques. These varieties are then tested and selected based on positive characteristics – some are heartier, more disease resistant, or more resilient to drought and heat. By planting seeds of these varieties, farmers have had higher crop yields.
- Nuclear techniques are also used to control insects that carry diseases and reduce food waste and food-borne illnesses.
- Post-harvest food safety, increasing trade, reducing food waste and monitoring residues and contaminants in food.

4 **strengthening sustainable water resources management:** Through isotope hydrology, scientists can determine the age, movement and source of freshwater resources. This key data can answer critical questions about the amount of water available, the rate at which it replenishes, its vulnerability to contamination and the source of pollutants. This information can help policymakers in their planning to ensure access and sustainable management of water resources.

5 **supporting the analysis of agricultural GHG emissions:** Through nuclear techniques, GHG emissions can be measured precisely, including identifying whether they are from crop and livestock production. Pinpointing the origin and amount of emissions can help countries to achieve their emission reduction goals.

Activities

The project will support the establishment of an interregional network of laboratories and experts on nuclear technologies for climate adaptation and non-power mitigation for the terrestrial landscape. The project will expand regional climate adaptation expert networks and facilitate their cooperation at the global level. Global cooperation is key to ensuring that solutions are comprehensive and sustainable and will help to bridge the gap between science and policy. By complementing ongoing national and regional efforts, the global project can become a forum for knowledge transfer, action, and connectivity.

In collaboration with the IAEA's laboratories, the network aims to strengthen institutional and human capacities in the application of nuclear and isotopic science and technology related to food, water and nutrition. This includes incorporating the results of monitoring and analysis activities into the evidence-based development of relevant policies and measures.

All IAEA Member States are invited to take part and provide their expertise in the form of teaching and training at technical cooperation events, proposing host institutions for technical meetings or workshops or through providing financial resources.

(Photo: Edson Ramirez/UMSA)

Project type:	Global
Duration:	4 years (2024-2027)
Required resources:	~ € 3.9 million

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For further information on this project (INT5159), please contact:
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#Atoms4Climate

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