

Assessing the Impact of Climate Change on Land-Water-Ecosystem Quality in Polar and Mountainous Regions: A New Interregional Project (INT5153)

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Aim of Interregional Project INT5153

As a result of the first FAO/IAEA expedition to Antarctica¹ in December 2011 under the TC project RLA/5/051, the IAEA, in close collaboration with expert research groups from various parts of the world, began to develop the interregional technical cooperation project INT/5/153 on “Assessing the Impact of Climate Change and its Effects on Soil and Water Resources in Polar and Mountainous Regions”. In June 2013 a project design meeting was held in Vienna to review and finalize the project proposal, which was approved for four years by the IAEA Board of Governors in November 2013. The project launch is set for June 2014 during the First Coordination Meeting and Workshop for the Preparation of Strategies and Protocols for Investigations in Benchmark Sites for Assessing the Impact of Climate Change. In addition to the scientists and technical experts who participated in the development of the INT5153 project, participants from national scientific institutions and representatives of international organizations such as FAO, UNEP and UNU-EHS, dealing with climate change in polar and mountainous environments have been invited. In total about 35 scientists and experts from over 20 countries will attend the meeting.

The INT5153 project aims to improve the understanding of the impact of climate change on fragile polar and mountainous ecosystems on both a local and global scale for their better management and conservation. Seven core and five related benchmark sites have been selected from different global regions for specific assessments of the

impact of climate change with the following expected outcomes and outputs:

Outcomes:

- Improved understanding of the impact of climate change on the cryosphere in polar and mountainous ecosystems and its effects on land-water-ecosystem quality at both local and global scales.
- Recommendations for improvement of regional policies for soil and agricultural water management, conservation, and environmental protection in polar and mountainous regions.

Outputs:

- Specific strategies to minimize the adverse effects of, and adapt to, reduced seasonal snow and glacier covered areas on land-water-ecosystem quality in polar and mountain regions across the world.
- Enhanced interregional network of laboratories and institutions competent in the assessment of climate change impacts on the cryosphere and land-water-ecosystem quality, using isotopic and nuclear techniques.
- Increased number of young scientists trained in the use of isotope and nuclear techniques to assess the impact of climate change on the cryosphere and land-water-ecosystem quality in polar and mountainous ecosystems.
- Platform/database with global access for continuing work and monitoring of impact of climate change on fragile polar and mountainous ecosystems at local and global scales, as well as

¹ In collaboration with the Universidad Austral de Chile, Valdivia, and with logistic support from Chile through the Instituto Antártico Chileno (INACH) and Uruguay

for communicating findings to policy makers and communities.

- Improved understanding of the effects of climate change disseminated through appropriate publications, policy briefs, and through a dedicated internet platform.
- Methodologies and protocols for investigations in specific ecosystems and conservation/adaptation measures for agriculture areas.

Project Background

Modern climate change has been described as ‘the defining human development challenge of the 21st century’. Model projections suggest that global surface temperature change by the end of the 21st century is likely to exceed 1.5°C relative to 1850 to 1900 for all Representative Concentration Pathways adopted by the IPCC (except RCP2.6) (IPCC, 2013). Nowhere are its effects more visible than in the polar and mountainous regions. Climate change is progressing at a rate several times the global average in Western Antarctica. For example, the Antarctic Peninsula region has experienced a rise of ca. 3°C in surface air temperature over the last 50 years (Turner et al., 2005), and 87% of the 244 glaciers along the west coast of the Antarctic Peninsula (AP) have retreated in the last 50 years (Cook et al., 2005).

Investigations carried out in the soils at the foot of retreating glaciers may provide vital clues to what the future holds for farmers in high mountainous regions across the world. Examining the impacts of climate change in Antarctic and Arctic landscapes can be particularly useful for a better understanding of the future impacts of climate change on landscape dynamics (including land degradation and resulting changes in land, water and ecosystem quality) in mountainous regions across the world.

The United Nations Environment Programme (UNEP) reports indicate the need for better access to existing data, better knowledge of data quality and the generation of new data in a manner that allows data sharing among researchers. The results of climate change impact

assessments in Antarctic and Arctic landscapes will enable the modelling of future trends and effects of climate changes, which would otherwise be difficult to acquire in a short period of time.

This information will provide the basis for assisting upland farming communities and regional policy-makers in the adaptation and mitigation of the impacts of climate changes, through improved soil and water management and conservation measures. In particular, communities living in the mountain ranges of Africa, Asia, Europe and North and South America (e.g. in the Alps, Caucasus, Hengduan, Himalayas, Andes, Tibetan Plateau, Rocky Mountains, Sierra Nevada, Cascades, Alaska, Tien-Shan, Mount Kenya and Pamir) will benefit from this information.

The thematic link of global importance, i.e. climate change, and selection of representative benchmark sites in polar and mountainous ecosystems, makes the project INT5153 truly interregional. In particular, the selection of Antarctica as one of the sites in this interregional project gives an additional and specific dimension to its interregional nature. The 1959 Antarctic Treaty handed the Antarctic continent to the world’s researchers, with the explicit goal of ensuring ‘in the interests of all mankind that Antarctica shall continue forever to be used exclusively for peaceful purposes.’ Some 30 countries now operate research bases in Antarctica. For instance, on King George Island, the major Island in the South Shetlands (Western Antarctica), eleven countries from Asia (China, South Korea), Europe (Germany, Poland and Russia), North and South America (Argentina, Brazil, Chile, Peru, Uruguay and the USA), have established scientific bases (Argentina: Isla 25 de Mayo, Chile: Isla Rey Jorge, Russia: Vaterloo or Waterloo). For this reason, in this interregional project, King George Island will play a major role. A simultaneous and long-term interregional approach focusing on a scientific assessment of the impact of climate change on polar and mountainous regions, culminating in recommendations for policies aiming to help with the adaptation of communities to climate change, is essential.