High Summit
LECCO 2013

INTERNATIONAL CONFERENCE ON
MOUNTAINS AND CLIMATE CHANGE

KEY MESSAGES
HIGH SUMMIT 2013

EvK2CNR

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Call for action

We, Representatives of National and International organizations, Mountain Stakeholders, Researchers and Experts of National and International Institutions and Universities, attending the International Conference on Mountains and Climate Change held from 23 to 25 October 2013, in Lecco, Italy;

Recognizing that mountain regions are a fundamental source of water and energy for a large number of people in the world and play a key role to understand the impacts of climate change;

Recognizing the need to improve atmospheric observations and the knowledge of the different mountain cryospheric components such as glaciers, permafrost and snow, together with a more accurate knowledge of the water resources stored in the cryosphere and their contributions to the water balance;

Being aware of the human influence on mountain ecosystems, goods and services and of their implications on the livelihood, health and welfare of mountain people and environment;

Recognizing the need to create a global monitoring network in mountain areas and to make data and research results openly and widely available;

Recognizing the need to improve communication among researchers, local communities and stakeholders, to share information and elaborate mitigation and adaptation strategies to climate change and to address actual needs and priorities;

Through this document, we intend to awaken policy makers to environmental problems in mountain regions, providing them with eight main statements that have been identified as recommendations of the High Summit Conference.

This synthesis report, presented during the last plenary HS session, has been organized in five topics: climate, cryosphere, mountain ecosystems, water, environmental and socio economic impacts. Each of them has been associated with recent key findings of the 5th IPCC Assessment Report, to stress the main actions needed to mitigate the risks induced by climate change, with particular focus on mountain regions.

IPCC Warming of the climate system is unequivocal, and since the 1950s, many of the observed changes are unprecedented over decades to millennia.

It is extremely likely that human influence has been the dominant cause of the observed warming since the mid-20th century.

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• Mountains are unique platforms to continuously monitor background atmospheric composition and climate-related quantities. Observations carried out in mountain regions are therefore representative of wide geographical areas, and should be supported and improved.

• The IPCC Fifth Assessment Report (AR5) has, for the first time, taken into consideration the connections between air quality and climate, which are clearly two sides of the same coin. Win-win solutions have to be found for emission reduction policies that are beneficial to reduce the current warming of the climate and to preserve human health and the well-being of ecosystems.

• It is clear that most aspects of climate change will persist for centuries even if Greenhouse gases (GHGs) emissions are stopped and, therefore, climate mitigation represents a multi-century commitment for human society.

• Reducing Short Lived Climate Forcers (SLCF), short-lived climate forcers, can lead to short-term climate benefits. However, a reduction of SLCFs will not eliminate the need for urgent actions on GHGs.

• It is important for scientific results to be translated into proper environmental policies, supported by local governments and international agencies.

Cryosphere

IPCC Overall glaciers world-wide, with a very few regional exceptions, have continued to shrink as revealed by the time series of measured changes in glacier length, area, volume and mass (very high confidence).

Current glacier extents are out of balance with current climatic conditions, indicating that glaciers will continue to shrink in the future even without further temperature increase (high confidence).

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• As it has been widely recognized, the main cryospheric components in mountain regions are glaciers, snow and permafrost. They are good indicators of change, reflecting trends in a range of conditions and seasons, from winter lowlands to summer alpine areas. For this reason, we need a more accurate quantitative knowledge of the different mountain cryospheric components, of their ongoing changes and of their forcing factors.

• Within the annual cycle of temperature and precipitation, glacial meltwater feeds rivers during the warm/dry season. In this context, the amount of water resources stored in the cryosphere, their contribution to the water balance and the ongoing changes are not well known, and a more accurate quantitative knowledge is necessary.

• Climate change will lead to pronounced changes in the glacial system. A more accurate knowledge of cryospheric hazards and of their distribution is needed, along with the identification of the physical processes involved.

• A stronger coordination among the researchers working in the field of the cryosphere, in hydrology, climatology, geology and ecology is necessary.

Water

IPCC Changes in the global water cycle in response to the warming over the 21st century will not be uniform. The contrast in precipitation between wet and dry regions and between wet and dry seasons will increase, although there may be regional exceptions.

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• Despite the uncertainties in historical data analysis and future projections of the hydrological cycle, it is expected that important seasonal shifts of the hydrological cycle will take place in the near future in mountain regions worldwide. Such seasonal shift may have fallouts upon all uses of water, including agriculture and food security, drinking water, hydropower, and also upon ecosystems.

• Hydrogeological hazards may arise from a modified hydrological cycle, especially within mountain areas, where environmental gradients are tremendously enhanced.

• Integration of water quality and water quality approaches, including sediment quantity and quality monitoring, is extremely important to understand the societal and economic relevance of water state modifications under present and future climate change.

• It is essential that high altitude mountain research with focus upon water resources is strengthened and continued, to monitor, understand, and model the effects of climate change. Particular attention should be given to precipitation processes, and to the development of adaptation strategies. The work of environmental agencies and research centers operating in high altitude environments needs to be continued and sustained henceforward.

Ecosystem

IPCC Natural terrestrial ecosystems (those not affected by land use change) are estimated by difference from changes in other reservoirs to have accumulated 150 [60 to 240] PgC between 1750 and 2010. The gain of carbon by natural terrestrial ecosystems is estimated to take place mainly through the uptake of CO_2 by enhanced photosynthesis at higher CO_2 levels and nitrogen deposition, longer growing seasons in mid and high latitudes.

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• Uncertainties in the state and ongoing changes of mountain ecosystems are still large, and estimates of their response to climate and environmental variations are difficult. For these reasons, we need to improve and expand activities devoted to measurement and observation of mountain ecosystems, for both biotic and abiotic (environmental) parameters.

• In estimating the response of mountain ecosystems to future climate and environmental change, we need to address the issue of the scale gap between the larger-scale climate projections and the small-scale, local ecosystem response. Suitable downscaling methods should be developed and implemented. Similarly, we need to quantitatively estimate the uncertainties in data and models, and their propagation across the modelling chain.

• We need to create a global measurement network in mountain areas, to collect the existing data, stimulate new measurement and observation programs, and make the data, modelling outputs and research results available to the scientific community, to stakeholders, to policymakers and to citizens. Along these lines, a global network for observation and information on mountain environments (GEO-GNOME) has been started within the framework of GEO/GEOSS during the High Summit conference.

• It is essential to improve communication between research results and local communities, especially in the most remote and/or poor areas, in order to make scientific results useful for the peoples living in mountain areas. This should go together with a user-driven definition of monitoring and research priorities and with capacity building at all levels, ranging from the involvement of citizens in scientific monitoring activities to the dissemination of a basic knowledge about ecosystems and the importance of nature conservation (also from an economic standpoint). In making such an endeavour, the role of international organizations and of NGOs is crucial.

Socioeconomic impacts

IPCC Future anthropogenic emissions of greenhouse gases, aerosol particles and other forcing agents (such as land use change) are dependent on socio-economic factors and may be affected by global geopolitical agreements to control those emissions to achieve mitigation.

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• Global Domestic Product – GPD does not take into account the contribution of all the assets involved in the economic process, like natural and human capital. There are, however, some tools which make it possible to identify and to value the contribution deriving from mountain ecosystems, such as environmental services, forests and sustainable agricultural cultivation.

• How much does it cost to produce our GPD? This is the core question. Some important assets are not measured in GDP, determining possible distortions which can be highlighted by comparing different Countries in terms of net saving and human and natural capital.

• The World Bank Group leads a partnership to advance natural capital accounting internationally. An example is the Wealth Accounting and the Valuation of Ecosystem Services partnership for promoting sustainable development by ensuring that natural resources are mainstreamed into development planning and economic accounts.

• Environmental taxation, Payment for Environmental Services and waste collecting/recycling, supported by introducing the recycling cost into the product price, are some effective tools to reduce resources consumption and to move to a green and low carbon economy.

• In the context of policies against climate changes, regulatory and voluntary carbon markets and carbon credits mechanism can value the virtuous exploitation of soils and the maintenance of the territory, typical of mountain ecosystems, in the context of policies against climate changes.

• The definition of a local voluntary market of carbon credits was presented during the High Summit, as a the pilot project which proposes the creation of a trading platform and the definition of agreements designed to reduce/offset the emissions through the purchase of credits related to agriculture and forestry sectors for mountain ecosystems.

Key remarks

Improvement of **atmospheric observations** and knowledge of the different **mountain cryospheric components, especially glaciers, permafrost and snow is needed**, together with a more accurate knowledge of the water resources stored in the cryosphere and their contributions to the water balance.

It is very important that high altitude mountain research focusing upon **water resources** is strengthened and continued, in order to monitor, understand and model the effects of climate change, with particular focus on precipitation processes, and to tackle adaptation strategies.

More detailed **knowledge of mountain ecosystems and of their long-term response to climate change** is necessary, together with the estimate of the potential changes in **ecosystem services.** Ground and remotely sensed data, monitoring campaigns, models and field experiments are all essential pieces of the puzzle which must be solved.

It is important to **ensure scientific research activities in the Mountain Regions and in the Climatic Observatories**, thanks to the support of national governments and international institutions also promoting a better coordination with international agencies.

Reducing **Short-Lived Climate Forcers - SLCF** (Black carbon, Methane, Tropospheric Ozone and Hydrofluorocarbons) can lead to immediate climate benefits and may be particularly important for protecting sensitive regions such as the polar regions, the Himalayas and other worldwide glaciers. Reductions in SLCF emissions can also provide **significant public health benefits**.

Reduction of SLCFs will not eliminate the need for urgent action on GHGs: controls on emissions of both long-lived and short-lived climate forcers are necessary.

In mountain areas, the extremely complex orography and meteorology can make **climate projections** even more uncertain. This uncertainty, mixed with the complexities connected to downscaling and with the uncertainties characterizing climate and ecosystem models, requires a special attention to correctly estimate the reliability of results.

It is very important **to value human and natural capital** as well as implement **actions aimed at virtuous exploitation of soils and maintenance of the territory typical of mountain ecosystems**: building upon this, some tools able to identify and value environmental services (environmental taxation, Payment for Environmental Services, waste collecting/recycling, **carbon credits mechanisms**, innovative **regulatory and voluntary carbon markets**) need to be developed in a short time.

High summit conference scientific sessions

OPENING REMARKS
Surendra Raj Kafle • Vice Chancellor of NAST Nepal Academy of Science and Technology, Nepal
Surendra Shrestha • Director of International Environment Technology Centre, UNEP, Japan
Deon Terblanche • Director of Atmospheric Research and Environment Branch WMO, Switzerland
Barbara J. Ryan • Secretariat Director of the Intergovernmental Group on Earth Observations (GEO), Switzerland
Maria Cristina Messa • Vice President of CNR, Italy

CLIMATE SESSION
Martin Beniston • Institute for Environmental Sciences, University of Geneva, Switzerland
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Gregory R. Carmichael • Center for Global & Regional Environmental Research, University of Iowa, USA
Vincenzo Artale • Italian National Agency for New Technologies, Energy and Sustainable Economic Development, Italy
Bhupesh Adhikary • Ev-K2-CNR Committee, Nepal
Thomas Abeli • Department of Earth and Environmental Sciences, University of Pavia, Italy
Raffaella Balestrini • IRSA Water Research Institute, CNR, Italy

MOUNTAIN ECOSYSTEMS SESSION
Antonello Provenzale • ISAC Institute of Atmospheric Sciences and Climate, CNR, Italy and GEO Ecosystems SBA Coordinator, Italy
Priptal Soorae • IUCN International Union for Conservation of Nature / SSC Re-introduction Specialist Group, United Arab Emirates
Guido Trivellini • WWF World Wildlife Fund, Switzerland
Bhaskar Singh Karky • ICIMOD International Centre for Integrated Mountain Development Directorate, Nepal
Dinesh Bhuju • NAST Nepal Academy of Science and Technology, Nepal
Marino Gatto • Department of Electronics and Information, Politecnico di Milano, Italy
Alberto Basset • Department of Biological and Environmental Sciences and Technologies, University of Salento, Italy
Valerio Sbordoni • Department of Biology, University of Rome "Tor Vergata", Italy

CRYOSPHERE SESSION
Claudio Smiraglia • Department of Earth Sciences "Ardito Desio", University of Milan and Italian Glaciological Committee, Italy
Frank Paul • Glaciology, Geomorphodynamics and Geochronology Physical Geography Division, Department of Geography, University of Zurich, Switzerland
Valter Maggi • Department of Earth and Environmental Sciences, University of Milano-Bicocca, Italy
Yaoming Ma • Institute of Tibetan Plateau Research, Chinese Academy of Sciences, China
Mauro Guglielmin • Department of Theoretical and Applied Sciences, University of Insubria, Italy
Shresth Tayal • Centre for Himalayan Ecology, Water Resources Division, TERI, India
Ethan Gutmann • National Center for Atmospheric Research, Boulder, USA

WATER SESSION
Renzo Rosso • Department of Civil and Environmental Engineering, Politecnico di Milano, Italy
Daniele Bocchiola • Department of Civil and Environmental Engineering, Politecnico di Milano, Italy
Martin Beniston • Institute for Environmental Sciences, University of Geneva, Switzerland
Andrea Lami • ISE Institute of Ecosystem Study, CNR and URT Ev-K2-CNR, Italy
Bodo Bookhagen • Geography Department, University of California, Santa Barbara, USA

MOUNTAIN NATIONAL PARKS SESSION
Franco Mari • Scientific Advisor SEED Project, Ev-K2-CNR Committee, Italy
Teodoro Andrisano • Majella National Park, Italy
Wolfgang Platter • Stelvio National Park, Italy
Ashiq Ahmad Khan • Pakistan Scientific Board, Ev-K2-CNR Committee, Pakistan
Andrew G. Seguya • Executive Director/Secretary Board of Trustees, Uganda Wildlife Authority, Uganda
Abdulwahid Hussein Haji Said • Erbil Governorate Board member for Protected Areas, Kurdistan Region, Iraq
Mukunda Raj Prakash Ghimire •Joint Secretary, Ministry of Forest and Soil Conservation, Government of Nepal, Nepal

ENVIRONMENTAL and SOCIO ECONOMIC IMPACTS OF CLIMATE CHANGE SESSION
Veerabhadran (Ram) Ramanathan • Scripps Institution of Oceanography, University of California, San Diego, USA
Muhammad Akram Kahlown • Pakistan Scientific Board, Ev-K2-CNR Committee, Pakistan
Hildegard Diemberger • Social Anthropology, University of Cambridge, UK
Pietro Boccardo • ITHACA Information Technology for Humanitarian Assistance, Cooperation and Action, Italy
Annalisa Cogo • Biomedical Sport Studies Center, University of Ferrara, Italy
Mylvakanam Iyngararasan • Division of Environmental Law and Conventions, UNEP, Kenya
Michael Gatari • Institute of Nuclear Science & Technology, University of Nairobi, Kenya
Gérard Marquis • Mountain Partnership Secretariat - FAO, Italy

MARKET BASED MEASURES FOR ENVIRONMENT SESSION
Piero Cipollone • Executive Director, The World Bank, Washington, USA
Fabrizio Acerbis • PricewaterhouseCoopers
Bhaskar Singh Karky • ICIMOD International Centre for Integrated Mountain Development Directorate, Nepal
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SHARING OF THE SYNTHESIS REPORT
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Elisa Vuillermoz • Ev-K2-CNR Committee, Italy
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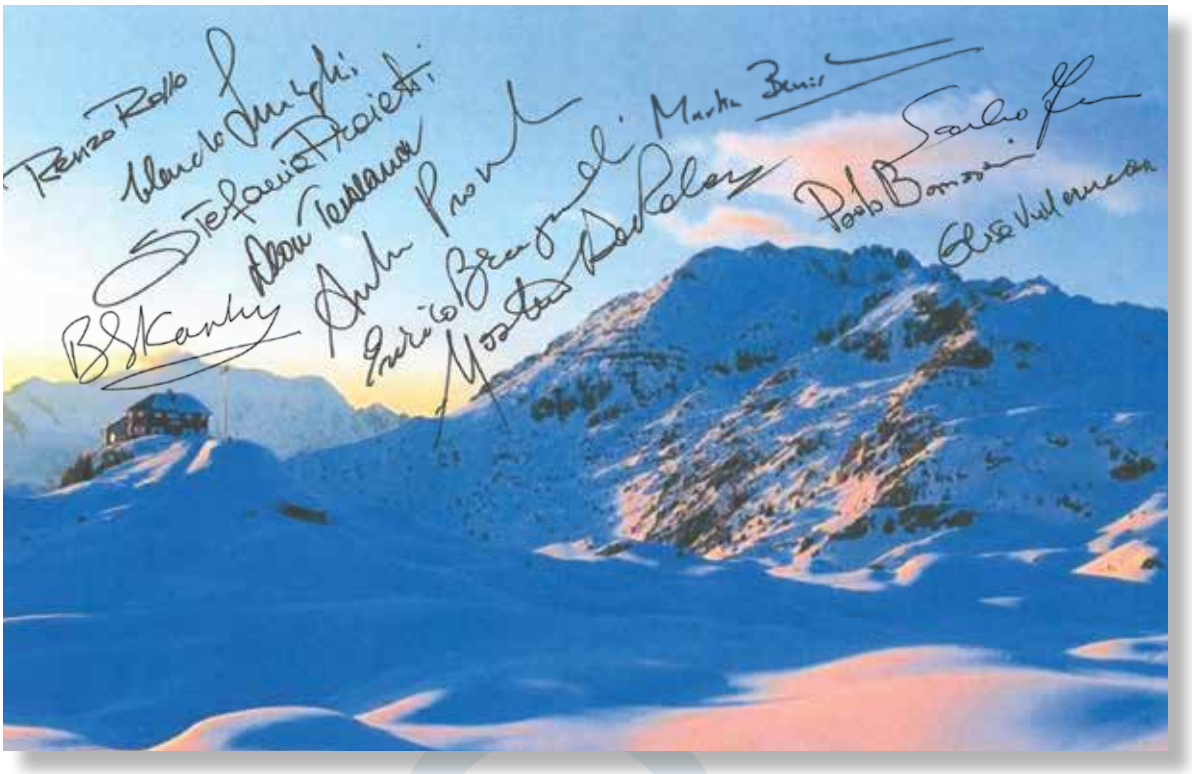
CLOSING REMARKS AND CONCLUSION
Gaetano Leone • Deputy Secretary, IPCC
Enrico Brugnoli • Department of Earth System Science and Environmental Technologies, CNR, Italy
Marco Bocciolone • Vice Rector of Politecnico di Milano - Polo territoriale di Lecco, Italy



This final report of the International Conference High Summit 2013 was signed on October 25, 2013 , by:
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November 2013 – COP19, Warsaw

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