Climate Change, Glacier Response, and Vegetation Dynamics in the Himalaya

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Editors

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Contributions Toward Future Earth Initiatives

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Foreword

I have been working on a report for the FAO recently that is about how the mountains of the world reached the level of the United Nations that initiated a mountain chapter in the so-called Agenda 21 and with 10 mountain resolutions in the UN General Assembly between 1998 and 2014. In this report the Himalaya is playing a very important role.

In the present book, I found in 3 sections and 20 chapters having a lot of highly promising and fascinating scientific problems or approaches, which are fundamental for the future of our planet and its still growing population. In 1960 the world population was about three billion, but in 2050 only two countries, China and India, will have together three billion inhabitants, following the UN Population Division. In "the International Year of Mountains 2002", the FAO as task manager of the mountain chapter in Agenda 21 published a report that 718 million people are living in the mountains of the world, of these 625 million in developing countries and of these 250–370 million are with food insecurity. The ICIMOD (International Mountain Centre for Integrated Mountain Development) in Kathmandu has calculated that around 1,3 billion people are living in the watersheds of the ten most important rivers from the Himalaya and the Tibet Plateau. What will be the situation at the end of century?

This question is an introduction to the first section about "Climate Change", but as long as some big and powerful countries are not cooperating, we are confronted with very serious problems. All the same the chapters of the first section are looking very promising, and they have a high value also for the other sections. The second section with the title "Climate Change Impact on Glaciers and Hydrology" is fundamental, not only for the mountain communities, but also for the surrounding lowlands with an irrigation-depending agricultural production. Looking at the second half of our century, when the glaciers of the "Third Pole" (Himalaya) are getting smaller and thinner and the run-off will be reduced, and then we must know that the Himalaya is the most sensitive indicator for climate change. We should never forget that water is often crossing national borders in a vast regional mountain system like the Himalaya. Lonergan said in a publication in 2005 in the UNEP Journal "Our Planet" about "Water and War": "If there is a political will for peace, water will not

be a hindrance. If you want reasons to fight, water will give you ample opportunities". The third section with "Climate Change and Vegetation Dynamics" is not only concerning the treeline, but it is an indicator for the whole biodiversity. Different altitudinal belts represent a compression of different climatic zones in a vertical structure on a shortest possible horizontal distance. This means that the higher mountains and especially the Himalaya are indeed the "sentinels" of climate change.

From this overview with the three sections, let's go down to the 20 chapters and their authors. Where are they coming from and where are they going to? Most impressive are the mixed chapters with authors from the north and from the south. These chapters and the whole book reminded me of a speech of Kofi Annan, the UN Former Secretary-General, during the UN Millennium Declaration, valid until 2015: "What is needed is a true partnership of developed and developing countries – a partnership that includes science and technology. No nation can afford to be without science and technology capacity". It is fascinating to see the different research fields and places around the Himalaya. We hope that exactly this Springer publication will help for a north-south dialogue, but also for a science-policy dialogue and for a transboundary cooperation, as it was recommended in 2012 in the Rio+20 conference and described in the final document "The Future We Want". We select some sentences: Paragraph 210: "Mountain glaciers are retreating and getting thinner with increasing impacts on the environment and human wellbeing". Paragraph 211: "We invite States to strengthen cooperative action with effective involvement and sharing of experience of relevant stakeholders by strengthening existing arrangements and regional centres of excellence for sustainable mountain development". Paragraph 212: "We call for greater efforts towards the conservation of mountain ecosystems, including their biodiversity. We encourage States to adopt a long-term vision and holistic approaches through mountain specific policies into national sustainable development strategies". You may see that your book is fulfilling these UN declarations from 2012.

By the way, I have been strongly involved in the foundation of the ICIMOD and I was generously invited to its 30th anniversary in Kathmandu 2013. ICIMOD is the centre for eight Himalayan countries. I hope that transboundary cooperation with this institution will be possible in the future. I thank once more the small group of the three editors for their wonderful composition of the book, but my acknowledgements go also to all the authors of the 20 chapters for their engagement and cooperation for the highest mountain system of the world!

Ex-President, International Geographical Union Bruno Messerli
Professor Emeritus, Institute of Geography
University of Bern, Switzerland

Foreword

There are numerous reasons why this book is important and its publication is timely. Firstly, the role of glaciers in relation to climate change is akin to the role of canaries in a coal mine. They provide one of the first signals that something is amiss. Glaciers worldwide are recessing not all of them but the vast majority – and the scientific consensus is that the reason for this is global warming. But the glaciers in the Himalaya play a special role that is not well appreciated by those outside of the Indian subcontinent. The Himalaya themselves form a vertical massif that protrudes into the lower atmosphere. The heating and cooling of the surface of the Himalaya and the Tibetan plateau plays a major role in the dynamics of the atmospheric circulation and thus a major role in the climate of the Asian region. If and when the Himalayan glaciers recede, they will change the nature of the albedo, the reflected sunlight, and are thus expected to induce major changes in circulation and climate.

If and when the Himalayan glaciers recede, a possibly even more serious change will be that of the lifestyle of the population on the Indian subcontinent that rely on the waters that flow from melting glaciers. A continent that is presently well supplied with water through its fluvial system could then endure water scarcity. The likelihood is that for a region as densely populated as the Indian subcontinent, any sudden diminution of the water supply will cause social disruption if not chaos and possible armed conflict. Thus, the more we can learn about the dynamics of glaciers and vegetation in the Himalaya, the better.

Issues such as this will be studied by the new international research programme called Future Earth, which is the major new initiative of the International Council of Science (ICSU) that brings together at least three of the existing ICSU international research programmes into this new one. It seeks to examine the effects of global change on all aspects of the biosphere and anthroposphere. Although ICSU initiated this process of merging its four environmental programmes to become Future Earth, it has become a multipurpose programme cosponsored by many organizations including ICSU.

The scientific community is presently engaged in a global dialogue to determine how it can participate in and assist Future Earth. The International Union of Geodesy and Geophysics (IUGG) established a new entity, the Commission for Climate and

Environmental Change, to be the vehicle by which IUGG could co-ordinate its science in a way that would assist Future Earth, and the Commission has so far concentrated on the hydrological issues involved in the initiative known as Panta Rhei and in a study of the implications of weather, climate and food security.

Climate Change and Dynamics of Glaciers and Vegetation in the Himalaya is a topic that is of obvious importance to both of these initiatives, of importance to global change science and of importance to the future of the societies that live in the Indian subcontinent. In short it is a topic of importance to Future Earth and to the Future of the Earth.

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