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Epilogue

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Epilogue

Martin F. Price

The preceding chapters were completed in early 2012. In June of that year, the Rio+20 conference took place. This epilogue considers, first, the attention given to mountains at that conference and subsequently in global processes focussing on sustainable development. The next section discusses a number of international organisations that were either introduced earlier in the book or have emerged following activities that have been described, with an emphasis on the decade since the first edition of this book was published. This epilogue concludes with comments on current and long-term issues that need to be considered in the context of sustainable mountain development.

Mountains on the Global Stage

Mountains at Rio+20

The outcome document of the Rio+20 conference, ‘The Future We Want’¹, contains 283 non-binding paragraphs, of which three refer specifically to mountains.

Mountains

210. *We recognize that the benefits derived from mountain regions are essential for sustainable development. Mountain ecosystems play a crucial role in providing water resources to a large portion of the world's population; fragile mountain ecosystems are particularly vulnerable to the adverse impacts of climate change, deforestation and forest degradation, land use change, land degradation and natural disasters; and mountain glaciers around the world are retreating and getting thinner, with increasing impacts on the environment and human well-being.*
211. *We further recognize that mountains are often home to communities, including indigenous peoples and local communities, who have developed sustainable uses of mountain resources. These communities are, however, often marginalized, and we therefore stress that continued effort will be required to address poverty, food security and nutrition, social exclusion*

¹ Available at <https://sustainabledevelopment.un.org/content/documents/733FutureWeWant.pdf>

and environmental degradation in these areas. We invite States to strengthen cooperative action with effective involvement and sharing of experience of all relevant stakeholders, by strengthening existing arrangements, agreements and centres of excellence for sustainable mountain development, as well as exploring new arrangements and agreements, as appropriate.

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, including through incorporating mountain-specific policies into national sustainable development strategies, which could include, inter alia, poverty reduction plans and programmes for mountain areas, particularly in developing countries. In this regard, we call for international support for sustainable mountain development in developing countries.*

One might consider that the inclusion of only three paragraphs indicates that the signatories of the document—Heads of State and Government and high-level representatives—did not recognize the importance of mountains to the same extent as at UNCED in 1992, whose final document—‘Agenda 21’—devoted one of its 40 chapters to sustainable mountain development, as described in Chapter 13 of this book. Nevertheless, it is notable that other global issues—such as climate change, biodiversity and desertification, each with a

UN Convention signed at UNCED—receive similar attention in ‘The Future We Want’. Consequently, it may be argued that the three paragraphs on mountains did show continued global attention to sustainable mountain development and reflect progress in the mountain cause.

To provide context for this statement, it is necessary to go back to 1993, when FAO was designated the lead agency for implementing the mountain chapter of ‘Agenda 21’. As described in Chapter 13 of this book, from 1993 onwards, FAO organised a series of meetings that led, among other things, to the establishment of the Mountain Forum in 1995 and the International Year of Mountains 2002. 2002 was also the year of the Rio+10 conference, the World Summit on Sustainable Development (WSSD). For the mountain cause, this meeting was important because it included the founding of the Mountain Partnership: a ‘voluntary alliance of partners dedicated to improving the livelihoods of mountain people and protecting mountain environments around the world’.² The key players in its establishment were the Governments of Switzerland and Italy, FAO, and UNEP; effectively, it provided a formal structure to replace the informal one that had existed since 1993. The Mountain Partnership is coordinated by FAO and brings together a wide range of mountain stakeholders, including governments as well as international, inter-governmental and scientific organisations and NGOs and private sector companies active in many fields. From the end of 2012 to late 2021, its membership has more than doubled, from

² <https://www.fao.org/mountain-partnership/about/en/>.

200 members from 73 countries to 437 members from 96 countries.

During the preparations for Rio+20, the Mountain Partnership Secretariat played a key role in bringing together many of its members—notably, the founding governments and organisations, ICIMOD, the Centre for Development and Environment (CDE) at the University of Bern, and the Mountain Research Initiative—to draft the text on mountains. Other input came from the ‘Major Groups’ of the UN Commission on Sustainable Development and negotiators at the Preparatory Committee meetings for the WSSD. Thus, the three paragraphs may be considered the product of a broad consultative process which recognised that the challenges identified in 1992 were still largely current, and further exacerbated by climate change. This process was complemented by the preparation and publication of a series of ten regional reports on progress towards sustainable mountain development from 1992 to 2012, also coordinated by the Mountain Partnership.³

Mountains and the Sustainable Development Goals

Three years after the Rio+20 conference, the UN convened a high-level plenary meeting of its General Assembly, in New York, to adopt the post-2015 development agenda, titled ‘Transforming Our World: The 2030 Agenda for Sustainable Development’.⁴ This includes 17 Sustainable Development Goals (SDGs)

and 169 targets. As for the previous conference, the Mountain Partnership and its members conducted a very active campaign over the preceding two years, advocating for the inclusion of text specific to mountains. The outcome is that mountains are mentioned, first in paragraph 33 of the final document, which refers to the conservation and sustainable use of ‘oceans and seas, freshwater resources, as well as forests, mountains and drylands’, and also in three targets. One of these refers specifically to mountains. Under SDG 15, which considers the sustainable use of terrestrial ecosystems, target 15.4 is:

By 2030, ensure the conservation of mountain ecosystems, including their biodiversity, in order to enhance their capacity to provide benefits that are essential for sustainable development.

Mountains are also mentioned in target 15.1:

By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements;

and also under SDG 6, on freshwater: target 6.6 is:

By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes.

³ The regional reports considered the mountains of Africa; the Alps; the Andes; Central Asia; Central, Eastern, and Southeastern Europe; the Hindu Kush-Himalaya; Meso America; the Middle East and North Africa; North America; Southeast Asia and the Pacific. They are available at <https://www.fao.org/mountain-partnership/publications/policybriefs/en/>.

⁴ Available at <https://sdgs.un.org/2030agenda>.

Again, while four specific mentions of mountains may appear few in number, the 2030 agenda mentions other geographic entities, such as drylands and deserts, a similar number of times. The three targets show continued global attention to the mountain cause, particularly on the topics of biodiversity conservation, ecosystem services, and water resources.

Since 2015, considerable work has been done on the relevance of not only these SDGs and their targets, but many others, for sustainable mountain development. An issue brief published by CDE and the Mountain Research Initiative⁵ considers this in relation to five mountain countries—Ecuador, Kyrgyzstan, Nepal, Switzerland and Uganda—and concludes that, despite considerable differences between the mountain regions of these countries, there are also common development priorities. However, this document and a related working paper considering Bangladesh, Chile, Ecuador and Nepal⁶ both conclude the lack of disaggregated data to sufficiently distinguish the situation in these areas from that at the national scale—at which the SDGs are typically assessed and reported—remains a key challenge for action in mountain areas. This challenge was recognised three decades ago in Chapter 13 of ‘Agenda 21’; although our knowledge and understanding of mountain environments and people has increased significantly, there is much work yet to be done.

Keeping Mountains on the Agenda

While the availability of disaggregated data is a continuing challenge with regard to many of the ‘facts’ of sustainable mountain development, data for human populations at the global scale are reasonably robust. Consequently, the Mountain Partnership Secretariat has been able to prepare three reports that consider the distribution of mountain people around the world and the underlying factors of vulnerability that many of them face. The latest report⁷ concludes that, in 2017, the global mountain population was nearly 1.1 billion, 15 percent of the world’s population—and that this represented an increase of 89 million people since 2012, almost all in developing countries. Crucially, 346 million of these people—half of those living in the mountains of developing countries—were vulnerable to food insecurity: their daily availability of calories and protein is below the minimum threshold for a healthy life. These are fundamental issues for sustainable mountain development.

Keeping mountains on the global agenda requires showing their relevance to global processes. Consequently, the Mountain Partnership Secretariat, together with other members, has published reports that show the relevance of mountains in relation to the issues addressed by: the global conventions on climate change, biodiversity, and desertification; International Years, such as the

⁵ Wymann von Dach S, Bracher C, Peralvo M, Perez K, Adler C (2018) Leaving no one in mountains behind: Localizing the SDGs for resilience of mountain people and ecosystems. Bern: Centre for Development and Environment and Mountain Research Initiative, with Bern Open Publishing.

⁶ Bracher C, Wymann von Dach S, Adler C (2018). Challenges and opportunities in assessing sustainable mountain development using the UN Sustainable Development Goals. Bern: Mountain Research Initiative and Centre for Development and Environment.

⁷ Romeo R, Grita F, Parisi F, Russo L (2020) Vulnerability of mountain peoples to food insecurity: updated data and analysis of drivers. Rome: Food and Agriculture Organisation of the United Nations.

International Year of Family Farming (2014); the Sendai Framework for Disaster Risk Reduction (2015–2030); and the 2030 Agenda.⁸ In addition, the Secretariat and FAO prepare reports on sustainable mountain development for the UN Secretary General, which provide valuable summaries of the activities of governments and organisations around the world. Over the past decade, these reports have been presented in 2013, 2016 and 2019 to the UN General Assembly, which has then adopted a Resolution on this topic.⁹ All of these reports show that mountains are increasingly important in key global contexts and that the number of governments and organisations active in the mountain cause has continued to grow, and the resolutions underline that sustainable mountain development remains on the global agenda. This was further substantiated when, in December 2021, the UN General Assembly adopted a resolution, sponsored by 94 governments, declaring that 2022 would be the International Year of Sustainable Mountain Development.¹⁰

Mountain Organisations

Among the members of the Mountain Partnership are many international organisations, some of which have been mentioned in previous chapters. This section focuses on five of these organisations, recognising that there are many others which have been and are active,

to a greater or lesser extent, on issues related to sustainable mountain development. In addition, there are many regional and national organisations active in this field.

In the Hindu Kush Himalaya (HKH), ICIMOD, introduced in Chapter 3, continues as a unique intergovernmental organisation that is supported by the governments of eight countries¹¹ in a region where cooperation is often not strong, if even existent, and there is a history of conflict which, in some cases, continues. Nevertheless, ICIMOD staff from all eight countries work together with the aim of developing and sharing ‘research, information and innovations to empower people’ in the mountains of these countries. ICIMOD provides ‘a regional platform where experts, planners, policymakers and practitioners can exchange ideas and perspectives towards the achievement of sustainable mountain development’.¹² Its three strategic impact areas are reduced poverty, enhanced resilience by reducing physical and social vulnerabilities, and enhanced ecosystem services. In addition to many activities on these topics over the past decade, a particularly notable accomplishment has been the publication of the HKH Assessment in 2019, following five years of collaborative work by more than 350 scientists from the HKH and beyond.¹³ It sets a global benchmark for the integrated assessment of the available knowledge for a large mountain region and also presents scenarios

⁸ These are available at <https://www.fao.org/mountain-partnership/publications/mountain-partnership-key-publications/en/>.

⁹ These are available at <https://www.fao.org/mountain-partnership/publications/un-documents/en/>.

¹⁰ <https://www.fao.org/mountain-partnership/publications/publication-detail/en/c/1460891/>.

¹¹ Afghanistan, Bangladesh, Bhutan, China, India, Myanmar, Nepal and Pakistan.

¹² ICIMOD (2017) Strategy and results framework. Kathmandu: International Centre for Integrated Mountain Development.

¹³ Wester P, Mishra A, Mukherji A, Shrestha AB (eds) (2019) The Hindu Kush Himalaya assessment—Mountains, climate change, sustainability and people. Cham: Springer Nature Switzerland AG.

for the future of the region, in the context of the SDGs. One measure of the global recognition of the importance of this region is that the funding for the assessment came from the governments of not only the eight countries of the HKH, but also Australia, Austria, Sweden, Switzerland and the UK. Within the region, the assessment was used as the basis for consultative processes in the eight countries, resulting in a ‘Call for Action’ with specific actions towards a shared vision that the future of the region should be ‘one in which its societies and its people—children, women and men—are prosperous, healthy, peaceful and resilient in a healthy environment’.¹⁴

In the past decade, two international organisations have been increasingly active and are introduced here because of their focus on collaboration and research: the Mountain Research Initiative (MRI) and the Global Mountain Safeguard Research (GLOMOS) programme of the UNU Institute for Environment and Human Security (UNU-EHS) and Eurac Research. The MRI was established in 2001 and has been primarily supported by a number of Swiss institutions ever since. The MRI ‘envisions a world in which research to identify and understand drivers and processes of global change in mountains is promoted and linked across disciplines and mountain regions worldwide’.¹⁵ Effectively, it provides a means to facilitate comparative worldwide research on mountain issues, as called for at the MAB-6 Lillehammer meeting in 1973,

described in Chapter 2 of this book. Importantly, since its establishment nearly three decades later, the MRI has been allied with the successive international programmes on research on, and monitoring of, global change: first, the International Geosphere-Biosphere Programme (IGBP), the International Human Dimensions Programme (IHDP), and the Global Terrestrial Observation System (GTOS); and subsequently Future Earth and the Group on Earth Observations (GEO). An early activity of the MRI was to publish a book—Global Change and Mountain Regions: An Overview of Current Knowledge¹⁶—which, in many ways, updated ‘Mountains of the World: A Global Priority’, published in 1997 (see Chapter 13).

As mentioned above, the MRI collaborated with CDE on the assessment of sustainable mountain development in the context of the SDGs from 2013 to 2018. In addition, over the past decade, the MRI has played a vital role in facilitating globally coordinated research, usually working with other active networks and organisations, resulting in key global publications on biodiversity, high-elevation climates, glacier recession and meltwater, and ecosystem services in mountain areas.¹⁷ These topics are all connected, and considered in an MRI-led initiative with GEO, initially launched in 2016 as the GEO Global Network for Observations and information in Mountain Environments (GEO-GNOME) and renamed in 2021 as GEO Mountains. Its

¹⁴ ICIMOD (2020) The HKH Call for Action to sustain mountain environments and improve livelihoods in the Hindu Kush Himalaya. Kathmandu: ICIMOD.

¹⁵ <https://www.mountainresearchinitiative.org/who-we-are>.

¹⁶ Huber UM, Bugmann HKM, Reasoner MA (eds) (2005) Global change and mountain regions: An overview of current knowledge. Dordrecht: Springer.

¹⁷ The resulting publications may be found at <https://www.mountainresearchinitiative.org/activities/mri-publications>.

aim is to ‘bring together research institutions and monitoring networks to enhance the discoverability, accessibility and usability of a wide range of relevant data and information pertaining to environmental and socio-economic systems—both in situ and remotely sensed—across global mountain regions’.¹⁸ It should therefore lead to further progress in addressing the perennial need for mountain-specific data at all spatial scales. As a GEO initiative, GEO Mountains is designed to support the 2030 agenda, Sendai Framework and the UN Framework Convention on Climate Change. In the latter context, MRI, other Swiss-based institutions¹⁹ and ICIMOD have been leading the preparation of a chapter on mountains for the sixth assessment of the Intergovernmental Panel on Climate Change (IPCC), the first IPCC report to include such a chapter since the second assessment in 1994. MRI activities include not only research and knowledge exchange, but also capacity-building; MRI has a working group on education for sustainable development²⁰ and was also closely involved in four global conferences of mountain scientists.²¹ Such activities are essential not only for providing opportunities to survey the state of the art, and gaps, in mountain research worldwide, but also for ensuring the long-term continuity of communities of active scientists and informed practitioners

and policymakers for sustainable mountain development.

GLOMOS was established in 2019 in North Tyrol, Italy, and represents a renewed attention to mountain issues within the UNU two decades after the conclusion of activities within its ‘Highland-Lowland Interactive Systems’ (later, ‘Mountain Geocology and Sustainable Development’) project, described from Chapter 6 onwards, and a subsequent project in the Pamir-Alai.²² GLOMOS aims to be ‘an interface between the international mountain research community and the UN system’. Its goal is to ‘contribute to the development of resilient mountain communities towards natural and man-made hazards and disaster risks, to protect the wealth of biological and cultural diversity, and to support adaptive solutions and sustainable transformation processes within these highly sensitive social-ecological systems, first and foremost in the Global South’.²³ As well as activities in Ecuador and South Africa,²⁴ a major current project is the preparation of an edited book, to be published in 2022, that will provide a state-of-the-art overview of research, identify challenges and enhance understanding of the diversity of mountain contexts in regions around the world, and present the recognition of mountain issues within international frameworks. This will be the first

¹⁸ <https://www.geomountains.org/rationale-and-objectives/rationale>.

¹⁹ University of Zurich, Helvetas.

²⁰ This published a special issue (Vol 40, 4) of MRD in 2020.

²¹ In Perth, Scotland in 2005, 2010 and 2015, organised by the Centre for Mountain Studies, Perth College, University of the Highlands and Islands; and in 2019, organised by the University of Innsbruck. The former two conferences both resulted in special issues of MRD (Vol. 32, S1; Vol. 36, 4), as well as other publications.

²² Pachova NI, Renaud FG, Hirsch D, Anarbaev M, Mamatov T, Ergashev M, Olimov I (2012) Towards sustainable land management in the Pamir-Alai Mountains. Bonn: United Nations University Institute for Environment and Human Security.

²³ <https://ehs.unu.edu/about/departments/glomos#overview>.

²⁴ Szarzynski J, Delves JL, Fontanella Pisa P, Membretti A, Robles SP, Pedoth L, Schneiderbauer S (2020) The Global Mountain Safeguard Research (GLOMOS) Programme: Linking academia and the United Nations system for transformative resilience in mountain regions. *Mountain Research and Development* 40(4): P4–P7.

overview of global mountain research and key issues since 2005.

Both the MRI and GLOMOS are partners in a new initiative on mountain issues within UNESCO's MAB Programme, the World Network of Mountain Biosphere Reserves, launched in 2021 following a decade during which there were no coordinated mountain activities within this programme²⁵. In addition, the MRI and GLOMOS—as well as other organisations including FAO, ICIMOD and CDE—are members of the International Mountain Society, which continues to publish Mountain Research and Development (MRD). Since it was founded in 1981 by Jack Ives, who was its first editor, as described in previous chapters, the scope of the journal has continued to expand²⁶. While there are other international journals with a mountain focus, MRD is pre-eminent in its field. It is unique in publishing not only peer-reviewed research, but also development approaches and experiences from mountains around the world as well as evidence-based agendas for research and policy; and actively fostering science-practice-policy dialogue and capacity-building for scientists in developing countries.

The range of organisations active in 'getting the facts right', disseminating them and increasing the capacity of people around the world to work towards sustainable mountain development has increased significantly over the past decade, as shown by the growing membership of the Mountain Partnership.

This epilogue has only specifically referred to six of these organisations. IMS and ICIMOD have been in existence for some decades; MRI and the Mountain Partnership have been active for two decades; and GLOMOS and the new MAB initiative show the renewed interest of UNU and UNESCO in mountain issues. There is significant collaboration between these organisations, and many of their activities are undertaken jointly with other organisations, of many different types, active at various scales. The majority of all the active organisations are members of the Mountain Partnership, whose membership includes the governments of 60 countries. The extent to which they are committed to sustainable mountain development, both in their own countries and more widely, varies. Nevertheless, to resume a theme introduced earlier in this book, Switzerland has continued to play a particularly important role in the mountain cause and is a major contributor to the activities of the Mountain Partnership, ICIMOD, MRI and IMS; the latter two are both located at the University of Bern.

Key Issues for Sustainable Mountain Development

The concept of sustainable mountain development was first introduced at the international scale in 1992, in Chapter 13 of 'Agenda 21'. This specified two 'programme areas' that needed to be addressed towards achieving this goal: 'generating and strengthening

25 Price MF, Schaaf T, Cárdenas Tomažič MR, Fontanella Pisa P, Köck G (2022) The World Network of Mountain Biosphere Reserves. In Schneiderbauer S, Szarzynski J, Fontanella Pisa P, Shroder JF (eds) Safeguarding mountains: A global challenge. Amsterdam: Elsevier (in press).

26 <https://www.mrd-journal.org/about/>.

knowledge about the ecology and sustainable development of mountain ecosystems' and 'promoting integrated watershed development and alternative livelihood opportunities'.²⁷ Ten years later, in 2002, a series of background papers were prepared for the Bishkek Global Mountain Summit, the final global event of the International Year of Mountains.²⁸ These identified 10 sets of key issues for sustainable mountain development. It is beyond the scope of this epilogue to comment on subsequent progress, though the reports on sustainable mountain development prepared for the UN General Assembly provide useful summaries, and it is to be hoped that the forthcoming book being coordinated by GLOMOS will provide an up-to-date assessment. More recently, as part of the work done in 2015-2018 by CDE and MRI on sustainable mountain development in the context of the SDG targets, a number were identified as particularly relevant. These relate to climate change and its impacts; the resilience of mountain people and ecosystems; the conservation and sustainable use of these ecosystems; the eradication of poverty; sustainable tourism; and health and education. All of these were recognised as important in 2002, and all but climate change in Chapter 13 of 'Agenda 21' ten years earlier. A key conclusion of this recent work comes back to many of the themes explored in this book: 'Given the high sensitivity of mountains to

climate change, the many disaster risks, and the diversity of priorities, entry points must be found for policies and interventions that simultaneously *address critical development issues and strengthen the resilience of mountain people and ecosystems*'.²⁹

This epilogue has been written two years into the coronavirus disease (COVID-19) pandemic, which has very clearly shown how important it is that mountain people and ecosystems are resilient, or can be supported to move in this direction. In addition to its direct health and mortality effects, COVID-19 has had many other impacts on mountain people. In the HKH, these have included increases in psychological stress, gender-based violence, and gender, social and economic inequalities; and the disruption or collapse of food systems and supply chains. The last of these is one of the impacts that shows the extent to which mountain societies and economies are entwined with global economies; others are the loss of remittance incomes and the cessation of tourism.³⁰ All of these impacts are likely to have been experienced in mountain communities in all developing countries and—apart from remittances and in countries where the tourism industry is more dependent on domestic than international travel—worldwide. As economies recover and travel becomes more possible, some of these impacts are starting to become less severe, though the pandemic will have many long-term effects.

27 United Nations (1992) *Managing Fragile Ecosystems: Sustainable Mountain Development*. Chapter 13 in *Agenda 21*, Rio de Janeiro: United Nations Conference on Environment and Development.

28 These were published as Price ME, Jansky L, Iatsenia AA (eds) (2004) *Key issues for mountain areas*. Tokyo: UNU Press.

29 Wymann von Dach S, Bracher C, Peralvo M, Perez K, Adler C (2018) *Leaving no one in mountains behind: Localizing the SDGs for resilience of mountain people and ecosystems*. Bern: Centre for Development and Environment and Mountain Research Initiative, with Bern Open Publishing. Italics in original.

30 ICIMOD (2020) *COVID-19 impact and policy responses in the Hindu Kush Himalaya*. Kathmandu: International Centre for Integrated Mountain Development.

The other pre-eminent global context is climate change, which is having—and will continue to have—increasing impacts on mountain ecosystems, and the people who live in them, around the world. The frequency and intensity of ‘natural disasters’—very often influenced by human activity, as described in previous chapters—is increasing. Such trends are of existential significance not only for mountain people but for billions living downstream, and show the importance of recognising the connections between all the different global challenges and crises that we face. Unfortunately, the outcomes and commitments of COP26, held in Glasgow in November

2021, seem unlikely to have been substantive enough to decrease emissions of greenhouse gases to limit global warming to 1.5°C. The world is becoming a more uncertain place. Ever more than before, there is a need for governments, international organisations, non-governmental organisations and private businesses to cooperate in the interests of sustainable mountain development—and it is to be hoped that the International Year of Sustainable Mountain Development, 2022, will catalyse and strengthen such cooperation, with valuable long-term outcomes. A secure future for the mountains will benefit the entire world.

APPENDIX I

List of Acronyms

CAS	Chinese Academy of Sciences (Academia Sinica)
CIA	Central Intelligence Agency (USA)
CIDA	Canadian International Development Agency
CNRS	Centre National de la Recherche Scientifique (France)
FAO	Food and Agriculture Organization (UN)
GTZ	German Agency for Technical Cooperation
IBP	International Biological Programme
ICIMOD	International Centre for Integrated Mountain Development
ICSU	International Council of Scientific Unions
IDRC	International Development Research Centre (Canada)
IGC	International Geographical Congress
IGU	International Geographical Union
IIASA	International Institute for Applied Systems Analysis
IMS	International Mountain Society
INGO	International non-governmental organization
INSTAAR	Institute of Arctic and Alpine Research (subsequently Arctic, Antarctic and Alpine Research)
IPCC	Intergovernmental Panel on Climate Change (UN)
IUCN	International Union for the Conservation of Nature and Natural Resources
KGB	Committee for State Security (former USSR)
MAB	Man and the Biosphere Programme (UNESCO)
MIT	Massachusetts Institute of Technology
<i>MRD</i>	<i>Mountain Research and Development</i> (journal)
NCAR	National Center for Atmospheric Research (USA)
NGO	non-governmental organization
NOAA	National Oceanic and Atmospheric Administration (USA)

NRC	National Research Council (USA)
NSF	National Science Foundation (USA)
RNAC	Royal Nepal Airlines Corporation
SATA	Swiss Association for Technical Assistance
SDC	Swiss Agency for Development and Cooperation
STOL	Short take-off and landing (aircraft)
UN	United Nations
UNCED	United Nations Conference on Environment and Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNU	United Nations University
USAID	United States Agency for International Development
WHO	World Health Organization (UN)

(names of several of the agencies changed throughout the period covered)

APPENDIX II

Mohonk Mountain Conference Resolution

RESOLUTION 1

The Mohonk Mountain Conference recognizes the special role of the Himalaya as a unique part of the world cultural heritage and wishes to draw attention to the critical importance of its spiritual contribution to the well-being of the world community.

RESOLUTION 2

The Mohonk Mountain Conference reaffirms that a serious situation has been developing in the Himalayan Region for several decades. This relates to the progressive environmental deterioration and the pronounced decline in the standard of living of many of the peoples affected, particularly the mountain peoples. One aspect is the rapid increase in total population in relation to the available agricultural and forest land. Taking this into consideration, it is resolved that an international conference be convened as soon as possible to further examine the issues and to recommend an urgent course of action.

It is also resolved that a small working group be formed to develop an action research design and to lay the groundwork for the proposed conference. The working group should be formed by the International Mountain Society in co-operation with the United Nations University, the East-West Center, the International Union for the Conservation of Nature and Natural Resources, the International Centre for Integrated Mountain Development (ICIMOD), and other organizations.

RESOLUTION 3

Realizing that nature recognizes no international boundaries and that many of the issues and challenges facing development and conservation cannot be dealt with adequately without co-operation between the countries of the Himalayan Region, the Mohonk Mountain Conference strongly urges the governments of the Himalayan Region to take steps to establish international parks in border areas (Parks for Peace) to promote peace, friendship, and co-operation in research and management, for the optimal sustainable use of the natural and human resources, and to improve the quality of life of all the peoples of the region.

RESOLUTION 4

The Mohonk Mountain Conference endorses efforts by the International Centre for Integrated Mountain Development (ICIMOD) to develop a documentation centre and to improve the dissemination of vital information on the region, particularly relating to hydrology and sediment transfer. It is recommended that these efforts be accelerated and that links be established with other appropriate institutions.

RESOLUTION 5

The Mohonk Mountain Conference welcomes the recent initiative of the World Resources Institute, the World Bank, and the United Nations Development Programme in establishing a tropical forest action plan which should facilitate efforts to deal with the comprehensive land-use aspects of the problem facing the Himalayan Region, and calls upon donors to provide the appropriate support.

CONCLUSION 1

The Mohonk Mountain Conference concludes that the Himalayan Region is best characterized as one of great complexity, not amenable to generalized development policies and panaceas. In view of this, the extensive current research on many aspects of the region should be accelerated and emphasis should be placed on specific and inter-related issues. These include, amongst others:

- the status and role of women in rural areas
- organized and spontaneous migration of peoples
- population growth patterns
- indigenous production strategies
- land ownership and taxation patterns
- the development and effectiveness of indigenous self-help movements
- co-ordinated research on selected trans-mountain watersheds

CONCLUSION 2

Taking into account the accumulating knowledge and expertise of its worldwide membership and publication system, the International Mountain Society resolves to make itself available, in conjunction with other organizations, to undertake research and to advise upon project proposals developed for application to the Himalayan Region.

*Mohonk Mountain House, 11 April 1986
Under the chairmanship of Maurice Strong*

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Endnotes

1 Quotation from *The Bangladesh Observer*, Dhaka, 2 June 1990 under the heading “Deforestation in the Himalaya Aggravating Floods.”

2 Quotation from World Resources Institute, “Tropical forests: A call to action.” Report of an international task force convened by the World Resources Institute, the World Bank, and the United Nations Development Programme, Washington DC: WRI, 1985.

3 The Cold War, the major political and military standoff between the Soviet Union and its satellites and the North Atlantic Alliance, which developed after World War II, seeped its antagonisms even to the extent of distorting international scientific cooperation. The so-called non-aligned countries, often referred to as the Third World, were also caught up in the deadly competition; many of them, for various political and/or economic reasons, would vote at the United Nations in the interests of the Soviet bloc. This had descended into international scientific affairs. In London in 1964, Academician Gerasimov threw the International Geographical Union into disarray by precipitously renouncing his position as its senior vice-president on a political expedient related to the East German delegation (Soviet bloc) not receiving their UK visas in time to enable them to attend (Chapter 2).

4 Roger G. Barry, Lawrence Hamilton, Dipak Gyawali, Dinesh Dhakal, Mel Marcus, Bruno Messerli, Sun Honglie, David Griffin, Ruedi Höger, Kevin O’Connor, David Pitt, Mischa Plam, Michael Thompson, and others.

5 Maurice Strong, prior to our first contact with him, had been a dominant figure in international environmental politics. One of his more significant roles was to work with Gro Harlem Brundtland, then prime minister of Norway, to produce the first major clarion call to threats facing our environment (*Our Common Future* was produced through the United Nations in 1975). He had previously served as secretary-general of the United Nations Conference on the Human Environment (Stockholm 1972) leading to establishment of the United Nations Environment Programme, headquartered in Nairobi, of which he was the founding director-general.

6 Prominent amongst them were Yuri Badenkov, Jayanta Banyopadhyay, Tim Forsyth, Robert Rhoades, Fausto Maldonado, Jane Pratt, Fausto Sarmiento, Inger Marie Bjonness, Peter Stone, and a growing group of former graduate students of the first generation: Don Alford, Barbara Brower, Alton Byers, Carol Harden, Hans Hurni, Hans Kienholz, Martin Price, Teiji Watanabe, and Robert Zomer.

7 Geomorphology is the term given to a sub-discipline of geography that involves the scientific study of landscape, its classification, and how it evolved. As it also involves analysis of slope processes, it leads into applied studies of landslides, avalanches, floods, and soil erosion. In many, especially northern, countries a significant part of geomorphology takes in the impacts of the Ice Ages on landscape evolution, as well as present-day

glaciology. In short, it is an important part of physical geography and, as such overlaps with climatology, geology, soil mechanics, hydrology, physics, and many other aspects of earth, or natural, science.

8 The 1968 visit to Darjeeling had such an impact on my future approach to mountains and mountain people that a full account is included in Chapter 4.

9 Nel Caine and Kathleen Blackie (Salzberg) already had been offered positions with me in Ottawa and were diverted to Boulder, Colorado.

10 The journal subsequently changed its name to *Arctic, Antarctic, and Alpine Research*.

11 Other members of the “executive committee” of the commission were professors Bruno Messerli (Switzerland), Masatoshi Yoshino (Japan), Wilhelm Lauer (West Germany), Mieczslaw Hess (Poland), and Dr Rimma P. Zimina (USSR; wife of Academician Gerasimov). Professor Peter Hollermann (Bonn University) was recruited as secretary.

12 In the 1970s, international political protocol divided the world into “the West” (developed countries), “the East,” and “the Third World.” Later, delicacy asserted itself, and Third World countries were apportioned between “least developed,” and “developing” countries – of course, additional changes have since been assessed as even more politically correct.

13 This led to our introduction to Walter Moser’s remarkable Obergurgl Model, the first attempt to model human and physical interaction in mountain environments.

14 MAB-6 (Salzburg), UNESCO’s MAB publ. 8, was in print by 5 June 1973, and di Castri realized that he had a willing “slave” for future episodes, of which there were many.

15 The 1970s were the early days of modeling and computer programming. Most academics were barely emerging from punch cards and tapes. The critically important Obergurgl Model, introduced later, was little more than a classroom flow-chart – but its importance resulted from its clearly demonstrated objective of multi- and interdisciplinary thinking. Today it could be claimed that the Obergurgl Model led into what is becoming known as transdisciplinary thinking.

16 The United Nations Environment Programme was one of the main achievements of Maurice Strong and the Stockholm Conference. In 1973, it was the latest of the series of UN programmes and has remained very active until the present day. It was the first of the UN agencies to be headquartered in Africa – Nairobi, Kenya.

17 Troll’s conference in Mexico (1966) that dealt with the high-altitude geocology of Central and South America was the first international high mountain scientific gathering. It was supported by UNESCO.

18 The entire MAB Programme was not intended to be a source of funding for large-scale international research, which would be far beyond either UNESCO’s interests or resources. The overall objective was to provide project outlines that would serve as catalysts for interested national and international groups to define specific objectives and use the prestige obtained from the UNESCO umbrella the better to compete for in-country research funds. Many of the 14 MAB projects quickly led to the establishment of national committees that were inspired into action. The U.S. national committee, representing several of the individual MAB projects, including Project 6, was based in the Department of State, Washington, DC.

19 Di Castri explained that, while UNESCO could never publicly influence such an appointment (democracy was the order of the day), he would “arrange” for my formal nomination through “proper” channels. To my eventual surprise, I found that I was nominated by Professor O.V. Makeev (USSR) and seconded by Dr Luis Briancon (Bolivia), neither of whom I had previously met.

20 At the time (1970s), it was traditionally required within the UN agencies to give equal standing to the French and English languages. This often caused problems because many of the “other world” participants could manage English, but not French. The point raised here simply underlines one of the obstacles in international relationships that had to be overcome. On more than one occasion, I was referred to as “Jacques Yves”! That problem no longer exists.

21 This meeting was held in Vienna (5–7

December 1973) after the Lillehammer meeting and its concluding report was incorporated into the Lillehammer proceedings as Appendix 9. I was also invited to attend the Vienna meeting.

22 Many of these kinds of working international meetings were taken as opportunities for host countries and cities to display their virtues as generous hosts. I always felt that, while not strictly necessary, the extracurricular activities served to help knit disparate and far-travelled participants and ensure a lot of enthusiasm and hard work.

23 A couple of years later, I was ten minutes late for the opening of one of our IGU mountain commission meetings in Innsbruck chaired by Carl Troll. I was the last to arrive, on the morning train from Vienna. Troll, a stickler for order and promptness, simply asked, "Yack, vat opera vas it this time?" as he indicated an empty chair beside him.

24 I wonder if any other country would have accepted a foreign national as a member of an official delegation to an international conference.

25 Plans were well advanced for the Mendoza meeting when Ricardo telephoned me at home in Boulder to indicate that it would have to be cancelled because of political problems – his house had been fortuitously sprayed with machine-gun fire the previous night. On learning of the tension in Mendoza, Francesco, from Paris, quickly arranged a substitute meeting in Bogotá.

26 This report materialized in a manner totally unanticipated at the time. By 1981, we were able to establish a new quarterly journal (*Mountain Research and Development*). Separate issues were devoted to the four-part report on the Andes with Paul as guest editor and partially funded by UNESCO and UNEP. This was critical, both to launching the journal and producing in high-quality print an English-language version that UNESCO was also able to use as the base for the French and Spanish editions.

27 The group that provided the impetus for GTZ to initiate the Munich meeting were as follows: John Cool of Harvard University, who was soon to become a major player with the Ford Foundation and to take up residence in Kathmandu; Frank P. Davidson, a macro-engineer and chairman, System

Dynamics Steering Committee, MIT; A.D. Moddie, vice-president of the Himalayan Club, New Delhi; Joseph A. Stein, an American architect and president, Joseph Allan Stein Assoc., New Delhi; and B.B. Vohra, Ministry of Agriculture and Irrigation, New Delhi. They all played influential roles in the account that follows.

28 International Workshop on the Development of Mountain Environment: An Interdisciplinary Approach for a Future Strategy. No date (1975). Ed. Klaus Müller-Hohenstein, German Foundation for International Development.

29 The Club of Rome was an influential global think tank. It was founded in 1968 and comprised a large group of world citizens: current and former heads of state, UN bureaucrats, high-level politicians, scientists, and economists. One of its most influential publications was *The Limits to Growth* (1975).

30 Frank was a most original thinker; he described himself as a macro-engineer (Davidson 1983) and ardent supporter of such major engineering works as the Channel Tunnel and a similar approach to ensure linkage between several Japanese islands. He used his independent position to assist with many developments that will be introduced later in the book, although it was not until the turn of the millennium that the Oxford English Dictionary endorsed the derivative term "montology." Following the meeting, we both had a spare evening awaiting our respective flights back to Boston and Denver the following day. This gave me the benefit of a dinner invitation and a long conversation with Frank. A common cause was established that subsequently led to invitations to Boston and a long period of vital advice and assistance, especially during formation of the International Mountain Society and development of the Mohonk conferences (Chapter 12).

31 In the 1960s and 1970s, Sino-Indian rivalry was at an all-time high. Aside from the border war, India had launched a self-interested aid programme of road-building in Nepal. This provided Kathmandu with the first road links to the south and an extensive east-west system. Not to be outdone, the Chinese drove a highway through the

Himalaya to Kathmandu, thereby counteracting any Indian strategic advantage. The Chinese road required a large bridge where it crossed the frontier between Tibet (Xizang Autonomous Region) and Nepal; it was named Friendship Bridge.

32 Mr M'Bow, UNESCO director-general, was personally involved, such was the sense of urgency.

33 Surely an idea assimilated by Professor Walther Manshard and interwoven into the programme of the newly created (1975) United Nations University.

34 In many ways, especially during intensive fieldwork, it was a challenge to mesh Western notions of behaviour, diet, and social propriety with those of contrasting cultures. But it was also a superb opportunity to generate a much higher level of understanding and appreciation. It was also a two-way process.

35 This led to a kind of commercial enterprise once I realized that our neighbours in Boulder, staff members of INSTAAR, and even some of my students, were more than anxious to acquire similar rugs. I first proposed to the refugee centre manager that I could charge twice \$64 per rug and still have no problem in selling them. This he refused – principles again getting in the way. I eventually got the better of him by proposing that the surcharge was to assist with the education of the Tibetan children. I ended up selling more than 50 rugs before my link with him faded. But a much more lasting undertaking, also related to educating Tibetan refugee children, quickly followed.

36 At the time, I had received a very warm invitation to spend the year with Professor Gunnar Hoppe in Stockholm. It was a hard decision to make, but once made, it marked the final step in the change of focus in my research activities from Arctic geomorphology to mountains and people.

37 This wayside rest place off the main highway no longer exists.

38 Our sojourn of 1976–77 at Appenberg proved pivotal to several of the main themes of this book. My stay there led to my introduction to Professor Walther Manshard who had been appointed vice-rector of UNU in 1976 and who invited me to

accept the position of coordinator of a new university mountain programme; it also was the location in 1990 where the mountain core group met to plan our approach to the Rio Earth Summit and create the *Mountain Agenda* leading to more intense political activism. I liked to compare it to a similar Swiss rural haven of peace and tranquillity, the town hall of Zimmerwald, close to the Messerli family house, where a certain ornithologist by the name of Lenin met in 1917, but not to discuss birds.

39 From the Caucasus research station, we were introduced to the glaciology, landscape processes, such as avalanches and landslides, the local flora and fauna, with the most experienced Russian scholars as guides: Vladimir Kotlyakov (who later succeeded Gerasimov as director of the USSR Institute of Geography), Genady Golubev (who visited Bruno and myself the following year in Switzerland), P.L. Gorchakovsky, R.I. Zlotin, and V.I. Turmanina. All of this in excellent weather and accompanied with outstanding food and colourful peasant dance entertainment in the evenings.

40 Eventually, after I had reached Switzerland I composed a series of letters describing in detail my experience, the plight of the Plams and my vivid recollections from reading the documents. I mailed copies to several U.S. newspapers and wrote a special letter to the president of the United States. I received no acknowledgement from either the White House or the newspapers, although the Plams' fortunes did take a decided turn for the better, as I later relate.

41 One Russian joke describes the Ljubljanka building, headquarters of the KGB, as the tallest building in Moscow because Siberia can be seen even from its basement.

42 On my return to Bern, I was able to confirm Roger Barry's proposal that, because the current director of INSTAAR's Mountain Research Station, David Greenland, would much rather be located close to the main campus, we provide Mischa with highly relevant employment as well as good accommodation for Olga and son.

43 Gerardo Budowski, a former director-general of IUCN, was coordinator of Project 2: Agro-Forestry Systems.

44 Other Chiang Mai workshop participants included Pisit Voraurai, Michel Bruneau, Eric Chapman, Terry Grandstaff, Peter Hoare, Peter Kunstadter, Jack McKinnon, Bruno Messerli, Masatoshi Yoshino (who also had been recruited as a member of our IGU mountain commission), Harald Uhlig, and many Thai colleagues.

45 All the documents were edited and produced under the title *Conservation and Development in Northern Thailand* (Ives, Sabhasri, and Vorauri 1980), UNU Press, Tokyo.

46 Following our retirement and return to Ottawa in 1997, it became apparent that production of a quarterly mountain journal was beginning to exceed our capacity. The transfer of the journal to the Geographical Institute, Bern University, together with a huge infusion of Swiss government funding was something of a personal triumph. With the start of the new millennium, following a 20-year struggle, we were delighted to be succeeded by Hans Hurni and his editorial team.

47 I had intended this as an ideal case for possible future repeat photography so that any further geomorphic activity could be recorded graphically. It became a vital piece of evidence once I realized how determined the local farmers were to ensure complete agricultural recovery.

48 The Chipko Movement (hug the trees) was an Indian Himalayan villagers' movement (initially women) led by Sunderlalji and others, many of whom had been followers and disciples of Mahatma Gandhi. It was a massive protest movement against logging mountain forests, especially resulting from commercial and provincial government corruption. At the height of its strength, it persuaded Prime Minister Indira Gandhi to place a ten-year ban on all Himalayan tree cutting in India.

49 At this point, I must record that, as the project in Nepal developed, Kamal performed yeoman service. Without his assertive approach, many vital things would not have happened or would have been much delayed – as foreign guests, there was no way in which we could have been sufficiently insistent.

50 Dr Schild served as executive director of ICIMOD from 2005 to 2011 and invited me to work

with his staff, including Pradeep Mool, to produce a publication on the problem of glacial lake outburst floods.

51 Pradeep's career has been exceptional. He has distinguished himself as a prime mover of Himalayan glacier mapping and analysis of the dangers associated with potential glacier lake outbursts. In this work, I have been associated with him through ICIMOD as recently as 2011.

52 The decision to begin fieldwork on the Kakani ridge actually had very positive rewards. It quickly led us to begin the major challenge to what became known as the theory of Himalayan environmental degradation.

53 I had applied for a visa for the military district of Sikkim from the Indian embassy in Washington DC well before my scheduled departure. After a very long delay and no visa, I received a formal letter explaining the delay and was told I would probably be allowed entry if I showed the letter together with my UN credentials.

54 It was not long since the "outside" world had been startled by President Nixon's visit to China and "ping-pong diplomacy."

55 A very strong Chinese liquor.

56 In 1904, Sir Francis Younghusband led a British military force into Tibet. While Tibet was essentially autonomous, if not independent, at the time, it produced a storm in international relations, including with China.

57 A swift round of telephone calls confirmed that many of our growing group of mountain activists would also meet in Beijing and Lhasa: Bruno Messerli, Corneille Jest, Makato Numata, Harald Uhlig, and Peter Wardle.

58 Roger Barry and Mischa Plam both separated from INSTAAR at the same time, Roger with the World Data Centre for Snow and Ice, together with the staff, transferred to the Cooperative Institute for Research in the Environmental Sciences (CIRES), Mischa to work as a private consultant.

59 Shades of Gilbert and Sullivan.

60 Proceedings of a Symposium on Qinghai-Xizang (Tibet) Plateau, Beijing, 25 May to 1 June 1980. Vol. I: Geology, Geological History and Origin of Qinghai-Xizang Plateau, Vol. II: Geological and

Ecological Studies of the Qinghai-Xizang Plateau, 2138 pp., Science Press, Beijing, and Gordon and Breach Science Publishers, New York, 1981.

61 Because I could not believe that my first, virtually accidental, shot had even been aimed correctly, I asked permission to pose them. Then I exposed the remaining eight frames. The first, accidental, shot proved perfect, the others only run-of-the-mill.

62 Another of many points of surprise showing how Western knowledge may not always be what it seems.

63 Tingri was one of the staging points of the early Mount Everest expeditions of the 1920s from which the expedition members obtained their first distant views of the mountain.

64 Academia Sinica is referred to subsequently as Chinese Academy of Sciences or CAS.

65 These constituted the overview of current environmental and socio-economic problems of the Andes that had been recommended during the MAB-6 regional meeting in La Paz. I was relieved that Paul Baker accepted my invitation to serve as series editor.

66 The first slate of IMS officers were president, JDI; vice-presidents, Corneille Jest and Heinz Löffler; secretary, Roger G. Barry; treasurer, Mischa Plam. The first issue of the journal was published in May 1981: editor, JDI; assistant editor, Pauline Ives; book review editor, Michael Tobias. The editorial advisory board consisted of Paul T. Baker (USA), Roger G. Barry (USA), Gerardo Budowski (Costa Rica), Frank Davidson (USA), Corneille Jest (France), Huang Pingwei (China), Heinz Löffler (Austria), Ricardo Luti (Argentina), Walther Manshard (Germany-UNU), Bruno Messerli (Switzerland), Sanga Sabhasri (Thailand), and Masatoshi Yoshino (Japan).

67 Joseph Rock was a pre-World War II phenomenon closely associated with the National Geographic Society. He took up permanent residence in a Naxi village close to Lijiang and from there travelled extensively. He made rare trips back to the United States that included a dinner at the White House. He was something of a recluse to Western life. He produced a Naxi-English dictionary and

made extensive studies of the Naxi way of life. From our point of view, he took a large number of photographs which, although developed in his Naxi village, were of very high quality. Many of them were ultimately archived by the National Geographic Society and became a vital source for subsequent photo-replication that allowed determination of landscape change over a 50-year period. A recent biography penetrates the activities and thoughts of this very odd personality who was eventually thrown out of China at the beginning of Chairman Mao's regime. He was accused of being a spy for the CIA, a fantastic charge (see Sutton 1974 for a biography of Rock).

68 Imhoff, E. (1974). *Die Grossen Kalten Berge von Szetchuan*. Orell Füssli Verlag: Zurich.

69 The "Love-Suicide Meadow" is a fascinating part of Naxi lore dating back to the seventeenth century when the Han emperor decided to bring minority subject nations under stricter control. The military commander in Dayan had been instructed to ensure a closer adherence to Han conventions. This meant that the marriages of Naxi (and other minority) children had to be fixed at birth and the hitherto Naxi concepts of free love and teenage self-selection banned. For a strongly matriarchal society, this produced a remarkable reaction. Young lovers who were about to be separated into a forced marriage responded by going into the mountains, often in groups and, after several days of feasting and love-making, committed suicide in the belief that they would be taken across the mountains to a form of Naxi "Shangri-La" where they would remain eternally young and survive to a life of beauty and ease. Our particular meadow had been one of the favourite "take-off" points for the everlasting life, and the practice had continued into the Communist era.

70 These meetings and field studies included Japan, Ethiopia, Madagascar, the Moroccan Atlas Mountains, the Pyrenees, New Zealand, Australia, Tajikistan, Ecuador, Peru, and Chile. The Swiss team undertook extensive applied research in Ethiopia, Madagascar, and on the Chilean Altiplano. This almost overwhelming series of undertakings certainly left us with a remarkable broadening of

our appreciation of mountain problems that provided solid backing for the eventual push towards Rio and the Earth Summit.

71 Our essential base map for the Kakani area mapping had the unusually valuable scale of 1:10,000 and a ten-metre contour interval. It had been published in 1977 by the German mountain research organization *Arbeitsgemeinschaft für vergleichende Hochgebirgsforschung*.

72 One of the few disadvantages of operating under the auspices of UNU was that the organization was a university and to become involved in actual physical development projects was totally beyond its remit.

73 Actually, this led to a highly relevant field project in Ecuador. With contacts in Quito, I was taken on what was becoming the usual kind of reconnaissance that afforded a traverse across the entire width of the Ecuadorian Andes from the Amazon rainforest, via the high volcanoes, to rain forest on the Pacific coast. In this endeavour, I was accompanied and guided once again by Gerardo Budowski. This reconnaissance was followed by the fieldwork of two graduate students, Carol Harden and Deborah Bossio who, together with Professor Christoph Stadel, undertook separate studies of the range of soil losses under differing altitudinal and farming systems. One of the highly relevant results included a great improvement in knowledge of the sources and rates of reservoir siltation.

74 It proved possible to undertake this essential third part of our original proposal by an extension into Bangladesh, supported by the Swiss Agency for Development and Cooperation (Hofer and Messerli 2006).

75 Playing for time worked sufficiently to give Walther Manshard chance to find a way. He developed an effective alternative: he arranged for UNU to cover the expense of providing complimentary subscriptions for developing world institutions and individuals. IMS was reimbursed for these arrangements to approximately the level of the original UNU publication grant.

76 While the colour proofs of the Khumbu hazard maps were being edited in Bern in August 1985, news reached us from Kathmandu that a

major *jökulhlaup* had discharged from the Langmoche Glacier in the western Khumbu on 4 August. Daniel Vuichard and Markus Zimmermann had recently returned from completing the bedrock geology mapping and I was also in Bern. After consultation with all concerned, we telephoned Walther Manshard in Tokyo and immediately obtained a supplementary budget item for Daniel and Markus to return to Nepal and undertake a full field investigation of the glacier and the downstream impacts of the disaster. The implications of this will be related.

77 Khadga Basnet and Narendra Khanal, who had spent a year with me in Boulder as Nepali UNU fellows, joined Alton's team along with Sherpa locals, Khancha Lama and Pembra Sherpa. Because the methods to be employed were unfamiliar to Alton and I was not free to accompany the field party, I was relieved to persuade Colin Thorn to return to Nepal for a second tour and take my place.

78 Early in the observation season, Alton detected that several of the rain gauges contained liquid when no precipitation had occurred. Some careful detective work determined that small Sherpa boys had been mischievously contributing urine to the gauges.

79 Teiji Watanabe joined me in Colorado as a doctoral candidate immediately after Alton had completed, so they didn't actually meet until much later (2007) although they were working on closely parallel field problems. Much of Teiji's doctoral work took him to the Langtang Himal where he completed an impressive array of soil erosion and slope movement measurements for comparison with a parallel set in his home mountains of the Japanese Alps. He also took a lead in the study of Imja Lake and its potential for catastrophic outbreak (*jökulhlaup*).

80 I had assumed that these were photographs taken by Fritz in 1956 when he was a member of the Swiss expedition to climb Everest and Lhotse and that he had taken them with a phototheodolite on loan from Erwin Schneider. Alton believes that they were taken by Erwin himself. He may be correct. However, it was Fritz's material and the freak of Konrad's rescue and placing them in my care that ensured they eventually emerged as

critical glaciological evidence.

81 Several small airstrips, with weather stations, had been set up during World War II so that, in the event of engine trouble, U.S. aircraft, flying from Bengal across “The Hump” (the Hengduan Mountains) to supply the Chinese Nationalist (Kuomintang), had a chance of survival. Of course, the U.S. military was promptly withdrawn in 1947 although, fortunately for us, the remnants of one of the airstrips was well situated to be made into our 1985 base camp.

82 It was normal practice for official visitors at that time to be accompanied by security staff, although the extreme youthfulness of our two soldiers left us speculating.

83 Today the etymologically incorrect name that is “officially” used is Tiger Leaping Gorge. Photographs of it appear in numerous websites as a world class tourist attraction. The name of the entire gorge in the Naxi language is *A cai ggoq*, while its lower reaches carried the Chinese name *xia hu tiao*. Thank goodness, we managed to visit in 1985 and 1992 while it was still barely known outside the Lijiang region, although it had been traversed by Joseph Rock in the 1920s and 1930s.

84 Regretfully, this part of the research plan was a partial failure. The young, inexperienced Chinese assistants failed to maintain observations during periods of heavy rain.

85 Age-dating the trees, for instance, provided proof that mature forests had developed on areas that appeared on Rock’s photographs as treeless. The great age of many subalpine forest stands (often in excess of 500 years) demonstrated that large areas had remained untouched by human tree-felling for centuries.

86 On the 1985 visit, the lake bed was carpeted in green, providing an important source of grazing for the village livestock.

87 A highly practical gesture was an invitation to indulge ourselves in the town baths. When Alton and I presented ourselves the following morning, we were marched through the streets in procession with the governor, cheering crowds lining the sidewalks. It was overwhelming. Then we found that, to ensure privacy, the entire and very

large public bath setup had been scrupulously scraped clean and everyone moved out until we had finished.

88 After years of unsuccessful search (long ago I had lost my original Sunday School prize) I obtained a second-hand copy of *Storms on the Labrador* through the Internet. It arrived in August 2004. As I opened, it I recognized with enthusiasm the end-cover drawings. This was followed by dismay as I realized that the book did not contain a single reference to Sir Wilfred Grenfell, to the Grenfell Mission, nor to the Moravians of the Labrador northern coast! My only explanation is that the prize was awarded to coincide with my Sunday School teacher’s series of lessons to augment the church’s fundraising efforts for the mission. Thus the title of the book and the name of Sir Wilfred Grenfell had merged in my young mind.

89 Ivan Head was president of the Canadian International Development Research Centre and one of the closest advisors to Prime Minister Pierre Elliot Trudeau. Maurice was also very close to the Canadian prime minister.

90 This was due to the constitutional relationship between the Canadian federal and provincial governments, education being the preserve of the provincial governments.

91 The mounted photographs were later delivered for permanent display at UNU headquarters in Tokyo. I learned later that “they had proved so attractive that most of them, unfortunately, have been taken home by various members of our Board of Directors.”

92 The proceedings were published as *Study Week on a Modern Approach to the Protection of the Environment*, Pontificiae Academiae Scientiarum Scripta Varia, 75, (Ed. G.B. Marini-Bettolo), 1989.

93 One especially memorable aside during the meeting resulted from an impatient interjection I made on the third morning. We had discussed major issues facing the world, including food shortage and poverty. I raised the need to add to the agenda the problems of uncontrollable population growth and birth control. This produced a shocked reaction prompting the chairman to insist on an immediate adjournment and early coffee break.

Each morning, the walls either side of the conference table were lined with robed observers. One of them immediately accosted me and took me into a small anteroom. I apologized for the disturbance I had caused and said that I had probably forfeited my personal meeting with the Pope. Instead, I was thanked for bringing up a vital and necessary major issue. The priest (who was Canadian and science adviser to the Pope) went on to assure me that I would receive a special welcome “for courage,” although His Holiness probably would not mention the topic of birth control. And so my high hopes were fulfilled; the photograph of His Holiness shaking my hand has a prominent place in my study.

94 Peter Stone had served for many years in Geneva as founding editor of the UN publication *Development Forum* and had been director of information for the Brundtland Commission.

95 *Mountain Agenda* was used as a name of convenience. There was no constitution, no officers, only use of the Institute of Geography, Bern University, as its address. In this way, we were signalling that it was open to all interested individuals and organizations, either formal or informal, with its initial purpose of bringing the mountain issue to widespread attention during the Rio Earth Summit.

96 The 300 copies of the book, endorsed by David Brower, Prince Sadruddin Aga Khan, Maurice Strong, and Lord Hunt of Llanfair Waterdine, together with an equal number of the *Appeal*, reached Rio a few days before the conference, courtesy of SwissAir.

97 The actual title of Chapter 13 was “Managing Fragile Ecosystems: Sustainable Mountain Development.”

98 Dr Tewolde Berhan Gebre Egziabher had been a close mountain colleague since our 1980s meetings in Addis Ababa, Ethiopia, when we had helped establish the African Mountains Association, of which he served as president. In 2000, he was awarded the Right Livelihood Award, often referred to as the “Alternate Nobel Prize.” In 2006, he received the UN top environmental prize: Champion of the Earth.

99 This shocked my UNESCO friends who had to remain behind the glass barriers as observers

– the situation of all UN agency staff.

100 Another book was justified, in part, because *Status of the World's Mountains* had been produced under great pressure with no time for peer review. In practice, *Mountains of the World: A Global Priority*, 1997, edited by Messerli, B., and Ives, J.D., turned into an even more challenging task, although there was a fair element of peer review.

101 Sean's Chinese name is Xia Shanquan.

102 On our first visit in 1993 we received a hearty welcome and quickly learned that a special village feast had been prepared. The traditional initiation of such an event was the presentation of a very large pig. Its throat was carefully cut and its blood gently squeezed out into a large iron bowl while the poor animal screamed. Eventually the animal died, but not before the bowl was nearly full. I was then presented the bowl. I took a deep draft of the warm blood, passing it on to the elder on my left. It slowly passed through the circle of elders, all of whom followed suit and imbibed. We then began the feast with the entire village.

103 The following year, a group of Naxi school children made a visit to the Queen Charlotte Islands, homeland of the Haida.

104 On my final visit to Wenhua in November 1995, I hiked in with an education inspection team from Beijing. I learned from their leader that she intended to award scholarships to the two most outstanding and needy students (by this she meant money to ensure that they had shoes, clothes, and supplies such as pencils and notebooks, essential for them to remain at school). On asking the monetary value of a scholarship, I was astounded to learn that these “life-saving” awards amounted to the interest that US\$200 would earn annually. I asked if it would be appropriate for me to provide funds for two more, to which she laughed in agreement. So I mentioned my intention to the head teacher and left the official delegation simply to make four awards instead of two, but on condition that my contribution was anonymous. Little chance! – my very modest contribution was reported, not only in the Lijiang newspaper, but in the main paper in Kunming. However, I enjoyed the ceremony and

thought no more about it. On my return journey home, some days were required in Kunming. Fuquan told me that we had been invited to dinner by a very important figure – General He Guocai, the senior military officer for Yunnan Province. It was a marvellous affair. He presented his card with a flourish and asked Fuquan to translate for me the Naxi script on the reverse side. It read: “I do not like to eat dogs.” He was Naxi and that phrase was omitted from the Mandarin text on the front side. During the dinner, when I asked him why he had honoured me with such a magnificent banquet, he explained that he had read the Kunming newspaper. As a very poor boy, he used to walk barefoot to the Wenhai school. He then thanked me, promised me a military escort for the following year if I wanted to trek the then very dangerous far western gorges and urged me to use his assistance and purchase land on the shore of the Wenhai Lake and build my summer cottage there. He assured me that the way China was developing, it would become a very valuable property. I was not able to accept either offer, although his estimate of land and property values have proven themselves quite accurate. Yet the story remains one of those invaluable treasures of work with mountain people.

105 Sohrab and Rustum were the legendary characters of a Persian epic. Matthew Arnold, the English nineteenth-century poet, captured the agony and poignancy of a day-long single combat beside the River Oxus (Amu Darya) wherein the great warrior Rustum unwittingly slew his long-lost son.

106 For a variety of reasons I was not able to accept.

107 *Forests and Floods: Drowning in fiction or thriving on facts?* Forest Perspectives 2, Bangkok, Thailand, and Bogor Barat, Indonesia. FAO Regional Office for Asia and the Pacific and Centre for International Forestry (CIFOR, 2005).

108 I was invited to dinner in Kathmandu (February 2010) by Professor Hasnain when he discussed his Himalayan glaciological research and his denial – I have no reason to doubt his word.

109 The Mountain Institute (West Virginia, U.S.A.) has recently received extensive support from the USAID to develop a combination of social and scientific research on high mountain watershed problems in relation to climate change. This led to the expedition to Imja Lake, quoted above, and a continuation during the 2012 post-monsoon season. On the 2012 occasion an education and training workshop in association with the local people led to acquisition of additional scientific data from Imja Lake and highly promising Sherpa participation. Amongst the scientific results, sonar-based bathymetric investigation revealed that the volume of water contained within Imja Lake is twice that previously reported (65 M cubic metres) and the glacier front retreated much more rapidly over the preceding three months than previously expected. The “High Mountain Glacier Watershed Program”, funded by USAID, is co-managed by The Mountain Institute and the University of Texas at Austin (Alton Byers, pers. comm., 25th November, 2012).

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