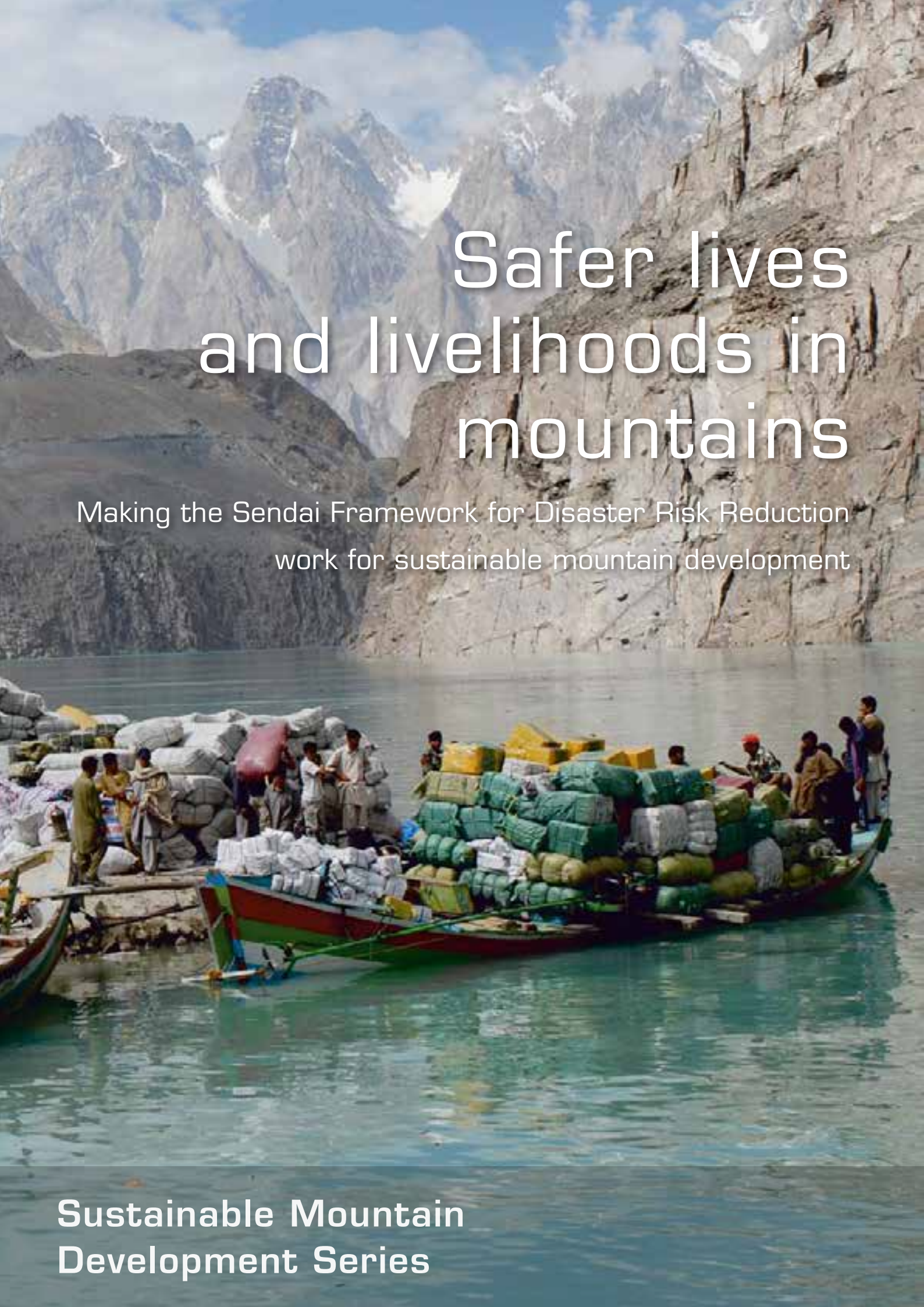

Safer lives and livelihoods in mountains

Making the Sendai Framework for Disaster Risk Reduction work for sustainable mountain development

Sustainable Mountain Development Series

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Cover photo: Goods had to be transported by boat after the Atta Abad landslide flooded 25 km of the Karakoram Highway, Pakistan, in 2010 (D. Butz)

From analysing geohazards to managing georisks

Caroline Michellier, François Kervyn, Olivier Dewitte

Recurrent conflicts and tensions in the mountain region around Lake Kivu, Democratic Republic of Congo, trigger migration towards rapidly growing urban centres. Natural hazards put this densely populated region under additional pressure. As a base for effective disaster prevention and risk management, the GeoRisCA project provides the relevant institutions with risk maps combining hazard and vulnerability assessments.

Studying and monitoring volcanic activity at Nyiragongo (N. d'Oreye, MNHN/ECGS)

A combination of seismic, volcanic and landslide hazards threatens the densely populated, mountainous area around Lake Kivu, Democratic Republic of Congo. This is further compounded by low scientific expertise and a dearth of geophysical and socio-economic data. Since 2012, the GeoRisCA project has analysed the geohazards and people's vulnerability, resulting in the first georisk assessment of the region. This € 1 million project funded by the Belgian Ministry of Research involves researchers from Belgium and Luxembourg, as well as local scientists.

The project focuses on the cities of Goma and Bukavu, which have populations of 670 000 and 750 000 respectively. In 2002, during the last eruption of the Nyiragongo volcano, 10 percent of Goma was destroyed by lava flows [1], causing long-term socio-economic impacts with about 120 000 homeless people and 50–150 fatalities. At the southern tip of Lake Kivu, Bukavu is built on steep and unconsolidated slopes, making it prone to landslides. These events, sometimes fatal, have dramatic impacts on infrastructure, with severe economic and/or sanitation-related consequences. In addition, human-induced environmental change (deforestation, urbanization) is linked to recent landslides [2].

By developing local risk maps as decision-support tools for the local authorities, GeoRisCA aims at improving disaster prevention, helping to reduce volcanic and landslide risk, and promoting long-term urban planning. The lack of accurate and reliable data was a main challenge and was addressed by an interdisciplinary approach combining satellite data, household surveys, intensive fieldwork and ground-based geophysical measurements. This resulted in an in-depth understanding of the spatiotemporal characteristics of the hazard risks [3, 4] and the socio-economic

Household survey through capacity building in Bukavu (C. Michellier, RMCA)

situation, urban dynamics and people's risk perception. These latter aspects play a key role in the risk assessment equation: To assess the potential impacts of a risk, it is essential to understand the community and environment in which a hazard occurs.

Moreover, throughout the research process, local scientists, the Institute of Statistics, the Civil Protection, city and provincial authorities and non-governmental organizations were involved in numerous discussions and field activities to ensure the most appropriate vulnerability and risk assessment [5] (Box 1). In doing so, the project has strengthened the mandate and action of the Civil Protection in three ways: (1) by emphasizing the crucial role of this provincial institution in charge of disaster prevention and risk management, (2) by initiating collaboration with local scientists, whose knowledge regarding georisks was reinforced throughout GeoRisCA, and (3) through financial support of the Civil Protection, as the political authorities are now aware of the natural hazards issue.

Finally, the project provides the stakeholders with administrative, hazard, vulnerability and risk maps, as well as with robust data sets and methodologies. And it has raised issues, such as capacity building and strengthening of monitoring techniques and networks (ground- and space-based), which are today addressed and implemented in new projects.

BOX 1 I Understanding people's vulnerability

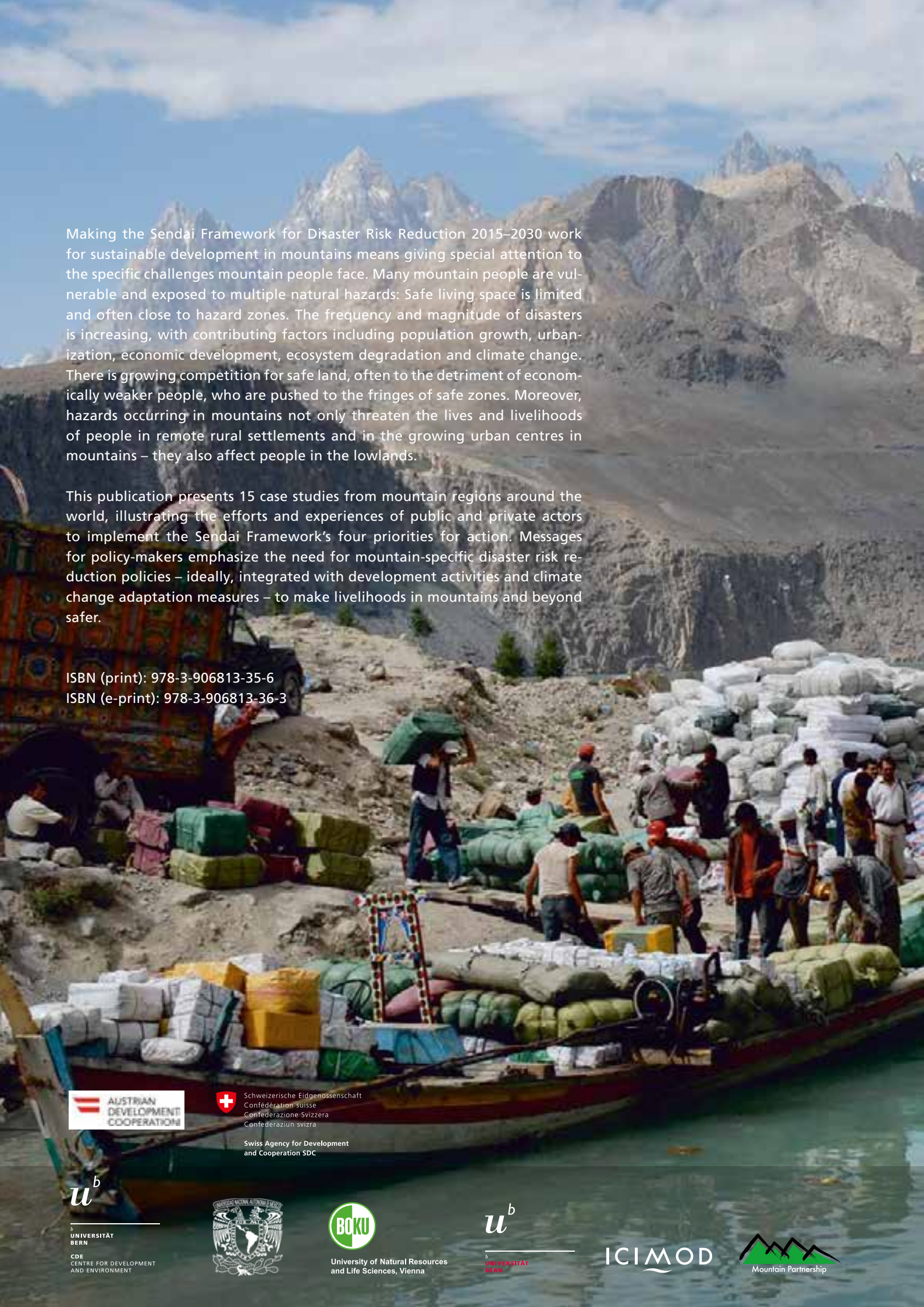
A local vulnerability index that considers the specific characteristics of a community and its environment increases the relevance, acceptance and effectiveness of disaster risk reduction (DRR) policies, particularly in times of local political unrest and severe poverty. Vulnerability assessment in the GeoRisCA project comprised the following steps:

- Semi-structured interviews with local institutions to understand their perception of vulnerability and their policies related to risk reduction.
- Working-group discussion based on an expert survey to agree on a local definition of vulnerability and define its relevant parameters.
- Household demographic survey to complement data scarcity, or data that are of limited quality, and develop spatial data layers on people's vulnerability.
- Involvement of the local scientists and DRR managers throughout the process, for an effective use of methods and results, and effective implementation of DRR strategies.

Lessons learned

- Strengthening community resilience requires efficient and effective communication between scientists, civil authorities and the communities themselves.
- Modern technologies coupled with extensive fieldwork enable understanding and monitoring of socio-economic and hazard dynamics, and allow for risk-sensitive urban planning.
- Reducing the divide between scientific research and development cooperation is crucial to promoting understanding between the two sectors, thus enabling them to take their respective constraints into account for effective disaster risk reduction.
- Political unrest makes it more likely that low priority will be given to natural hazards.

Bukavu encroaches on steep slopes affected by landslides (C. Michellier, RMCA)



Making the Sendai Framework for Disaster Risk Reduction 2015–2030 work for sustainable development in mountains means giving special attention to the specific challenges mountain people face. Many mountain people are vulnerable and exposed to multiple natural hazards: Safe living space is limited and often close to hazard zones. The frequency and magnitude of disasters is increasing, with contributing factors including population growth, urbanization, economic development, ecosystem degradation and climate change. There is growing competition for safe land, often to the detriment of economically weaker people, who are pushed to the fringes of safe zones. Moreover, hazards occurring in mountains not only threaten the lives and livelihoods of people in remote rural settlements and in the growing urban centres in mountains – they also affect people in the lowlands.

This publication presents 15 case studies from mountain regions around the world, illustrating the efforts and experiences of public and private actors to implement the Sendai Framework's four priorities for action. Messages for policy-makers emphasize the need for mountain-specific disaster risk reduction policies – ideally, integrated with development activities and climate change adaptation measures – to make livelihoods in mountains and beyond safer.

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