

Introduction to the Hindu Kush Himalaya Assessment

Coordinating Lead Author

Eklabya Sharma, International Centre for Integrated Mountain Development (ICIMOD), Kathmandu, Nepal,
e-mail: eklabya.sharma@icimod.org (corresponding author)

Lead Authors

David Molden, International Centre for Integrated Mountain Development (ICIMOD), Kathmandu, Nepal,
e-mail: david.molden@icimod.org

Atiq Rahman, Bangladesh Centre for Advanced Studies, Dhaka, Bangladesh,
e-mail: atiq.rahman@bcas.net

Yuba Raj Khatiwada, Ministry of Finance, Govt. of Nepal, Kathmandu, Nepal,
e-mail: dryubaraj@gmail.com

Linxiu Zhang, International Ecosystem Management Partnership, United Nations Environment Programme
and Center for Chinese Agricultural Policy, Chinese Academy of Sciences, Beijing, China,
e-mail: linxiu.zhang@un.org

Surendra Pratap Singh, Central Himalayan Environment Association, Nainital, India,
e-mail: surps@yahoo.com

Tandong Yao, Institute of Tibetan Plateau Research, Chinese Academy of Sciences, Beijing, China,
e-mail: tdyao@itpcas.ac.cn

Philippus Wester, International Centre for Integrated Mountain Development (ICIMOD), Kathmandu, Nepal,
e-mail: philippus.wester@icimod.org

Note: All authors are HIMAP Steering Committee Members, except Philippus Wester, who is HIMAP
Coordinator

Corresponding Author

Eklabya Sharma, International Centre for Integrated Mountain Development (ICIMOD), Kathmandu, Nepal,
e-mail: eklabya.sharma@icimod.org

Contents

1.1 Global Mountain Perspective	2
1.2 The Hindu Kush Himalaya—A Global Asset	3
1.3 Key Issues of the HKH	5
1.4 Overall Objective, Rationale and Key Questions	5
1.4.1 Overall Objective.....	5
1.4.2 Rationale for the Assessment.....	5
1.4.3 Key Questions	6
1.5 Vision	6
1.6 HKH Priorities Contributing to the Sustainable Development Goals	7
1.7 Conceptual Framing of the Assessment	7
1.8 Assessment Process	15
1.9 Outline of the Assessment	15
References	15

1.1 Global Mountain Perspective

Mountains are large landforms raised above the surface of the earth emerging into peaks and ranges. Mountains occupy 22% of the world's land surface area and are home to about 13% of the world's population (FAO 2015). While about 915 million people live in mountainous region, less than 150 million people live above 2,500 m above sea level (masl), and only 20–30 million people live above 3,000 masl.

About half of all humankind directly depends on mountain resources, primarily water. Mountains support 25% of world's terrestrial biodiversity and include nearly half of the world's biodiversity 'hotspots'. Of the 20 plant species that supply 80% of the world's food, six of those (apples, barley, maize, potatoes, sorghum and tomatoes) originated in mountains (Fleury 1999). In humid parts of the world, mountains provide 30–60% of the fresh water downstream; and in semi-arid and arid environments, they provide 70–95% (Kapos et al. 2000; WCMC-UNEP 2002). Mountains provide goods and services of global significance in the form of water, hydroelectricity, timber, biodiversity and niche products, mineral resources, recreation, and flood management (Schild and Sharma 2011; Molden and Sharma 2013). Mountains are more diverse region rich in ethnicity and languages. In general, poverty is higher in mountain regions and people are often at higher risk than people elsewhere. According to a recent FAO analysis, 39% of mountain populations (urban and rural combined) in developing countries were considered vulnerable to food insecurity in 2012, an increase of 30% compared to 12 years prior (FAO 2015).

Mountain geological formations are fragile and ecosystems are degrading fast because of both natural and anthropogenic drivers of change. Mountains are also places of cultural meaning and refuge. Many mountain inhabitants have settled there to escape religious or political persecution or wars in lowlands. Mountains are also often focal areas of armed conflict. Mountain areas have ecological, aesthetic, and socioeconomic significance, not only for people living there, but for those living beyond—especially those in the lowlands who benefit from the ecological services mountains provide. Thus, mountains, in one perspective, stand as some of the planet's last natural 'islands' in a sea of increasingly anthropogenic influenced lowlands, providing a number of significant ecological functions extending beyond mountain regions (Hamilton 2002).

Mountains also represent unique areas for detecting climate change and assessing climate change impacts (Nogues-Bravo et al. 2008; Dyurgerov and Meier 2005). As climate changes rapidly through elevation over relatively short horizontal distances, so do hydrology, vegetation, ecological conditions, and socio-economic settings (Whiteman 2000; Xu and Melick 2006). This rapid change over distance, in turn, also influences cultural values and societies. In this way, it is important to recognise the complexities of environment-society interactions—culture and environment are mutually reciprocating systems.

The increasing awareness of climate change impacts on mountains, mountain ecosystems, and mountain communities have started drawing attention to mountains during international debates such as the United Nations Conference on Environment and Development in Rio de Janeiro in 1992,



Fig. 1.1 The Hindu Kush Himalayan region and 10 major river basins

the Sendai Framework for Disaster Risk Reduction 2015, the Paris Agreement 2015 of the United Nations Framework Convention on Climate Change, and the Sustainable Development Goals (SDGs) and Targets 2030. There should be more pursuits for mountain perspectives to form an integral part in any discussions about future plans for sustainable development in the context of climate change. That means not just highlighting the vulnerabilities and fragilities inherent to mountain locations, but also emphasizing the resilience and strength that mountain people and communities bring when seeking to deal with these challenges.

1.2 The Hindu Kush Himalaya—A Global Asset

A critically important geo-ecological asset, the Hindu Kush Himalaya (HKH) is the origin of 10 major river basins and encompasses over 4.2 million km² area (Bajracharya and Shrestha 2011; Bajracharya et al. 2015) (Fig. 1.1). This HKH area and Tien Shan mountains together form the largest area of permanent ice cover outside of the North and South Poles (hence, the occasional reference to the HKH as the “Third Pole”) and is home to four global biodiversity hotspots, 330 important bird areas (Chettri et al. 2008), and hundreds of mountain peaks over 6,000 m. The region provides

ecosystem services (e.g., water, food, energy) that directly sustain the livelihoods of 240 million people in the mountain and hills of the HKH. Nearly 1.9 billion people living in the 10 river basins also benefit directly and indirectly from its resources (see Box 1.1), while more than 3 billion people enjoy the food produced in its river basins. The region is also home to some of the most diverse cultures, languages, religions, and traditional knowledge systems in the world.

Box 1.1 Population of the Hindu Kush Himalaya and the ten major rivers basins originating in the Hindu Kush Himalaya

Box Authors: Golam Rasul, Abid Hussain and Sudip Pradhan, ICIMOD

Based on the latest available government data sources and projections, in 2017 the population of the mountain and hills of the Hindu Kush Himalaya is around 240 million people (see Table 1.1). The total population in the ten major river basins with their headwaters in the HKH is around 1.9 billion, including the 240 million in the mountain and hills of the HKH (see Table 1.2).

The ethnic diversity and cultural wealth of the HKH extend from the Hindu Kush valleys in Afghanistan to the diverse hill

Table 1.1 Population in the mountain and hills of the HKH

Countries	Areas included in the HKH region	Population of HKH in million (Year of data sources)	^a Population in 2017 (million)	^a Population in 2030 (million)
Afghanistan	All provinces except the provinces of Kandahar, Helmand, Nimroz, Farah, and Herat	22.85 (2016–17)	22.85 ^c	29.91
Bangladesh	Chittagong hills	1.60 (2011)	1.78	2.27
Bhutan	Entire territory	0.78^b (2017)	0.78 ^c	0.96
China	Parts of the provinces of Yunnan (Diqing, Nujiang and Dali prefectures), Sichuan (Ganzi, Aba and Liangshan prefectures), and Gansu (Gannan, Wuwei and Zhangye prefectures); Xinjiang autonomous region (Kashigar, Kezilesu, Hetian and Altai prefectures); Tibet (entire territory), and Qinghai province (entire territory)	32.51 (2015)	33.29	38.86
India	Entire territory of 11 mountain states (Assam, Uttarakhand, Himachal Pradesh, Manipur, Jammu and Kashmir (Indian administered area), Meghalaya, Mizoram, Nagaland, Sikkim, Tripura, Arunachal Pradesh), and Darjeeling and Kalimpong districts of West Bengal state	76.98 (2011)	86.27	110.44
Myanmar	Chin, Shan, Rakhine and Kachin states	11.18 (2014)	11.70	14.24
Nepal	Entire territory	26.49 (2011)	28.75	34.31
Pakistan	Khyber Pakhtunkhwa province, 24 districts (out of 32) of Balochistan province (excluded districts are Kachhi, Gwadar, Jafarabad, Jhal Magsi, Lasbela and Sohbatpur), Azad Jammu and Kashmir (AJK), Gilgit-Baltistan and Federally administered Tribal Areas (FATA)	51.47^d (2017)	51.47 ^c	72.64
Total		223.86	236.90	303.63

Notes

^aExponential projections of populations. The periods of growth rate estimation for HKH areas were 2009–2017 (Afghanistan), 2001–2011 (Bangladesh), 2010–2017 (Bhutan), 2011–2015 (China), 2001–2011 (India), 1983–2014 (Myanmar), 2001–2011 (Nepal), and 1998–2017 (Pakistan). These growth rates are used to project populations for 2017 and 2030

^bProjected population for 2017 procured from Statistical Year Book of Bhutan, 2016

^cPopulation statistics for 2017 are directly collected from official sources of respective countries (Statistical Year Book of Bhutan 2016; Population Census of Pakistan 2017; Statistical Year Book of Afghanistan 2016–17)

^dProjected population of Azad Jammu and Kashmir and Gilgit-Baltistan for 2017 was added to the population of HKH areas procured from Population Census of Pakistan 2017

Sources (1) Data for latest population statistics are collected from Statistical Year Book of Afghanistan 2016–17; Population and Housing Census (Bangladesh) 2011; Statistical Year Book of Bhutan 2016; Year Books of China, Yunnan Province, Sichuan Province, Gansu Province, Xinjiang Autonomous Region (China) 2016; Population Census (India) 2011; Population and Housing Census of Myanmar 2014 (The Union Report, Volume 2); National Population and Housing Census of Nepal (national report) 2011; Population Census 2017; Govt. of AJK 2014; Govt. of Gilgit-Baltistan 2013

(2) Data for Base Year population (used for growth rate estimation) collected from Statistical Year Book of Afghanistan 2008–09; Population and Housing Census (Bangladesh) 2001; Statistical Year Book of Bhutan, 2016; Year Books of China, Yunnan Province, Sichuan Province, Gansu Province, Xinjiang Autonomous Region (China) 2012; Population Census (India) 2001; Population and Housing Census of Myanmar 2014 (The Union Report, Volume 2); National Population and Housing Census of Nepal (national report) 2011; Population Census (Pakistan) 1998

Assumptions for Projections In- and out-migration rates, fertility rate and mortality rate will remain stable

and mountain systems of Myanmar. Between these areas, we find the arid and semi-arid regions of the Pamir and Karakoram mountains; the high Himalaya of India, Nepal, and Pakistan; the un-spoilt beauty of Bhutan; the Tibetan Plateau of China; and the three parallel rivers of the Salween, Mekong

and Yangtze in the far eastern region located in Yunnan Province of China. The HKH features great heterogeneity from north to south and east to west in relation to precipitation, vegetation, and human livelihoods. This variability defying making easy generalizations about the region.

Table 1.2 Area and population of the ten major river basins originating in the HKH

River basins	^a Area (km ²)	^b Population in 2010 (million)	^b Population in 2015 (million)
Amu Darya	645,870	27.19	30.18
Brahmaputra	528,083	64.63	68.07
Ganges	1,001,090	539.43	580.09
Indus	1,116,350	244.31	268.42
Irrawaddy	426,393	40.18	42.87
Mekong	841,337	74.58	77.31
Salween	363,898	18.19	17.88
Tarim	929,254	10.65	11.37
Yangtze	2,066,050	600.92	604.94
Yellow River	1,073,440	192.86	198.02
Total	8,991,765	1,812.95	1,899.14

Notes

^aThe area of individual basins have been calculated from basin boundary shapefile in Albers equal-area conic map projection developed by ICIMOD

^bThe basin-wise population has been calculated from the “Gridded Population of the World adjusted to UN country level population estimates for 2010 and 2015” dataset produced by the Center for International Earth Science Information Network (CIESIN), Columbia University (<http://sedac.ciesin.columbia.edu/data/collection/gpw-v4/united-nations-adjusted>)

1.3 Key Issues of the HKH

This assessment considers the key issues in the HKH region in the context of related questions that draws regional attention, cooperation and policy solutions. The HKH region is geologically fragile, with young and rising mountains, usually vulnerable to erosion and landslides, even without human interference. The region is undergoing rapid change driven by stressors such as climate change and human conflicts, and factors like globalization, infrastructure development, migration, tourism and urbanization. The outcome of interplay of these complex drivers of change is challenging to predict but will have major consequences, not just in the region but globally. There is a critical need to assess these drivers’ potential cost to the HKH environment and human wellbeing as well as the opportunities they may present. Per capita fossil fuel CO₂ emission from the HKH countries is one-sixth of the global average, however the region immensely suffers from the impact of climate change. Climate change is further enhanced by short-lived climate pollutants such as black carbon, which is emitted in large quantities in regions upwind of the HKH where dirty energy sources also have a large impact on health. From a policy standpoint, achieving food, water, energy, and livelihood security in the

region will require exploring scenarios based on different assumptions so that the scientific community, policy-makers, the private sector, and community stakeholders can come together and make optimal governance decisions to sustain this global asset. It will also require country-specific recommendations to guide national-level policy-making.

1.4 Overall Objective, Rationale and Key Questions

1.4.1 Overall Objective

This assessment aims to (1) establish the global significance of the HKH, (2) reduce scientific uncertainty on various mountain issues, (3) lay out practical and up-to-date solutions and offer new insights for development of this region, (4) value and conserve existing ecosystems, cultures, societies, knowledge, and distinctive HKH solutions that are important to the rest of the world, (5) addresses contemporary policy questions, and (6) influence policy processes with robust evidence for sustainable mountain development.

1.4.2 Rationale for the Assessment

An assessment is distinct from a review. Whereas research speaks to other scientists in a particular field, assessments critically evaluate current states of knowledge about a topic with an aim to develop policy-oriented solutions, and inform relevant decision-makers across sectors. Assessments are structured to address specific social problems by translating science into forms that are salient, legitimate, and credible to wider audiences (Clark et al. 2006). Nevertheless, assessments also give due importance to reducing scientific uncertainty.

An integral part of assessments is indicating the level of confidence that chapter teams have concerning key findings, based on the available data, evidence and peer-reviewed publications. For the HIMAP Assessment it was decided to follow the four-box model adopted by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) for the qualitative communication of confidence, which juxtaposes the level of agreement with the quantity and quality of the evidence. In the Chapter Overviews the following four confidence terms are used, in brackets and italics: (*well established*), (*established but incomplete*), (*unresolved*) and (*inconclusive*). For a key finding to be well established, the quantity and quality of the evidence is high as is the level of agreement. For inconclusive both are low, while for unresolved multiple independent studies exist but the conclusions do not agree (low level of agreement). Lastly, established but incomplete pertains to findings where the general level of agreement is high

among experts, although only a limited number of studies exist and the level of evidence is low to moderate.

The target audiences for this assessment are those who make decisions on investments and management regarding mountain development, that is, policy-makers, government agencies, foundations, academics, natural resource managers, private-sector investors, and civil-society members. In addition, our assessment aims to inform the general public about important mountain issues so that everyone can help to make better decisions through political processes in HKH countries.

In 2007, the Intergovernmental Panel on Climate Change (IPCC's) fourth assessment report (Pachauri and Reisinger 2007) predicted that climate change will be the most prominent driver of global change in the 21st century and pointed to the lack of consistent long-term monitoring in the HKH. The report called for national, regional, and global efforts to fill this data gap. Little progress was made in the HKH by the time of the IPCC's fifth assessment report (Pachauri and Meyer 2014). While universities, nongovernmental organizations, and scientific organizations have made strides in assembling and consolidating data, information on environment, natural resources and social systems of the HKH collectively remains too fragmented and incomplete to derive any meaningful conclusions about trends and scenarios.

The Hindu Kush Himalayan Monitoring and Assessment Programme (HIMAP), which brings together hundreds of scientists and experts from the region and around the world, aims to address these knowledge gaps and propose a way forward. This comprehensive assessment goes beyond climate change and is expected to greatly assist efforts to address threats and act on opportunities, and gives importance to upscale cutting-edge approaches. HIMAP derives inspiration from the Arctic Monitoring and Assessment Programme, which has systematically generated meaningful data and analysis about key trends and future scenarios on environment and natural resources in the Arctic region.

1.4.3 Key Questions

A set of questions relevant for the assessment was developed first by analysing the key issues of the HKH region. The assessment was designed in a way that each chapter team considered relevant questions in writing their chapters. HIMAP has considered the following critical questions:

- What are the most important drivers of change in the HKH, what is the role of climate change, and what are their potential impacts on biodiversity, ecosystem services, livelihoods, and water resources?
- What are the most important strategies, policies, and governance arrangements for enhancing community adaptation to drivers of change, including climate

change; how can they be out-scaled; and what are their impacts?

- How do gender-equitable and inclusive approaches support sustainable mountain development, and how can these be realized?
- What migration trends exist in the region, what are their present impacts on livelihoods and the environment, how climate change is inducing migration and should migration be taken as adaptive strategy, and what are the options for addressing migration and the likely consequences of those options?
- What is the existing status of the cryosphere, what changes are likely, and what are the possible impacts of those changes?
- What is the current and likely future quantity, variability, and quality of the water in the 10 major river basins of the HKH; what are the potential impacts of change on water availability; and how can negative impacts be mitigated?
- What are the best means of reducing the risk of floods and droughts, and how can they be introduced at various scales, including on Transboundary Rivers?
- Why is air pollution increasing in the HKH, how is the HKH affected by air pollution from within and beyond the HKH, and how can the problem be reduced?
- What are the energy needs and possibilities for the people of the HKH, what are the positive and negative impacts of hydropower development, how effective and safe is hydropower generation as an economic enterprise, and how can hydropower best be sustainably developed in the region?
- How can ecosystems be managed to support soil and biodiversity conservation, and improved livelihoods in the various contexts found in the HKH?
- What ecosystem services do mountains provide, and how can management and supply of these services be compensated?
- What watershed-, landscape-, and forestry-based approaches will best support ecosystem services, food and water security, and community resilience?
- How can the HKH develop a green economy? What technologies (modern, traditional, and indigenous) and approaches are best suited for sustainable mountain development in the region, and how can they be out-scaled?

1.5 Vision

The assessment foresaw the key issues of the region, drew 13 critical questions for addressing the identified issues, and both the issues and questions were used in formulating the

vision of the assessment: *To enable a prosperous, peaceful, and poverty-free people; food, energy, environment and water secure people; and climate- and disaster-resilient mountain communities for the region and the world.*

- (1) Prosperous—wellbeing in terms of productive and dignified, social (quality of life, social capital, health), cultural (identity plus integration), and environment (clean air, water, pollution management, and healthy natural resource base)
- (2) Equality of access to opportunities and benefits of resources for everyone regardless gender and social class
- (3) Food security—healthy people with access to adequate, affordable, good quality and nutritious food
- (4) Energy security—access to adequate amount of energy that is affordable, non-polluting and sustainable, without unduly affecting the present low carbon status.
- (5) Water security—access to quality, affordable water; and protection from extreme events such as floods and droughts
- (6) Vibrant and bio-diverse ecosystem services for people to support culture and economies; protection and wise use of ecosystem services
- (7) Climate and disaster resilient communities and countries; contributing to mitigation and adaptation; means—finance, capacity building, knowledge and technology
- (8) Cooperation at all levels (people to people, business to business, government to government) between countries for sustainable and mutual benefits to achieve vision
- (9) Unrestricted people movement across the HKH countries
- (10) Recognition of the HKH region as a global asset.

1.6 HKH Priorities Contributing to the Sustainable Development Goals

Considering the issues, questions and vision as part of this assessment, we drafted our chapters and key messages in line with the United Nations' Sustainable Development Goals (SDGs). In this way, our "Priorities for Mountains and People of the HKH" reflect the ideals and inspiration of the SDGs. We created this complementarity through a three-step exercise:

- (a) Define HKH priorities, align them with SDGs and refer to relevant HIMAP assessment chapters;

- (b) Define HKH specific targets for 2030;
- (c) Identify suitable indicators derived from the list of proposed SDG indicators; and indicate data availability.

Table 1.3 lays out the relationship between HKH priorities and the SDG framework.

1.7 Conceptual Framing of the Assessment

The concept of the assessment was logically developed step by step by framing of key issues, identifying critical questions to address the issues and visioning of the exercise and identifying nine priorities that could contribute to 2030 SDGs.

Our assessment addresses the environmental, economic and social pillars of sustainable mountain development and will serve as a basis for evidence-based decision-making to safeguard the environment and advance people's wellbeing. This report will not be a one-time publication. It is planned as the first of a series of monitoring and assessment reports about the HKH.

In spite of the vast expanse of mountains and their importance in the world, as a unique and exclusive land form, they have been largely ignored within better known environmental assessments such as the IPCC and Millennium Ecosystem Assessment. In those assessments, mountains are not examined in detail: scientific knowledge is scattered and traditional indigenous knowledge systems are mostly absent. This assessment intends to fill these gaps and provide information for improved decision making in and for the HKH. HIMAP intends to provide a connection of this region in global assessments such as IPCC AR 6 and subsequent ones and IPBES, and intends to contribute to global targets like 2030 SDG goals, 1.5° World after Paris UNFCCC 2015 agreement and Sendai Framework for Disaster Risk Reduction 2015.

The assessment chapters consider status, trends and scenarios on environmental, economic and social systems of the HKH region, and come up with recommendations that build into key policy messages. This assessment focuses on various drivers of change all of which are influenced by impacts of climate change. Mountain people and ecosystems tend to experience change more rapidly and with greater intensity. Mountain regions are no longer isolated from globalization. The HKH's biodiverse resources, rich indigenous knowledge systems, and enormous reservoirs of water provide vibrancy to the region and beyond. Understanding how these features may change over time is extremely important. In response, we devote many pages of this assessment to considering alternative development pathways and discussing ideas for enhancing regional cooperation in the HKH for sustainable mountain development.

Table 1.3 Framework for SDG consistent priorities for mountains and peoples of the HKH

SDG consistent priorities for the HKH region	Targets (related SDG targets in parentheses)	HKH Indicators (SDG indicators listed in parentheses)	HIMAP assessment corresponding chapter	Link with most relevant SDG
<p>End poverty in all its forms everywhere in the mountains and ensure that women, men and children of the HKH region lead healthy lives in an inclusive and equitable environment</p>	<ul style="list-style-type: none"> • Reduce income poverty to zero in mountain areas by 2030 (1.1) • Reduce non-income poverty including health, education, and other basic needs to zero in mountain areas by 2030 (1.2) • Achieve universal health coverage, access to quality healthcare services and access to safe, effective, quality, and affordable essential medicines and vaccines for all people in the mountains (3.8) • All girls and boys in the mountains complete free, equitable and quality primary and secondary education (4.1) • Facilitate orderly, safe, and responsible migration and mobility of people within and between mountain and non-mountain areas (10.7) • By 2030, reduce to less than 3% the transaction costs of migrant remittances and eliminate remittance corridors with costs higher than 5% (10.c) 	<ul style="list-style-type: none"> • Proportion of <i>mountain</i> population below the international poverty line (= \$1.25 a day), by sex, age, employment status and geographical location (urban/rural) (1.1.1) • Proportion of <i>mountain</i> men, women and children of all ages living in poverty in all its dimensions according to national definitions (1.2.2) • Proportion of <i>mountain</i> population covered by social protection floors/systems, by sex, distinguishing children, unemployed persons, older persons, migrants, persons with disabilities, pregnant women, new-borns, work-injury victims and the poor and the vulnerable (1.3.1) • Proportion of <i>mountain</i> population living in households with access to basic services (sanitation, health, education) (1.4.1) • Proportion of total adult <i>mountain</i> population with secure tenure rights to land, with legally recognized documentation and who perceive their rights to land as secure, by sex and by type of tenure (1.4.2) • Mortality rate attributed to household and ambient air pollution (3.9.1) • Proportion of <i>mountain</i> youth (aged 15–24 years) not in education, employment or training (8.6.1) • Proportion of the rural <i>mountain</i> population who live 	<ul style="list-style-type: none"> • HKH drivers of change (2) • Air pollution (10) • Disaster risk reduction and increasing resilience (11) • Mountain poverty vulnerability and livelihoods (12) • Gender and inclusive development (14) • Migration (15) 	<p>Goal 1. End poverty in all its forms everywhere</p> <p>Goal 3. Ensure healthy lives and promote well-being for all at all ages</p> <p>Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all</p>

(continued)

Table 1.3 (continued)

SDG consistent priorities for the HKH region	Targets (related SDG targets in parentheses)	HKH Indicators (SDG indicators listed in parentheses)	HIMAP assessment corresponding chapter	Link with most relevant SDG
<p>Promote sustainable production systems to assure food security, nutrition security, and income for mountain people, with particular attention to women's changing roles in agriculture</p>	<ul style="list-style-type: none"> • End all forms of malnutrition in the mountains and improve food and nutrition security, particularly for women and girl children (2.2) • Enable higher incomes for small-scale farmers, including women farmers (2.3) • By 2030, ensure sustainable food production systems and implement resilient agricultural practices <i>in the mountains</i> that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality (2.4) • Increase investment in rural infrastructure, agricultural research, technology development, and plant and livestock gene banks in the mountains to improve agricultural productive capacity (2.a) • Achieve sustainable management and efficient use of natural resources (12.2) 	<ul style="list-style-type: none"> • within 2 km of an all-season road (9.1.1) • Proportion of <i>mountain</i> population that has convenient access to public transport, by sex, age and persons with disabilities (11.2.1) • Prevalence of undernourishment by sex and age (2.1.1) • Prevalence of malnutrition by sex and age (2.2.2) • Average income of small-scale food producers, by sex and indigenous status (2.3.2) 	<ul style="list-style-type: none"> • Food and nutrition security (9) • Disaster risk reduction and increasing resilience (11) • Mountain poverty vulnerability and livelihoods (12) • Adaptation strategies (13) • Gender and inclusive development (14) 	<p>Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture Goal 12. Ensure sustainable consumption and production patterns</p>
<p>Achieve gender and social equity through inclusive and transformative change in the mountains</p>	<ul style="list-style-type: none"> • Eliminate all forms of violence against all women and girls (5.2) 	<ul style="list-style-type: none"> • Proportion of government recurrent and capital spending to sectors that disproportionately benefit 	<ul style="list-style-type: none"> • Sustaining HKH Biodiversity and Ecosystem Services (5) • Meeting Future Energy Needs in the HKH (6) 	<p>Goal 5. Achieve gender equality and empower all women and girls Goal 10. Reduce inequality within and among countries</p>

(continued)

Table 1.3 (continued)

SDG consistent priorities for the HKH region	Targets (related SDG targets in parentheses)	HKH Indicators (SDG indicators listed in parentheses)	HIMAP assessment corresponding chapter	Link with most relevant SDG
<p>Ensure a year-round secure water supply in the mountains with universal and affordable access to safe drinking water, sanitation,</p>	<ul style="list-style-type: none"> • Ensure women's and marginalized groups' effective participation and equal opportunities for leadership at all levels of decision-making in political, economic and public life (5.5) • Increase number of women in institutions by at least 100%, particularly at the decision-making levels (16.7) • Adopt and strengthen policies and legislation for the promotion of gender and social equality and the empowerment of all women and girls at all levels, with a focus on mountains (5.c) • Eliminate gender disparities in education in the mountains (4.3) • Empower and promote the social, economic and political inclusion of all irrespective of age, sex, race, ethnicity, origin, religion or economic or other status (10.2) 	<p>women, the poor and vulnerable groups (1.b.1)</p> <ul style="list-style-type: none"> • Participation rate of youth and adults in formal and non-formal education and training in the previous 12 months, by sex (4.3.1) • Whether or not legal frameworks are in place to promote, enforce and monitor equality and non-discrimination on the basis of sex (5.1.1) • Proportion of total agricultural population with ownership or secure rights over agricultural land, by sex; and share of women among owners or rights-bearers of agricultural land, by type of tenure (5.a.1) • Growth rates of household expenditure or income per capita among the bottom 40% of the population and the total population (10.1.1) • Proportions of positions (by sex, age, persons with disabilities and population groups) in public institutions (national and local legislatures, public service, and judiciary) compared to national distributions (16.7.1) • Proportion of population who believe decision-making is inclusive and responsive, by sex, age, disability and population group (16.7.2) 	<p>Water availability and use (8)</p> <ul style="list-style-type: none"> • Food and nutrition security (9) • Air pollution (10) • Disaster risk reduction and increasing resilience (11) • Mountain poverty vulnerability and livelihoods (12) • Adaptation strategies (13) • Gender and inclusive development (14) • Migration (15) • Governance and Institutions (16) 	<p>Goal 16. Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels</p>
<p>Ensure a year-round secure water supply in the mountains with universal and affordable access to safe drinking water, sanitation,</p>	<ul style="list-style-type: none"> • Create secure water supply for key development sectors (agriculture, energy) that are viable year-round (6.4) 	<ul style="list-style-type: none"> • Proportion of <i>mountain</i> population (disaggregated by sex, age and social categories) using safely managed drinking water services (6.1.1) 	<ul style="list-style-type: none"> • Climate change in the HKH (3) • Status and change in the cryosphere (4) • Water availability and use (5) • Food and nutrition security (9) 	<p>Goal 6. Ensure availability and sustainable management of water and sanitation for all</p>

(continued)

Table 1.3 (continued)

SDG consistent priorities for the HKH region	Targets (related SDG targets in parentheses)	HKH Indicators (SDG indicators listed in parentheses)	HIMAP assessment corresponding chapter	Link with most relevant SDG
and water for productive purposes	<ul style="list-style-type: none"> • Build effective and efficient mechanisms to implement and monitor transboundary cooperation agreements (6.5) • Achieve universal and equitable access to safe and affordable drinking water to all mountain people by 2030 (6.1) • Achieve access to adequate and equitable sanitation services and hygiene education for all in mountain regions (6.2) • Reduce women and children's water collecting time and work load by 2030 • Support and strengthen the participation of mountain communities in water management (6.b) 	<ul style="list-style-type: none"> • Proportion of <i>mountain</i> population (disaggregated by sex, age and social categories) using safely managed sanitation services, including a hand-washing facility with soap and water (6.2.1) • Level of water stress: freshwater withdrawal as a proportion of available freshwater resources (6.4.2) • Proportion of transboundary basin area with an operational arrangement for water cooperation (6.5.2) • Proportion of men and women in the decision-making levels in water and climate related institutions 	<ul style="list-style-type: none"> • Disaster risk reduction and increasing resilience (11) • Mountain poverty vulnerability and livelihoods (12) • Adaptation strategies (13) • Gender and inclusive development (14) • Migration (15) • Governance and Institutions (16) 	Goal 13. Take urgent action to combat climate change and its impacts
Universal access to clean energy in the mountains from sources that are affordable, reliable, and sustainable	<ul style="list-style-type: none"> • Universal access to clean and affordable energy by the people in the mountains (7.1) • Increase electrification in rural areas (7.1) • Increase use of renewable energy (7.2) • Decrease air pollution (3.9 and 11.6) • Increase access of energy for women decreasing their workload, time and drudgery (7.1) 	<ul style="list-style-type: none"> • Mortality rate attributed to household and ambient air pollution (3.9.1) • Proportion of mountain population (disaggregated by sex and social categories) with access to electricity (7.1.1) • Proportion of mountain population (disaggregated by sex and social categories) with primary reliance on clean fuels and technology (7.1.2) • CO₂ emission per unit of value added (9.4.1) • Annual mean levels of fine particulate matter (e.g. PM2.5 and PM10) in cities (population weighted) (11.6.2) 	<ul style="list-style-type: none"> • Climate change in the HKH (3) • Status and change in the cryosphere (7) • Air pollution (10) 	Goal 7. Ensure access to affordable, reliable, sustainable and modern energy for all
Halt biodiversity loss, land degradation and sustainably manage forests and other ecosystems in the mountains to enhance ecosystem resilience for sustained flow of services	<ul style="list-style-type: none"> • Ensure the conservation of mountain ecosystems, including their biodiversity and habitats (15.4) • Take urgent action to minimise human-wildlife conflict and end 	<ul style="list-style-type: none"> • Change in the extent of ecosystems over time (6.6.1) • Proportion of important sites for terrestrial and freshwater biodiversity that are covered by 	Sustaining HKH Biodiversity and Ecosystem Services (5)	Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and

(continued)

Table 1.3 (continued)

SDG consistent priorities for the HKH region	Targets (related SDG targets in parentheses)	HKH Indicators (SDG indicators listed in parentheses)	HIMAP assessment corresponding chapter	Link with most relevant SDG
<p>Ensure integration between adaptation to climate change, disaster risk reduction and sustainable development for the mountains through evidence-based decision making</p>	<p>poaching and trafficking of protected species of flora and fauna in the mountains (15.7)</p> <ul style="list-style-type: none"> Reduce ecosystem degradation by development projects by 50% and restore degraded ecosystems (15.5) Include ecosystem values in national accounting practices (15.9) Increase investment in biodiversity conservation, and ecosystem based adaptation and sustaining services by 50% by 2030 (15.a) Ensure 100% community participation in biodiversity programmes at the local level Increase women's participation in decision making processes by 50% in natural resource access and benefit sharing programmes Establish a mountain specific database for species and ecosystem services (17.18) 	<p>protected areas, by ecosystem type (15.1.2)</p> <ul style="list-style-type: none"> Proportion of land that is degraded over total land area (15.3.1) Coverage by protected areas of important sites for mountain biodiversity (15.4.1) Mountain Green Cover Index (indicator to measure changes of green vegetation in mountain areas, informed by satellite imagery data) (15.4.2) Red List Index (endangered species) (15.5.1) Official development assistance and public expenditure on conservation and sustainable use of biodiversity and ecosystems (15.b.1) Number of countries that have adopted legislative, administrative and policy frameworks to ensure fair and equitable sharing of benefits (of use of genetic or other natural resources) (15.6.1) 	<p>reverse land degradation and halt biodiversity loss</p>	<p>reverse land degradation and halt biodiversity loss</p>
<p>Ensure integration between adaptation to climate change, disaster risk reduction and sustainable development for the mountains through evidence-based decision making</p>	<ul style="list-style-type: none"> Concerted action to keep global level climate change to 1.5° by 2100 (17.14) Strengthen resilience and adaptive capacity to climate related hazards and natural disasters in the mountains (13.1) Reduce mortality rates, especially for women and children due to extreme climate events (1.5) Reduce economic loss due to extreme climate events (11.5) Integrate mountain specific climate change measures into 	<ul style="list-style-type: none"> Number of deaths, missing persons and persons affected by disaster per 100,000 people (disaggregated by sex) (1.5.1) Direct disaster economic loss in relation to global GDP, including disaster damage to critical infrastructure and disruption of basic services (11.5.2) Proportion of local governments that adopt and implement local disaster risk reduction strategies in line with the Sendai Framework for 	<ul style="list-style-type: none"> Status and change in the cryosphere (7) Disaster risk reduction and increasing resilience (11) Adaptation strategies (13) 	<p>Goal 13. Take urgent action to combat climate change and its impacts</p> <p>Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable</p> <p>Goal 1. End poverty in all its forms everywhere</p>

(continued)

Table 1.3 (continued)

SDG consistent priorities for the HKH region	Targets (related SDG targets in parentheses)	HKH Indicators (SDG indicators listed in parentheses)	HIMAP assessment corresponding chapter	Link with most relevant SDG
<p>Build resilient, equitable and inclusive mountain communities empowered by economic opportunity and investment in mountain infrastructure and connectivity</p>	<p>national policies, strategies and planning (13.2)</p> <ul style="list-style-type: none"> • Develop sustainable and resilient infrastructure in the mountains to support economic development and human well-being (9.1) • Sustain per capita economic growth in the mountains and at least 7% annual GDP growth (8.1) • Devise and implement mountain specific policies to promote sustainable mountain tourism, which creates local jobs, promotes local culture and products (8.9) • Achieve access to full and productive employment and decent work for all women and men in the mountains, and equal pay for work of equal value (8.5) • Protect labour rights and promote safe and secure working environments for all workers, including migrant workers from mountain areas, in particular women and those in precarious employment (8.8) • Eradicate forced child labour and human trafficking (8.7) 	<p>Disaster Risk Reduction 2015–2030 (11.b.1)</p> <ul style="list-style-type: none"> • Annual growth rate of real GDP per capita, <i>disaggregated for mountain areas</i> (8.1.1) • <i>Mountain tourism</i> direct GDP as a proportion of total GDP and in growth rate (8.9.1) • Proportion of jobs in sustainable <i>mountain</i> tourism industries out of total <i>mountain</i> tourism jobs (8.9.2) • Average hourly earnings of female and male employees <i>in mountain areas</i>, by occupation, age and persons with disabilities (8.5.1) • Unemployment rate, by sex, age and persons with disabilities <i>in mountain areas</i> (8.5.2) • Level of national compliance with labour rights (freedom of association and collective bargaining) based on International Labour Organization (ILO) textual sources and national legislation, by sex and migrant status (8.8.2) • Volume of remittances <i>to mountain areas</i> (in United States dollars) as a proportion of total GDP (17.3.2) 	<ul style="list-style-type: none"> • Mountain poverty vulnerability and livelihoods (12) • DRR and increasing resilience (11) • Adaptation strategies (13) • Gender and Inclusive Development (14) • Migration (15) 	<p>Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all</p> <p>Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation</p> <p>Goal 11. Make cities and human settlements inclusive, safe, resilient, and sustainable</p>
<p>Promote a mountain-specific agenda for achieving the SDGs through increased regional cooperation among and between mountain regions and nations</p>	<ul style="list-style-type: none"> • Cooperate at all levels across the HKH region for sustainable and mutual benefits (17.17) • Enhance regional and international cooperation and access to science, technology and innovation to achieve the SDGs in mountain areas (17.6) • In national, regional, and global decision making institutions and processes, recognize and 	<ul style="list-style-type: none"> • Number of science and/or technology cooperation agreements and programmes between countries, by type of cooperation, <i>focusing on mountains</i> (17.6.1) • Extent of use of country-owned results frameworks and planning tools by providers of development cooperation <i>and</i> 	<p>Governance and Institutions (16)</p>	<p>Goal 17. Revitalize the global partnership for sustainable development</p>

(continued)

Table 1.3 (continued)

SDG consistent priorities for the HKH region	Targets (related SDG targets in parentheses)	HKH Indicators (SDG indicators listed in parentheses)	HIMAP assessment corresponding chapter	Link with most relevant SDG
	<p>prioritize the uniqueness of the HKH mountains and its people. Ensure representation in decision-making (17.15)</p> <ul style="list-style-type: none"> • Allocate significantly greater resources and identify incentives for conservation of benefits from mountain ecosystems (15a and 17.2) • Enhance capacity-building support to HKH countries to increase significantly the availability of high quality, timely, reliable data that is specific to mountain regions, disaggregated by income, gender, age, race, ethnicity, migratory status and disability (17.18) • Equal protection of migrants under effective rule of law and good governance (16.3) 	<p><i>recognition of the HKH</i> (17.15.1)</p> <ul style="list-style-type: none"> • Net official development assistance <i>to mountain areas in the HKH</i>, total and to least developed countries, as a proportion of the Organization for Economic Cooperation and Development (OECD) Development Assistance Committee donors' gross national income (GNI) (17.2.1) • Total amount of approved funding <i>for mountain areas</i> in developing countries to promote the development, transfer, dissemination and diffusion of environmentally sound technologies (17.7.1) • Proportion of sustainable development indicators produced at the national level <i>specific to the HKH mountain areas</i>, with full disaggregation when relevant to the target, in accordance with the Fundamental Principles of Official Statistics (17.18.1) • Level of national compliance with labour rights (freedom of association and collective bargaining) based on International Labour Organization (ILO) textual sources and national legislation, by sex and migrant status (8.8.2) 		

1.8 Assessment Process

The International Centre for Integrated Mountain Development (ICIMOD) coordinated HIMAP, constituted the chapter author teams and the process was steered by policy decisions of the Steering Committee. The assessment process involved several rounds of Steering Committee meetings, workshops of Coordinating Lead Authors and Lead Authors including write-shops and peer inter-chapter reviews, subject expert reviews, and open reviews for anyone interested. Science-policy dialogues were organized to develop key policy messages. For this assessment, HIMAP has engaged more than 300 researchers, practitioners, experts, and policy-makers. The publication of the first Comprehensive Assessment of the HKH in 2018 is planned as a wide-ranging, innovative evaluation of the current state of knowledge in the region and of various drivers of change and their impacts, and a set of practically oriented policy recommendations. The process is following these steps:

- **Framing of the assessment:** A framing workshop and consultations with various experts to define the structure and process of the assessment.
- **Drafting of chapters:** Based on the experience of other assessments, a network of people with in-depth knowledge of the region to draft the chapters.
- **Peer review:** Rigorously review the chapter drafts, both by peers and via open review.
- **Dissemination:** Using multiple channels, to communicate to a wide range of audiences during the process to draw attention while the assessment is still in preparation.
- **Engagement with policy-makers:** share with policy-makers in the region through various processes.
- **Development of a summary document:** A summary for decision-makers based on the results of the process.
- **Publication and launch:** Publication of the first edition of the assessment in 2017.

1.9 Outline of the Assessment

Each chapter of the assessment address three broad themes within its particular confines:

- (1) Defining the vision and state of knowledge;
- (2) Drivers of change and integrated future scenarios; and
- (3) Noting ideas and praxis for sustainable development.

The critical questions were used by each of the chapters to address the key issues of the region. The sixteen chapters include: Introduction—setting the scene: Drivers—local,

regional, and global; Climate change in the HKH; Future scenarios; Sustaining HKH biodiversity and ecosystem services; Meeting future energy needs; The cryosphere; Water security—availability, use, and governance; Food and nutrition security; Air pollution; Disaster risk reduction and increasing resilience; Mountain poverty, vulnerability and livelihoods; Adaptation strategies; Gender and inclusive development; Migration; and Governance and institutions.

References

- Bajracharya, S. R., & Shrestha, B. (Eds.). (2011). *The status of glaciers in the Hindu Kush-Himalayan region*. Kathmandu: ICIMOD.
- Bajracharya, S. R., Maharjan, S. B., Shrestha, F., Guo, W., Liu, S., Immerzeel, W., et al. (2015). The glaciers of the Hindu Kush Himalayas: Current status and observed changes from the 1980s to 2010. *International Journal of Water Resources Development*, 31(2), 161–173.
- Bangladesh Bureau of Statistics. (2001). *Population and housing census 2001*. Dhaka, Bangladesh: Statistics and Informatics Division, Ministry of Planning, Government of Bangladesh.
- Bangladesh Bureau of Statistics. (2011). *Population and housing census 2011*. Dhaka, Bangladesh: Statistics and Informatics Division, Ministry of Planning, Government of Bangladesh.
- Central Bureau of Statistics (2011). *National population and housing census of Nepal (national report) 2011*. Kathmandu, Nepal: National Planning Commission Secretariat, Government of Nepal. Retrieved from <http://cbs.gov.np/image/data/Population/National%20Report/National%20Report.pdf>.
- Central Statistics Organization. (2009). *Statistical year book of Afghanistan 2008–09*. Kabul, Afghanistan: Government of Islamic Republic of Afghanistan. Retrieved from <http://cso.gov.af/Content/files/Population%20Full%20chapter.pdf>.
- Central Statistics Organization (2017). *Statistical year book of Afghanistan 2016–17*. Kabul, Afghanistan: Government of Islamic Republic of Afghanistan. Retrieved from <http://cso.gov.af/Content/files/%D8%B3%D8%A7%D9%84%D9%86%D8%A7%D9%85%D9%87%20%D8%A7%D8%AD%D8%B5%D8%A7%D8%A6%DB%8C%D9%88%DB%8C%20%D8%B3%D8%A7%D9%84%201395/Population.pdf>.
- Chettri, N., Shakya, B., Thapa, R., & Sharma, E. (2008). Status of a protected area system in the Hindu Kush-Himalayas: An analysis of PA coverage. *The International Journal of Biodiversity Science and Management*, 4(3), 164–178.
- Clark, W. C., Mitchell, R. B., & Cash, D. W. (2006). Evaluating the influence of global environmental assessments. In R. B. Mitchell, W. C. Clark, D. W. Cash, & N. M. Dickson (Eds.), *Global environmental assessments: Information and influence* (pp. 1–28). Cambridge, USA: MIT Press.
- Dyrgerov, M. D., & Meier, M. F. (2005). *Glaciers and changing earth system: A 2004 snapshot*. Boulder: Institute of Arctic and Alpine Research, University of Colorado.
- FAO. (2015). *Mapping the vulnerability of mountain peoples to food insecurity*. Rome, Italy: Food and Agriculture Organization of the United Nations.
- Fleury, J. M. (1999). *Mountain biodiversity at risk* (Vol. 2, pp. 1–6). IDRC Briefing.
- Gansu Provincial Bureau of Statistics. (2012). *Statistical yearbook of Gansu Province 2012*. Lanzhou, People's Republic of China: Government of Gansu Province.

- Gansu Provincial Bureau of Statistics. (2016). *Statistical yearbook of Gansu Province 2016*. Lanzhou, People's Republic of China: Government of Gansu Province.
- Hamilton, L. S. (2002). *Why mountain matters? World Conservation: The IUCN Bulletin 1/2002*.
- Kapos, V., Rhind, J., Edwards, M., Price, M. F., & Ravilious, C. (2000). Developing a map of the world's mountain forests. In M. F. Price & N. Butt (Eds.), *Forests in Sustainable Mountain Development: A State-of-Knowledge Report for 2000* (pp. 4–9). Wallingford: CAB International.
- Ministry of Home Affairs. (2001). *Population census 2001*. Delhi, India: Office of the Registrar General and Census Commissioner, Ministry of Home Affairs, Government of India. Retrieved from http://www.censusindia.gov.in/2011-common/census_data_2001.html.
- Ministry of Home Affairs. (2011). *Population census 2011*. Delhi, India: Office of the Registrar General and Census Commissioner, Ministry of Home Affairs, Government of India. Retrieved from http://www.censusindia.gov.in/2011-common/census_data_2001.html.
- Molden, D., & Sharma, E. (2013). ICIMOD's strategy for delivering high-quality research and achieving impact for sustainable mountain development. *Mountain Research and Development*, 33(2), 179–183.
- National Bureau of Statistics of China. (2012). *Statistical yearbook of China 2012*. Beijing, China: Government of the People's Republic of China. Retrieved from <http://www.stats.gov.cn/tjsj/ndsj/2012/indexeh.htm>.
- National Bureau of Statistics of China. (2016). *Statistical yearbook of China 2016*. Beijing, China: Government of the People's Republic of China. Retrieved from <http://www.stats.gov.cn/tjsj/ndsj/2016/indexeh.htm>.
- National Statistics Bureau. (2016). *Statistical year book of Bhutan 2016*. Thimphu, Bhutan: Government of Bhutan. Retrieved from http://www.nsb.gov.bt/publication/files/SYB_2016.pdf.
- Nogues-Bravo, D., Araujo, M. B., Romdal, T., & Rahbek, C. (2008). Scale effects and human impact on the elevational species richness gradients. *Nature*, 453(8), 216–220.
- Pachauri, R. K., & Reisinger, A. (Eds.). (2007). In *Climate change 2007: Synthesis report. Contribution of working groups I, II and III to the fourth assessment report of the intergovernmental panel on climate change*. Geneva, Switzerland: Intergovernmental Panel on Climate Change. Retrieved March 12, 2016, from www.ipcc.ch/report/ar4/.
- Pachauri, R. K., & Meyer, L. A. (Eds.). (2014). *Climate change 2014: Synthesis Report. Contribution of working groups I, II and III to the fifth assessment report of the intergovernmental panel on climate change*. Geneva, Switzerland: Intergovernmental Panel on Climate Change. Retrieved March 12, 2016, from www.ipcc.ch/report/ar5/.
- Pakistan Bureau of Statistics. (1998). *Population census 1998*. Islamabad: Government of Pakistan. Retrieved from <http://www.pbs.gov.pk/content/population-census>.
- Pakistan Bureau of Statistics. (2017). *Population census 2017*. Islamabad: Government of Pakistan. Retrieved from <http://www.pbs.gov.pk/content/population-census>.
- Planning and Development Department. (2014). *Azad Jammu and Kashmir at a Glance 2014 (report)*. The government of Pakistan. Retrieved from <https://pndajk.gov.pk/uploadfiles/downloads/AJK%20at%20a%20glance%202014.pdf>.
- Planning and Development Department. (2013). *Gilgit-Baltistan Azad Jammu and Kashmir at a Glance 2013*. Muzaffarabad, Pakistan: Statistical Cell, Planning and Development Department, Government of Gilgit-Baltistan. Retrieved from <http://www.gilgitbaltistan.gov.pk/DownloadFiles/GBFinancilCurve.pdf>.
- Schild, A., & Sharma, E. (2011). Sustainable mountain development revisited. *Mountain Research and Development*, 31(3), 237–241.
- Sichuan Provincial Bureau of Statistics. (2012). *Statistical yearbook of Sichuan Province 2012*. Chengdu, People's Republic of China: Government of Sichuan Province.
- Sichuan Provincial Bureau of Statistics. (2016). *Statistical yearbook of Sichuan Province 2016*. Chengdu, People's Republic of China: Government of Sichuan Province.
- The Ministry of Immigration and Population. (2014). *Population and housing census of Myanmar 2014 (State wise reports)*. Nay Pyi Taw, Myanmar: Department of Population, Ministry of Immigration and Population, Government of Myanmar.
- UNEP-WCMC. (2002). *Mountain watch: Environmental change and sustainable development in mountains*. Cambridge, UK: UNEP—World Conservation Monitoring Centre.
- Whiteman, D. (2000). *Mountain meteorology*. London: Oxford University Press.
- Xinjiang Autonomous Region Bureau of Statistics. (2012). *Statistical yearbook of Xinjiang autonomous region 2012*. Ürümqi, People's Republic of China: Government of Xinjiang Autonomous Region.
- Xinjiang Autonomous Region Bureau of Statistics. (2016). *Statistical yearbook of Xinjiang autonomous region 2016*. Ürümqi, People's Republic of China: Government of Xinjiang Autonomous Region.
- Xu, J., & Melick, D. (2006). Emancipating indigenous knowledge: Can traditional cultures assist Himalayan sustainable development. *Sustainable Mountain Development*, 50, 31–35.
- Yunnan Provincial Bureau of Statistics. (2012). *Statistical yearbook of Yunnan Province 2012*. Kunming, People's Republic of China: Government of Yunnan Province.
- Yunnan Provincial Bureau of Statistics. (2016). *Statistical yearbook of Yunnan Province 2016*. Kunming, People's Republic of China: Government of Yunnan Province.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>), which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.



The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.