

Status of Gender, Vulnerabilities and Adaptation to Climate Change in the Hindu Kush Himalaya



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The International Centre for Integrated Mountain Development, ICIMOD, is a regional knowledge development and learning centre serving the eight regional member countries of the Hindu Kush Himalaya – Afghanistan, Bangladesh, Bhutan, China, India, Myanmar, Nepal, and Pakistan – and based in Kathmandu, Nepal. Globalisation and climate change have an increasing influence on the stability of fragile mountain ecosystems and the livelihoods of mountain people. ICIMOD aims to assist mountain people to understand these changes, adapt to them, and make the most of new opportunities, while addressing upstream-downstream issues. We support regional transboundary programmes through partnership with regional partner institutions, facilitate the exchange of experience, and serve as a regional knowledge hub. We strengthen networking among regional and global centres of excellence. Overall, we are working to develop an economically and environmentally sound mountain ecosystem to improve the living standards of mountain populations and to sustain vital ecosystem services for the billions of people living downstream – now, and for the future.



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The Himalayan Climate Change Adaptation Programme (HICAP), one of the initiatives under ICIMOD's Regional Programme on Adaptation to Change, is a six-year research programme initiated in 2012. It is implemented by ICIMOD in collaboration with CICERO and GRID-Arendal, with responsibilities for overall research competence and communication and outreach respectively. With 28 international and regional partners, HICAP carries out basic and applied research as well as policy engagement to contribute to enhanced resilience to change, particularly climate change, through improved understanding of vulnerabilities, opportunities, and potentials for adaptation. It covers five river sub-basins: upper Indus (Pakistan), Koshi (Nepal), upper Brahmaputra (Tibetan Autonomous Region, China), eastern Brahmaputra (India), and upper Salween Mekong (China). The programme is supported by the Governments of Norway and Sweden.

For more information, please visit www.icimod.org/hicap

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Cover photo: A fisherwoman goes about her daily chores in Maguri beel in Tinsukhia, Assam, India. The wetland provides much of the food and sustenance for people living around it.

Status of Gender, Vulnerabilities and Adaptation to Climate Change in the Hindu Kush Himalaya: Impacts and Implications for Livelihoods, and Sustainable Mountain Development

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Foreword

ICIMOD believes in a future where the region's mountain people can experience enhanced livelihoods, equity, and social and environmental security; where they can adapt to environmental, socioeconomic, and climate change; and where future generations of mountain and downstream populations can enjoy the benefits and opportunities afforded by the region's natural endowment. Globalization and climate change have an increasing influence on the stability of fragile mountain ecosystems and the livelihoods of mountain people. ICIMOD aims to assist mountain people to understand these changes, adapt to them, and make the most of new opportunities, while addressing upstream-downstream issues. In the endeavor to reach towards this goal, ICIMOD is committed to gender equality and inclusive development. It believes that interventions are most successful when they take into account the points of view of everyone in the society, regardless of gender, caste, or ethnicity. Gender equality and empowerment of women is one of the important hallmarks of ICIMOD's work.

During recent decades, rapid population growth, urbanization, migration, feminization of the landscape, economic development, and climate change have begun to pose a challenge to traditional livelihood strategies and coping mechanisms. Once self-sufficient people now face dire economic poverty. Mountain populations are, on the whole, poorer than the national average in the HKH region. In all this, mountain women and girls are often disproportionately affected by climate and socioeconomic changes, yet they are key to adaptation efforts in mountain contexts where high rates of migrating men mean that women and girls carry out the main responsibilities for managing natural resources, households, communities, and everyday survival. Although women are key managers of their environment and often carry out a disproportionate amount of agricultural, household, and community work, they are often excluded from decision making and knowledge sharing.

Taking into account the tremendous role of women in mountains towards adaptation measures, opportunities and challenges, the main finding of the paper is that it is important to initiate and ensure gender-responsive climate financing mechanisms which could support gender-sensitive and gender-responsive innovations. It is hoped this study will help understand in particular women's resilience to climate change impacts, mainly in the context of natural resource management and sustainable mountain development. It will also contribute towards efforts to strengthen the gendered components of planned adaptation measures and policies by underscoring how taking into account women's prominent role and gendered knowledge in natural resource management can play a critical role in supporting sustainable development initiatives.

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Acronyms and Abbreviations

ADB	Asian Development Bank	NAPCC	National Action Plan on Climate Change
AIPP	Asia Indigenous Peoples Pact Foundation	NEC	National Environment Commission
BRAC	Bangladeshi Rural Advancement Committee	NGO	Non-Governmental Organisations
CBoS	Central Bureau of Statistics	NTFP	Non-timber forest products
CCA	Climate change adaptation	OCHA	United nations Office for the Coordination of Humanitarian Affairs
CDM	Clean Development Mechanisms	OSCE	Organization for Security and Co-operation in Europe
CFP	Community Forestry Programme	PES	Payment for environmental services
CFUG	Community forest user group	PV	Psychological vulnerability
CVCA	Climate Vulnerability and Capacity Analysis framework	REDD	Reducing emissions from deforestation and forest degradation
DDR	Disaster risk reduction	REDD+	reducing emissions from deforestation and forest degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries
FAO	Food and Agricultural Organization	SEI	Stockholm Environment Institute
GLOF	Glacial lake outburst floods	SHGs	Self-help groups
HKH	Hindu Kush Himalaya	UN	United Nations
IDMC	Internal Displacement Monitoring Centre	UNDP	United Nations Development Programme
IFAD	International Fund for Agricultural Development	UNEP	United Nations Environment Programme
IFRC	International Federation of Red Cross and Red Crescent Societies	UN-INSTRAW	UN International Research and Training Institute for the Advancement of Women
IISD	International Institute for Sustainable Development	UN-REDD	United Nations Programme on Reducing Emissions from Deforestation and Forest Degradation
IKAP	Indigenous Knowledge and Peoples Network	USAID	United States Agency for International Development
ILO	International Labour Organization	WHO	World Health Organization
INGOs	International non-governmental organisations	WOCAN	Women Organizing for Change in Agriculture and Natural Resource Management
IPCC	Intergovernmental Panel on Climate Change		
ITDG	Intermediate Technology Development Group		
IWGIA	International Work Group for Indigenous Affairs		
LAPAs	Local Adaptation Programmes of Action		
MFSC	Ministry of Forest and Soil Conservation		
NAPAs	National Adaptation Programmes of Action		

Executive Summary

The overarching recognition in all the literature is that climate change will have huge and largely detrimental impacts on vulnerable communities, and that gender will be a defining feature in shaping individuals' experiences of adverse circumstances. However, there is to date little research on how actual and potential climate change impacts are and will affect women and men, on adaptive capacities at community or household levels, and on the ways in which gender and social differences are expressed in and reflected through inequalities and discrimination in policies, institutions and practices.

What is crucial is to understand that even though climate change is often viewed as a purely scientific and technical phenomenon, it has profound implications for social justice and gender equality because the climatic stressors compounded by socioeconomic drivers of change will result in social, political and economic vulnerabilities of people and society, setting back development and destroying livelihoods. .

The Stern review has reported that climate change will have differential impacts among countries and those living in poor countries are likely to suffer disproportionately both in terms of being impacted earlier and to a greater degree, and the Hindukush Himalayas (HKH) region is one of these. Despite rich biodiversity, the region is home to poorest of the world and the most vulnerable in the face of climate change. Poverty in the region generally manifests in low income, ill health, poor access to health facilities, malnutrition, poor education, low skill, high dependence on natural environment, high insecurity and physical vulnerability, drudgery and limited capability and enterprising capacity. These dimensions of poverty are directly or indirectly linked to mountain bio-physical and socioeconomic specificities characterized by geographic isolation, poor physical and economic infrastructure, poor access to markets, technologies, information, poor institutional services, and limited economic opportunities. Mountain people have always been exposed to droughts, floods, soil erosion, and changes in the crop cycle. However, the difference now is that not only has intensity and frequency of such stress events increased over recent decades, but at the same time the socioeconomic drivers of change, such as migration, urbanization, peri-urbanization, increasing demands for energy and power, the extraction of water for industrial and agricultural activities, waste dumping and growing pollution of water and air, is also adding to the pressure and have in a sense weakened this ability of the communities.

As elsewhere, throughout the HKH gender inequalities play a critical role in shaping people's vulnerabilities and reducing resilience to adverse circumstances. The gender division of labor in the HKH is highly skewed, especially when agricultural, pastoral and wage labor is combined with household, community and casual labor. With high rates of male out-migration that is a feature of this region, women's workloads in these domains of work have intensified without corresponding increases in access to resources, decision-making and secure rights to land. Women continue to be constrained by unequal power relations, gender-biased attitudes and norms, and sometimes, systematic exclusion and under-representation resulting in limited access to resources, ownership and control over critical natural resources. Thus, in a socioeconomic and political landscape of myriad forms of social exclusions, it is the gender structure, deeply entrenched socio-cultural ideologies, that marginalize women's work contributions relative to men, rendering them more vulnerable and at risk vis-a-vis men. Thus, climate change associated risks and vulnerability have a fundamental gender dimension (Ravon 2014); and as Dankelman (2010:14) states "Like many disasters, climate change threatens to increase existing inequalities and... gender inequality is one of the most pervasive of these".

The paper looks at a range of materials in order to develop a better understanding of how communities in general and women more particularly impacted, are coping with and adapting to their changing circumstances; the lessons that community-based adaptations from the wider South Asian region offer for helping to mitigate adverse conditions; the state of climate adaptation policies, national and local action plans (NAPAs and LAPAs) of countries of the HKH; and, finally, identifies research gaps in the regional material available on climate change and gender and makes suggestions for future actions.

In the past few years there has been an outpouring of materials addressing the issue of gender and climate. But there is a paucity of documentation on the specific risks and vulnerabilities, along with coping strategies in the context of climate change of mountain communities generally and from a gendered perspective particularly. There is limited evidence-based data on two major and related issues: (i) the role of differently positioned women in adaptation and impacts of climate change and (ii) how different drivers of change are also creating new dynamics or exacerbating existing ones. We know, for instance, that due to high rates of male out-migration women have higher workloads, responsibilities, and burdens, and that the spillover of this additional burden often results in low enrollment and disenrollment for girls from formal education.

Considerably more work is needed to better understand the number of issues that affect the differentiated relationship between and among women and men and their ability to cope with and adapt to climate change in rapidly changing environments and different socio-cultural contexts across the region. While climate variability and environmental changes clearly affect both women and men, gender inequities ranging from divisions of labor to lack of ownership of land and access to critical resources differentially shape coping strategies and ability to adapt. And, while women play a vital role in maintaining the biodiversity upon which subsistence livelihoods depend, there are still serious lacunae in our understanding of their skills, capacities, knowledge and the range of competencies that they bring to bear in their day-to-day tasks. There is clearly still much to be done and not just stop at technical interventions aimed at reducing differentiated impacts of climate change. More importantly is to bring about a paradigm shift in the institutions – from a gender neutral, if not gender blind, to more social and gender transformative visions.

Identifying several gaps in knowledge and research, the paper outlines recommendations to these and also outlines strategies for supporting women as key adaptors of change.



Climate Change, Gender and Vulnerability: Making the Connections

Introduction

Climate change is emerging as one of the most pressing issues facing the global community with its potential to alter the course of development and human progress, posing momentous concerns not only for the well-being of nature but also for the very survival of human beings (Kapoor 2011, Mearns and Norton 2010). As a result climate change is likely to play a pivotal role in redefining development outcomes in the course of the 21st century and beyond. Climate change is compounded by, and contributes to, social, political and economic vulnerabilities of people and society, setting back development and destroying livelihoods (Souza et al. 2015, Ribot 2009, Ruth and Ibarra 2009). However, even though climate change “is often viewed as a purely scientific and technical phenomenon... [it must also be recognized as] a social, economic and political phenomenon with profound implications for social justice and gender equality” (Skinner 2011:1).

Over the past decade extreme, weather conditions and events such as drought and flood; and sea level rise (Pachauri and Reisinger 2007, Verner 2011) have become a reality throughout the world, affecting the lives of more and more people - both the rich and the poor- and making life, for many, increasingly uncertain. Differential impacts of climate change can severely affect the poor and marginalized sections of society. The impacts of climate change are “not evenly distributed” (Stern 2006: vii) among countries and those living in poor countries are likely to suffer disproportionately both in terms of being impacted earlier and to a greater degree. (Mertz et al. 2009, Smit and Pilifosova 2003, Smith et al. 2001).

Not only will climate change affect regions very differently, but it will also affect men and women differently (Alston 2013, CIDA 2002, Djoudi and Brockhaus 2011, Eakin 2005, Hunter and David 2009, MacGregor 2010, Terry 2009). This differential impact is due to the gendered roles and responsibilities as well as status and identities of women and men in the household and communities (FAO 2010, Lambrou and Nelson 2010, Masika 2002). While climatic variability does not always result in disadvantages and detrimental situations for women (Bhattarai et al. 2015, Dankelman 2010, McLaughlin & Dietz 2008), in many situations women are likely to experience disproportionately more negative effects than men due to existing entrenched gender structures and power relations (Agarwal, 1994, 2001, 2009, Bhattarai et al. 2015, Buchy and Subba 2003, Cornwall 2005, Gururani 2002).

Climate change is “not gender neutral as women men’s decisions differ on risk taking lines, use and type of coping strategies, adaptability and advice taking and information seeking behaviors” (Nurse-Bray 2015:1). Consequently, in many communities, climate change will have a disproportionately greater effect on women because of inequitable distribution of rights, assets, resources and power – as well as repressive cultural rules and norms, and greater responsibilities, making them often poorer and less educated than men and often excluded from political and household decision-making processes that affect their lives. These and other factors indicate that women will be more vulnerable than men to the effects of climate change (Aguilar 2006, 2009, Aguilar et al. 2004, 2007, Alston 2013, Brody et al 2008, Demetriades and Esplen 2008, CARE 2010, Kapoor 2011, Bartels et al. 2013, Mehta 2007a, Mitchell et al. 2007, Nurse-Bray 2015, Okali and Naess 2013, Skinner 2011, Vincent et al. 2010).

Climate change impacts will have detrimental effects on gender divisions of labor and access to and control over resources and intensify the existing gender vulnerabilities (Demetriades and Esplen 2008, Change 2001, Solomon et al 2007, Kakota et al. 2012, Nelson and Stathers 2009). Thus, climate change associated risks and vulnerability have a fundamental gender dimension (Ravon 2014); and as Dankelman (2010:14) states “Like many disasters, climate change threatens to increase existing inequalities and... gender inequality is one of the most pervasive of these”.



The other dimension is that although women are often perceived primarily as victims (Arora-Jonsson 2011, Bretherton 1998) they can be key agents of adaptation and mitigation to climate change as their responsibilities in households and communities as stewards of natural resources, their positions place them well to develop strategies for adapting to changing environmental realities. Therefore, as Okali and Naess (2013:2) put, “Together, these somewhat contradictory but powerful narratives provide a strong justification for placing women at the centre of climate change adaptation policies” thus making gender a critical factor in understanding vulnerability to environmental and climate change (Parikh and Denton (2003). According to MacGregor (2010:14) “any attempt to tackle climate change that excludes a gender analysis will be insufficient, unjust and therefore unsustainable”.

At the same time it must be understood that vulnerability to climate change impacts are not only shaped by gender constructs but also by roles, responsibilities, and entitlements associated with various other social stratifications and differences, including class, caste, ethnicity/race, religion, age, etc. Therefore, women or men cannot be homogenized as all women or all men will not have similar vulnerabilities or experience impact of climate change in the same way because their roles, responsibilities, and expectations are shaped by more than their gender (Carr and Thompson 2014:182). The social and cultural norms play a critical role in shaping the gender divisions of labor, labor mobility and decision-making patterns in households and communities along with local realities (Brody et al. 2008, Demetriades and Esplen 2008, Lambrou and Piana 2006, Resurrección 2013, Terry 2009). Thus it is essential to integrate gendered intersectionality when looking at differentiations within social vulnerability to the impacts of climate change.

To further complicate our understanding of the situation, climate change and climate variability is occurring within a context of many other drivers of change that have been unfolding over time. Processes of globalization and regionalization along with economic liberalization are connecting markets and reconfiguring economic relations, interactions and dependencies; populations are growing, in some cases very rapidly; people are moving, voluntarily and involuntarily whether due to geopolitical conflict or otherwise; infrastructural development, industrialization and

urbanization are creating an increasingly built-up environment; and added to this in many cases are unpredictable government policies. In tandem these trends are reshaping land use dynamics, changing the resource bases and in some instances rendering local knowledge systems obsolete whilst giving rise to new bodies of information, creating new livelihood systems and setting in motion new patterns of consumption and acquisition, mindsets and value.

This is the context against which the phenomenon of climate change has moved from its once marginal position of policy discussions to one that is increasingly central to policy and development dialogues and programmatic work. Initially focusing on bio-physical and weather-related components, climate change research and programmatic discourses have come to appreciate the varied, complex, and often highly detrimental impacts it will have. That it will be the poorest and most marginal of people, particularly from the South, who will bear the brunt of climate change-related impacts has given further impetus to the need to ground research, analysis and policy in approaches that have the ability to capture the nuances of how these larger processes will be experienced by people from the different social and gender identities given their specific vulnerabilities and adaptive capacities.

In the past decade a considerable body of theoretical material and, to a lesser extent, empirical material has emerged outlining the myriad ways in which the experience of gender¹ – intersecting with other socioeconomic disparities such as class, caste, ethnicity and so forth – play a preeminent role in shaping the structures and processes of exclusion, which in turn influences differential experiences of weather-related and other crises. While greater attention is now being given to locale-specific community adaptive processes and mechanisms, an explicitly gendered approach to it remains as yet an understudied area of study. The social differences shape adaptation outcomes because the ability to take adaptive actions depends on the resources the individual or groups have, which in turn very much depends on the “geographic location, class, age and gender” (Bartels et al. 2013:8).

Scope of report and methodology²

This working paper focuses on gender and climate change in the mountain context, with specific reference to the Hindu Kush Himalaya (HKH). It builds on a literature review that was commissioned in 2008 by the International Centre for Integrated Mountain Development (ICIMOD) and finalized the following year to look at gender and climate change in the region in the context of water and water-induced hazards. The scope of this document is somewhat wider, looking at climate change impacts on the production systems on which mountain communities of this region depend for their subsistence livelihoods and in which women play central roles. To this end, the report looks at a range of materials in order to develop a better understanding of how communities in general and women more particularly are coping with and adapting to their changing circumstances; the lessons that community-based adaptations from the wider South Asian region offer for helping to mitigate adverse conditions; the state of climate adaptation policies, national and local action plans (NAPAs and LAPAs) of countries of the HKH; and, finally, identifies research gaps in the regional material available on climate change and gender and makes suggestions for future actions.

As elsewhere, throughout the HKH gender inequalities play a critical role in shaping people’s vulnerabilities and reducing resilience to adverse circumstances. Characterized most acutely through women’s lack of control over, and limited access to productive resources along with the persistence of deeply entrenched socio-cultural ideologies that marginalize their work contributions relative to men, the rapidity of socioeconomic and ecological change occurring in these mountains underscores the continued salience of gender as an analytical tool for uncovering the often ‘taken for granted and thus not easily noticed’ aspects of people’s lives. In a region of such tremendous ethnic, religious and other diversities and marginalities, clearly many categories of men too are rendered vulnerable by virtue of who they are and what they lack. At the same time, in a socioeconomic and political landscape of myriad forms of social exclusions, it is the gender structure that renders women more vulnerable and at risk vis-a-vis men.

At present there is limited evidence-based data on two major and related issues: 1) the role of differently positioned women in adaptation and impacts of climate change and 2) how different drivers of change are also creating new dynamics or exacerbating existing ones. We know, for instance, that due to high rates of male out-migration women

¹ Gender refers not to male and female, but to masculine and feminine - that is, to qualities or characteristics that society ascribes to each sex. People are born female or male, but learn to be women and men. Perceptions of gender are deeply rooted, vary widely both within and between cultures, and change over time. But in all cultures, gender determines power and resources for females and males.

² Parts of this draw on the Terms of Reference for Gender Expert Consultant, Gender and Governance, ICIMOD, 2011

have higher workloads, responsibilities, and burdens, and that the spillover of this additional burden often results in low enrollment and disenrollment for girls from formal education (Goh 2012, Kapoor 2011, Lambrou and Piana 2006, Ngozi Akosa and Oluyide 2010, Petrie 2008, Skinner 2011,). When disasters occur, more women die than men, reflecting women's social exclusion: they are less able than men to run, often have not learned to swim, and have behavioral restrictions that limit their mobility and voice in the face of risk. There are gendered differences also in the rehabilitation and recovery phases after disasters: women and girls are particularly vulnerable in post-disaster situations because they lack land and other assets that could help them cope, making them more likely to face food shortages, sexual harassment, unwanted pregnancies, trafficking and vulnerability to diseases and could be forced to drop out of school or marry earlier (Vincent et al. 2010). All this will reinforce gender inequalities. It is therefore important to understand how climate change and inequality are linked and the way unequal power relations are affected by social, economic, cultural and political constraints in dealing with adaptation measures. The social differences shape adaptation outcomes because the ability to take adaptive actions depends on the resources the individual or groups have, which in turn very much depends on the "geographic location, class, age and gender" (Bartels et al. 2013:8).

Taking into account the tremendous role of women in mountains towards adaptation measures, opportunities and challenges, this study will help understand in particular women's resilience to climate change impacts, mainly in the context of natural resource management and sustainable mountain development. It will also contribute towards efforts to strengthen the gendered components of planned adaptation measures and policies by underscoring how taking into account women's prominent role and gendered knowledge in natural resource management can play a critical role in supporting sustainable development initiatives.

In the past few years there has been an outpouring of materials addressing the issue of gender and climate. But there is a paucity of documentation on the specific risks and vulnerabilities, along with coping strategies in the context of climate change of mountain communities generally and from a gendered perspective particularly. Given this lack, there is valuable material to be had on HKH communities' coping strategies – with some but not necessarily very detailed gendered information – which comes from the community-level studies that have been done to capture impacts of and responses to water stress in China, Nepal, India, and Pakistan (Klatzel and Murray 2009). This by and large substantiates what has emerged from the empirically more grounded and theoretically rich material that has come out of studies documenting the gender-differentiated impacts in a variety of disaster contexts. To this can be added an emerging body of work in the domain of Climate Change Adaptation that is beginning to document best practices at the community level. While still in its infancy, early research in this field underscores the potential for community-level mobilisation and the extent to which, in both small and large ways, those most likely to be affected by climate change impacts constitute a vital constituency to be included in adaptation and mitigation plans.

This Report draws on a broad range of these materials which represent a number of 'genres':

- Reviews of approaches and best practices
- Tool kits, gender mainstreaming and training manuals
- Fact sheets
- Conceptual frameworks informing practical action
- HKH studies
- Locale specific gender studies

One challenge that emerges from a study of this sort is the privileging of certain kinds of literature and research over others. While this is necessary in order to build one's work and remarks on studies that are themselves credible, there is also a concern that the lived experiences and voices of women and men alike are not left unheard. Most often, these are either treated as myths, perceptions, and anecdotes, too "self-evident or non-sensical... [thus] falling outside the domain of the formal knowledge systems and hence needing no attention". (Kulkarni et al. 2009:6).

Organization of report

The report is organized into seven sections. This first section gives a conceptual understanding of gendered vulnerabilities and an overview of gender and climate change in the HKH context. The second section looks at



gender issues in the context of water, livelihoods and water-induced hazards. Section 3 examines gender impacts of climate change in the main production systems of the HKH; Section 4 looks at how migration and urbanization are creating new challenges. Section 5 looks at health and other social issues relating to climate change. Section 6 examines the policy context, while Section 7 notes areas where further work is needed.

Conceptual approaches to understanding gendered vulnerability

The concept of vulnerability is central to the discussion and analysis of climate change, and a term variously used and interpreted with different connotations depending on what it is trying to explain. Related terms include risk, exposure, sensitivity, resilience and adaptive capacity. In the more restrictive bio-physical discourse on climate change these terms have not necessarily emphasized differentiation amongst and within communities. In its current usage vulnerability builds on the convergence of four related communities of research: disaster risk reduction, environmental management, climate change and poverty reduction which, until recently, operated in parallel and using different frameworks and approaches (Fussler 2005, SEI and IISD 2003, Sterrett 2011).

As the definitions of social vulnerability and the differentiated impacts of climatic hazards have been established since the 1990s, much effort has already been established in understanding differential impacts and who are the most vulnerable. The view of vulnerability as a state (i.e. as a variable describing the internal state of a system) has its base in studies of the structural factors that make human societies and communities susceptible to damage from external hazards (Allen, 2003). The nature of vulnerability will depend on the nature of the hazard i.e. vulnerability is understood strictly as the sensitivity to the hazard, and the vulnerability can differ based on the properties society or community (Brooks 2003). This definition of vulnerability is the one generally applied when identifying the most vulnerable members of society, and examining differences in vulnerability between or within geographical units that may experience similar hazards (Downing and Patwardhan 2003). Although spatial location is important, the social aspects such as socio-cultural practices and norms, along with institutional, political and economic factors defining

who has entitlements to resources and assets and who is excluded from them, are key to vulnerability (Eakins and Luers 2006, Bartels et al. 2013, Scoones 2009, Blaikie et al. 2014).

Thus, within the development of social vulnerability, the term has become broader and increasingly interdisciplinary in order to incorporate the idea that vulnerability is not just a characteristic of some groups, but rather vulnerability is produced, underlain, and driven by a wide variety of conditions. Poverty, living in marginal and fragile environments, having limited access to material, social, economic and political resources (including skills and technologies), few income earning possibilities, and limited ability to diversify or adapt in difficult circumstances, infirmities and conditions of disability, and life cycle positions contribute to make some people less resilient and less able to cope with and adapt to crisis situations (Pasteur 2011). Another key element in understanding vulnerability is the role of uncertainty in shaping the lives of the very poorest and marginalized. While arguably everyone's lives are affected by macro processes ranging from the behavior of financial markets to policy price supports, the absence of personal and institutional safety nets render some much more vulnerable than others. Thus, vulnerability is also "linked to poverty intrinsically" (Mondlane et al. 2013:9). All these, along with a considerable body of theoretical and empirical research on gender in disasters, has contributed toward explicit and implicit social dimensions of risk and vulnerability.

Some dominant frameworks have been developed to understand manifestations of vulnerability and the underlying conditions driving them. In the IPCC Fourth Assessment Report (AR4) attempts have also been made to bridge the divide between social and biophysical understandings of vulnerability.

The Hyogo Framework 2005-2015 defines vulnerability as a 'set of conditions determined by physical, social, economic and environmental factors or processes which increase the susceptibility of a community to the impact of hazards,' (adopted by the UN at the World Conference on Disasters in 2005). This emphasizes the need to look at vulnerability not simply as a result of, or a response to, environmental extremes but, rather, see it as embedded in the very stuff of everyday social existence. It is largely about context as it is determined by factors such as unequal access to opportunities, poverty and inequality, marginalization, food entitlements, access to resources, insurance, and housing quality rather than outcome; and is more commonly termed as social vulnerability (Adger 2006, Adger and Kelly 1999, Ahmed and Fajber 2009, Blaikie et al. 2014, Cross 2001, Kelly and Adger 2000, Olmos 2001). Thus it is crucial to note that vulnerability is intricately connected with existing social structures which are so linked to power (Scoones 2009, Sugden et al. 2014).

A number of other conceptual and action-oriented modules are now being used to analyse vulnerability at the community and household levels, including the Climate Vulnerability and Capacity Analysis (CVCA) framework; Climate Smart Disaster Risk Management, Ecosystem Adaptation, Shared Learning Dialogues, the Local Adaptive Capacity framework (Sterrett 2011), the Pressure and Release Model (Blaikie et al. 2014) which was developed from a political ecology perspective with the intent to bridge the divide between social and biophysical understandings of vulnerability (Adger 2006), and more recently the From Vulnerability to Resilience framework– or V2R developed by Practical Action, which addresses the multidimensional nature of poverty through an integrated approach (Ibrahim and Ward 2012, Pasteur 2011).

Poverty, living in marginal and fragile environments, having limited access to material, social, economic and political resources (including skills and technologies), few income earning possibilities, and limited ability to diversify or adapt in difficult circumstances, infirmities and conditions of disability, and life cycle positions contribute to make some people less resilient and less able to cope with and adapt to crisis situations (Pasteur 2011). The vulnerable live in uncertainty, tending to be the hardest hit in times of crisis, often losing the sources of their livelihoods (which, in a rural context typically include one or more of the following: land, animals, tools and the few savings that they might have). It is also typically a category of people who lack the clout to gain political leverage or to find representation in policy and institutional decisions that affect their lives. Disproportionately living in countries and regions with few if any social support systems, and all too often – as in mountain contexts – largely in the absence of basic services such as healthcare, schools and transportation systems, these populations can be acutely affected in times of crisis (Ibid). Another key element in understanding vulnerability is the role of uncertainty in shaping the lives of the very poorest and marginalized. While arguably everyone's lives are affected by macro processes ranging from the behavior of financial markets to policy price supports, the absence of personal and institutional safety nets

Box 1: Key definitions

Adaptive capacity: The potential of individuals, communities, and societies to be actively involved in the processes of change in order to minimise negative impacts and maximise any benefits from climate change.

Climate change: A change in weather that persists for decades or longer, arising from human activity that alters the composition of the atmosphere (i.e. greenhouse gas emissions).

Climate change adaptation (CCA): Actions that people and institutions take in anticipation of, or in response to, changing climate. This includes changes to things they do, and/or the way they do them.

Climate resilience: Where adaptive capacity relates to the ability to influence and respond directly to the processes of change (to shape, create or respond to change), resilience is the ability to absorb shocks or ride out changes.

Climate variability: Natural variations in the climate that are not caused by greenhouse gas emissions (e.g. it rains more in some years and less in others).

Disaster risk reduction (DRR): The concept and practice of reducing disaster risk through systematic efforts to analyse and manage the causes behind disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and environment, and improved preparedness for adverse events.

Mitigation: Measures to reduce greenhouse gas emissions (note that the term 'mitigation' is used differently by DRR practitioners, who use it to mean reducing or limiting the adverse impact of hazards and related disasters).

Vulnerability: The characteristics and circumstances of a community, system, or asset that make it susceptible to the damaging effects of climate change and other hazards.

Source: Oxfam GB (2009) Introduction to Climate Change Adaptation: A Learning Companion, Oxfam Disaster Risk Reduction and Climate Change Adaptation Resources. Cited in Sterrett, 2011

render some very much more vulnerable than others. Thus, vulnerability “looks to be linked to poverty intrinsically” (Mondlane et al. 2013:9)

Crosscutting these markers of vulnerability is gender – the fact of being female or male – which intersects with other key social fault lines such as class, caste, ethnicity, age, and other dimensions of marginality to shape the extent to which people can manage adverse situations without suffering long-term and occasionally potentially irreversible losses of well-being (Nelson and Lambrou 2008, Das 2009).

Gendered vulnerability is based on the three major situations and conditions:

- **Work types and spaces of men and women:** All over the world, women are more engaged in informal sectors where not only are their contributions invisible but also liable to be more vulnerable to changes and shifts in environment because of the conditions in this type of work, such as lack of safety nets, scant or no remuneration, lack of rights, which limits their ability to adapt (Kakota et al. 2012, Dankleman and Jansen 2010).
- **Inequities in access and control over assets and resources:** In most parts of the world, women’s control over resources and assets is much less in comparison to that of men’s. This inequity constrains and hinders women’s ability to adapt to the changing climatic conditions because “gender inequalities in the distribution of assets and opportunities mean their choices are severely constrained in the face of climate change” (Skinner, 2011: 2). Women’s vulnerability is further enhanced due to their inability to accrue (due to lack of or limited options for income generating activities) and control financial savings in most developing countries. “Therefore, women are often not in a position to make substantial investments in livelihood changes in the midst of environmental and financial shocks” (Bartels et al. 2013:14).
- **Gender division of roles and responsibilities:** The gender division of labor makes women responsible for reproductive activities (along with productive activities), which are more prone to be highly impacted by climate changes. The reproductive activities include domestic responsibilities such as cooking, cleaning, caring of children, old and sick, tending to the home garden and smaller ruminants. Thus, it is usually women and girls who are responsible for fetching and collecting water and fuel wood and as these resources become scarcer due

to climatic and environmental conditions such as drought, changing rainfall pattern and quantity, women have to travel farther to collect these resources, which means that they may not have to engage in income-generating activities, go to school and trainings, to assume leadership roles in the community, or even to give time to their health, (Skinner 2011, The World Bank 2008).

- ***Inequalities in decision-making:*** Women are consistently under-represented in institutions at the local and national level, and have little say in decision-making. Not only this, women face much more challenges than men in accessing all levels of policy and decision-making processes, hugely constraining them in influencing policies, programmes, and decisions that impact their lives (Habtezion, 2013).

An emerging body of material, much of it from the gender and disaster literature, provides abundant empirical evidence of the myriad ways in crisis situations are not gender neutral, and that they have the ability to exacerbate already existing inequalities, vulnerabilities and poverty (Brody et al. 2008, Hannan 2002, Pachauri and Reisinger 2007, Laub and Lambrou 2004, Lynn 2005, Neumayer and Plumper 2007).

Gender-differentiated roles and responsibilities, rights, access, knowledge and priorities shape vulnerabilities, often resulting in women suffering disproportionately during and after disasters because of socioeconomic constraints and inequalities (Brody et al. 2008, Parikh 2007). The breakdown of social order after disasters disadvantage women (Neumayer and Plumper 2007). However, there are also numerous incidents of positive changes where “women have emerged victorious as leaders and have been empowered to manage all affairs by themselves... after disasters when they are left alone by husbands who go to look for resources away from home or run away from responsibilities”(Asiimve 2014). There is guarded optimism regarding the potential for significantly disrupting and transforming gender relations following natural disasters, as reported in the E-forum on gender equality, environmental management and natural disaster mitigation, United Nations Division for the Advancement of Women, Department of Economic and Social Affairs (Enarson 2001).

Some examples to consider:

- From Armenia, the NGO Women and Development targeted rural women for grassroots health education, capitalizing on the period after a major earthquake to provide more knowledge, skills, and resources to women as family health providers. Perhaps more significantly, Armine Mikayelyan and her colleagues noted (Armenia), the post-disaster period helped break women’s traditional silence around health issues related to male migration, such as sexually-transmitted diseases. Because rural women were explicitly targeted for training, they were not only more able to keep families healthy but “became surer and saw themselves as part of their problem’s solution.”
- Indian women, too, reportedly gained self-confidence following gender-sensitive relief measures targeting women: Disasters can be great liberators! While witnessing a very vocal meeting of rural women in village Srirampur, Orissa, about a year and a half after the cyclone of 1999, I was informed by the NGO there (Church’s Auxiliary for Social Action) that before the cyclone, women would rarely come out and interact on social issues, let alone interact with outsiders. This changed after the cyclone, because relief packages of most NGOs, and even the government, were targeted at, or through, women. That phase really empowered them, made them amenable to interacting on social issues, and also increased their self-esteem and their status within their families and society! [Anshu Sharma, SEEDS³, India].
- Similarly, Bahattin Aksit (Turkey) observed after the 1999 Marmara earthquake that men were left “lonely and lost” while “women’s local networks and friendships were empowering them to talk about the trauma and finding local community ways of coping with the new life.” While women’s local, community orientation was a powerful resource for them in the immediate aftermath, neither male nor female domains were significantly broadened or challenged in the aftermath of the event.

People’s vulnerabilities are typically ‘clustered,’ and shaped not just by one deficiency but by several overlapping ones. These include tangible insufficiencies, such as the absence of money, credit, an inadequately built house located too close to a river that tends to flood, a degraded natural resource base on which subsistence livelihoods depend, illiteracy and lack of adequate access to information and knowledge. There are also important intangibles – hard to ‘see’ but no less critical in shaping the extent of people’s vulnerabilities: lack of entrepreneurial experience

³ SEEDS is a non-profit organisation that seeks to protect the lives and livelihoods of people exposed to natural disasters and living in disaster prone areas.

and/or innovative “spirit”; the erosion of social support systems; beliefs and customs that constrain people’s movements, options and assumptions about what they can and cannot do. These result in three broad and interwoven categories of vulnerability: social, physical, psychological.⁴ While not invariable, these vulnerabilities often have harsher implications for women for reasons spelled out above. Nevertheless, an over-privileging of gender to the exclusion of these other intersecting categories can unwittingly end up reinforcing discriminatory social practices to the detriment of the most vulnerable segments of society.

It seems important to underscore that a gender perspective is not about merely bringing women’s concerns into the spotlight. By placing the emphasis on women it is not in any way meant to suggest that rural men are not affected by transformations on the ground.

Rather, it highlights the very different ways in which – even in this time of high growth and opportunities – male and female life options and experiences continue to diverge widely. Much of this reflects women’s and men’s differential access to and control over land and other land and water-based resources, their access to different types of opportunities through which to diversify their income sources. As Bradshaw and Fordham (2014: 235) put it, “Vulnerability to an event then is not based on sex or biological differences between men and women, but rather due to how society constructs what it means to be a man or a woman, what roles they should play and how they should behave. As gender intersects with characteristics such as class, ethnicity, and sexuality, and interacts with age/ life course, different women experience different levels of vulnerability”.

Box 2: Gender vulnerabilities

- Women’s workloads increase in times of crises: events that disrupt access to the natural resources on which households’ subsistence needs depend means that women are likely to have to walk longer distances for water, fodder and fuel sources, making cooking, washing and childcare more difficult.
- Women are more economically vulnerable: Women lack independent access to and control of productive assets, typically have lower literacy and educational levels than men, and tend to be constricted by socio-cultural mores that limited their mobility and access to income-generating work.
- Girl children often have to drop out of school to assist their mothers: the increased out-migration of men in response of adverse circumstances which results in women carrying the burden of additional agricultural and household duties reinforces gender roles, and denies girls access to education.

Box 3: “Gender?! As if men aren’t affected by disasters...”

The misconception that ‘gender’ refers solely to women continues to persist amongst the lay public as well as professionals. Profiles of at-risk populations throughout the HKH and in South Asia more generally underscore how myriad factors intersect to create the conditions of social exclusion and marginality that render some more vulnerable than others. Men and women from ethnic minorities, Dalits** and other socially marginalized populations, are highly vulnerable, in many respects more so because their cultural and linguistic marginality reinforces their socio-political marginality. Similarly, those living in hazardous areas or conditions, including inadequate housing and unsafe locations such as remote mountains and foot of glacier lakes prone flash floods and GLOFS, the illiterate who are unable to read early warning announcements and instructions, and less likely to participate in disaster preparedness trainings; fisherfolk and small agricultural producers who are disproportionately located on hillsides and river embankments that are likely to be eroded, all face high levels of vulnerability. However within each of these categories it is the crosscutting nature of gender – or the fact of being female – that typically renders women more vulnerable, and more likely to be disproportionately affected and experience a slower rate of returning to ‘normal’ that prevails.

* Comment by a male participant overheard after a presentation on gender and floods at an international NGO.

** Dalits are a designation for a group of people traditionally regarded as untouchable; Dalits are a mixed population, consisting of numerous social groups from all over India and in Nepal; they speak a variety of languages and practice a various of religions.

⁴ From social perspective, vulnerability refers to “the characteristics of a person or group and their situation influencing their capacity to anticipate, cope with, resist and recover from the impact of a natural hazard” (Neumayer and Plümper 2007: 2-3). While climate vulnerability can occur through decreasing water tables, water loss, changing water salinity, loss of arable land, agriculture, income, biodiversity, etc. social vulnerability is resulted in through social exclusion from the structures and institutions that provide opportunities and voice in society (Caizhen 2009: 325). Physical vulnerability is the most visible area of vulnerability - it is related to physical/material poverty and includes land, climate, environment, health, skills and labor, infrastructure, housing, finance and technologies. Poor people suffer from crises more often than people who are richer because they have little or no savings, few income or production options, and limited resources. They are more vulnerable and recover more slowly (Cannon et al. 2003). Psychological vulnerability (PV) is a term used to describe problems facing individuals with a mental illness or intellectual disability which cause significant impairment in an individual’s social interactions (Herrington and Roberts, 2013). Such vulnerabilities can place individuals at a disadvantage during social interactions in general, and in disasters in particular.



Vulnerability is therefore a dynamic condition produced by existing inequities in distribution and access to resources, individual's choices and opportunities, which are shaped by the history of social domination and marginalization (Eakin and Luers 2006). Thus, according to Liverman (2015) vulnerability is not experienced, but rather embodied, based upon personal circumstances. Understanding that vulnerability is not just a result of a set of intrinsic properties that individuals or groups possess, " we come to understand how people come to be gendered, disciplined and regulated as women or men and as a result, differentially vulnerable under varying conditions of climate stresses (Resurrección 2013:39).

Yet the very 'matter of fact-ness' of our social and cultural situations can obscure the significance these categories can make to how people live their lives and the options open to them. In the HKH and larger South Asian context the legal provisions guaranteed to all citizens irrespective of caste, creed and gender are often at odds with the customary practices observed by individual communities in which females are not the moral equivalents of males. In many parts of the sub-continent scarcity of resources, coupled with customs, notions of entitlement and political arrangements determine that girls and women often receive considerably less access to basic resources such as food and medical attention (Nussbaum 1999, Papanek 1990, Sen 1990). Despite legal provisions or the rhetoric of equality, not everyone has similar or equal prospects of responding to opportunities, and subtle ways are found to lessen the burdens for some by others bearing a greater share of it. It is precisely this taken-for-granted logic of cultural systems everywhere that often does not get recognized unless circumstances put them under scrutiny in which a gender perspective and analysis helps to make explicit. While it is certainly essential to identify certain issues and concerns that may be labeled as 'women's needs,' the reality is that neither men nor women constitute a homogenous group. To understand this is to begin to appreciate the processes by which, by virtue of caste, socioeconomic status, ethnicity and other socially-created forms of exclusion, many millions of men too are marginalized and prevented from realizing their full rights and potentials (Mehta 2007a).

Gender and climate change in the HKH mountain context

The HKH is an extensive geographical region extending to some 3,500 kilometers from Afghanistan in the west to Myanmar in the east, covering some or all of eight sovereign countries⁵ that represent diverse political and economic systems. In addition it is a region which has for decades lived with geo-political tensions, cross-border conflicts and war. The HKH mountains are endowed with rich diversity of natural resources: abundant water, rich biodiversity, scenic landscape, extreme heights and gorges of the snow-capped mountains, fragile but diverse ecosystems and fertile valleys providing numerous ecosystem goods and services. It includes all or part of four global biodiversity hotspots, 330 important bird areas, 60 eco-regions of which 12 are global 200 eco-regions; a total of 488 protected areas cover 39% of the total area (Karki et al. 2011). Known as the 'Third Pole', it has the largest body of ice outside the polar caps and some of the world's most important glaciers, which act as one of the main sources of freshwater reserves that directly sustain people living in many parts of the region (Lutz et al. 2014). The source of some of the world's major river systems (including the Ganges and Brahmaputra) its ten river basins offer vital ecological services to both upland and lowland populations. The HKH, along with the monsoons, supplies about 75-90% of the water required for over 55% of Asia cereal production and nearly 25% of the world's cereal supply (Nellemann et al. 2009). This biological richness and diverse ecosystem is offset by geological fragility on to which multiple overlapping drivers of change, including climate change have been placing pressures over a considerable period of time (Erikson et al. 2009, Myers et al. 2000, Pandit et al. 2007, Tsering et al. 2012, Jianchu et al. 2009, Singh et al. 2011). The region is noted to be a major hotspot for climate change (Stocker et al. 2014) and marked out as a "risk hotspot" for climate-induced hazards and disasters (Aon Benfield 2010).

The livelihoods of the people living here are based on agriculture, livestock raising, management of natural resources, migration, labor-intensive household management, and income generation through small scale trade, and wage and casual labor (Leduc and Shrestha 2008). For millennia, mountain people have learned to adapt to changing seasons and extreme weather conditions (Ibid, Hewitt and Mehta 2012), while planning for regular disastrous events of too much, too little water and extreme temperature changes that affect their wellbeing and survival (Klatzel and Murray 2009, Rhoades 2007, UNEP 2004). Therefore, mountain people have always been exposed to droughts, floods, soil erosion, and changes in the crop cycle (Shrestha et al. 1999, Tsering et al. 2012). But the difference now is that the intensity and frequency of such stress events has increased over recent decades. In addition, the changing socioeconomic contexts, especially those driven by external factors, have in a sense weakened this ability of the communities. While there is not much research in this field, there are "indications that knowledge and practices that once contributed to reducing vulnerabilities are eroding in the face of cash incentives and needs, and livelihood diversification" (Hewitt and Mehta 2012:4).

It is not just the sheer size of the HKH and the role it plays in the provisioning of global eco-services that makes this vulnerability to climate change, natural disasters and their environmental and socioeconomic risks a cause of considerable concern. Many of the overlapping "drivers" and "pressures" identified as contributing to climate-induced changes have particular resonance for HKH and also Asian populations and environments, a continent which is home to five of the world's twenty megacities and where the effects of globalization and economic liberalization are increasingly being felt (Karki et al. 2011, UN-HABITAT 2007). High population growth, changing demographics associated with rural-to-urban migration, along with urbanization and of peri-urbanization often of an unplanned variety is having a detrimental impact on natural resource bases. On top of this, economic liberalization and free market policies are feeding into a burgeoning industrial base and a consumer culture that is increasingly touching even the lives of rural populations and helping to forge people's relationships to the land as well as to notions of sustainability. Increasing demands for energy and power, the extraction of water for industrial and agricultural activities, waste dumping and growing pollution of water and air, along with increasing pressures on natural resource bases on which a majority of the region's population depends for their livelihoods are consequently all part of the larger picture in which climate change is working.

The region has been experiencing above-average warming and climatic variability during the 20th century -in the Himalayas, progressive warming at higher altitudes has been three to five times greater than the global average (Karki et al. 2011). The impact of these changes within the Himalayan ecosystems is exacerbated by existing

⁵ The Hindu Kush Himalaya stretches across the 8 countries of Afghanistan, Pakistan, India, Nepal, China, Bhutan, Bangladesh and Myanmar.

environmental and socioeconomic problems: poverty, water scarcity or food insecurity (Mertz et al. 2009), which “in turn contribute to a downward-spiraling cycle” with adverse impact on the livelihoods of the people and pushing them to “desperate measures” (Chettri et al. 2014). Mountain environments create further vulnerabilities to climate change such as the additional set of hazards of landslides and other mass movements (Karki et al. 2009) which has high probability of increasing with a rise in extreme events, resulting in substantial destruction of land and property along with loss of lives and livelihoods leading to aggravation of the problems of poverty, food insecurity, hazards and social inequity.

The feminist political ecology approach, which examines the place of gender in the political ecological landscape, exploring gender as a factor in ecological and political relations, (Rocheleau 1995, Rocheleau et al. 1996, Hovorka 2006, Elmhirst 2011) help to refine the understanding of mountain communities’ potentialities for and the limitations they face in getting involved in issues that are shaping their rural and, increasingly urban lives and which can be tapped into for addressing vulnerabilities to climate change. The various specificities unique to mountain environments - inaccessibility (lack of or poor connectivity), fragility (communities’ tightly woven relationship with a natural resource base that is easily put out of balance) and marginality (politically, economically and socio-culturally) – have, in varying degrees and contexts, historically given rise to unique socio-cultural formations throughout the Himalayan region which have to in diverse ways and degrees provided the groundswell of systems of protection, management and regeneration of natural resources that have enabled communities to eke out livelihoods often in harsh and demanding circumstances.

However, the opening up of mountain communities to a wider world of institutional arrangements, relationships and opportunities have not only reconfigured old ways of being but, in some instances, have undermined systems that once connected people to their resource bases and kept intact the local institutions and relationships that helped to support this human-nature connection. With the risk of minimizing enormously complex, differentiated and varied experiences, this exposure to ‘the outside world’ has in many respects also helped to widen the differences between women’s and men’s income-earning and asset controlling possibilities. Mountain populations are becoming increasingly differentiated, a function of ever-closer ties to the market economy and institutions of state systems. These in turn are shifting the contours of mountain communities’ social capital. Migration (largely male), higher education levels, off-farm employment and patterns of urbanization have created (or at least altered old) equations between populations and their resource bases. The emergence of a consuming class is similarly shaping new aspirations and desires shaped by a culture of money increasingly at odds with an approach to development that is rooted in sustainable and conservationist approaches. And yet this scenario also presents opportunities: of enabling new social capital to emerge, one centred on a younger generation that is able to build on footholds in myriad worlds and bring new types of knowledge and insights to sustainable development.

This leads to the cross cutting issue of gender. The gender division of labor in the HKH is highly skewed, especially when agricultural, pastoral and wage labor is combined with household, community and casual labor, and when high rates of male out-migration are considered. Recent comparative research on the ‘feminization’ of agriculture and natural resource management, undertaken by ICIMOD and supported by IFAD, illustrates this trend, whereby in some mountain regions in India women undertake 4.6 to 5.7 times the agricultural work men carry out. In Nepal, the range is skewed even more with women carrying out 6.3 to 6.6 times the agricultural work that men carry out (Lama, 2010 and Jain, 2009). Women in the HKH have always played a central role in agriculture and natural resources management, but “despite being the mainstay of the economy and the holders and practitioners of local knowledge, women have very little say in the decision-making processes relating to agriculture, water and forests and this remains a male domain” (Sogani 2013: 266). In recent years, their workloads in these domains of work have intensified without corresponding increases in access to resources, decision-making and secure rights to land. Women continue to face differential access to resources, ownership and control over critical natural resources. It is also well known that women are further constrained by unequal power relations, gender-biased attitudes and norms, and sometimes, systematic exclusion and under-representation. Thus, in mountain regions, gender inequalities in access to resources and decision-making processes that affect communities, cultures and environments (U.N. General Assembly Resolution 64/205, 2010 cited in Karki et al. 2011) are some of the key challenges that hinder women and men’s active participation in sustainable development processes. Moreover, different and new drivers of change also create new, or exacerbate ongoing dynamics. For instance, high rates of male out-migration mean that women experience intensive workloads, responsibilities and burdens, which in turn often results in low enrolment



and drop-out of girls from formal education as well as increases in gender-based violence and trafficking of girls and women.

All the above trends are further exacerbated by changes in the climate, environment and during times of climate induced disasters (Klatzel and Murray 2009; Mehta 2007b). A first form of ‘gendered’ vulnerability to climate change relates to labor (Sugden et al. 2014: vii): women’s workload increases as distances travelled by women increase to access natural resources (such as water, fuel wood, fodder, food, pastures, medicinal plants, fuel, and crops) and as production schedules are affected due to changing environments and climate conditions (Bhattarai et al. 2015, Sugden et al. 2014). In fragile HKH mountain ecosystems, women are rendered particularly vulnerable where the slopes of agricultural fields are steep, landslides and erosion are common and accessibility to basic services such as transport, education, health care and development services is limited.

During extreme events such as drought, floods and other climate-related disasters women and girls face additional risks of intimidation, gender-based violence, sexual harassment, trafficking and rape largely due to gender inequities, women and girls are frequently subjected to intimidation, gender-based violence, sexual harassment and rape. The World Disaster Report recognizes that women and girls are at higher risk of sexual violence, exploitation abuse, trafficking and domestic violence in disasters (IFRC 2007). Climate-related disasters may disrupt local security safety nets, leaving women and children unaccompanied, separated or orphaned due to the erosion and breakdown of normal social controls and protections, making them especially vulnerable to human trafficking. Economically impoverished mountain families are particularly vulnerable to being deceived with false offers of remunerated work and education for girls, trapping them into a well-established system of forced labor and sex work. Consequently, organized trafficking is emerging as a potentially serious risk associated with environmental problems in the HKH. In Nepal, an estimated 12,000–20,000 women and children – including some boys – are abducted or deceived into forced labor (ca. 30%) and brothel-based sex work (ca. 70%) every year. Estimates based on emerging data from anti- trafficking organizations such as Maiti Nepal suggest that trafficking may have

increased from an estimated 3,000-5,000 in the 1990s to current levels of 12,000–20,000 per year. The data also suggests that trafficking may have increased by 20- 30% during disasters (Karki et al 2011, Nellemann et al. 2011). Thus, women experience acute and differential impacts given the accelerated pace of climate change. These impacts exacerbate existing inequities in socially constructed gender roles, responsibilities, perceptions and skewed power relations that tend to disadvantage women.

The feminist political ecology approach is also of value in thinking about gender in the mountain context generally, and in the context of climate change-related impacts particularly. For a start, it invites an ‘unpacking’ of the category ‘mountain woman’, recognizing that women, along with their communities and households, are becoming increasingly differentiated and that this has ramifications for women’s adaptive capacities, as well as the relevance of their knowledge.

It is often cited that women have valuable indigenous knowledge about managing their environments, context-specific skills developed in response to mountain conditions, technical know-how in relation to agriculture, pastoralism, and forest and watershed management, and the ability to cope with the everyday changes brought about by climate and other drivers of change (Nellemann et al. 2011). Thus, mountain women are strategically placed for both dealing with impacts and adaptation, and are at the front line in sustaining their environments (Ibid). But along with this, what is critical is the pressing need to take into account how the changing contexts of women’s lives are reconfiguring the relevance of their knowledge systems and their relations (and commitments) to their resource bases. The drivers against which climate change is occurring - globalization, migration, urbanization, education and new employment opportunities, changing environmental conditions, technology, and so forth – is altering land-human relations: it is affecting how people use and access natural resources, as well as reconfiguring people’s relationships to one another, within and across households and communities and institutions and personnel of the state and other types of macro agencies. In this context it seems important to widen our thinking about the mountain women – natural resource management equation. Context is everything, and there is need to think more critically (and creatively) about how and why women’s (and men’s) knowledge systems are changing and the broader implications of this. Identifying the differential vulnerabilities is the key to understanding and adapting to climate change (Aguilar et al. 2007, Aguilar 2009, Kasperson and Kasperson 2001, Zahur, 2008).

A related concern which falls outside the scope of this discussion is the impact this matrix of environmental and socioeconomic trends, and particularly the water crisis, will have on wider security concerns. For instance, water is already a major source of tension and disputes at inter-governmental levels in the region. High population growth rates, disproportionately large numbers of the very poor, a shrinking resource base and, in all the countries of the region, various forms of societal conflict in the form of war, insurgencies, conflicts between immigrants and ‘people of the land,’ environmental stresses and competition over resources are likely to have wide ranging implications for regional and cross-border security, whether directly or indirectly. Cross-border migration, which has been fuelling tensions for decades, is also likely to increase as environmental disruptions coupled with economic dislocation and political unrest push more people to cross into other countries.⁶ These movements will continue to aggravate on-going competition over increasingly scarce resources and reinforce the marginalization of some communities vis-a-vis others (Sinha 2006). They will also have acutely different implications for affected women and men.

Against this canvas of ecological vulnerabilities, socioeconomic shifts and political tensions it is not surprising that research and assessments of climate change trends and a deeper understanding of local adaptive mechanisms and responses in the region have been inadequate (Tsering et al. 2010). The challenges in filling these research lacunae are also considerable given the larger contexts of underdevelopment, long-standing conflicts, and weak or lack of institutional structures and human resources required to support such endeavors. Populations of the HKH are amongst the poorest in the region. According to a report by ICIMOD, 61 million or 31% out of 2 billion population of the HKH live below the poverty line (Hunzai et al. 2011). Thus, despite rich biodiversity, the region is home to poorest of the world and the most vulnerable in the face of climate change (Chettri et al. 2010, Fang and Leduc 2010, Singh et al. 2011). Poverty in the region generally manifests in low income, ill health, poor access to health facilities, malnutrition, poor education, low skill, high dependence on natural environment, high insecurity

⁶ Cited from Alam, Sarfaraz “Environmentally Induced Migration from Bangladesh to India”, *Strategic Analysis*, 27 (3), July-September 2003, p 422

and physical vulnerability, drudgery and limited capability and enterprising capacity (Karki et al. 2011). These dimensions of poverty are directly or indirectly linked to mountain bio-physical and socioeconomic specificities characterized by geographic isolation, poor physical and economic infrastructure, poor access to markets, technologies, information, poor institutional services, and limited economic opportunities (Fang and Leduc 2010). Furthermore, the geographic isolation is most often compounded by differences in language and customs has invariably resulted in socio-cultural, economic as well as political marginalization of the mountain people. Thus, many live on the margins of development opportunities available to others of their countrymen, whilst others bear a double marginalization by virtue of their minority ethnic and tribal status within their own countries with limited or no voice, representation and participation within economic and political centres of power - many of which are located in the plains.



Water, Livelihoods, and Water-Induced Hazards

The gendered nature of an emerging water crisis

Throughout the HKH, climate change impacts are being felt most prominently around water issues, which is an important asset for sustaining livelihoods in the region. There is evidence of rising temperatures, increased melting of glaciers, variability in rainfall, longer and more intense periods of drought and floods (Klatzel and Murray 2009). An increase in the severity and frequency of monsoonal storms and flooding in the region is expected, exacerbating the incidences of landslides (UNDP, 2007). Not only will this result in the danger to life and property, but the generated sediments is likely to be deposited in the agricultural lands or in irrigation canals and streams, thus negatively impacting crop production and in the quality of agricultural lands (NEC 2000). Mall et al's study (as cited in Parikh 2007) also points out that the changes in the precipitation pattern will impact significantly the water resource situation in the South Asia and HKH. At an anecdotal level people speak of shorter periods of rainfall, less snow where once it was plentiful, of seasonal changes that have enabled different crops to be cultivated, of milder winters that reflect wider warming trends. Apart from flooding, which is the shorter-term prognosis of glacial melting, it is likely that serious water crises can occur in the longer-term as rivers run dry or become seasonal. Since seven of the world's major river basins originate in the Himalayan and Tibetan plateaus for which four countries – China, India, Nepal, Bhutan and Burma – share borders this scenario requires common efforts among governments to reach agreements (Aon Benfield 2010).

In many respects the contemporary water situation is not a new one. Historically throughout the region its availability has been characterized by an oscillation between too much or too little. Most of the water access is seasonal, shaped by monsoon regimes or winter precipitation; it falls over very short periods of time, is inadequately absorbed into mountain watersheds and basins with the result that groundwater systems tend to be inadequately recharged. The broad implication of this pattern means that communities have had to adapt to long stretches of inadequate access to water for meeting household, agricultural and other needs to shorter periods of intense and sometimes devastating water flows in the form of flash floods, riverine floods and waterlogging. Throughout the region mechanisms and strategies to cope with water scarcity and over-abundance have been reflected in agricultural calendars dictating the start and end of growing seasons and ritualized in cultural and religious activities, with diversification into trading, herding and other activities to help augment precarious subsistence agricultural production. While constrained access to water is not a new phenomenon, what is new and increasingly stressful are the growing uncertainties that are altering hydrological cycles. Although the precise reasons are still unclear and still contested, evidence suggests that glacial melting and a reduction in snow cover are affecting downstream water bodies. Other drivers too are shaping water access: growing populations, seasonal and permanent outmigration, peri-urbanization and urbanization, more market-driven forms of interactions, industrialization and privatization of resources affect not just availability but also how water is being used (Aon Benfield 2010, Eriksson et al. 2009, Klatzel and Murray 2009).

Throughout the HKH, water issues follow a pattern found throughout the South Asian region, heavily gendered with many implications. The World Water Development Report 2012 (Cosgrove 2012) mentions that among the many water-related challenges worldwide, the crisis of scarcity, deteriorating water quality, the linkages between water and food security, and the need for improved governance are the most significant in the context of gender differences in access to and control over water resources. The gendered nature of water-related work – who does it, who controls it and, often, who pays the biggest price for its poor quality and lack of access. Thus, water related work holds very different meanings for women and men. "Women are intrinsically tied to water" in ways that don't necessarily hold for men (WHO 2011: 21). As in other regions, women and men participate in use, management, benefit sharing and decision of water, but with different degree of needs, problems, and access to and control over water resources. It is women and their daughters who carry the main responsibility for collecting, storing, protecting and distributing



water within the household for drinking, cooking and washing, as well as for animal husbandry and kitchen gardening (Brody et al. 2008, Dhar and Jacob 2008, Gautam et al. 2007, , n.d. Leduc et al. 2008, Sherpa 2007, Singh and Singh 2015). Furthermore, studies carried out in Nepal and India reveal that it is primarily women and girls, who not only collect and store water but also protect water resources and maintain water systems (Regmi and Fawcett 1999, Khadka et al. 2014, Jalees 2005, Singh and Singh 2015).

In much the same way that women's reproductive (domestic) work goes largely unacknowledged, so too in contexts of water scarcity, a lower priority is often placed on water needs within the home as compared to activities taking place in fields (especially if the crops are income generating). Consequently, under conditions of water-stress women are forced to trek longer distances for potable water (Dixit et al. 2009, Khadka et al. 2014, Mehta 2007a, Swarup et al. 2011) creating even more strain on their work burden and laying the foundations for future contestations over the remaining scarce resources (Machhi et al. 2011, Mitchell et al. 2007, Narain 2014, Singh and Singh 2015, Thaxton, n.d.). Considering the time already taken for women and girls to collect water, increase in water scarcity means they have to spend more time in this already drudgery-ridden task, thus depriving women and girls from opportunities to escape the vicious circle of poverty and disempowerment: girls spend many hours fetching water instead of attending school or enjoying their childhood, women also miss the chance of accessing wage employment (Cap-Net et al. 2006). Furthermore, they also suffer in terms of health because as primary collectors of water they are often the first to be exposed to waterborne diseases due to the increasing contamination of surface water and ground source and the heavy workload involved in fetching water is also a serious maternal health issue. The consequence of all this is perpetuation of intergenerational transfer of poverty, hunger and disempowerment among women and girls.

Thus, not only does water scarcity have detrimental impacts on women and girls, "change in water amount or quality" but it also impacts on gender inequality in terms of access to water, farming systems, the division of labor, employment opportunities and incomes of men and women, with male-headed households and female-headed households impacted differently (Caizhen 2009:324).

Impacts of temperature rise and water-related hazards

Evidence of rising temperature is seen in the melting of glaciers in the Himalayas. This has both short-term and long-term impacts: in the short term, it means increased risk of flooding, erosion, mudslides and GLOF in the region – in Nepal, Bangladesh, Pakistan, and north India – during the wet season. Furthermore, since the melting of snow coincides with the summer monsoon season, any intensification of the monsoon and/or increase in melting of glacier could contribute to flood disasters in Himalayan catchments. There are some evidences from some mid-latitude regions of Nepal pointing to other impacts associated with rising temperatures, such as a decline in soil moisture levels, droughts, fires and possible pest outbreaks that are affecting crop yields (Regmi and Adikhari 2007) and evidence of the extinction or migration to higher altitudes of some plant species (Brody et al. 2008, Kasperson and Kasperson 2001). And in the longer term, such temperature rise could lead to a rise in the snowline and disappearance of many glaciers causing serious impacts on the populations relying on the 7 main rivers in Asia fed by melt water from the Himalayas, therefore, throughout Asia one billion people could face water shortage leading to drought and land degradation by the 2050s (Christensen et al. 2007, Cruz et al. 2007). Climate-induced disasters such as droughts, floods, and landslides are frequent in this region (Fang and Leduc 2010). There are already number of reports bring attention to increase in frequency and magnitude of water-related hazards and disasters such as floods, flash-floods, debris flows, glacial lake outburst floods (GLOF), droughts and landslides in the Himalayan region (Aon Benfield 2010, Dankelman 2008, Fang and Leduc, 2010, Khanal et al. 2007, Roy and Venema 2002). Additionally, the HKH has experienced devastating earthquakes, wildfires, cyclones and tidal waves. Together these hazards and disasters have caused and will continue causing major losses of life and setbacks to the economy and overall development of the region (Cruz et al. 2007). Aggravating the situation further are the unique contexts of mountainous areas such as remoteness and isolation which deprive populations from accessing essential information about climate change and its potential impact on life-threatening hazards.

Temperature increases, however, need not always be problematic; some positive impacts are also associated with this phenomenon. For instance, in some higher-lying areas of Nepal the receding snowline and rising temperatures provide an opportunity for agriculture at higher altitudes, and previously unusable areas are now becoming arable land:

- In the high-altitude villages in Bajhang the people are now able to grow millet in areas where previously it was too cold to do so, and similarly in Terhathum, it is now possible to grow fruits such as lychee (*Litchi chinensis*) and mango (*Mangifera indica*) that require warmer temperatures and were previously unsuitable for these altitudes (Machhi et al. 2011). Warmer winters have also been associated with higher crop yields and a reduction in winter mortality of livestock; the elderly in particular report that warmer winters are more comfortable, that the once arid landscape has become greener, that they are now able to grow crops that could earlier only be grown in green-houses and that apples are now bigger and sweeter (Dahal 2006, 2012; Kasperson and Kasperson 2001, Regmi and Adikhari 2007).
- In Uttarakhand, India the rise in temperatures has led to faster maturing of potatoes due to which the crop could be harvested in 3 to 3.5 months instead of the traditional 5 to 6 months, and this additional time is providing new opportunities to farmers to successfully to grow cauliflower and peas as cash crops in this period for a higher income; rising temperatures were found to be suitable for new crops, like ginger and turmeric (that withstand water and temperature stress better and at the same time are popular cash crops), ground nuts and fruits such as mango and banana; and in addition, prolonged growing seasons now allow for more than one crop cycle per year (Machhi et al. 2011).
- Higher temperatures along with increased precipitation in the high altitude villages of Trashy Yangtse in Eastern Bhutan have led to better crop yields; orange trees are flowering earlier and are growing at higher elevations (almost 1,000 m higher), providing more opportunities for farmers; and similar altitudinal shifts have been noticed in exotic flora, previously found only at lower elevations and in the southern region (Ibid).

The nature of water related hazards in the HKH is unique and diversified: floods, tropical cyclones, storm surges, river erosion, GLOFs and landslide are key water-related hazards in the region, affecting the lives of millions of people every year. Communities have had little choice but to learn to adapt to the seasonal (and occasionally daily) threats of hazards hanging over them, the inconveniences of being cut off from the outside world for often weeks or months quite simply being part of the texture of what it means to make ones home in the mountains. Every year

the monsoon season wreaks havoc, and many mountain areas witness a particularly heavy toll in terms of lives lost, people displaced, and homes damaged or washed down fragile slopes. The consequences of annual heavy rains, swollen rivers and floods are far-reaching for livelihoods and are, by no means straightforward: sand deposits decrease soil productivity and put more pressure on remaining fertile land, soil erosion and landslides erode entire lands and villages, dead livestock pollute water sources and women have to spend more time on looking for, carrying and purifying water for their families (Dankelman 2008, Mitchell et al. 2007, Raworth 2008, Regmi and Adikhari 2007, Thaxton n.d.). This is feeding into growing concern that crop yields in South Asia could fall by up to 30% by the mid-21st century, deepening the risk of food insecurity and hunger in many countries (Pachauri and Reisinger 2007). Poor and marginalized households are particularly affected because they often can only afford land situated in places at risk, such as close to the river or the fragile slopes. Many rural farmers depend solely on the natural resources for their livelihood, and changes in monsoon patterns already have devastating effects (Gautam et al. 2007). Similar unpredictability and changing flood patterns have been noted in Bangladesh with consequent damage to people, homes, stored food and grains, crops and assets, and where women report not being able to recover after one flood event before the next hits (Dankelman 2008).

All the water-related hazards interact with gendered power differentials to create situations where men and women cope, experience and suffer the hazards and disasters differently (Sultana 2010). Women are feared to be more vulnerable to climate-induced water-related stresses and extreme events like floods (Brody et al. 2008, Dankelman 2008). There is ample evidence that during natural disasters, women and girls are more prone to mortality compared to men and boys. For instances, in Nepal, flood-related fatalities were found to be significantly higher according to gender and age. One study recorded them at 13.3 per 1,000 for girls (aged between 2 and 9 years), 9.4 per 1,000 for boys of the same ages, 6.1 per 1,000 for adult women and a much lower 4.1 per 1,000 for adult men (WHO 2005; Bartlett 2008); and similarly in Bangladesh in the 1991 cyclone and flood the mortality levels was higher for women – amongst females over the age of ten were three times higher than those of males (Bern et al. 1993, Parikh 2007, Roehr 2007, Twigg 2004). In contrast, the mortality rate of men in both flood- and salinity-prone areas was only 17% of the total (Golam et al. 2009). This higher female death rate has been



attributed to gender norms on what men or women should do or have (Chowdhury et al. 1993, Dasgupta et al. 2010, Nelson et al. 2002, Neumayer and Plumper 2007, Sharmin and Islam 2013, Dankelman 2008). Again in Myanmar too, from the 130,000 people killed by the cyclone of May 2008 that hit the Ayeyarwady Division, 60% were women (Care Canada 2010).

Women are the first to suffer but last to get the disaster information - this is because the social structure of most of these societies that formally relegate women's dependency on male members in receiving disaster information, risk awareness, preparedness and evacuation (Dhungel and Ojha 2012, Shrestha. et al.2012). Studies from Bangladesh and Nepal show that, in the case of natural disasters, women are more susceptible to injuries and death than men because they do not get information in time (Khan et al. 2010). In Bangladesh early warning signals had not reached large numbers of women because the information had been disseminated primarily in public places to which many women do not have easy access; and even when women received warnings they were constrained by cultural norms that restrict women's freedom of movement in public - e.g. women were not allowed to leave the houses without a male relative, many women waited for their husbands to return home to take the decision to evacuate, thereby losing precious time that might have saved their lives and those of their children (D'Cunha 1997, Parikh 2007, Sharmin and Islam 2013, UNEP 1997). In Sindh, Pakistan in the floods the decision on when, where and how to flee was entirely in the hands of male heads of household or male community elders (IDMC 2011).

In the aftermath of the disaster too women face more negative impacts. For instance:

- In Bangladesh conditions in cyclone shelters were not suited to women's needs and thus impacted negatively on a positive response; the shelters were ill designed and insensitive to gender and culture specific needs - large numbers of men and women huddled together which is not acceptable in the Bangladeshi culture of seclusion, there were no separate toilets for men and women, there was lack of water, toiletries like sanitary pads, thus reducing privacy levels. All this especially enhanced the discomfort of menstruating, pregnant and lactating women (Baden. et al 1994, D'Cunha 1997). Similarly, A Rapid Gender Field Survey conducted by BRAC- Bangladesh Gender, Justice and Diversity Division in 2007 on Cyclone Sidr relief efforts found that after the storm women were vulnerable to harassment, violence, famine and sexual trafficking; the study also found that women were less likely, to take off clothing such as their long saris, during floods, and these got caught in the floating debris, increasing their chances of drowning (Khan 2012).
- In Sindh, Pakistan women interviewed in camps and at other displacement sites during the floods said that the demands of purdah (seclusion of women) made it difficult for them to access showers, latrines, emergency supplies and doctors, with obvious implications for their health and hygiene (IDMC 2011); the March 2011 report by the UN Office for the Coordination of Humanitarian Affairs (OCHA 2011) found that internally displaced women and girls across the country could not venture out to receive emergency food aid without being threatened for violating purdah. The IDMC paper (2011) also reports that unmarried women, pregnant women and adolescent girls were particularly affected by the lack of easily accessible doctors and health facilities both in camps and flood-affected communities generally. Furthermore, women also reported sexual harassment in camps where different tribes, families and villages were thrown together (UNIFEM 2010). Incidents reported were of rape, harassment, domestic violence and physical violence were also reported (IDMC 2011). The findings of the report of the gender-based violence sub-thematic group, Sukkur, April 2011 (cited in IDMC 2011) rated physical assault by family members as the main form of violence against women between November 2010 and April 2011.

Apart from the extreme impacts are the impacts on daily lives. In general, women are responsible for providing water for their families, therefore, increasing water scarcity or even flood implies increased burden on women and girls who will have to spend more time and effort to carry, store and purify potable water (Singh and Singh 2015). Thus, such climate related water stresses and gender inequalities aggravate the situation for women and girls in a number of ways. Finding potable water and dealing with sanitation needs is particularly difficult. In Bangladesh, even when there is severe disruption of local freshwater sources following floods, cyclones and saline intrusion it is women's responsibility and task, irrespective of their physical condition, to provide drinking water for their families due to which women need to walk long distances, sometimes up to 10 kilometers every day over rough terrain, in search of water, consuming an enormous amount of their time and effort (Dankelman 2008). Not only this, following flooding in Bangladesh, day-to-day tasks such as cooking and cleaning the house become more time-

consuming, for instance due to rising water levels women are compelled to raise their stoves or go to neighbors' houses to prepare food (Khan et al. 2010). In Nepal too studies have shown that women's responsibility to take care of the family increases with declining water availability thereby jeopardizing women's opportunities to work outside the home or attend school (Mitchel et al. 2007, FAO 2007). A finding from a study in Hopar villages in Pakistan, showed that the loss of land due to landslides was mainly where women work, and affecting facilities on which they are most dependent. The worst damages occurred close to the villages; the spaces where women spend most of their lives. Since the women's primary role is to produce food for family and village, land loss made it ever-harder to maintain the level of production, even as the number of mouths to feed was growing. As a result, they had to work longer hours and further afield, requiring more walking and carrying, thus having adverse impacts on their health - most were under constant stress, very thin, had recurring problems with palpitations, menstrual bleeding, and other signs of over-work and distress. (Azhar-Hewitt 2011).

Thus, water related climatic hazards and stresses is likely to have a particularly harsh effect on women and girls because of their distinct roles in relation to water use and their specific vulnerabilities in the context of disasters. The inter-sectionality of gender with class and caste further increases the vulnerability of poorer and lower caste women during and after such disasters (Neumayer and Plumper 2007).

Adaptation strategies

Living in unpredictable and harsh environments has compelled mountain communities to develop ways of coping with excesses and shortages of water. Coping strategies to deal with limited or too much water have thus been built into subsistence strategies, whether in terms of diversification of livelihoods or adopting various short-term and long-term strategies to help 'cut one's losses.' As in the day-to-day life, there is a clear gender division of labor in responding to disasters too. The gender division of labor leads to major differences between men and women in preparation, responding, and recovering from disasters.



Many of the preventive and adaptive measures documented in the HKH are initiated and carried out by women, and studies suggest that women are particularly innovative and willing to change practices which may be unsustainable or which increase the risk for being hit by floods and droughts (Gautam et al. 2007, Mitchell et al. 2007). Case studies from Pakistan and Nepal record (Livelihood Options for Disaster Risk Reduction, ITDG, 2000 cited in Fordham 2001) that in preparation for floods women take action to preserve food items and seed material for continuity of livelihoods. The domain of raising the bunds to prevent flood waters entering homesteads, taking women and children to safety seems to be the responsibility of men. However, much more detailed work needs to be done to develop a more nuanced gendered understanding of adaptation strategies and to better understand men's and women's roles and relative inputs.

Studies from Chitral (Pakistan) and the Terai (Nepal) reveal how flood-prone communities create structures made of bamboo, clay or mud, raised off the ground which ensures safe and dry storage of fuel wood, matches, dry food, animal fodder and medicines. Women also engage in preparatory measures in advance of floods to stock up on essential items such as grains, oil and kerosene, as well as drying fish and vegetables for future use. The types of storage structure used necessarily reflect households' economic assets. Poorer households cannot afford to invest in building special structures and some of the simpler structures are more easily damaged in the floods. In such instances, or in acute crisis situations, families take their belongings and animals and move temporarily to people with houses that are more elevated than their own, or use safe public buildings such as schools or offices that have been allocated as public shelters (Dekens 2007a, Dekens 2007b, Dankelman 2008, Gautam et al. 2007).

Communities also develop other kinds of structural measures to help mitigate flooding outcomes. People in the Jugedi Khola watershed in the central Terai (Nepal) are implementing innovative techniques to lift the water for irrigation which has become inaccessible because of rising streambeds due to deposition of debris, as well as construct simple barriers to prevent the rivers from flooding or to divert the stream flow (Bahadur and Bhandari 2008). However, such systems of stream control and diversion are not always adaptive, as found in the eastern Terai where efforts to alter the course of water bodies may simply relocate the source of the problem elsewhere (Dekens 2007b).

Livelihood diversification in activities both on and off the land is a common response to dealing with the vagaries of floods. For men in most of the HKH, off-farm seasonal migration has become an important adaptation strategy (Adhikari 2014, Zomer et al 2009, Fang and Leduc 2010, Jones and Boyd 2011, Leduc 2009, Sugden et al. 2014,). In contrast, women who are left behind have changed cropping pattern to reduce the risk of crop failure. In some areas communities alter cropping patterns, growing off-season vegetables and fruits, and other more marketable crop varieties that can be harvested before the flood season (Dekens 2007a, b, Dhar and Jacob 2008, Gautam et al. 2007, Bahadur and Bhandari 2008, Kollmair and Hoermann 2011, Mitchell et al. 2007). Elsewhere women have changed from depending solely on rice cultivation to also growing bananas, doing some fishing and other off-farm activities, although some of the new crops may require hybrid seeds, which may be more expensive and hence less accessible to the poor.

Studies also suggest how women have been aware that rises in temperature have contributed to an increase in fungal and bacterial diseases, as a result of which they started to use more chemical fertilizer (Gautam et al. 2007, Mitchell et al. 2007). Women in Sikkim shifted from wet rice cultivation to dry-land paddy cultivation after facing water shortages; while in some areas of Nepal women farmers are conserving water springs in ecologically sensitive areas by through participation in community forestry where they, have banned harvesting of timber from trees that in the stage of extinction (Karki and Gurung 2012). A study done by ICIMOD shows a similar picture. After the flood of 2008, women in the Koshi area, realizing that sediment removal would not be possible through outside resources, took the land's revival into their own hands and initiated collective vegetable cultivation plots in portions of the sedimented soil. After four years, much of the flooded land remains barren, yet through the hard work of these women, patches are coming back to life, and the women are now able to harvest some produce from the land, bringing dignity and a sense of normalcy back to their families (Khadka and Nibanupudi, 2015) There are instances of women in Chitwan, Nepal, selling surplus milk and vegetables as a common practice to generate extra income (Bahadur and Bhandari, 2008); of selling off livestock to ensure cash deposits to cover the loss of crops and assets (Dankelman 2008), and, in Bangladesh, selling one's labor, a common practice that may result in difficulties as the money is often used well before the work has been carried out.

Both droughts and floods cause crop loss and food shortages and these in turn force households, some more than others, to adapt their dietary intakes accordingly. Throughout much of the HKH food scarcity affects women disproportionately: it is women who are responsible for providing their families with nutritious meals often in the midst of hardship and in contexts where men's and boys' access to food is prioritized (Dankelman 2008). There are however ways in which adaptations to environmental changes facilitated by new technologies have been positive. A woman's grassroots foundation in Uttarkhand has introduced the use of alternative energy based on solar energy and biogas, as well as improved cooking stoves, and these have helped to reduce the time women spend on fuel collection and cooking, as well as lessening the pressure on the already scarce forest cover of the HKH (Dhar and Jacob 2008).

Social networks and support systems play a critical role in helping people in times of crisis. By virtue of women's household roles and the fact that they are more likely than their menfolk to remain in the village they are the ones who, typically, are involved in multiple informal (and occasionally formal) networks at the community level on which they draw for support in times of difficulty and scarcity. They borrow and exchange with neighbors if crops or stored grain are lost or deficient; tend to know more than men who is infirm, pregnant or in other ways in need of help; and find ways of sharing knowledge and learning from the past to help adapt better in the future (Dankelman 2008, Dekens 2007a, Dekens 2007b, Bahadur and Bhandari 2008, Mitchell et al. 2007).

What all these studies show is that women in the areas assessed are entrepreneurial and that they have a clear idea about what they need and what prevents them from adjusting their farm practices to an increasingly varying climate (Mitchell et al. 2007). They may lack the expert knowledge, finances, tools or permission to carry out preparative and adaptive measures, but they frequently have a rich knowledge and perception of the situation and of what can be done to improve it. Although more vulnerable than men to food insecurity, water shortages and diminishing livelihoods, women are repositories of knowledge on ensuring food security, managing water sources, helping their families survive during shortages, and hold an array of experiences which can be useful for developing gender sensitive adaptation strategies for addressing climate change (Aguilar 2007, 2009, Aguilar et al. 2007, Thaxton, n.d.). At the same time, the evidence is that often innovative attempts, localized adaptation strategies and extensive local knowledge of the local resource base may not always be sustainable or adequate, especially when the floods (and droughts) are intensified. All too often, strict gender roles or caste practices, economic destitution or the lack of access to information and resources come in the way of women learning new skills and using new tools to diversify their livelihood strategies (Gautam et al. 2007).



Agriculture, Food Security, and Management of Natural Resources

Agriculture is particularly sensitive to climatically-induced changes, responding to and affected by too much or too little water due to changing rainfall patterns, lack of or delayed access to water. Agriculture is expected to be affected differently throughout the region, with some places projected to experience a decline in potentially good agricultural land, while others will benefit from substantial increases in suitable areas and production potentials (Fischer et al. 2002, Tao et al. 2004). Added to the impacts of climate change is the fragile ecosystem of the region coupled with economies that are very dependent on local environmental resources and limited response capability (Shrestha 2005). Consequently, the impact on food security in the region is bound to be significant, undermining the regional food security. This is a cause of immense concern for the region because although the region is one of the richest areas in the world for biological diversity, it is also one of poorest regions in terms of economic development with fragile and poorly accessible landscape, sparsely scattered settlements and poor infrastructure. Survival of these people depends on subsistence farming and necessitates the extensive use and management of natural resources.

The HKH is characterized by a diversity of farming practices that have been developed and nurtured through many generations. Since the micro climatic conditions and variations in ecological systems within the region have generated very specific practices suitable for each specific zone, it is highly likely that each of these specific practices is responding to climatic changes in different ways (Rai and Chakesang 2009). Communities that are highly dependent on agriculture, have few other options to turn to, and with little or no appropriate coping mechanisms are likely to be particularly vulnerable to any changes in this domain.

Communities' rights to resources in mountains areas were traditionally governed by customary norms that granted open access to certain resources (such as grazing lands), rotational systems of guarding forests and other lands. These norms and often the institutions through which they were disseminated have over the decades been considerably eroded or weakened as a consequence of state policies favoring the nationalization/privatisation of forests and other land-based resources. The creation of sector based line departments, each responsible for a specific resource domain (e.g. forestry, water resources, grazing lands), has also further alienated communities from their resource bases and their relation to these resources thus affecting the spirit of responsibility for maintaining them. A further complication stems from the variety of government laws, policies and personnel through which people's relationships to their resource bases and ecosystem services are now mediated. More recently processes of climate and other global changes, along with demographic and socio-political changes have further weakened traditional coping mechanisms.

Over the course of the few decades the devolution of management of resources to communities has attempted to address some of the more glaring problems that have arisen over conflicting ownership and access rights, working through both customary institutions still in existence and new ones occasionally created explicitly to take on the challenge of engaging communities in resource conservation and management. However, while these local-level institutions, both the old and the new, have had certain successes, they also point out the difficulties in addressing equity, gender and other marginalities that are taking on a new urgency in the context of climate change.

Throughout the HKH and across very different agro-ecological zones and production systems women have historically played a central role in subsistence economies, whether in farming or forest-related work, in pastoral economies or in shifting cultivation systems. Although the exigencies created by life at high altitudes demands a much greater flexibility in gender divisions of labor than is typically found elsewhere, women's roles as primary supporters of homesteads and family farms have intensified over the decades as diminishing subsistence prospects and underemployment in rural areas have pushed (mainly) men into seeking alternative livelihoods in off-farm domains (Bose 2000, Gurung 1999, Leduc 2009, Mehta 1996, Sidh and Basu 2011). Thus the gender division of labor visible throughout the Himalayan region is one which places on women an arduous and often literally back-breaking work regime. They carry the main responsibility for providing water, fodder, fuelwood and food for their

households, their work often entailing engagement with polluted water sources, degraded woodlots, eroded soils and unproductive landholdings (Dankelman 2008, Leduc 2010, Leduc et al. 2008, Sherpa 2007).

As the primary users, managers and custodians of natural resources – especially in situations of high male out-migration or involvement in non-farm local work – women also play a vital role in the conservation of mountain biodiversity and agrodiversity. It is consequently essential that a richer understanding of the knowledge systems they tap into (and how these are coming under stress) and the constraints they face in effectively meeting their roles as producers and managers be developed, especially against the growing challenges of climate change-related impacts on these resource bases.

Agriculture

Rain-fed mountain farming systems, conducted on small and often fragmented landholdings and on steep terrain and often characterized by low productivity are highly susceptible to climate change. In many areas there is already considerable anecdotal evidence of communities having to contend with the changing pattern of seasons as temperatures rise and snow and rainfall become more uncertain. In parts of the Eastern Himalaya people report the need for changing cropping patterns in order to adjust to new circumstances of rising temperatures, too little or too less water, and feel that farmers will be the hardest hit by the changing environment (Sharma and Tsering 2009). In some areas declines have been seen in the production of rice, corn, and wheat due to increasing water stress arising partly from increasing temperature coupled with and a reduction in the number of rainy days (Tsering et al. 2012).

Over the course of the past decades the feminization of mountain agriculture has emerged as one of the most pressing issues facing productivity and food security issues. Linked primarily to male out-migration in search of alternative off-farm livelihoods women in many areas have been compelled to take on tasks formerly done by men, especially in land preparation, harvesting and post-harvesting activities, and the marketing of produce (Hoermann et al. 2010, Kelkar 2007, Kollmair and Hoermann 2011, Leduc 2009, Sidh and Basu 2011). However, working the



land does not necessarily accord status of 'farmer' to women- but are still considered as helpers (Ahmed and Fajber 2009, Felix et al. 2010, Goodrich 2012, Kelkar 2013, Manfre et al. 2013). This is because farming systems and the work done here is a domain or area that is spatially and socially distinct from 'the home', therefore a 'public' domain (Goodrich 2012), and this 'public' world of work and production tends to be seen, and ideologically constructed, as the world of men (Zwarteveen 2013).

Since men are most often, if not always, the owners of land and the main recipients of the income derived from agriculture it can be said that the loss of agricultural land due to natural disasters related to climate will directly affect men. However, men are more likely to have alternative income sources, while for women who usually are engaged in subsistence cultivation in home gardens combined with rearing smaller livestock that are often their main and only sources of income (Dankelman 2008), any negative impact of climate change on these activities alongside cereal production affect women disproportionately (Sugden et al. 2014).

By and large women's role and contributions are looked at with indifference not only by the government departments and other organizations but also by the family and communities. Consequently, they are overlooked by extension agents, who are primarily male⁷ and frequently disregarded in the delivery of services. Male extension agents frequently target male-dominated farmers groups and focus information and inputs on their needs (World Bank 2008), sometimes because it may not be culturally acceptable for them to interact with women. When women do participate in extension activities they may not be provided equal recognition for their responsibilities and skills. Consequently they lack access to relevant technologies, training opportunities, information, and extension services or financial credit. Farmers and farming activities continue to be perceived as "male" by policy makers, planners and agricultural service deliverers, thereby ignoring the important and increasing role women play in agriculture (Gallina 2010:8). Thus, despite overwhelming evidence of their productive roles and as the main producers of food grains, prevailing gender ideologies within communities and institutions of state render them largely invisible. This situation is further aggravated by the privileging of scientific over local/indigenous knowledge, with the result that all too often women's knowledge and skills end up being overlooked or dismissed. For instance in a case study by Moitra and Kumar (2011) in Uttarakhand, India, women reported that their traditional ways of doing were no longer considered relevant, and were instead being replaced by modern systems of knowledge, which actually did not always fulfill the promises that they were made to believe and sometimes were even detrimental to them, taking away their access to and control over natural resources.

The coupling of the feminization of agriculture with this invisibility has contributed to a growing feminization of poverty, responsibility and obligation in rural areas. As Chant (2008: 128) argues, "it is not only gender inequalities in incomes and consumption which are important but gender differences in time and labor inputs, and of particular significance to a 'feminization of poverty', however defined, the fact that the onus on women to cope is increasing". In the context of HKH this is mostly because women cannot rely on men as men have migrated. Having primary responsibility for household work, caring for children and elders, agricultural work, collecting water, fodder, food, and income generation, etc. which, along with sociocultural constraints on their physical mobility, give them little flexibility to pursue employment opportunities or being involved in organizational management and decision making (Khadka and Nibanupudi, 2015). Recent comparative research on the 'feminization' of agriculture and natural resource management, undertaken by ICIMOD and supported by IFAD, also illustrates this trend, whereby in some mountain regions in India women undertake 4.6 to 5.7 times the agricultural work men carry out. In Nepal, the range is skewed even more with women carrying out 6.3 to 6.6 times the agricultural work than men (Gurung and Bisht, 2014).

While responsibilities for dealing with livelihoods and poverty are becoming progressively feminized, there seems to be no corresponding increase in women's rights and rewards (Nellemann et al. 2011). Gender and cultural systems of entitlement ensure that across different socio-cultural formations women tend to have considerably less access to critical resources compared to their menfolk and they rarely own land and other productive resources or have much decision-making powers. Also disturbing is that women are forced into accepting rather than challenging these mounting responsibilities in a spirit of quiet and self-sacrificing acquiescence. While recourse to 'traditional' norms of female altruism in a time of transition may be a tactical gesture to ensure household survival, the danger is that

⁷ Extension services worldwide remain dominated by men -it is estimated that globally only 15% of extension agents are women (World Bank/FAO/IFAD, 2009).

women will have to carry on assuming more responsibilities with severe costs to their personal health and well-being (Chant 2008:182; Khadka and Nibanupudi, 2015).

And yet there is growing evidence of the ways in which women are the repositories of 'local' or 'traditional' knowledge for the cultivation of crops, wild edibles, useful forest resources, seed selection and storage, weeds and weed management that enable communities to maintain subsistence security in often remote and harsh environments. Across the Eastern and Western Himalaya in communities such as the Apatani, Lepcha, Mizo, Naga and Garhwali women are involved in the preservation of high quality seeds (Goodrich 2012, Gurung ed. 1999, Kerkhoff and Sharma 2006, UNDP/FAO 2001, cited in Dhakal and Leduc 2010). Amongst the Marma community in the Rangamati Hill District of Bangladesh women hold primary responsibility for cultivating kitchen gardens which contribute to the conservation of the genetic pool of 19 perennial food and fruit species (Aumeeruddy-Thomas and Shengji 2003, cited in Dhakal and Leduc 2010); and in Meghalaya in North East India kitchen gardens produce 37 seasonal crops and 30 perennial ones (Kerkhoff and Sharma 2006, *ibid*). This is not to suggest that men neither contribute nor have the expertise to engage with the land. However, gender divisions of labor, constraints on women's mobility, as well as their responsibilities for the wellbeing of household members ensure that it is women who play a highly, and in many areas a more, significant role in these activities. In addition to their different roles, there is also evidence that women and men have different preferences and needs, often prescribed by the specific activities they are involved in. Thus, a study from the Drosh Valley in Chitral, Pakistan, indicates that men's knowledge of fruiting species is linked to the utility of these plants for thatching material, fuelwood, sheds and shelters (Aumeeruddy-Thomas and Shengji 2003 cited in Dhakal and Leduc, 2010).

One of the pressing issues now facing the gendered nature of agricultural work (and of biodiversity conservation and management more generally), and one that is becoming more pronounced in the light of rapid changing ecological and socioeconomic circumstances, is women's lack of rights to land and other productive assets. There is compelling evidence to suggest that effective 'use rights' – if not full control – along with the ability to tap into institutional credit, training and extension are essential for women to be effective producers and managers, to be



able to participate fully in decision making and more generally realize their agency. There are also many positive spillover effects, including improved household health and education status as well as child survival which, if not directly related to agricultural productivity, certainly have important indirect implications for longer-term well-being of individuals and households (Agarwal 1994, Government of India 2004 cited in Kelkar 2010, Kelkar 1992). Nevertheless, throughout the region the persistence discriminatory socio-cultural practices, policy and institutional barriers continue to stand in the way of women obtaining control of property and resources, and this is true even in contexts where there are legal provisions supporting this which the ILO describes as one of the “main forms of gender inequality across the world” (ILO 2004 cited in Kelkar 2010).

Forests, watersheds and biodiversity management

The role of common property and open-access resources such as forests, watershed, etc. are essential to the food security of poorer rural households, livelihoods and coping strategies in the region (Rahman et al. 2007). Forests (along with rangelands) are the predominant land systems in the hills and mountains of the HKH. They are central to environmental and ecological equilibrium, ensuring that perennial water bodies remain healthy, providing watershed protection and are critical to maintaining the rich floral and faunal biodiversity characteristic of these mountains. In addition they support agriculture through the enrichment of the soil, the provisioning of fodder, foods and medicinal herbs. These rich sources of biodiversity have over the past century and increasingly in recent decades been affected by development interventions (road construction, hydroelectric projects, and the introduction of horticulture and intensive agriculture), commercial felling of trees and, as populations grow and pressures increase, the unsustainable use of forest resources.

Through their collection of fodder leaves and grasses, fuelwood, forest-based foods and medicinal herbs mountain women play a central role in managing trees and forest resources (Agarwal 1992, 1997; Gururani 2000, 2002, Linkenbach 2007, Rawat 1995, Shiva 1988). As with their agricultural work, their involvement in this domain imbues them with sophisticated, locale-specific appreciation of forest resources and how they connect with aspects



of crop production and animal husbandry. Degradation of common property resources such as forests, watershed, etc. also disproportionately affect women as they are the ones who are in charge of the tasks of collecting fuelwood, fodder and water from the water bodies. Some examples of this from Nepal are: a study from three villages in western Nepal found that women work up to 18 hours a day collecting fuel, fodder and water (Sugden et al. 2014); another study shows that in the hill villages of Nepal, women perform 82% of the fuelwood collection work and with climate change forest productivity is impacted, reducing the availability of fuelwood and increasing the workload of women (Haigh and Vallely 2010); yet another study in Baitadi, Surkhet and Dailekh districts, women reported the increased distances they must travel to collect water, fuel and fodder for household uses, in addition to the need to collect water for cattle because rivers and streams are drying (Gum et al. 2009). In addition, such degradation also impacts on women's access to income as resource harvesting from such communal ecosystems are often one of the few sources of cash women can personally control (Agarwal 1998).

Over the past few decades, and with varying degrees of successful, devolutionary initiatives in several of the HKH countries have worked towards supporting women's roles in community forestry initiatives, with Nepal's model offering the most successful and transformative model of local-level forest governance. Its Community Forestry Programme (CFP) includes many thousands of forest user groups who manage over a million hectares of forest lands. Several hundred of these groups are women-led and managed, and women also constitute a considerable percentage of mixed gender groups (Gurung, et al 2010). However, at the same time, there are numerous studies that indicate that the extent of change is actually limited with large numbers of women, poor and excluded caste and ethnic groups still highly marginalised in the community forestry process with (Agarwal 2009, Bushley 2002, Buchy and Subba 2003, Chhetri 2001, Lama and Buchy 2002, Nightingale 2002, Parajuli et al.2010, Paudyal 2008, Winrock 2002, Yadav et al. 2008, Uprety et al. 2012). Similarly, experience to date of separate establishment of women's only CFUGs in a number of project-supported districts are also not wholly positive; often leading to increased marginalisation of these organizations and no increase in empowerment of women (Buchy and Rai 2008, Rai and Buchy 2004, Seeley 1996). However, where there has been greater presence of women in the community forestry institutions, many statistically demonstrable benefits, such as enhancement of women's effective participation in decision-making, women's higher influences in the nature of decisions made, especially the rules of forest use and their implementation; and improvement of forest conservation outcomes, have been cited (Agrawal 2010). As the MFSC in its review report (2013) states, although community forestry in particular has tried to ensure there is representation of women in key decision-making positions in community forestry groups, the prevailing cultural norms still make it difficult for women to access and influence decision-making processes.

PES (*Payment for eco-system services*) and **REDD+** (*reducing emissions from deforestation and forest degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks*)

Much of women's work inputs in forests and agriculture are now being recognized as having an "added value" of in terms of helping to limit and mitigate carbon emission through carbon sequestration in trees and soils via their forest and soil-related work. Emerging issues such as payment for environmental services (PES) and reducing emissions from deforestation and forest degradation (REDD) are now creating new directions for local communities to get involved with, offering the possibility for developing alternatives and opportunities (Karki et al. 2011). Case studies are emerging which highlight the potentialities of Clean Development Mechanisms (CDM). One instance comes from the mid-Himalayan state of Himachal Pradesh, India, where the Mid-Himalayan Watershed Development Project is mobilising small farmers and forest user communities toward the development of carbon sinks through afforestation on currently highly degraded and barren lands. The outcomes, via afforestation activities and watershed development are expected to generate considerable employment for the poorest members of participating communities (Ibid).

However, both PES and REDD are themselves foregrounded in larger issues of resource ownership; and gender is a critical variable in shaping access to and control over resources. Further, gender interacts with class, caste, race, culture and ethnicity to shape processes of ecological change, the struggle of men and women to sustain ecologically viable livelihoods, and the prospects of any community for sustainable development (Rocheleau et al. 1996). As such, they inevitably raise concerns about the mechanisms through which women, as well as more generally poor and marginalized communities or segments of communities can be included in benefits from these compensatory processes. This is evident by the prevailing gender inequality and marginalization of women and

the poor in the decision-making at every level and thus accessing of benefits, despite the fact that women and the poor are primary users of forests (Agarwal 2001, Reed and Varghese 2007, Mwangi et al. 2011). Another concern is whether REDD+ will create yet another level of burden for women already struggling for access to resources to ensure them a modicum of a subsistence, or whether it opens up opportunities for them to be compensated for their work in maintaining forests and soils (Gurung et al. 2010). As pointed out in scoping study report by WOCAN/UN-REDD/USAID (2013) there have been a few publications and dialogues that have pushed forward the agenda on gender and REDD+. At the same time clear guidelines informing processes of remuneration are still not in place, while there remains a conspicuous absence of women in REDD consultations (Mehta 2009).

However, the potentials for developing gender-equitable REDD+ exist and some opportunities have been identified: The USAID's publication on Getting REDD+ Right for Women (Gurung et al. 2011) stating that women have been systematically identified as key stakeholders or beneficiaries of REDD+ because of their invisibility in the forest sector—largely viewed as a masculine domain, gives the present constraints as well as opportunities for women's participation in REDD+ design, governance, implementation, and benefit sharing. Similarly, UN-REDD Programme report (2011) identifies four key areas that would benefit from gender mainstreaming:

- Capturing the different roles, rights and responsibilities of men and women, as well as their particular use patterns and knowledge of forests;
- ensuring the accuracy of drivers of deforestation and forest degradation and methods for conservation, sustainable management of forests and enhancement of forest carbon stocks;
- improving the equitable sharing of benefits from REDD+; and
- ensuring consistency with the human rights-based approach to development.

What is required is gender-sensitive institutional reform so that women not only get participation in but also have decision-making powers. There are some examples from community forestry user group in Nepal and India showing that a high proportion of women in user-group executive committees and other key decision-making bodies significantly improves forest condition; similarly groups with all-women executive committees in the Nepal, despite receiving much smaller and more degraded forests to manage, showed better forest regeneration and canopy growth than other groups. These impacts are attributed to women's contributions to improved forest protection and rule compliance, increased opportunities for women to use their knowledge of plant species and methods of product extraction are likely contributory factors (Agrawal et al. 2006). Similarly another case of CFUG in Nepal where women are in the decision-making body shows that the management decisions they have taken have led to significant improvements, including an increase in total carbon stock of more than 1 ton per hectare (around 2 percent annual growth in carbon stock); sequestration of around 440 tons of carbon dioxide per year (additional to the no-management scenario); and community income increased to by \$280 per year, a significant increase (the total is \$880 per year per household) (Murdiyarsa and Skutsch 2006).

Rangelands

Rangelands are one of the most important ecosystems in the mountain regions of the HKH. They account for over 60 per cent of the HKH, with over 100 million people in the region directly dependent on their resources to meet daily subsistence and over 1 billion people benefiting from the water resources conserved and regulated by these ecosystems. They provide many important eco-services, act as watersheds by serving a vital regulatory role in maintaining, regulating and storing water, help to maintain carbon in soils and in peatlands, and contribute to the stabilization of soils, nutrients and weather systems. In addition they offer people in the region and downstream a wide range of non-grazing rangeland products and services (NGRPS) that include diverse genetic resources, recreational spaces and fresh air (Zomer et al. 2009).

As in other areas, in rangelands too there is evidence of gender division of work and roles. In most countries in the HKH, the majority of women and children carry out the arduous work of collecting, drying and using of firewood, medicinal plants and other products from rangelands for economic, social and cultural purposes, as well as collecting water and food both out of and in times of crises (Khadka and Verma 2012, Verma and Khadka 2014, 2016; Tabussam 2006). Studies in communities across disparate cultural settings, including Chitral (Pakistan), Ladakh (India) and Mustang (Nepal) reveal similarities in terms of the considerably longer hours women work



compared to men, and their limited access to technologies that could mitigate some part of their work burden, information and financial supports (Leduc 2009). In Indian Trans Himalayan region of Ladakh where there is the Changpa pastoral production system, women are mostly involved in milking and dairy processing, while men are responsible for shearing cashmere wool, herding and selling of animals (Namgail et al. 2007). Women, in the yak-breeding nomad community of the Tibetan Plateau, play a vital role - as producers and raisers of children, as managers of the household, and as active decision-makers pertaining to a range resources, including grass and water, and livestock (Miller 1998). In Yunnan province, northwestern china, where agropastoralists grow a variety of both subsistence and cash crops, as well as keeping seven species of livestock (yak, cattle, sheep, goats, pigs, horses and chickens); men manage the cash crops while women cultivate subsistence crops around their homesteads, and in regard to livestock, based on the traditional division of labor women raise pigs and chickens, while men take cattle, sheep and goats to the mountain grasslands for grazing. (Shen Shicai and Qian Jie 2009). Among the pastoralists of the Bhutan rangelands, women often manage animal products such as milk, cheese, meat, yak hair, skin and wool; they take the decisions regarding breeding, exchange and sharing of animals and also play a central role in trade with villages in the low lands (Dey and Gyelthshen 2010).

However, despite women's prominent role in, trade, managing natural resources, etc., and despite the communal nature of pastoral land, with a small percentage of pasture holdings in the name of individuals (28.72%), it is only men who hold the land titles as per government orders (FAO 2012), and women's participation in community and local governance is limited by patriarchal discourses, biases and norms that define gender roles and ideologies, hence their needs are under-represented (Verma and Khadka, 2014, 2016).

Over the decades rangelands have come under various bio-physical and social stresses, many of which are similar to those affecting other highland ecosystems such as the over- overgrazing of pastures, encroachment by non-native plant species, deforestation, and rising human populations. The climatic changes in the form of unusual and untimely snowfall and too little water has severely impacted the rangelands and the life and livelihood of the

pastoralists depending on them. Rangeland degradation, frequent landslides/mudslides, flooding, avalanches during winter and reduction of pastures is commonly observed. Recent studies have shown that warming has decreased vegetative productivity and plant species diversity as well as shortened the growing seasons of vegetation (Klein et al. 2004, 2007, Yu et al. 2010). Perceptions expressed by pastoral men and are similar - both pastoral men and women, in all the study areas in the remote rangelands of Bhutan, China and Nepal conducted by ICIMOD, agree that they have observed the changing weather pattern, especially over the past decade – “they experienced a gradual warming in their surroundings and perceived summers to be hotter than normal, and winter to be colder than normal” (Khadka and Verma 2012:47). The pastoral communities have also perceived the direct and indirect impacts of climate change (Joshi et al. 2013). This has resulted in the reduction of the quantity and quality of grasses in the pasturelands, significantly impacting the fodder productivity for livestock threatening the livelihoods of the herders. For instance, the gradual and sometimes sudden shift of seasonal events has caused serious problems to the rotational grazing of livestock in alpine and Trans-Himalayan plateaus (Sharma and Rai 2012). Thus, climate change is the most threatening factor for the herders living in the harsh mountainous terrains of the HKH, as it is leading to the prevalence of various diseases and the growth of grasses on which the yaks feed (Chettri 2008, Gyamtsho 2000, Sherpa and Kayastha 2009, Wangchuk et al. 2013). The climate also has impact on the milk production of the yaks as stated by Dong et al. (2007). Eventually, the changing climate would alter the migration cycle of the herds; pose a threat to plant and animal species, and change the breeding and development patterns (Sherpa and Kayastha 2009).

Unpublished case studies initiated by ICIMOD in Afghanistan, Nepal and Pakistan also highlight the link between decreased rainfall in rangelands and the expansion of degraded areas as well as the acceleration of desertification. These studies also indicate that the disappearance of water resources due to prolonged drought has forced people to change their migration routes or even abandon pastoralism (Kathamndu 2011). Changing vegetation cover in addition to growing demands for scarce water resources have also altered rangeland eco-hydrological systems, affecting stream flow and the recharging of ground and surface water sources. Runoff and erosion processes have also affected land management systems. The combination of eco-hydrological and societal drivers have had particularly important implications for these vulnerable ecosystems and the communities who live in them (Karki et al. 2011, Wilcox and Thurow 2006).

Thus people in the rangelands have to deal with the vagaries of the environment including periodic drought (and sometimes floods), the lack of appropriate services, and the challenges that a functioning pastoral system produce: extensive migrations; working for long periods of time with little food and water; carrying of water and fuelwood for long distances; conflict and physical violence; etc. (Flintan 2008). The hardest hit by these changing trends are the poor, women and children, facing the daily burden of collecting fuel and water from a declining resource base: the impact of the reduced rainfall has led to water scarcity, disappearance of natural springs, and drying of pan dams, due to which women must now cover longer distances to fetch water. For example in the study sites of India, women reported that they have to travel 10 km per day to fetch water. Likewise, the impacts of climate change are also seen in the outmigration of men, which has implications on gender divisions of labor. Thus, women’s workloads has increased, as they often need to travel long distances to graze herds, fetch water and collect firewood and yak dung (Khadka and Verma 2012).

Along with climate change, social-institutional change has affected the livelihood of the herder communities as development activities and market interventions are also major sources of change and stress. One example comes from the Karakoram range in the Northern Areas of Pakistan which, over the past two decades, has been subject to rapid development due to the construction of the Karakoram Highway that links Pakistan and China. The development of this communication infrastructure has resulted in a network of ‘jeepable’ roads throughout the region which, in turn, has led to an increase in the movement of people into and out of the area, the emergence of markets and commodities, and new types of production specifically directed toward the market (Kamal and Nasir 1998). Elsewhere, such as the Tibetan Plateau, tourist and pilgrim activities have brought about changes; in the trans-Himalayan regions of Ladakh and Lahaul Spiti (India) the presence of the army, government line departments, non-governmental organizations, community-based rural development schemes and small infrastructure projects such as micro-hydel schemes and irrigation channels have also been catalysts of change. These changing local employment patterns and better transportation facilities have also contributed to changing pastoral dynamics as more people take advantage of short-term migration out of the region.

But along with opportunities have also come disadvantages that may undermine the adaptation capacity of herder communities to climate variability and change (Wang et al.2014). For instance, studies have found that privatization and grazing sedentarization in the rangelands of the HKH and more so Tibetan Plateau have changed the use pattern of grasslands whereby the herders now are concentrated in a demarcated area (Bauer 2005, Foggin 2008, Klein et al. 2011, Ning and Richard 1999, Ning and Zhaoli 2002, Zhaoli et al. 2005).

All these trends are helping to throw up gender issues that are similar to those in other mountainous areas. Studies in communities across disparate cultural settings, including Chitral (Pakistan), Ladakh (India) and Mustang (Nepal) reveal similarities in terms of the considerably longer hours women work compared to men, and their limited access to technologies that could mitigate some part of their work burden, information and financial supports (Leduc and Yan 2009). The findings from studies Verma and Khadka 2014, 2016) illustrate:

- pastoral women work more hours in a day than pastoral men in sustaining livelihoods and in areas such as animal husbandry, agriculture, household work, collection of water, fuel food and other natural resources;
- women's roles and responsibilities are numerous and gruelling in everyday pastoral livelihood activities, while men's roles tend to be limited to their involvement in herding, wage labor, and marketing of animal products and cash crops;
- women's participation in community and local governance is limited by patriarchal discourses, biases and norms that define gender roles and ideologies, hence their needs are under-represented;
- women have to walk increasingly greater distances to collect fuel wood, water and animal dung due to degrading environmental conditions in the rangelands and the drying up of water resources near their seasonal settlements and homesteads, but despite this they still face the constraints as the natural resources from rangelands meet only 11 per cent of the total demand for energy required; and
- development services such as trainings, credit provision, livestock extension, etc. still exclusively target men, thus limiting women's participation and minimise the potential for meaningful development impact.

Amongst the many constraints to effective rangeland governance in the past has been the failure to include and listen to pastoralists themselves. This is now being addressed through the implementation of co-management initiatives which, in the manner of participatory forestry initiatives, are based on the devolution of decision making powers to local communities (and relevant organizations) through which to develop more equitable and sustainable systems of resource management, and identifying all stakeholders and developing mechanisms by which different and often opposing concerns and interests can be addressed (Yangzong 2009, Foggin 2012). However, a major challenge is that a gender perspective is rarely incorporated into rangeland resources management programmes in the HKH. A review of China's rangeland policies actually reveals that the reinforcing of patriarchal norms and values have led to the strengthening of older gender inequalities and the emergence of new ones. Women pastoralists find themselves losing rights to land and control over basic assets, experience increases in their work loads and, the coupling of this with their lower social status further denies them access to training opportunities (Xu 2010). As in the other areas of the HKH, although both women and men have critical knowledge about sustaining mountain rangelands, their roles, access and decision-making power over rangeland resources differ by gender. However, as pointed out by Khadka and Verma (2012:8) there is a general lack of understanding of gender dimensions of rangeland resources.

Shifting cultivation

Shifting cultivation is the most prominent farming system in the eastern Himalayas - largely located in Northeast India, the Chittagong Hill Tracts of Bangladesh, Eastern Bhutan, Myanmar and Southwest China. This system of agriculture provides a way of life for a large number of ethnic minorities and other poor and marginalized upland communities as it is mainly practiced by the indigenous communities who are among the most marginalized social and economic groups in the HKH. They are predominantly forest-based and dependent, drawing on a mix of sedentary cultivation, hunting and gathering activities, forest farming and transhumance pastoralism in higher elevations. Since shifting cultivation is so different from other types of agriculture practiced in the lowlands, this system is much misunderstood; whereas for most people practicing this type of cultivation it is not only a farming technique but a way of life (IWGIA, AIPP, IKAP 2009). Shifting cultivators in the eastern Himalayas are facing problems with a diminishing and deteriorating natural resource base as a result of which they face much difficulties



in meeting their livelihood requirements. As social and ecological changes transform their physical landscapes, ambiguities over ownership and tenure of resources create tensions between communities and governments, and marginal lands and resources dwindle (Kerkhoff and Sharma 2006). Until recently, state policies invariably viewed shifting cultivation as an old practice that needed to be stopped (Kerkhoff and Sharma 2006).

Many aspects of shifting cultivation practices offer opportunities for addressing negative climate change impacts, such as, more carbon is being sequestered in areas under shifting cultivation than under other forms of land use, like permanent cropping of seasonal plants, or plantations and, shifting cultivation enhances bio-diversity and is crucial for in-situ conservation of crop genetic resources (IWGIA, AIPP, IKAP 2009: 4-5). ICIMOD's study (2006) also suggest that regardless of whether trees are chosen for economic or biological purposes, or most commonly a combination of both, the improved forest fallows, which are the most important component in shifting cultivation, play a crucial role in conserving biodiversity and deliver many of the same environmental services as primary tropical and sub-tropical forests including soil erosion control and water source protection.

Gender suffers a "double invisibility" in this system of cultivation, yet there is a growing appreciation that within this system men and women typically have differing roles, knowledge, skills and interests (Colfer et al. 2015: 921). In most of the areas where shifting cultivation is practiced, women play a significant role but they are hardly represented in the decision-making level (Ibid; Gurung 2001a, Gurung 2001b, Goodrich 2012). In India, in the move to stop shifting cultivation, state policies are promoting monocultures leading to adverse impacts on women because they lose many of the resources viz. vegetables, fruits, NTFPs, they used to get, both for home consumption and for selling (Colfer et al. 2015). With the looming climate change threats this loss becomes more serious.

Adaptive strategies

As men and women have access to different range of opportunities—more so for the men—women and men show different coping strategies to deal with stress caused by changing climatic patterns on agriculture and food systems. As pointed out above in section 3.1, one of the main adaptation practices for young men has been outmigration to urban areas or foreign countries for employment opportunities (Gioli et al. 2014, Hoermann et al. 2010, Sugden et al. 2014). For example, in the far west and mid-west Nepal, men and boys migrate to India after they plant or sow the crops, leaving all the farming responsibilities to the women (Adhikari 2014). In other parts of Nepal, men move out for longer periods, 2-3 years or longer, leaving all the farm and household works in the hands of the women (Khadka et al. 2014, Gum et al. 2009). Thus, feminization of agriculture and rural livelihoods in many parts of the HKH is a reality and highlights how rural women are already situated at the forefront of mitigation and adaptation activities. In many parts of Nepal and the Indian central Himalayan region women have long been involved in managing forests and in some instances have assumed leadership of community responsibilities (Agarwal 2010, Karki, et al. 2012). However, they continue to face differential access to resources, ownership and control over critical natural resources, a reflection of the limited impact evidence-based data in helping to transform legal and institutional supports to address existing skewed gender power relations.

The limited available studies and anecdotal evidence suggests that in many areas women are adapting to environmental changes, developing shifts in their portfolios of crop species and varieties in order to adjust cropping pattern and crop calendar. Equally importantly, locale-specific studies in Bangladesh, India and Nepal by ActionAid show how poor and highly vulnerable women are also able to articulate and prioritize what they need in order to be able to sustain their livelihoods, whether it be safe places to live and to store their harvests and livestock during the monsoon season; better access to services such as agricultural extension; training and information about adaptation strategies and livelihood alternatives; and access to resources to implement effective strategies and overcome constraints (Mitchell et al. 2007). In extreme cases, as already noted, people migrate elsewhere, although there



is virtually no material to suggest whether such moves and the demands of connecting with new ecosystems are necessarily positive.

Adaptive responses to flood (and drought) conditions referred to in Section 2.5 highlight some of the ways in which communities generally and women in particular respond to changing conditions in agriculture. Diversification of production is a common strategy, with changing cropping patterns and/or growing different types of grains, vegetables or fruits. In the Nepal, women are actively involved in the promotion of homestead gardens, water ponds and tree conservation in ecologically sensitive areas, agroforestry, off-seasonal vegetables, alternative energy technologies such as biogas, improved cooking stove, and also participate in promoting sustainable soil management by protecting farmyard manure from sun and water, they integrate legumes with cereal crops, and are introducing cash cropping such as tomato production in small greenhouses (Karki and Gurung 2012, Mitchell et al. 2007, Shrestha et al. 2014). A case study from Sikkim in India's northeast suggests that women have begun to domesticate wild cardamom which is more disease resistant than the cardamom species that had failed in previous years, whilst others are resorting to traditional seed saving practices, conserving in situ genetic resources and community exchange between communities (Dhar and Jacob 2008, Dhakal and Leduc 2010). In Nepal, women are practicing multiple cropping/ intercropping in the same plot by planting legumes with maize - legumes provide additional income and food in case the major crop fails or is lost (Shrestha et al. 2014). An interesting observation pointed out by Onta and Resurreccion (2011) in regard to agricultural adaptation strategies in Nepal is that the intersection of gender and caste not only produce the social categories that most shape vulnerability to climate change, but this also very interestingly enables particular cross-caste relationships (between the same gender groups) that helping to foster adaptation to climate change.

In the high altitude rangelands communities a major strategy is out-migration of men, resulting in an increase in women's work burden. Apart from this, the communities are resorting to other various adaptation strategies too. The Dzumsas of the Sikkim have ensured strong adaptive strategy in high altitude agro-pastoralism such as timing of farming, rotational grazing, movement of animals and fodder production for the lean season - they have designed a coping strategy by regulating the number of herd animals, sharing of grazing pastures for a pre-determined period of time and diversification of agriculture crops; similarly, herders have started fodder production in their farms especially for the severe winter months; in the last 10 -12 years, ecotourism promotion has gradually gained momentum as a supplement to the existing livelihood for the communities of Lachung and Lachen (Sharma and Rai 2012). Case study of the Nagqu County, a remote area of the northern Tibetan Plateau of China, analysing the adaptation strategies adopted by local herders show that here too the people have numerous strategies, such as planting forage grass, buying fodder from the market, renting pastures, joining formal or informal cooperatives, and diversifying livelihoods, social, cultural, and institutional challenges still exist (Wang et al. 2014). However, there is lack of gendered studies or cases regarding adaptation strategies in the rangelands.

Migration and Urbanization

Migration

Throughout the HKH, migration, particularly of men, is a traditional phenomenon and a major livelihood strategy of rural households dependent on natural resources (Hoermann et al. 2010, Kollmair and Hoermann 2011), which are “highly vulnerable to climatic and environmental stresses” (Gioli et al. 2014: 255). One estimate places migration levels in the mountainous regions of South Asian countries for adult males in excess of 40 percent (Rasmussen and Parvez 2002). Roots of migration in the region lie in transhumance and trading practices centuries ago, while at present it is primarily influenced by conditions of rural poverty, chronic under- and unemployment and the ever-widening gap between diminishing subsistence production and rising consumption needs (Hoermann et al. 2010). In recent decades migration patterns have been further fuelled by civil conflict and geo-political tensions in several areas. Other factors contributing to rural population flows include the dislocation of populations as a consequence of environmental degradation and natural disasters (such as the devastating earthquake in Kashmir and, more recently, the catastrophic floodings over the past two years in Pakistan), and large-scale development projects that affect communities’ habitats, livelihoods and security (the Tehri Dam in Uttarakhand, Three Gorges Dam in China, and many other instances).

Conditions of uncertainty created by unpredictable weather patterns characterised by unseasonal temperatures and extreme events such as floods and acute water stress, landslides as well as the accumulating changes such as rising sea levels, land degradation, and declining freshwater resources, which tend to exert relatively more permanent and dispersed effects, play a role in migration (Kreutzmann 2005, Reuveny 2007, Haigh and Vallely 2010, Sugden et al. 2014). Added to these are factors such as under-development, dependence on the environment for livelihood, high population density and growth, and income inequality. Aspirations for a better life and the attractions of finding a foothold in urban areas are now compounding migration flows situation. Therefore, it is important to note that migration is prompted by a combination of social and climatic or environmental factors (Adhikari 2014, Kraler et al. 2011,). For instance, in Nepal it is not easy to determine the overall impact of climate change on migration because the political, social and economic structures at the local level all play a huge role (Boano et al. 2008, Massey et al. 2007). Similarly in Bangladesh migration varies according to location and social factors (Ahmad 2012, IDS 2011, Sugden et al. 2014).

An important characteristic of migration in the HKH is its gender specificity. It has been a typically male activity, with men leaving their villages for varying degrees of time, moving to other lowland areas in their own countries or migrating across geo-political boundaries in search of work, while women remain in the villages to maintain homesteads and family farms. A major reason for this is “migration requires economic and physical capacities that are not available to everyone” and women in particular due to the social construct of gender are the ones who do not have these (Engelman 2009: 35). In Nepal not only is the number of men migrating far more than women (Adhikari 2014, Khadka et al. 2014, Maharjan et al. 2012, Gum et al. 2009) it is also more men who migrate outside the country while women predominantly migrate within Nepal. In 2001-02, women formed only 11% of over 762,000 persons out-migrating from Nepal (Demographic 2007). Similarly according to the Nepal Labor Force Survey, 2008 about 15% of the total male population and less than 2% of female population are recorded as absentees living outside the country (Maharjan et al. 2012).

Table 1 shows the migration destination and ratio of men and women in 2006.

Similarly a study by Ahmad (2012) in nine areas of Bangladesh reports that in the past decade, an average of 77% men compared to 23% women have migrated. The study also showed that in general, men migrate to nearby areas and work as agricultural or other laborers, while women migrate to large cities, because there are

Table 1: Migration destination and ratio of men and women in 2006

Migrations destination	Women (%)	Men (%)
Internal (within Nepal)	85.9	50.1
To India	11.6	37.2
To countries other than India	2.5	14.4

Source: Demographic. 2007.



limited economic opportunities for them in rural areas. In regard to seasonal migration, the other notable difference between male and female migration is about time period - male workers stay for longer periods (averaging 74 days) than female workers (14 days).

While this traditional profile of migrants is still dominant, processes of globalization, economic liberalization and geo-political conflict have in recent years begun to reconfigure the equation. New demands for cheap labor worldwide along with continued inadequacy of rural employment opportunities are now beginning to compel young women to join the exodus into urban areas and even, in some contexts, to engage in international migration flows as the migration of rural Nepali women to Malaysia serves to illustrate (Allen 2003:7). Studies have also indicated that in Nepal increase in the collection time for fodder and firewood, and decline in agricultural productivity increases the probability of local (within district) out-migration of women, closely linking climate change-induced migration for women with deterioration of natural resources as they are both the primary collectors and users (Bohra-Mishra and Massey 2011, Massey et al. 2007, Shrestha and Bhandari 2007). In Bangladesh too, a notable trend in more recent years is the large number of young single women migrating to urban centers within the country. ADB (2010) confirms that the proportion of women is increasing and women now predominate among migrants of ages 15-25, and suggests that such migration flows will contribute to larger patterns of social change. There are anecdotal evidences of the new and changing gender profile of migration from parts of the Central and Western Himalaya of North India too, where a new generation of young educated women is now choosing to accompany their husbands into urban areas, thereby breaking the customary pattern of women tending to family farms and homesteads. There is also evidence that the growing affluence of some households (in the north Indian states of Uttarakhand and Himachal Pradesh for instance) whose access to both higher education and firm footholds in urban white collar occupations is creating forms of intra-household and community differentiation that did not exist a generation ago. These trends underscore the extent to which mountain communities' lives are increasingly embedded in larger structures and processes of global power that are helping to redefine people's rising aspirations

and connecting them to national consumer cultures. They also speak to the ways in which, in this time of climate uncertainties, knowledge systems and connections to the land are undergoing substantive transformations.

Migration is a copying strategy adopted by both men and women for better livelihood options in the face of climate change but it has significant gendered outcomes and impacts. As more men migrate than women, a direct and major result is the increase in women-headed household. Female-headed households have steadily increased in Nepal from 13.6% in 1995-96 to 19.6% in 2003-2004 and 26.6% in the 2010-2011 (Demographic 2007). Other studies (CBoS 2012, Chandramouli 2011) in regions of Nepal show the same trend. In Bangladesh too such household are estimated to be between 15% (Mitchel et al. 2007) to 20-30% (ADB 2010). Thus women-headed households have become an important part of the rural economy but at the same time resulting in increased and new forms of vulnerability (Alston 2006, Sugden et al. 2014).

In the larger context of climate change, the highly gendered nature of migration has focused attention on the impacts the absence of men for long stretches of time on women's labor allocation as a major consequence is increase in women's work burden (Adhikari 2014, Adhikari and Hobley 2012, Bhattarai et al. 2015, Gartaula 2007, Hoermann et al. 2010, ICIMOD, 2014, Karki 1998, Kaspar 2005, 2006, Kelkar 2007, Khadka et al. 2014, Kollmair and Hoermann 2011, Kraler et al. 2011, Leduc 2009, Molden et al. 2014, Nellemann, et al. 2011, Gum et al. 2009, Sidh and Basu 2011, Sugden et al. 2014, Zahur 2009). A study by Hoermann et al. (2010) finds that on average, women in the western HKH work 16 to 18 hours a day, however due to male migration, it has increased on average by 2 to 4 hours a day. In addition, it also results in barriers for accessing services like healthcare and relief (Kraler et al. 2011, Zahur 2009). Female-headed households are particularly vulnerable as the burdens placed on such women is greater than normal as such women have to take on all the roles and responsibilities of their menfolk, especially that of primary income earners (Bhattarai et al. 2015, Sugden et al. 2014). Worse, while responsibilities for dealing with livelihoods and poverty are becoming progressively feminised, there seems to be no corresponding increase in women's rights and rewards (Nellemann et al. 2011). The result is that such households tend to suffer more frequently from food insecurity and poverty underlining the acute vulnerability of this significant subset of women. For instance over 95% of female-headed households in Bangladesh are below the poverty line. Also when the men send the remittances not to the women directly but to the male of other family members, particularly to the in-laws of the women, then this makes the women more dependent on these family members for financial resources, which may make them more vulnerable to poverty and abuse, including of a sexual nature, from the family and the community (Alston 2006, Debnath and Selim 2009, Kaspar 2005, 2006, Sugden et al. 2014).

On the other hand, there is also the view that in some instances male migration can give women greater decision-making powers, and open up new livelihood possibilities for them (Brown 2008, Masika 2002). Locale-specific studies from Uttarakhand and Nepal indicate a range of impacts, including greater decision-making inputs, an increase in social status due to money being earned by men and greater freedom on the positive side, and problems with in-laws, and an increase in workloads on the negative side (Debnath and Selim 2009, Giri and Darnhofer 2010, Hoermann et al. 2010, Jain 2010, Kaspar 2005, 2006, Paneru 2006, Paris, et al. 2005, Sherpa 2010,). For instance in a study in Uttarkhand 62% of the surveyed women were happy about the migration of their husbands because it increased household income, improved their social status in the village, increased their decision-making power, and provided them with more freedom (Hoermann et al. 2010). Studies in Nepal too indicate increase in women's decision-making powers when their men-folk migrate (Giri and Darnhofer 2010, Karki 1998, Kaspar 2005, Paneru 2006, Paris et al. 2005). These studies also report that in general the migration of the men increases the work load of women in the beginning, but as the men send remittances the work load start to decline as they are first used to pay off debts and then to hire labor. Similarly, in Bangladesh too where women are direct recipients of remittances, the likelihood of greater economic empowerment and decision-making for themselves and for the household is increased (Debnath and Selim 2009).

However, although the seasonal or permanent migration of men can increase women's control over income and household affairs, it can also increase their vulnerability to shocks - For example, women-headed households due to male out-migration are particularly vulnerable to natural disasters such as floods, with the loss of family support networks (Sugden et al. 2014). This means that although women's decision-making role may increase, they still have to take the additional burden of shouldering the challenges both within the house and outside, including

adapting to climate change and its effects which has spin-off impacts that involve income, labor availability, time, health, etc. (Bhattarai et al. 2015, Leduc et al. 2008, Onta and Resurreccion 2011).

Studies on the impact of male out-migration on women note that the extent and nature of impacts depends on several conditions such as nature of migration, type of household, size of remittance, land and livestock holding, number and age of children and household members; education and age of the woman as well as the duration of marriage (Alston 2006, Debnath and Selim 2009, Desai and Banerji 2008, Kaspar 2005, Louhichi 1997, Paneru 2006, Paris et al. 2005). The inter-sectionality of gender with class and caste, plays a critical role in the impact of male out-migration - in a study from Chitwan in Nepal, it was found that it was only the lower-caste Hindu and non-Hindu groups who were migrating due to declining agricultural productivity; the better-off high-caste Hindus did not seem to be affected by this to migrate. Thus, indicating that caste privilege may protect people from the negative effects of environmental deterioration (Massey et al. 2007). Which further shows poor and low caste women's compounded vulnerability.

Looking at the other side of migration- i.e. women migrating from the place of origin, the outcomes and impacts on these women are also varied and unique (Chindarkar 2012). For many such women who do migrate, their limited skills and educational levels hamper them and they struggle to adapt to a completely different situation (Haigh and Valley 2010). Most often these women are confined to low-skilled jobs in domestic and care work, hotel and catering services, the entertainment and sex industry, agriculture and assembly lines (OSCE 2009). A study of Bangladesh found that poor rural women migrating to cities like Dhaka are often forced into long hours and low-paying jobs in sweatshops or as domestic help due to their lack of education and skills (Kakissis 2010). Similarly a study of Nepali migrants indicate that while male migrants work in diverse fields such as farming, industrial or service sector, women migrants are found in care economy (Bhadra 2007). These sectors are characterized by poor working conditions, low pay, withheld wages, considerable insecurity and high risk of sexual harassment, exploitation and abuse (Brown 2008, IOM 2010). Thus, women migrants tend to face more adverse outcomes and impacts despite the fact that a major share of the informal urban labor market comes mostly from women who have migrated mostly from female-headed households affected by water related disasters (Dankelman 2008). Very often, such young women are often lured into prostitution by professional gangs, with the promise of jobs elsewhere (Cell 2009). For instance, after the Cyclone Sidr in 2007 in Bangladesh a large number of girls migrated to the towns to work as domestic workers and in the garment industry, but many, particularly from poorest families, were forced into prostitution, while most never returned to school (Swarup et al. 2011).

There are also some indications of positive outcomes of female out-migration. Despite the disadvantage of poor education/ literacy and lack of skills, the study by Ahmad (2012) found that women migrants have more access to income-earning opportunities and markets than those in rural areas, thus increasing their potential to acquire assets and capital. The other positive outcome that is indicated is that as senders of remittances, migrant women may acquire a new role as primary providers for the family, whereas women staying behind may assume more responsibility, thereby obtaining more autonomy in managing household resources and taking on traditionally male roles in the community (UN-INSTRAW 2007).

Thus, gendered migration outcomes of climate change "on one hand may seem to be empowering women, while on the other they may actually exacerbate their socioeconomic status and make them worse off" (Chindarkar 2012:6). This indicates that the outcomes of migration are manifold, layered and often contradictory, have short-term and long-term consequences, affect labor allocation and production patterns of rural households, influence intergenerational and gender relations in positive as well as negative ways, and, in the very best of situations, open households up to both economic remittances as well as social remittances, - i.e. migrants send home more than money, these include ideas, images, beliefs and values (Levitt 1998, 2001). At the very least they enable resource-poor households the option of alleviating some of the burden of subsistence by releasing some of their family members. In all instances, whether intra-country or cross-border, social networks play a critical role in shaping the migrant experience, playing a particularly vital part in determining individuals' transnational migration strategies (Thieme 2006).

Urbanization and other social issues

Together, migration and urbanization are rapidly becoming twin 'primary drivers' of change as a consequence of the reconfiguring of populations and the related pressures being placed on increasingly fragile and inadequate resources bases, infrastructure and services (Aon Benfield 2010, Water 2009). In some mountain areas urbanization and peri-urbanization have been rapid. Although lacking essential services and infrastructure, and often offering limited employment opportunities, these centres serve as magnets for both the skilled and unskilled, a population of mainly young men whose greater awareness of possibilities is being gleaned through access to television and the radio. While both rural to urban migration and the urban encounter open up many new possibilities, in the context of the types of uncertainties that are being created by climate change they also open people up to new challenges and dilemmas. Urban growth in the absence of appropriate land-use strategies, basic supports and amenities is increasingly implicated in heightening vulnerabilities for populations and yet remains largely off the mountain research agenda (Hewitt and Mehta 2012). As such the study and analysis of climate change processes in urban and peri-urban contexts in mountains is still limited. Most studies focus on rural area with few looking at adaptation efforts in urban settings (Sterrett 2011). UN-Habitat 2010 includes Thimpu [Bhutan] and Kathmandu [Nepal] in its discussion of urban areas most vulnerable in the face of climate change), with the main focus thus far being on the impact of disasters on densely populated areas of habitation with poorly-built infrastructure (Aon Benfield 2010). Conceptual and empirical studies from a specifically gender perspective seem not to have received attention.

There are a number of reasons why the urbanization - adaptation to climate change equation needs to be considered within an explicitly social/gendered framework. While the spread of an increasingly built-up environment is already affecting how people live, their access to resources, and making water scarcity a chronic issue in people's lives, there are other less tangible ways in which urban lives will be affected by climate change impacts, and these may be implicated in how people of either gender engage in adaptation activities. Processes of urbanization and peri-urbanization are rapidly reconfiguring not only physical but also social landscapes, extending conceptually the parameters of what we typically mean when we talk of 'the environment': now a built, concrete and mortar environment is also part of the discussion and part of the problem. Related to this is the emergence of a consuming class, even in fairly remote rural areas. The product of economic growth in many parts of the HKH, this is a constituency which has new types of aspirations and desires. Mountain populations are also becoming more differentiated, something that is apparent both within villages and across the village-town continuum. This, coupled with a pervasive "money culture" may also be implicated in establishing values and mindsets that are increasingly at odds with an approach to development that is rooted in sustainable and conservationist approaches. New contexts however change a great deal and have bearing on people's sense of ownership of and commitment to their environments and resources, changing abilities, competencies and perhaps even willingness to think about and engage in adaptive strategies (for instance people's, or certain groups of people's, ability to 'take ownership' of resources that they feel no longer belong to them).

Health and Other Social Impacts

Until recently the study of climate change impacts has focused on their environmental and economic consequences. Now increasing concern is directed at the health implications, an area of research which is complex given that populations, and segments of populations within larger ones, have different susceptibilities to illnesses and diseases. Climate change will impact on health of most populations in the coming decades and put the lives and well-being of billions of people at increased risk (Costello et al. 2009). The IPCC, too, has stated that climate change is projected to increase threats to human health through changed infectious disease patterns, disruptions of agricultural and other supportive ecosystems, and population displacement, and conflict over scarce or depleted resources, like water, fertile land and fisheries (Pachauri and Reisinger 2007).

It has been widely recognized that the rising water levels associated with climate change will lead to an increase in water borne diseases, while the other expected health consequences of climate change comprise higher rates of malnutrition due to food shortages, increases in heat-related mortality and morbidity, and increased respiratory disease where air pollution worsens. Climate-induced disasters such as droughts, floods, and landslides are frequent in this region and these have significant negative impacts on human wellbeing through loss of life and property, injury, disease epidemics, and so forth. Health systems are deficient in most areas due to lack of resources and supplies, given the inaccessible terrain and remoteness of the region, which increases the vulnerability of the population of this region to the adverse impacts of climate change (Ravindranath et al. 2005).

Although empirical studies are still lacking, there are predictions that across the HKH (and the broader South Asian region as a whole) climate change-related shifts will contribute to a generally deteriorating profile of health and given the underdeveloped water and sanitation systems, diarrhea and other water-borne diseases are very likely to increase Fang and Leduc 2010). This will be seen in increases in malnutrition due to the failure of food security



strategies (along with growth retardation in children and low immune system function); extreme weather events which will result in greater stress levels, injuries and diseases; water-stress and contaminated supplies will increase the incidence of diarrheal diseases, infectious diseases, malaria, schistosomiasis, and dengue which are highly sensitive to climate so are likely to spread into new regions (Tsering et al. 2012). Malaria in particular can pose to be a major threat because it may have a prolonged transmission window and penetrate elevations above 1,800 metres (WHO 2007), and also increasingly warmer weather will make it more difficult to control and eradicate malaria and prevention will cost more. The projection of the impact of climate change on forests also shows that the forests in northeastern India will become wetter, which will make them conducive to sustaining the malaria vector (Fang and Leduc 2010). In fact, the changing geographic distribution of vectors has been identified in both Yunnan province of China, Nepal and Sikkim in India where cases of malaria have been found in villages located at high altitudes (Bhattacharya et al. 2006, Eriksson, Jing and Dekens 2008).

Perhaps the biggest health concerns center on 'slow-onset hazards' associated with water, its accessibility and growing scarcity. Throughout the HKH water quality is being compromised due to human-made and natural (e.g. arsenic) pollutants. Many other factors are feeding into this situation, including the rapid growth of urban areas that are not supported by adequate sanitation and other infrastructural supports, and the decline of natural water bodies and other habitats (Aon Benfield 2010). In Yuanmou County, Yunnan province of China, there has been no decline in reported waterborne diseases in the last 15 years despite the high economic growth rate and associated rapid improvements in living standards. Extreme droughts, flooding, and poor sanitation have increased the prevalence of water borne diseases like typhoid, cholera and diarrhea in Nepal claiming the lives of nearly 30, 000 people (the majority of whom are children below the age of five years) annually (Eriksson, Jing and Dekens 2009, Regmi et al. 2008). In Bangladesh, floods, waterlogging, drainage congestion, and cyclones due to climatic change, have increased the incidence of diarrhea, cholera and typhoid as the sanitation systems are often under waist-high water, contaminating the entire waterbody (Neelormi and Ahmed 2009).

Within this general scenario gender inequities are likely to make women and girls considerably more vulnerable to conditions of poor health. Globally, natural disasters such as droughts, floods and storms kill more women than men, and tend to kill women at a younger age (WHO 2014). In many areas girl children and women are often more susceptible to health conditions because of cultural entitlements that discriminate against them in the allocation of food and healthcare, thus such climate-sensitive health impacts, like under nutrition and malaria, show important gender differences. The patriarchal societies in most of the HKH have ideologies rooted in women's self-sacrifice and obedience to the husband as household head, which means putting women's own interests last (Baten and Khan 2010, Khondker 1996,) due to which in rural areas particularly, the distribution of food within the household is highly gender-biased with women typically eating last what is left. This gets exacerbated during climatic events such as floods, droughts, and landslides as then the agricultural production is reduced causing food insecurity in the household.

The intra-household food allocation has been culturally assigned to men and women where, women and young girls get less food and so are at a greater risk for malnourishment in situations of climatic stress as the limited food resources may go to male members of households on priority (Mitchell et al. 2007, Sugden et al. 2014). In such a situation women may be more malnourished and especially if she has to lactate an infant and nurture another child in her womb (Cell 2009), resulting in low birth weights and poor health outcomes for newborn babies. However, findings from flood, drought and saline areas of Bangladesh presented by Golam et al. (2009) suggest that the view that women are always the ones to be disadvantaged in regard to nutritional status during hazards is a generalization that is not always true. The study states that men, women and children are differently affected in different hazard contexts - women were the most vulnerable (90%) in the flood-prone area in terms of food availability whereas males were the worst affected (95%) in the drought-prone area, and on the other hand, children suffer much more (95%) during a hazard period in the salinity-prone area.

In Bangladesh, women were found to be the prime consumers of saline and contaminated water within their family (Cell 2009), which poses particular threat to the pregnant women in coastal areas who are already suffer from preeclampsia, eclampsia and hypertension (Nicholls et al. 2007). Apart from this, pregnant women face another health related vulnerability – they are particularly vulnerable to malaria as they are twice as “appealing” as non-pregnant women to malaria-carrying mosquitoes due to several reasons: first, women in the advanced stages

of pregnancy (mean gestational age 28 weeks or above) produce more exhaled breath (on average, 21% more volume) than their non-pregnant counterparts and there are several hundred different components in human breath, some of which help mosquitoes detect a host; second, during pregnancy, blood flow to the skin increases, which helps heat dissipation, particularly in the hands and feet which act as stimuli for the insect to locate its target; third, the abdomen of pregnant women is on average 0.7 °C hotter than that of non-pregnant women and that there may be an increase in the release of volatile substances from the skin surface and a larger host signature that allows mosquitoes to detect them more readily at close range. This maternal malaria increases the risk of spontaneous abortion, premature delivery, stillbirth and low birth weight (WHO 2014).

Due to climate related conditions, women are often the ones with greater workloads with having to walk or travel longer distances in arduous mountain conditions to fetch water and fuelwood for household consumption and sometimes they may also have to walk and travel further for agriculture or livestock rearing, etc. (Mitchell et al. 2007), which can lead to more health related risks and problems for them. And, in conditions of limited or no sanitation, women and girls often experience considerable stress and even health complications arising from social taboos around menstruation and modesty norms which prevent them from attending to their needs in a timely fashion, the cause of high rates of urinary tract infections, whilst lack of clean water is the source of chronic gastrointestinal illnesses (Bradshaw, 2004, Enarson 2006, WHO 2002, 2005).

Increased climate hazards and stress is also having psycho-social impacts such as stress, anxiety and a feeling of depression and helplessness on women and young girls, particularly when families have to relocate and live in camps after disasters, which often breaks the social support networks and family ties that are important for women since they have less access to formal services and support than men (Sugden et al. 2014, WHO 2014). Although men, too, are affected by these impacts, the impact is greater on women because “of unequally structured care responsibilities at home” (Joshi 2015:171) where they have the extra responsibility and burden of looking after other family members, even when they themselves are in distress and despair (Chindarkar 2012, Mitchell et al. 2007, Nelson et al. 2002). There is also evidence that psychological stress, frustrations and anger among men during such conditions due to lack of employment and income which result in violence against women and children (Bartlett 2008, Brody et al. 2008, Dankelman 2008, Hiscock et al. 2009,). Women and girls also tend to face more harassment and violence outside the household especially when traveling long distances for collection of fuelwood and water or even collecting relief supplies (Dankelman 2008, Nellemann et al. 2011, Watch 2009).

The impacts of climate change on human health are not always entirely negative. Some positive impacts have also been noted, such as warmer winter temperatures being implicated in reducing cold-related diseases and deaths. The elderly in some of the higher altitudes, as well as amongst herding populations on the Tibetan plateau have also expressed feeling more comfortable in the winter months in the last few decades (Eriksson, Jing and Dekens 2008).

Other drivers of health-related changes are emerging from the combined impacts of economic globalisation, urbanization and migration. As noted in the preceding section, these are certainly creating many new opportunities but also opening people up to new vulnerabilities, such as becoming more susceptible to new diseases (like the human immunodeficiency virus [HIV]). The weakening of family structures and the feminisation of agriculture are also contributing to making households more vulnerable to certain trends.

Another very important impact of climate change is the impact on the incomes of men and women. This impacts women in South Asia more so, as the sources of personal income they can control are often less than those of men because firstly, women often receive less pay than male counterparts, which can range from 57 to 79% of men’s salaries in Nepal, India and Bangladesh, (CBoS 2009, FAO 2011). Furthermore, much of women’s work is still unpaid: Nellemann et al. (2011) point out that much of the work done by women in rural Nepal being restricted to the home and farm is considered casual and so unpaid. Finally, gender ideologies still restrict women’s participation in the public domain and thereby limiting their options for income generating activities – e.g. in most of the Eastern Himalayas, more so in Nepal, most parts of north east India and Bangladesh and even in Pakistan and Afghanistan men are traditionally more engaged in commercial activities outside the home as these are public spheres, while women are involved mostly in livelihood activities which do not involve market engagement or cash (Bhattarai et al. 2015, Goodrich 2012, Saxena 2011).

Climate change negatively affects women's education too. Due to the gender ideologies and social norms it is the girls who are the first ones to be taken out of the schools when such hazards and disaster happen. For example, in Bangladesh when the livelihood options and status of a family deteriorate due to climatic hazards and disasters, young girls are taken out of school and married off so as to lighten the financial burden of the family (Khan et al. 2010). For example, after the Cyclone Sidr in 2007 one interviewee claimed that as many as 50% of the girls in her school left due to marriage (Swarup et al. 2011). In Nepal, it was found that changing climate negatively affected girls' education by increasing their work load due to their tasks of collecting water and fuel wood because as these resources got scarcer, the girls had to spend longer hours in this, which led to much more school dropouts in many areas (Baten and Khan 2010, Nellemann et al. 2011, Gum et al. 2009).



Policies and Institutional Responses

The countries in the HKH recognise climate change as a major driver of change. Nevertheless for reasons already outlined in Section One, this is a 'data deficit' region (as noted by the International Panel on Climate Change (2007), with only certain areas (the Eastern Himalaya) and certain issues (glacial melting and changes in ice mass) being studied (Kathmandu 2011). At a formal level many of the countries that share in the HKH have committed themselves to engaging with climate change concerns. National Adaptation Programmes of Action (NAPA) have been established in Bangladesh (in 2005) and Nepal (in 2010), and several countries have developed national level climate change strategies and action plans (e.g. the Bangladesh Climate Change Strategy and Action Plan [BCCSAP], the National Action Plan on Climate Change in India in 2008 which has a specific section on the Himalayan Ecosystems, and the draft National Climate Change Policy in Pakistan.

However, these plans and policies still remain largely on paper only, with few if any significant adaptation efforts at the national level having been set in motion. Moreover, in virtually all instances limited funds have been committed to support action plans (Sterrett 2011). Another issue is that the climate change adaptation (CCA) policy approach remains fragmented rather than being integrated with disaster risk reduction, sustainable agricultural, and other relevant policies. This situation has been explained in terms of both a lack of conceptual understanding on what constitutes adaptation and how it can be incorporated into sustainable development (Ahmed and Fajber 2009). A number of international and national NGOs have started to develop CCA programmes in different South Asian countries. These programmes and the approaches taken vary tremendously, from 'stand-alone' projects to adaptation that is entirely mainstreamed in development programmes (Sterrett 2011).

At this point in time, policy makers and practitioners acknowledge that the poor and most socially excluded of populations are already and will continue to be most vulnerable to climate change impacts. Nevertheless, a glimpse of policy and institutional responses suggests that gender inclusivity remains largely at the level of rhetoric as most of the policies for climate change adaptation and mitigation do not specifically address the vulnerability of women or gender issues (Parikh et al. 2012). For instance, India's National Action Plan on Climate Change's (NAPCC) assessment of the effects of climate change acknowledges that gender will be a significant factor in determining the impacts of climate change as well as the need to address gender concerns in adaptation interventions, yet it fails to identify the mechanisms through which such adaptations could occur and gives only a few gender specific measures (Ahmed and Fajber 2009, Parikh et al. 2012).

There are numerous state programs aimed at facilitating climate change local adaptation, disaster preparedness as well as for improving agriculture and conservation of natural resources like water, forests, soil etc. However, not only does most of the national policies not give much consideration to gender issues despite the growing evidences of gender-differentiated local adaptation practices to climate change, the scope of women to benefit from these or to contribute to local-level decision making is also often limited (Ahmad and Fajber 2009, Bhattarai et al. 2015). On the contrary most of the policies are driven by impact oriented and technology driven paradigm (Ayers 2011, Bhattarai et al. 2015). Bhattarai et al (2015:130) further opine that "Such neo-liberal approaches to adaptation have not fundamentally changed local-level gender based power structures and women's social status, nor overcome policy silos...". One main reason is that the national-level policies and practices often fail to take into consideration the needs of women or value women's knowledge. Even where there are equal rights given in some policies and regulations, these remain so only on paper as in practice women continue to face discrimination due to entrenched cultural norms.

While it is partially true that many of the policy interventions are not effective due to lack of gender/sex-disaggregated data on climate risks, what is more important is "an understanding of existing inequalities between women and men, and of the ways in which climate change can exacerbate these inequalities. Conversely, it also requires an understanding of the ways in which these inequalities can exacerbate the impacts of climate change on women and men" (Brody et al. 2008:2). The gendered inequalities also include the gendered distribution of power and knowledge which all lead to gendered vulnerabilities. These gendered vulnerabilities further intersect deeply with other social differences based on class, caste, ethnicity/race, and other forms of marginalization. Thus gender

equity in climate change and adaptation cannot be achieved without taking into account other intersecting social disparities based on class, caste, ethnicity, race, and other cultural forms of marginalization. This means addressing the structural inequalities as well as poverty at a much broader level is critical, particularly given that women from poorer and marginalized households are the most vulnerable to climate change.

Taking the lessons of many years of gender mainstreaming, it is critical that policy and practice institutions go beyond roles of men and women, and work toward a deeper and more nuanced understandings of gendered forms of vulnerability. Policies and institutional responses need to address these with a commitment to tackle gender inequality across society. Above all, this has to be expressed in considerably stronger commitment of financial, technical, and human support addressing specific gendered priorities in the context of climate change (Sterrett 2011). Such commitments from the State as well as the society are crucial for building/strengthening the adaptive capacity of poor women, their families and communities to the adverse impacts of climate change. Overlooking and ignoring gender issues will undermine the very goals and objectives of the policies and institutional responses and make no progress in the adaptation, and in fact these would reproduce and exacerbate the gender inequities.

Furthermore, the knowledge, experiences and capacity of men women need to be recognized. Policies and responses should not only be designed to specific needs of poor and vulnerable men and women, but going a step further, the entire process needs to recognize and build upon the capacity of women and men, which would lead to useful and important knowledge and insights (Brody et al. 2008). Policy interventions and institutional responses for equitable climate change adaptation for both men and women include ensuring women's rights to land, making more effective use of microfinance through a more integrated approach, promotion of collective action and cooperative structures amongst women, and the integration of indigenous knowledge into programs for adaptation to climate change (Ahmad and Fajber 2009). This hinges on a bottom-up participatory approach which understands and considers local social structures, men and women's differential needs, experiences and knowledge, and include local institutions and collectives.



Conclusions and Recommendations

The overarching recognition in all the literature is that climate change will have huge and largely detrimental impacts on vulnerable communities, and that gender will be a defining feature in shaping individuals' experiences of adverse circumstances. At the same time, there is to date little research on how actual and potential climate change impacts are and will affect women and men, on adaptive capacities at community or household levels, and on the ways in which gender and social differences are expressed in and reflected through inequalities and discrimination in policies, institutions and practices. This state of affairs is true at a regional (South Asian) level as well as for communities of the HKH. This final section highlights gaps in understanding and research, identifies areas for urgent work and ends with once again stressing the important role that women have in adaptation initiatives.

Considerably more work is needed to better understand the number of issues that affect the differentiated relationship between and among women and men and their ability to cope with and adapt to climate change in rapidly changing environments and different socio-cultural contexts across the region. While climate variability and environmental changes clearly affect both women and men, gender inequities ranging from divisions of labor to lack of ownership of land and access to critical resources differentially shape coping strategies and ability to adapt. And, while women play a vital role in maintaining the biodiversity upon which subsistence livelihoods depend, there are still serious lacunae in our understanding of their skills, capacities, knowledge and the range of competencies that they bring to bear in their day-to-day tasks.

Gaps in knowledge and research

The literature points to a lack of gender-disaggregated data, and there is poor documentation of adaptation programmes and the lessons that emerge from them for helping to make communities and households more resilient. A large part of the problem is that disasters continue to be seen as the outcomes of 'natural' events, to be addressed by relief and rehabilitation, technological solutions and administrative machineries. This has served to overlook long-term climate-resilient development generally and the involvement of local communities in such efforts. Moreover, adaptation activities tend to be ad-hoc initiatives, carried out under the aegis of INGOs and national organizations; there tends to be little effort or ability to coordinate across different levels and to work toward developing supportive conditions to enable adaptive strategies that are based on a clear analysis of differential vulnerabilities (Ahmed and Fajber 2009).

There is an urgent need to fill in a number of gaps.

In-depth qualitative and quantitative research:

- This needs to be carried out in different agro-ecological / production systems in the HKH, including rangelands and in shifting cultivation areas, and focus on both women's and men's lives. Both components are essential in order to capture the multiple dimensions of what makes people vulnerable (e.g. some factors are easily identified and measured -- such as location of settlements, buildings at risk, or extent of environmental degradation; others difficult to assess, such as resource tenure, or changes in attitudes). Here it is important to stress that the lived experiences of women and men must be captured, so methodologies need to be sufficiently flexible and multifaceted to enable both rigorous research and enable people's voices to be heard.
- There is an urgent need to begin to develop an understanding of women's and men's lives and the nature of vulnerabilities and adaptation issues in urban and peri-urban contexts.
- Develop a more nuanced understanding of how gender vulnerabilities intersect with other dimensions of inequality and marginalisation as they exist in different communities in the HKH. Also further inquiry and analysis of differences within the gender groups.
- Documentation of gender and socially differentiated local knowledge of climate in different contexts, and how this is used in local-level adaptation activities (and also how, within differentiated communities, what kinds of knowledge prevail).

Identify and validate women's priorities in extreme events (droughts, floods, etc) and find ways of backing them up by channeling adequate financial, human, and technological resources to support them.

- So far, the considerable body of information of how extreme weather events affect women has not really been translated into action. Here ICIMOD could play a valuable role in working with regional and country partners to develop collaborative efforts (along with capacity building initiatives) to work toward strengthening women's security.⁸
- Identify and refine (for the HKH context) different vulnerability mapping tools that enhance the adaptive capacity and resilience. Several INGOs, national level organizations and local initiatives are already working on adaptation programmes in various areas using different frameworks for capturing dimensions of vulnerability. The conceptual tools used need to be simple, so that stakeholders of different capabilities can use and make sense of them.
- Identify best practices that can be drawn on. Although many of these initiatives are still in their initial stages and may not have lessons to share, their work does offer insights and highlights where further work is required to help engender adaptation initiatives. (Ahmed and Fajber 2009).

Develop a more sharply defined understanding of what adaptation means and looks like in practice

- In the context of supporting long-term sustainable development initiatives there is a need to move beyond the conventional understanding of adaptation that is linked to 'coping' and to expand this to include 'the capacity of social actors to shift livelihood strategies under stress, and to develop supporting systems that are resilient and flexible to absorb and respond to the impacts of [climate] change' (Ahmed and Fabjer 2009).⁹
- Women's knowledge and prioritizations for action need to be given more focus in broader discussions of adaptation and additional and larger-scale research is needed to generate the comparable data sets that will be required for differentiated action plans (Ongra and Badola 2015).
- Expand the understanding on the impact of PES/REDD on gender inequalities.

Support collaborative partnerships and shared learning dialogues

- Developing collaborative partnerships between researchers, development practitioners, and policy advocates is essential for laying frameworks for adaptation and working toward engendering them (Ahmed and Fajber 2009).
- Sharing the outcomes of ongoing documentation and learning of successes with communities.
- Identifying organizations working at different levels within each member country, and (related to the above point) identify how to support their work in identifying communities' differential vulnerabilities and facilitating those initiatives working to strengthen the adaptive capacity of poor women and men.
- ICIMOD is well-situated to support shared learning dialogues at different levels (e.g. community, district, and states) and across member countries. These have an important role to play in bringing different stakeholders (government functionaries, vulnerable communities, NGOs, and representatives from other relevant institutions) together to understand different perspectives on climate change, and are a beginning point from where new opportunities and thinking about innovative adaptation measures can emerge (Moench and Dixit 2007).
- Networking and collaboration between different social actors.

Capacity building across different institutions at different levels

- Notwithstanding the rhetoric surrounding gender, it remains inadequately understood at virtually all levels from the very top downwards. Government officials, policy planners, extension service providers and fieldworkers alike continue to be in need of 'reminders' of the mechanisms by which male biases serve to render women invisible.
- Mitigation strategies continue to focus largely on developing infrastructure works such as embankments, or to

⁸ One innovation is providing toilets specially adapted to functioning in low-lying flood-prone areas. This has potential to strengthen women's security and dignity, as well as helping to manage health and the spread of disease (Ahmed and Fajber, 2009).

⁹ This approach also delineates between autonomous ('underlying systems that enable people and organizations to take advantage of opportunities available in the new environment, or constrain their ability to shift livelihood strategies as conditions evolve') and planned adaptations ('the ability to proactively identify, and respond to, emerging constraints and opportunities; enable autonomous adaptation processes by supporting the development of flexible, resilient, and accessible social and physical infrastructure systems; and establish social protection systems capable of ameliorating the impact of climate change on vulnerable groups') Ahmed and Fajber 2009.

engage in relief and rehabilitation. The extent to which local communities are involved as active participants has to be further examined and addressed.

- Specific programmes should be formulated for knowledge and capacity building of women. Women should be allowed greater participation in the decision making process of institutions, and in planning and implementation of developmental programmes (Parikh et al. 2012).

Supporting women as key adaptors of change

Empirical studies from the wider South Asian region as well as emerging work from the HKH underscore the full extent to which rural women know what they need to respond to the crises of their lives and to move toward greater resilience. Field studies from Bangladesh, India and Nepal illustrate how wrong it is, in the face of adversity, to equate women's vulnerability with passivity. On the contrary, they actively engage in putting in place coping strategies and mechanisms that will protect their families, assets and livelihoods. Equally if not more importantly, they know what institutional supports they need to strengthen their ability to face difficult conditions, just as they recognise the importance of changing their attitudes and practices to meet new circumstances (Mitchell et al. 2007). Given this evidence a critical and urgent recommendation is to initiate and ensure gender-responsive climate financing mechanisms which could support gender-sensitive and gender-responsive innovations.

Lessons from on-going work in the region points to certain directions that ICIMOD is well-positioned to explore and support in its endeavor to engage in gender-sensitive climate change studies.

Particularly because research and policy collaboration with local institutions is important not only for policy outcomes but also for "expanding forms of social capital and networks of support the face of livelihood uncertainty and ecological change" (Ongra and Badola, 2015:521).

- Community-based self-help groups (SHGs) networks and collectives have a potentially vital role to play in strengthening the capacity of communities generally and women particularly to mobilize toward participating in collective measures to create new, or strengthen existing, safety nets. SHGs have become a popular mechanism through which to draw women into activities which support livelihoods and to reduce their financial risks on a small scale. There is tremendous potential for expanding the kinds of activities such groups engage in, ranging from actively becoming involved in adaptation-related activities to documenting local level practices and knowledge.
- Identify, acknowledged and replicate/adapt productive livelihood contributions of mountain women.
- Identify other informal social support systems (e.g. systems through which exchange labor is shared) that could be tapped into to enable women and men to access skills, resources, information.
- With regard to the above point, there is considerable potential to tap into an increasingly well-educated (in the formal sense of the word) younger generation of women and men whose 'social capital' could be tapped, through documenting, mobilising and other activities.

There is clearly still much to be done and not just stop at technical interventions aimed at reducing differentiated impacts of climate change. More importantly is to bring about a paradigm shift in the institutions – from a gender neutral, if not gender blind, to more social and gender transformative visions.

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