

# 6 Gaps and Needs

## Capacity Building and Training Needs

Capacity-building actions aim to increase the capacity of institutions, governments, businesses, and the public to prepare for climate change. Capacity-building actions include research and assessment, monitoring, extension and training, and policy change. Many capacity-building initiatives are underway in the EH related to climate change adaptation. A number of these initiatives are highlighted below.

1. Addressing climate change and extreme weather in government planning and operations.
2. Implementing effective monitoring and reporting procedures for climate change and its impacts.
3. Developing climate models and other tools for addressing climate change risks and adaptation options.
4. Supporting applied climate change research that meets the needs of decision-makers.
5. Developing capacity throughout the EH to respond to extreme weather and climate change.

The National Adaptation Programmes of Action (NAPAs) in the regional countries are currently at various levels of development. Within the EH, Bhutan is at an advanced stage of implementing its NAPA proposals, while Nepal is still in the conceptual and formulation stages. Besides what is envisaged under NAPA, there are several potential areas of intervention that could contribute to building adaptation capacity in the region. The following are some of the priority recommendations:

1. Improve knowledge through analysis and research (impacts of climate change on surface and groundwater in the EH, hydrological modelling tools that work with climate change scenarios).
2. Review operational policies and practices (flood risk management, conservation area management).
3. Build awareness and capacity (forecasting capacity, information for education, policies and decision-making, climate observation and monitoring systems, high-resolution maps of climate variables and other biophysical parameters).
4. Implement action on the ground (drought and flood management initiatives, region-wide consultations

and survey to assess views on climate change impacts and adaptation).

The countries in the EH lack the capacity to invest in meteorological data collection and analysis to provide their citizens and climate-sensitive sectors with a steady flow of good quality information. The IPCC acknowledges that current climate models for the HKH region provide insufficient information to downscale data on rainfall, temperature, and water. One reason for this is that the region has a low density of meteorological stations, a situation exacerbated by data/information access issues. Long, historical time-series of important climatological variables are needed to conduct meaningful climate change studies. Therefore, a strategically placed network of automated weather stations traversing the length of the EH and positioned along ecologically defined north-south transects would strengthen the data collection platform. Research on climatological proxies such as tree-ring studies and glacial ice-cores need to be intensified to extend the time-series back into the discernible past.

Opportunities in education and training are critical for the development of meteorological infrastructure and to ensure that relevant research is conducted. The human capital and institutions for these activities are comparatively lacking in the region, as evidenced by the distribution of published international research. The capacity for monitoring and forecasting climate can have an important bearing on livelihood security. For agricultural producers, advance warning of abrupt changes in rainfall patterns or temperature can mean the difference between a successful harvest and crop failure. Seasonal forecasting systems and the effective dissemination of the information they generate can enable farmers to monitor potential hazards and respond by adjusting planting decisions or changing the mix of crops.

The education and training of stakeholders, including policy-level decision makers, is important in the successful assessment of vulnerabilities and planning adaptation activities, as well as the implementation of adaptation plans. Training is also needed for models to be effectively applied and used for assessments at the national and regional levels. Therefore, it is imperative to build

the capacity of key government officials in the EH on vulnerability to climate change and potential adaptation activities. This can be achieved through the creation of a regional pool of experts/trainers to facilitate country-based programmes to address climate change impacts through the development of a common regional training module by collating and synthesising available scientific information. Some of the rationales for training needs are as follow:

- Experts on climate change are still not competent and need exposure and capacity building.
- Information and databases in the region are weak and need to be developed.
- Remote sensing and modelling technologies, which are currently embryonic or nonexistent, need to be developed.
- There is a need for hands-on experience on climate models with capacity to capture complex terrain features.
- There is a need to improve understanding of the regional and local dimensions of vulnerability, keeping in mind integrated approaches.
- There is a need to raise public awareness, focus government attention, and build capacity at all levels of society.
- The capacity to carry out specific research in taxonomy, conservation biology, and impact assessment needs to be improved.

## Knowledge Gaps and Potential Research Areas

We still do not have sufficient understanding of the natural dynamics of mountain ecosystems to come up with solutions to the problems confronting the environment and people in the region. Current knowledge on climate change and impacts in the EH is poor with few hard data, despite the fact that mountain issues like retreating glaciers have received global attention. The knowledge gap is so vast that we could think of limitless interventions to contribute to enhancing our wisdom in dealing with mountain-specific issues. By far the greater proportion of past efforts has been expended on considering the potential impacts of climate change on forest ecosystems, notwithstanding all the current attention on glaciers, permafrost, and wetlands. There has also been more consideration of potential climate change impacts at the ecosystem level, although some specific plans for species at risk that identify climate change as a potential threat are underway and policies for the management of target wildlife do already exist. There is also a relative lack of focus on understanding the impacts at the genetic level. On the climate front, there has been a relatively

high focus on impacts associated with changes in mean annual or seasonal temperature, compared to other climate drivers. Climate extremes play a dominant role in many impact processes (Parmesan 2005), and more attention should be given to the potential for changes in the magnitude and frequency of extreme weather events in the EH.

### Knowledge gaps

Three broad areas stand out as knowledge and data gaps in need of further development and refinement. First, there is still a great deal to be learned about the potential magnitude and rate of climate change at the regional and local levels, and subsequent impacts on the full range of biodiversity endpoints. However, given the reality of scarce resources, efforts should be made to develop a focused research agenda in order to maximise the practical benefits of research investments. Considerations in developing that agenda should include: priority climate change threats to biodiversity in the EH; current gaps in existing knowledge (e.g., research in the freshwater realm is under-represented); and linking information requirements to the specific needs of assessing feasible climate change mitigation and adaptation options for biodiversity management

Second, there is no consolidated handbook of proven biodiversity conservation techniques or climate adaptation techniques that are targeted to the EH. Consideration should be given towards building local biodiversity and climate change case studies through targeted investment. Over time, further consideration should be given to developing a training manual specifically for the EH, perhaps modelled after the one published by WWF (Hansen et al. 2003).

Finally, it is beyond the scope of this report to develop detailed assessments for each of the priority climate change threats to biodiversity. However, we can begin by outlining the steps for a strategic approach to the task. These steps include:

1. defining biodiversity management priorities in terms of the specific endpoint at risk for each system (i.e., ecosystem, species, or genetic diversity);
2. identifying the climate stressors and developing future scenario projections for the climate variables of interest;
3. identifying the impact mechanisms and documenting potential future impacts and uncertainties;
4. developing a set of feasible adaptation actions; and
5. collecting information on the costs and benefits of adaptation options.

## Potential areas for research

Some potential research areas include, among many others, an inter-comparison of key physical and biological processes along a series of transects placed over the region; establishing a comprehensive regional mountain database; in depth study of the mountain cloud forests; and strategies for responding to new health hazards in mountains and for addressing human migration in response to adverse climatic and other environmental pressures. More specific areas for action research that could bring about tangible and considered results are categorised in the following sections under the focal components of mountain ecosystems defining the basis for the assessment framework. These research ideas and prospects are reflected in the six technical papers prepared to inform and guide this assessment report.

## Ecosystems and biodiversity

Climate change adaptation in biodiversity conservation and sustainable use needs to grow out of a clear understanding of the important habitats and species and the nature of their resiliency to climatic stresses. The various conservation initiatives in the EH must be coordinated and collective partnerships must be developed between stakeholders so that the entire EH is able to cope with the present and future impacts of climate change. Research needs to be conducted to advance our understanding of climate change and its possible impacts on biodiversity, and to inform mitigation and adaptation strategies in the EH.

Research areas identified for biodiversity include the following:

1. Strengthen and review policies to make them more sensitive to the interaction in processes and the linkages between the consequences of biodiversity and climate change.
2. Develop a comprehensive database of species and ecosystems, and properly document indigenous knowledge and practices on adaptation to climate change, including variability and extremes.
3. Carry out an extensive and in depth assessment of the movement of invasive species; critical landscape linkages to flagship species; PAs coverage and effectiveness; the adaptability of biodiversity entities; fire management regimes; and impact on agricultural productivity. More emphasis should be placed on riparian habitats, least explored ecosystems, habitats of threatened species, and floral and faunal hotspots.
4. Conduct a comprehensive survey and inventory of the distribution range of plant and animal biodiversity

within PAs, population trends of flagship/endemic or threatened species, and the status of mid-sized mammals and other groups of animals.

5. Carry out thorough research on ecosystem structures, functioning, productivity, and delivery of ecosystem goods and services, including piloting.
6. Conduct a study of the interaction between climate change and land use change to assess their combined impact on biodiversity, atmospheric CO<sub>2</sub> concentration, species composition, and carbon dynamics for different ecosystems.
7. Perform valuation of ecosystem services from biodiversity conservation areas.
8. Conduct a socioeconomic study on land tenure systems, food security, resources use rights, decision-making processes, and governance systems, which influence community resilience to climate change.

## Water and wetlands

There is an urgent need to undertake a detailed inventory of wetlands that includes basic information on their hydrological, physical, chemical, and biological characteristics, as well as human interactions (impacts and use) with their functions and services. Wetlands need to be classified according to their functional attributes and their ecosystem services need to be prioritised.

Research areas identified for water and wetlands include the following:

1. Conduct a detailed inventory of wetlands with quantitative data on their ecological characteristics, functions, and services.
2. Study the planktonic and benthic diversity of different types of wetlands and their role in carbon and nutrient transfer along the food chain.
3. Study the responses of both plant and animal species to components of climate change such as elevated CO<sub>2</sub> concentration, temperature, and hydrological parameters.
4. Conduct a study of the environmental flow requirements of various organisms in different stretches of rivers and other kinds of wetlands.
5. Conduct a study of the effects of enhanced CO<sub>2</sub> concentration on primary production, decomposition, N metabolism, and transpiration in major plant communities (species).
6. Conduct detailed limnological studies on the structure and functioning of glacial lakes.
7. Conduct a study of the effects of temperature on primary and secondary production, decomposition,

nutrient dynamics, and the growth of various aquatic species.

8. Conduct a study of the effects of temperature and enhanced CO<sub>2</sub> levels on growth, carbon sequestration, and methane emission in different wetland types.
9. Carry out monitoring of distribution ranges of various plant and animal species.

### Hydrometeorological hazards

The major concern of people and communities in the EH region is the fate of the glaciers. There is a need to improve our understanding of the cryospheric processes of snow and ice and the effects on climate, biodiversity, and human wellbeing. Integrated model-based studies of environmental change in the EH, including monsoonal variation, are urgently required to clarify projected changes in weather patterns.

Research areas identified for hydrometeorological hazards include the following:

1. Carry out mapping of glacial hazard areas and proper analysis of potential threats.
2. Undertake snow avalanche forecasting and risk mapping for mountain tourism.
3. Conduct a vulnerability assessment of local people to natural hazards.
4. Develop an authoritative set of climate change scenarios for the region.

### Human wellbeing

There is still insufficient understanding of, and high uncertainty about, how climate change will impact on the various dimensions of human wellbeing. The information brought to light by the limited studies that have been conducted has not been translated into policies and adaptation plans. Climate change issues are still pursued in isolation from mainstream development activities and not fully integrated into development plans and policies. Stakeholders argue that very little is known about the livelihoods of local people let alone the impacts of climate change or, for that matter, the linkages between ecosystem changes and livelihoods of local populations. Problems associated with data and information availability, access, standards, and unequal holdings have been a constant source of exasperation over the years. This state of affairs in the EH opens up enormous opportunities for inter-disciplinary and cross-sectoral research on livelihoods, health, and human wellbeing to be conducted in a comprehensive and equitable manner.

Research areas identified for human wellbeing in close consultation with stakeholders from the region include the following:

1. Conduct cross-sector, cross-boundary, and transdisciplinary research on climate change and its impacts on human wellbeing in the EH region, covering human health and its relationship with poverty and migration, and the implications for ecosystems.
2. Develop a comprehensive and readily accessible information system encompassing demographic, socioeconomic, biophysical, cultural, technological, and institutional aspects of the region.
3. Undertake an assessment of people's vulnerability to natural hazards and document adaptation techniques to both beneficial and adverse impacts of climate change, identify how they contribute to human wellbeing, and the associated implications for ecosystems.
4. Isolate climate change effects from other interacting effects of global change, including the potential snowballing influence of climate change on other more conspicuous drivers of change.
5. Conduct a trade-off analysis between conservation and development in protected area systems, and an analysis of the impact on the wellbeing of communities living inside park boundaries focusing on human-biodiversity interactions and the institutions involved.
6. Conduct epidemiological studies of vector-borne and water-borne diseases under changes in climatic conditions.

### Stakeholder consultations

The outcomes and recommendations from both rounds of stakeholders' workshops were profuse, providing a wish list of researchable topics based on obvious and perceived knowledge gaps in our understanding of the differentials in climate change from the IPCC report and the far-reaching ramifications for mountain ecosystems. While most of the proposed research areas were legitimate, there were some suggestions that were speculative and that do not qualify as researchable areas, some topics were too broad, and some perceived knowledge gaps were not in fact gaps. Nonetheless, the stakeholder consultative workshops identified a number of research gaps with sector and system specific research priorities (Annex 4). The stakeholders recommended that the research focus be on action-oriented research with the involvement of all relevant stakeholders and that research should focus on sectors and systems that as yet lack careful research.

The positions articulated in the stakeholder consultations and the conclusions made in the technical papers on the research themes present some broad perspectives on the status of knowledge and understanding in the region on issues pertaining to climate change and mountain ecosystems. As expected, there was some common ground on the significance and priority of certain research areas, differing mainly in setting the agenda for research proposals, approaches to developing and improving management options, and some strategic inflections largely conditioned by professional affiliations and schools of thought. In a process of concurrence and conciliation, the outcomes of these two phases of assessment were consolidated into preliminary research concepts for the region. The purpose of assessing the potential impacts of climate change upon mountain ecosystems is to provide information to decision-makers and stakeholders about the consequences of possible actions. Research should be guided to meet these information needs, taking stock of past efforts and establishing a sound basis for future elaboration.

Crucial research gaps and most desirable research concepts that ICIMOD could foray into include:

1. **Research on ecosystem valuation:** We need to improve our understanding of how society depends upon ecosystems and how people value different aspects of ecosystems. This information should be used in developing research priorities and in choosing among alternatives for increasing ecosystem resilience. A viable research project would be how to enhance ecosystem services through sustainable natural resource management by implementing an integrated watershed approach, adopting PES (payment for ecosystem services) schemes, and securing ecosystem functions under the adverse impacts of economic and demographic factors.
2. **Research on ecosystem functioning:** We still lack basic information and knowledge on how ecosystems function, limiting our ability to predict and understand how changes in one part of an ecosystem affect other parts, and how non-climatic stresses interact with climate change in determining ecological impacts. A promising research area is to conduct a dynamic or process-based investigation along altitudinal gradients from cryosphere and upstream headwaters to downstream river basins to assess the sensitivity of vegetation, snow, ice, and water resources to a range of forces at ecological and climatological boundaries. The data requirement can be supported by a data-mining and clearinghouse project in ICIMOD, and through the proposed Himalayan Transect initiative.
3. **Research on monitoring of ecosystems:** Indicators of the status of ecosystems and the magnitude and distribution of stresses upon ecosystems should be included in long-term ecological monitoring plans. Early warning signs of potential loss of valued ecosystem functions should be identified and included as indicators. The concept for a research project could include long-term monitoring and analysis of indicators of climate change in mountain regions, with a particular focus on cryospheric indicators, watershed hydrology, terrestrial and aquatic ecosystems, and human wellbeing. Ecological monitoring is essential to explore the relationships between these systems.
4. **Research on management options:** Understanding the effectiveness of various management strategies is crucial to targeting limited resources for ecological protection. The Kangchenjunga Landscape Conservation approach illustrates the value of such research, as this novel, in situ paradigm has emerged out of a large body of research and management experiences with conventional protected area systems. The landscape model may be used to design an integrated research strategy for the other major types of EH ecosystems likely to be sensitive to climate change. The agro-ecosystem approach to production agriculture is another area of research that harmonises ecosystem conservation and livelihood strategies, enabling mutual coexistence between man and nature. As it is based on resource use within the limits of ecological potentials, landscape conservation and biosphere reserves could adopt this approach to make conservation people-friendly and economically sustainable. Another project concept could be a decision support system engineered around a core of integrated model-based dynamic simulations of vegetation dynamics, biodiversity, and ecosystem services in different mountain regions with particular emphasis on coupled ecological, hydrological, and land use models, allowing the study of feedbacks between land surfaces and the atmosphere, and integrated (physical, biological and economic) analyses of climate change for policy purposes.

## Policy and Governance

Political systems will have to agree to pay the early costs to reap the long-term benefits. Leadership will be required to look beyond electoral cycles. Climate change demands urgent action now to address a threat to two constituencies with little or no political voice: the world's poor and future generations. This raises profoundly important questions about social justice, equity, and human rights across countries and generations.

Building the resilience and coping capacity of the poorest and more vulnerable sections of society will require a fundamental reappraisal of poverty reduction strategies, backed by a commitment to enhanced equity in tackling social disparities. Adaptation policies are likely to be more successful and responsive to the needs of the poor when the voices of the poor identify priorities and shape the design of policies. Accountable and responsive government and the empowerment of people to improve their own lives are necessary conditions for successful adaptation. But the response to adaptation challenges must operate within a programme-based framework, and not through project-based institutional structures operating outside wider national planning systems for budgets and poverty reduction strategies. Because climate change impacts on everything we do, all legislation also needs to be assessed and scrutinised to evaluate its impact on climate change.

The impact of climate change on the lives of the poor is not the result of natural forces. It is the consequence of human action: the product of energy use patterns and decisions taken by people and governments of the 'rich' world. The case for enhanced financing of adaptation in developing countries is rooted partly in the simple ethical principle that the countries that are responsible for causing the harm are also responsible for helping those affected to deal with the consequences. International cooperation on adaptation should be viewed not as an act of charity, but as an expression of social justice, equity, and human solidarity.

As agriculture is the dominant land use system in the EH, ensuring its sustainability can promote rural development, and increase food security and ecosystem vitality. Immediate responses should be conservation, reforestation, redefining protected areas, and adopting integrated watershed management approaches. Good governance is the foundation of any land conservation strategy. Besides providing appropriate legal and policy mechanisms for administering land ownership, it can

foster the active participation of civil society in land reform efforts and ensure the equitable distribution of the benefits from agrarian development. The situation is relevant considering the need to recognise and protect the rights of women farmers whose contributions tend to go unnoticed, as benefits are not shared equitably.

The integration of adaptation planning into wider poverty reduction strategies is a priority. Successful adaptation policies cannot be grafted onto systems that are failing to address the underlying causes of poverty, vulnerability, and wide disparities based on wealth, gender, and location; they have to be brought into the mainstream of poverty reduction strategies and budget planning. Dialogue over Poverty Reduction Strategy Papers (PRSPs) provides a possible framework for integrating adaptation into poverty reduction planning. The revision of PRSPs through nationally-owned processes to identify financing requirements and policy options for adaptation could provide a focal point for international cooperation. Climate change adaptation planning should not be seen as a new branch of public policy, but as an integral part of wider strategies for poverty reduction and human development.

Livelihood enhancement, food security, poverty reduction, and environmental protection are high priorities on the development agenda of the nations of the EH. Mechanisms and instruments exist on a broad, regional scale for cooperation in addressing these issues, but imperatives are on a local scale to meet the basic needs for human wellbeing. The focus is on water, agriculture, biodiversity, and natural disasters that are climate-sensitive, and on climate disservices, in building capacities and enhancing the resilience of communities and institutions.

The impacts of climate change can severely hamper development efforts in key sectors, while development policies and programmes will, in turn, influence ability to adapt to climate change. Development approaches have become sensitive to indigenous knowledge and technologies, and traditional methods are being integrated into conventional strategies to ensure success in implementation. An example of such an approach is the UNFCCC's National Adaptation Programmes of Action (NAPAs) for use by least developed countries to prioritise their urgent adaptation needs. The rationale for NAPAs rests on the limited ability of least developed countries to assess their vulnerability and adapt to climate change. NAPAs help to incorporate the human and economic dimensions of local communities, particularly

livelihood aspects and inter-sectoral relationships. NAPAs are useful in developing specific strategies and policy implementation building upon existing coping strategies, rather than focusing on scenario-based modelling, but they exhibit a weaker attribution to future climate change.

The Millennium Development Goals (MDGs) set the benchmark for development priorities, and climate change could hamper their achievement unless climate-resilient strategies are adopted to sustain ecosystem resources for human wellbeing. Entry points for managing climate change effects in the development process must be identified for necessary adjustment. Table 26 highlights potential areas for integrating climate change adaptation into development strategies to realise the MDGs.

Consultations with stakeholders and interactions with professionals and key partners as part of this assessment uncovered several issues and options for mitigation and adaptation to climate change in the region. The following actions are some of the initiatives that the governments of the relevant RMCs are undertaking, or will undertake, to address climate change. The actions are grouped into six main categories:

1. **Sustainable energy production and efficient use:** Enhancing energy conservation and efficiency in industry, and small business
2. **Efficient infrastructure:** Transportation, buildings, and communities – looking at increasing efficiency and promoting opportunities for innovation
3. **Sustainable forests and carbon sink management:** Managing forests and agricultural land to increase carbon sequestration and decrease impacts
4. **Government leadership and outreach:** Reducing emissions from government operations, increasing capacity to adapt, increasing public outreach on mitigation and adaptation
5. **Water management:** Supporting research geared towards developing water resource management tools, and supporting integrated watershed management to address issues such as drought and floods
6. **Ecological tax reform:** Addressing key consumption areas – such as energy use, water use, and solid waste disposal – that directly or indirectly harm ecosystems

Noticeably absent from national policy objectives (except for Bhutan and some cursory treatment by other countries) is an explicit objective related to climate change adaptation. Bhutan is set to become the first nation in the world in which the citizens will have a constitutional obligation to preserve the environment and implement environmental standards and instruments based on the precautionary polluter pays principle, and maintenance of intergenerational equity (UNEP 2007). The Government of Bhutan has made environmental protection a centre-piece of its development agenda and has become the first state to ensure sustainable use and reaffirm its sovereign right over its own natural and biological resources. Given the scope of potential impacts in the EH, stated objective for climate change should be included as part of any update to biodiversity conservation action plans of the regional countries. The starting point is to build climate change risk assessment into all aspects of policy planning. In turn, risk management requires that strategies for building resilience are embedded in adaptation policies and mainstreamed across ministries.

There is an urgent need for expanded dialogue so that societal priorities for ecosystem protection can be articulated. Public education, supported by ongoing research, is essential to inform such dialogue. Decisions need to be made with the understanding that the basis for decisions can change as information increases. The diverse research and education initiatives, beyond their intrinsic value, also have the objective of feeding into the policy sphere. The policy response should lead to coordinated action by ICIMOD and the regional countries in favour of environmental protection in mountains and uplands, and to help local populations adapt to changing ecological, economic, and health-related impacts.

Policy should also aim to convince key global actors such as the World Trade Organization to take mountain issues into consideration in the planning of future trade accords and commercial practices. Furthermore, a strengthening of ties between the 'Mountain Chapter' of Agenda 21 and the UN Conventions on Climate Change, Biodiversity, and Desertification may lead to a more efficient, holistic approach to the problems currently facing the Eastern Himalayan region.

Table 26: **Impacts of climate change on human wellbeing and the Millennium Development Goals** (impacts and wellbeing information types taken from Berry 2007)

Climate change impacts	Component of human wellbeing affected	Millennium Development Goal
<ul style="list-style-type: none"> <li>• Damage to livelihood assets, including homes, water supply, health, and infrastructure</li> <li>• Reduction in crop yields</li> <li>• Changes in natural systems and resources, infrastructure and labour productivity</li> <li>• Social tension over resource use</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced ability to earn a living</li> <li>• Food security endangered</li> <li>• Reduced income opportunities; affects economic growth</li> <li>• Increased human conflicts</li> <li>• Lives and livelihoods destabilised</li> <li>• Communities forced to migrate</li> </ul>	Goal 1 Eradicate extreme poverty and hunger
<ul style="list-style-type: none"> <li>• Loss of livelihood assets and natural disasters</li> <li>• Malnourishment and illness and the decreased ability of children to learn when they are in class</li> <li>• Displacement and migration</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced opportunities for fulltime education; more children (especially girls) are likely to be taken out of school to help fetch water, earn an income, or care for ill family members</li> <li>• Reduced school attendance</li> <li>• Reduced access to education</li> </ul>	Goal 2 Achieve universal primary education
<ul style="list-style-type: none"> <li>• Women become more dependent on the natural environment for their livelihood, including agricultural production</li> <li>• Fewer resources and greater workload</li> <li>• Climate related disasters</li> </ul>	<ul style="list-style-type: none"> <li>• Exacerbation of gender inequality</li> <li>• Poor health</li> <li>• Less time to engage in decision making and earning additional income</li> <li>• Women and girls are typically the ones to care for the home and fetch water, fodder, firewood, and often food</li> <li>• Female-headed households with few assets are particularly affected</li> </ul>	Goal 3 Promote gender equality and empower women
<ul style="list-style-type: none"> <li>• Heat-waves, floods, droughts, and extreme weather</li> <li>• Increase and spread of vector-borne diseases (e.g., malaria and dengue fever) and water-borne diseases (e.g., cholera and dysentery)</li> <li>• Anaemia resulting from malaria</li> <li>• Reduction in the quality and quantity of drinking water</li> <li>• Natural disasters, increased malnutrition and famine</li> </ul>	<ul style="list-style-type: none"> <li>• Increase in death and illness</li> <li>• Negative effects on health of children and pregnant women</li> <li>• Increase in maternal and child mortality</li> <li>• Increase in malnutrition especially among children</li> <li>• Food security endangered</li> </ul>	Goal 4 Reduce child mortality  Goal 5 Improve maternal health
<ul style="list-style-type: none"> <li>• Water stress and warmer conditions</li> <li>• Acceleration of the negative effects of AIDS</li> </ul>	<ul style="list-style-type: none"> <li>• Increased incidence of disease</li> <li>• Increase in malnutrition</li> <li>• Lower livelihood assets</li> </ul>	Goal 6 Combat HIV/AIDS, malaria, and other diseases
<ul style="list-style-type: none"> <li>• Alterations and possible irreversible damage to the quality and productivity of ecosystems and natural resources</li> <li>• Decrease in biodiversity and worsening of existing environmental degradation</li> <li>• Alterations to ecosystem-human interfaces and interactions</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced ecosystem services</li> <li>• Loss of biodiversity</li> <li>• Loss of basic support systems for livelihood</li> </ul>	Goal 7 Ensure environmental sustainability
<ul style="list-style-type: none"> <li>• Climate change is a global issue and a global challenge</li> <li>• International relations may be strained by climate impacts</li> </ul>	<ul style="list-style-type: none"> <li>• Global cooperation, especially to help developing countries adapt to the adverse effects of climate change</li> <li>• International relations</li> </ul>	Goal 8 Develop a global partnership for development