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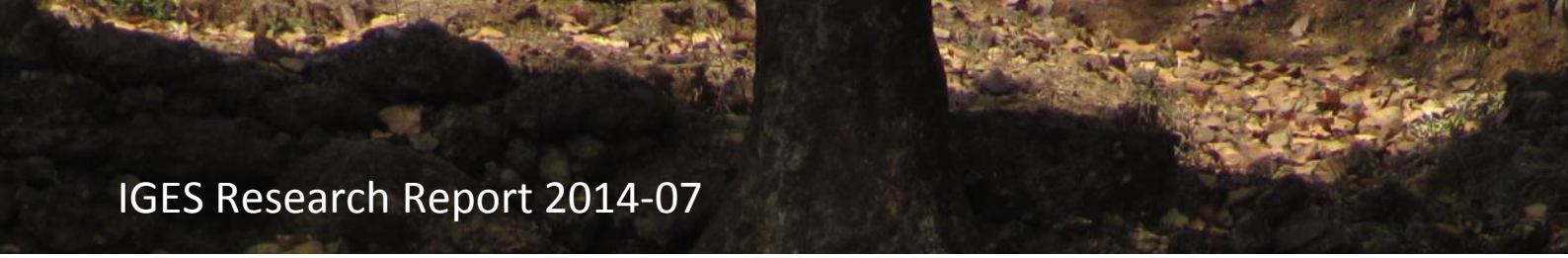

IGES Research Report 2014-07

CLIMATE CHANGE, CHANGING RAINFALL AND INCREASING WATER SCARCITY

An integrated approach for planning adaptation and building resilience of smallholder subsistence livelihoods in Nepal

IGES Institute for Global Environmental Strategies
公益財団法人 地球環境戦略研究機関

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CLIMATE CHANGE, CHANGING RAINFALL AND INCREASING WATER SCARCITY

An integrated approach for planning adaptation and building resilience of smallholder subsistence livelihoods in Nepal

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FOREWORD

The impacts of climate change are felt increasingly all over the world and water is the key medium through which these impacts unfold. For some regions, climate change could exacerbate water scarcity through more erratic rainfall. Water scarcity is already severe in some areas because of growing socio-economic pressures on water resources. The Food and Agriculture Organisation of the United Nations (FAO) estimates that in 2025, 1.8 billion people will be living in countries with absolute water scarcity, and two-thirds of the world's population could be living in water-stressed conditions. Local communities in the developing world, where over 700 million people already lack access to safe drinking water (mostly in rural areas) will find it hard to cope with water scarcity resulting from climatic and non-climatic stresses. For them, securing drinking water is difficult due to a lack of water supply facilities and/or the remoteness of water sources. In addition, uncertain rainfall and inadequate irrigation means they cannot grow sufficient food for an adequate diet. Addressing water scarcity is thus not only important to climate change adaptation, it can contribute to achieving the Millennium Development Goals (MDGs) and the future Sustainable Development Goals (SDGs) related to water and food security.

The Institute for Global Environmental Strategies (IGES) is an international research institute conducting practical and innovative research for realising sustainable development in the Asia-Pacific region. In line with its mission, improving water security in the region is one of IGES' core areas of research. In this report, the authors provide an in-depth analysis of causes and impacts of water scarcity on smallholder subsistence livelihoods in rural areas of Nepal. For Nepal climate change means altered rainfall patterns as well as melting of glaciers in the Himalayas. Nepal's climate future is thus one of increased water scarcity and increased vulnerability of most smallholder subsistence livelihoods, which are highly dependent on water. In this context, this study proposes an integrated approach for planning adaptation measures to deal with water scarcity problems in local contexts, where decisions are often taken in an ad-hoc manner and climatic data are generally not available. I believe this study will be useful to policymakers and practitioners seeking practical solutions to the challenges posed by water scarcity brought about by climate change to rural development.

Hideyuki Mori
President
Institute for Global Environmental Strategies

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EXECUTIVE SUMMARY

This research report assesses water scarcity and its impacts on smallholder subsistence livelihoods in the context of climate change in Nepal, a mountainous country located entirely within the Ganges River Basin. It identifies and analyses existing coping responses and assesses options for introducing an adaptive response strategy to improve resilience of households and local communities to increasing water scarcity. The aim of this study is to contribute towards development of an integrated approach for planning adaptation measures to unprecedented and increasingly challenging local level water scarcity problems.

This research was conducted in selected hill and plain areas of the Koshi River Basin in the east and the Karnali River Basin in the west of Nepal. This research relied on both the analysis of rainfall data and social research methods (key informant interviews, questionnaire surveys and focus group discussions) to understand local perceptions of water scarcity and household response strategies.

In the first stage of the assessment the report finds that changing rainfall patterns – a likely manifestation of climate change – have triggered local water scarcity by widening the gap between water supply and demand. Socio-economic drivers, such as deforestation, population growth, contamination of water sources and increasing use of water have also exacerbated water scarcity. The resultant imbalance between water supply and demand has increased pressure on natural water sources such as springs, rivers and groundwater.

In the second stage the report explores the impacts of water scarcity on the main four pillars of smallholder subsistence livelihoods identified during the study: households, forestry, crop farming, and livestock. The study finds that water scarcity has heavily impacted on livelihoods and weakened all its four pillars, which are strongly dependent on water. It has resulted in declining productivity and income loss, and this in turn is affecting the wellbeing of the households.

In the third stage, the report examines coping responses of the households and communities to deal with the various manifestations of water scarcity. This study categorises the existing coping responses into five sets of strategies that reflect the decreasing range of choices available to households as water becomes scarcer. The first two strategies (S1: Enhance capture and storage; and S2: Improve distribution, allocation, efficiency) are meant to prevent potential impact and losses, while the other three strategies (S3: Limit water uses; S4: Accept losses in income and use savings; and S5: Responses of last resort) are meant to minimise them. However, households and communities have adopted these strategies autonomously without proper understanding of long-term consequences. Standalone actions that are uncoordinated and lack planning are amongst the main barriers to enhancing the effectiveness of these coping responses.

In the fourth and final stage, the report examines and develops options for strengthening the existing coping responses and improving resilience of the smallholder subsistence livelihoods. The analysis reveals that the effectiveness of the coping responses can be enhanced by approaching the water scarcity problem from an integrated perspective. A systematic understanding of the dimensions of the water scarcity problem and its impacts on local communities is the basis for planning adaptive strategies and hence to build resilience at the local level. The report proposes one potential way for applying an integrated approach which coordinates three domains of the socio-ecological systems (SES), namely, landscape, economy, and socio-institutional. The effectiveness of the proposed integrated approach can be evaluated by examining the resilience of the SES with the help of indicators provided in this report.

The proposed integrated approach, however, should be followed by taking into account the local realities and priorities of the smallholder subsistence livelihoods. Longer timeframe for implementation and a high need for resources can be a barrier for adopting an integrated approach as communities are mainly prepared for small-scale interventions that result in immediate returns to support their day-to-day needs. These needs can be addressed by prioritising actions that improve productivity of the water and land management systems and by focusing on the low cost options that provide immediate benefits to households, but can also be sustained over a long period. Such land and water management interventions should be backed by appropriate technology, investment (finance) and institutional support. This support should follow a planned step-wise manner and be provided as a “packaged solution” for enhancing the capacity of communities. Such a solution involves identifying deficiencies of existing coping measures and prioritising actions to overcome them, by promoting participation, experimentation and learning.

This research report makes an attempt to address the issue of changing rainfall — a prominent impact of climate change highlighted by the recent IPCC Fifth Assessment Report — and specifically focuses on the water scarcity triggered by changing rainfall. We hope that the proposed integrated approach can be usefully applied for planning local adaptation measures not only in Nepal but also in similar hill-plain landscapes found across the Ganges River Basin and other types of smallholder subsistence livelihoods. The report is expected to inform governments, local and international organisations, experts and stakeholders involved mainly in adaptation planning and dealing with water resources management at the local level. Being an interdisciplinary area, the relevant stakeholders and organisations working in agriculture, forestry, and local development may also find this report useful.