ICIMOD Working Paper 2017/11

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FOR MOUNTAINS AND PEOPLE

Everybody Lives Upstream

The Watershed Approach for the Changing Climate of 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.

Contact person: Rajan Kotru rajan.kotru@icimod.org

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Everybody Lives Upstream

The Watershed Approach for the Changing Climate of the Hindu Kush Himalaya

Authors

Rajan Kotru, Sudhirendar Sharma, Eklabya Sharma and Thomas Hofer

International Centre for Integrated Mountain Development (ICIMOD), Kathmandu, Nepal

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Christopher Butler (Editor)
Dharma R Maharjan (Layout and design)
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Foreword

The watershed management approach has been recognized globally as an integrated approach for bridging spaces between human and natural ecosystems for conserving, using, and renewing natural resources, especially water. As an outcome of the Earth Summit in 1992, developing countries initiated reforms in which the watershed management approach was transformed from a purely technical to a participatory and multi-stakeholder based process. Public organizations across the world began to promote investments and interventions to restore and secure ecosystem services in hundreds of watersheds across the world.

Participatory and integrated watershed management approaches have been applied across the Hindu Kush Himalaya (HKH) with varying degrees of success, and the sustainability of its impacts has been questioned. As we have observed in the HKH, watershed management faces multiple challenges of limited policy and practice uptake, complex and unclear institutional mechanisms, and inadequate linkages between livelihoods and markets. In other words, finding harmonious convergence amongst several service delivery organisations has remained elusive.

The need to build resilience to climate change impacts has added layers of conceptual complexity to watershed management, and the urgent need for the watershed management to deliver "adaptation strategies at scale". For example, climate change is likely to exacerbate matters, as increased precipitation variability has been predicted in the HKH. Thus, larger landscapes, such as watersheds, will be challenged to bring conservation and development dividends for people who depend on these resources.

In this context, it is important to develop mountain farmers' abilities to cope more effectively with the problems and opportunities presented by climate change. Implementing agencies related to conservation and development have often struggled to facilitate the transformation from exploitative land-use regimes to more sustenance-nuanced relationships between human society and ecological systems.

Encouragingly, the challenges and impacts of climate change have opened up new opportunities for collaboration and facilitated convergence on public schemes, such as national commitments to the Sustainable Development Goals. In this context, and despite these gains, watershed management still lacks sufficient theorizing combined with evidence-based science.

It is timely to review past watershed management approaches in HKH, and present an analysis that consolidates the lessons and recommendations gathered from around the region. This work – presented here in this report – should lead the way to create a "New Generation Watershed Management" where everyone recognizes that we all live upstream and need to demonstrate greater stewardship in our use of watersheds to sustain a wide range of life and livelihoods. Therefore, the title of this working paper 'Everyone Lives Upstream' signifies that in new generation of watershed management upstream-downstream interests are mutually inclusive. In other words downstream communities have as much as responsibility for upstream conservation and vice-versa upstream communities will need to practice stewardship in the upper catchments.

David Molden, PhD
Director General
ICIMOD

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Acronyms and Abbreviations

ABI	Arnold Bergstraesser Institute
ADB	Asian Development Bank
CDM	Clean Development Mechanism
EU	European Commission
FAO	Food and Agriculture Organisation
FUG	Forest User Group
GIS	Geographic Information System
GP	Gram Panchayat
GPS	Global Positioning System
HIMCAT	Himalayan Conservation and Agriculture Technology
HIMALI	High Mountain Agribusiness and Livelihoods Improvement
HKH	Hindu Kush Himalaya
ICIMOD	International Centre for Integrated Mountain Development
IBM	Incentive Based Mechanism
IES	Incentives for Ecosystem Services
IFAD	International Fund for Agricultural Development
KfW	Kreditanstalt fuer Wiederaufbau
NGWM	New Generation Watershed Management
Pvt	Private
R&D	Research and Development
RBM	River Basin Management
REDD	Reduced Emissions through Deforestation and Forest Degradation
SDC	Swiss Development Cooperation
WOCAT	World Overview on Conservation and Agriculture Technology
WM	Watershed Management
WOTR	Watershed Organisation Trust
WSSD	World Summit on Sustainable Development

Executive Summary

Globally, the watershed approach has been proven as a way to bridge human and natural systems for the conservation, sustainable use, and renewal of natural resources, especially water.

Reforms and decentralization across the global South have elevated the need to build on participatory watershed development and management, particularly among major development organizations promoting investments and interventions in watersheds across the Hindu Kush Himalaya (HKH).

Given the suitability and perceptible impacts of watershed approach on sustainable natural resource management most of HKH countries now have national development strategies in place that expect to counter conservation and development challenges at scale posed by non-climatic as well as climatic factors. Diverse perspectives notwithstanding, project experience across the HKH demonstrates that the watershed management approach can, under the right mix of specific instruments and associated investments, create the synergies required both for sustainable soil and water conservation and for the optimisation of resource use that will improve the local livelihoods. The overall conclusion is that we need to follow the principle of partnership and collaboration and establish a viable working relationship with the participating governments since the proposed New Generation Watershed Management (NWGM) initiatives are going to be tested and applied in their territory for the benefit of their people. It is understood that NGWM will have to take on board both, climatic and non-climatic issues, which in combination have exacerbated the complexity in managing the watershed landscapes.

In other words, several key structural and reform processes (e.g., decentralization, water governance institutions) in HKH have been slow, and hence inherent issues of good governance, participatory management of natural resources, use of value-added technologies and productive involvement of private sector have not been resolved. Climate agenda has been added only off-late and hence a huge demand of innovating upon the current watershed management practices has emerged.

The new watershed initiatives in HKH need to network key institutions to collaborate on testing NGWM in critical RBs/Watersheds. While the 'Strategic Results Framework' of ICIMOD provides a wider scope for testing NGWM through its transboundary landscape management and river basin management initiatives, the Mountain Partnership on the other hand offers an advocacy platform for its vertical and horizontal levels integration. The new concept can rely on the above 4 strategic pathways as aligned to regional and global demands for finding answers to: How should transboundary cooperation work?; How adaptive management can be practiced?; Can local financial mechanisms be the panacea for sustainability of impacts and financial investments made?; and How modern institutions for capacity building should look like?; and which are the promising capacity building packages for tackling regional challenges thrown by climatic and non-climatic factors? The adapted concept is designed to involve HKH countries, government interventions and range of institutions and communities. The concept, however, needs to integrate in existing institutional structures and thus avoid duplicity and needless complexity and confusion. Formal and informal local government structures can provide viable entry points for broad-sector collaboration. The concept is timely as transboundary cooperation in HKH – as realized by all nations - is the key to secure and sustain watershed based ecosystems for the benefit and welfare of massive populations across upstream-downstream boundaries having transnational character. More importantly, adoption of NGWM in the Himalayan context will help achieve the Sustainable Development Goals, as it aligns generally with several goals such as # 1, 5, 6, 13 and more specifically with goal # 15 (4). This keeping in view that poverty in HKH is still higher than plains of South Asia, due to outmigration of men, women issues have become pertinent, climate change is fast emerging as a future challenge, other natural disasters and sustainable management of resources and good resource governance remain enigmatic themes. This publication is a product of a major workshop outputs held in 2011 by ICIMOD jointly with FAO and is complemented by learning of some key watershed development initiatives in HKH over the last decade.

Introduction

The Hindu Kush Himalaya (HKH) as a mega-watershed is gaining increasing attention as climate change becomes a more widely accepted phenomenon and the post-2015 Development Agenda and Sustainable Development Goals become a central part of policy discourse. At higher altitudes, warming trends are amplified, extreme weather events (e.g.) have become frequent over small distances, and glaciers and springs in the headwaters of some of Asia's most important rivers are increasingly vulnerable (Klatzel et al., 2009; Lutz, Immerzeel, Shrestha, and Bierkens, 2014; Singh, Bassignana-Khadka, Karky, Sharma, et al., 2011).

The Hindu Kush Himalaya, often called the 'water towers' of Asia, are the source of ten major Asian rivers: the Amu Darya, Indus, Tarim, Ganges, Brahmaputra, Irrawaddy, Salween, Mekong, Yangtze, and Yellow. In addition to the unparalleled beauty of its landscapes, the HKH plays an important role in global atmospheric circulation and the regional hydrological cycle, and is home to rich, globally-significant biodiversity (Eklabya Sharma, 2012). Recent analysis shows that, on average, 31% of the population of the HKH lives below the poverty line. When compared to the national average in HKH countries (26%), it is clear that mountain people are poorer than those in non-mountain areas (Hunzai, Gerlitz, Hoermann, & others, 2011)

Through the provision of key regulating, supporting, and cultural services, the HKH supports the survival of 1.3 billion people (ICIMOD, 2012). The region's ecosystem goods and services are essential for food and energy production and the overall economic wellbeing of the region, including both communities in the mountains and those living downstream.

Long-term changes in hydrology, extreme weather events, growing needs of burgeoning populations, and an increasingly unpredictable climate affect the lives and livelihoods of billions of poor people in the region's downstream areas (Molden & Sharma, 2013; Schild, 2008). Early assessments of the effects of climate change highlight the need to reduce knowledge gaps and scientific uncertainties in order to address climate-induced challenges and boost the long-term resilience of ecosystems and communities.

There is a multitude of instruments being applied in watershed development (e.g., community forestry, catchment area treatment, income generation, participatory water governance, and incentive-based mechanisms). However, their potential to build climate resilience while addressing contemporary issues of gender, poverty, and equity has not yet been fully assessed. Detailed analysis of past and current watershed management initiatives across the diverse geography of the HKH, as well as at the local watershed level, could help focus future activities on improving policy and practice so that watershed-level approaches contribute to building sustainability along with adaptive resilience.

The positive impacts of effective watershed management extend beyond building climate resilience. A rapid ecosystem services valuation by (Earth Economics, 2010) put the annual value of 12 of 23 identified ecosystem goods and services provided by the watershed of China's Qinghai Province – consisting of forests, grasslands, scrub/shrub lands, wetlands, lakes, ice and snow, urban green space, and barren land – between USD 12 billion and USD 123 billion. Such figures don't account for the unquantifiable, such as the value of the human use of wild places in high-altitude areas of the Tibetan Plateau (2000) green accounting valuation of watershed services for the Indian state of Himachal Pradesh amounts to USD 1.4 billion.

Countries in the HKH have been implementing participatory integrated watershed management programmes through the application of a mix of policy instruments, reform actions, and investments aimed at environmental sustainability, soil and water conservation, and livelihood improvement with varying degrees of success. These instruments need to be more effective, especially given recent evidence on changes in the region's cryosphere, projected climate trends, and assessments of community vulnerability that show the region is fast becoming a hotspot for rapid and significant climate change impacts (Eriksson et al., 2009).

A Tested Approach to Sustainable Natural Resource Management

The watershed management approach (Box 1) has been globally recognized as an integrated way to bridge human and natural systems for the conservation, sustainable use, and regeneration of renewable natural resources, especially water. Major development organizations are promoting participatory watershed management in hundreds of watersheds around the world. Almost all of the countries in the Hindu Kush Himalaya are promoting the watershed approach (Table 1). In the late 1980s, China launched a massive programme aimed at conserving soil and water along the upper and middle stretches of the Yangtze River. By the end of 2008, the programme had been implemented across 96,000 km^2 in more than 5,000 watersheds. With support from the World Bank, the Indian mountain state of Uttarakhand is investing USD170 million in the second phase of the Watershed Development Project. While the first phase treated 234,000 ha of sloping watersheds, the coverage will be extended to cover an additional 200,000 ha of arable and forested lands in the second phase. In its 'Bhutan 2020' policy document, the Government of Bhutan named watershed management as the "single most important strategy to maintain the resource base to support the national economy" (Royal Government of Bhutan, 1999).

Box 1: **A watershed is the geographical area drained by a water course**

The **watershed management approach** applies to units ranging from a farm crossed by a creek (a micro-watershed), to a large river or lake basin.

The watershed management approach is a multi-sectoral approach that combines a number of existing mechanisms, including bottom-up and top-down planning, monitoring and evaluation, environmental impact assessments of interventions, gender balance in decision making, compensation mechanisms, networking, and capacity development (Hofer & Warren, 2007). It resonates with an agreement made at the 2002 World Summit on Sustainable Development in Johannesburg that stressed the need to "develop integrated water resources management and water efficiency plans by 2005, with support to developing countries through actions at all levels (United Nations, 2002). Since the mid-1990s, states have undertaken reforms to decentralize watershed management while also promoting a convergent institutional approach to conserving water, land, and biodiversity and improving livelihoods within the broader context of sustainable development at river basin and national levels (Jain, Rai, & Sharma, 2000; Rai & Sharma, 1998; Sharma, Rai, & Sharma, 2001; Sharma, Sundriyal, Rai, & Krishna, 1998). However, many watershed initiatives were not designed with consideration of the need to support climate change resilience. A new generation of watershed management is needed to develop the capacity to capture climate-relevant learning from ongoing projects and to develop and guide future instruments and investments. Multiple sectors are investing in the development of watersheds, but analytical research on the combined impacts of these sectors on the development is currently inadequate.

Table 1: **Recent investments in watershed management in the Hindu Kush Himalayan region***

Country	Project	Donor	Period	Amount (million)
Afghanistan	Improving Livelihoods of Rural Communities	Swiss Agency for Development and Cooperation (SDC)	2012–2016	USD 11
Bhutan	Wang Watershed Management Programme	European Union	2000–2007	USD 13.8
China	Changjiang/Pearl River Watershed Rehabilitation Project	World Bank	2006–2012	USD 100
India	Climate Change Adaptation – North Eastern Region of India	German Federal Ministry for Economic Cooperation and Development (BMZ)	2011–2015	Euro 80
	North Eastern Region Community Resource Management Project for Upland Areas II	International Fund for Agricultural Development (IFAD)	2009–2016	USD 93.4
	Himachal Pradesh Mid Himalayan Watershed Development Project	World Bank	2005–2012	USD 60
	Uttarakhand Decentralized Watershed Development II Project	World Bank	2014–2021	USD 170

*This list is not complete, but is indicative of the range of investments in watershed management in the region. Moreover due to extension of some projects the overall outlay could change.

This publication is in no way a complete analysis of watershed management in the HKH. However, it does offer a broad assessment of the current state of watershed management in the HKH. It provides a glimpse into the evolution of watershed management and development approaches, including ongoing transformations, where and how research has unfolded, and how strategic political focus is shifting toward future challenges in areas such as livelihoods, drinking water, and the monetization of ecosystem services. Hence, it can be used as a tool by decision makers to inform policy and practice and to gauge what has worked. It can also provide researchers with focus areas for future work.

Transformation of the Watershed Approach

The Development Perspective

The holistic vision of the watershed approach has attracted large development investments, despite the complexity of managing governance aspects of watershed management. However, even with institutional commitments and a sustained flow of funds, projects employing the multi-purpose, multi-scale watershed approach have not achieved desired impacts. Some potentially innovative projects have slipped back into business-as-usual, top-down approaches within institutional confines, and have not addressed the needs of local people. As a result, there have been persistent challenges.

To promote a new generation of watershed management in the HKH, it is important to review existing and past watershed management approaches from diverse perspectives before suggesting a framework for its future, particularly in a rapidly changing climate scenario.

The current design of watershed management programmes in the HKH originated in the 1970s and 1980s. Early focus was on applied soil and water planning, which emphasized technical efforts aimed at specific on-site and downstream physical outcomes. The tendency to prioritize the biophysical framework in watershed development warranted a top-down planning approach. However, a lack of congruence between human and biophysical boundaries often created animosity between local populations and external watershed project managers. As a result, investment costs were high and not always justified, and the assets and benefits created often had a limited life.

By the end of the 1980s, the failure of the 'technical' approach was well established, and experts and development practitioners undertook a major rethinking of the water management approach. In the 1990s, during the dawn of decentralization reforms in parts of the HKH, integrated and participatory watershed management techniques were applied with the aim of forging a convergent approach for conserving water, land, and biodiversity, as well as improving livelihoods, within the broader context of sustainable development at national and river basin levels (Arnold Bergstraesser Institute, 2006; Jain, Rai, & Sharma, 2000; Rai & Sharma, 1998; Sharma, Rai, & Sharma, 2001; Sharma, Sundriyal, Rai, & Krishna, 1998).

In the HKH this brought in, to some extent, local governance bodies as stakeholders for planning and implementing watershed projects. Thus, in Hiware Bazar, Maharastra State, the Gram Sabha became the nodal institution, deciding everything from identifying the site for a water harvesting structure to the sharing of water and types of crops to be taken grown. The Gram Sabha continues to lead planning processes so that ecological wealth generated doesn't go to waste. The move away from targeted investments and toward inclusive and participatory approaches has improved institutional convergence. However, because theory and practice intersect and overlap at different levels of decision making, the list of potential challenges remained long. The first challenge was in finding a sustainable balance between the twin aims of conservation and livelihood improvement. Livelihood activities often remained the top priority of communities and were delivered in a supply driven mode despite the 'participatory planning' label. As a result, conservation-related activities suffered both on account of quality and quantity. Given the short period of time, it was also difficult to convince local populations that investments and interventions made upstream under a demand-driven watershed management programme would positively impact downstream conditions and their projected demands. Despite the emphasis on institutional convergence, a lack of post-project ownership and institutionalization of the approach resulted in limited visible impacts on the ground. Also, under this approach, physical scales have often been confused with organizational scales(i.e. planners expected that definition of working area of watershed would logically lead to converging of several public institutions for common expected output, which did not happen as mandates and administrative boundaries often do not coincide with each other), with most projects not only time-bound, but also mostly donor driver or stand-alone public watershed schemes, which has made policy planners and practitioners sceptical of upscaling good lessons.

In the 2000s, various pilot projects tested ways to add value to watershed-based ecosystem services, and several long-term projects have resulted in the mainstreaming of defining policy and practice impacts. Some key examples were from Nepal (Kulekhani Project facilitated by Winrock Nepal with Government of Nepal), India (incentive-based mechanisms tested under Indo-German Changar Eco-Development Project in Himachal Pradesh (see Box 2), and China (Xining Flood and Watershed Management Project implemented by Government and funded by World Bank). Several key instruments have been applied within a range of watershed projects, including community-based forestry, flood control, water harvesting, water storage, biogas and solar energy, breed improvement, microcredit, and incentive-based mechanisms. These have had perceptible impacts on the ground.

The Uttarakhand Decentralized Watershed Development Project in India (2004–2012) was the first project to build the institutional capacity of 'gram panchayats' (a cornerstone of local self-government organizations in India) to own, manage, and deliver development objectives at the local level. The gram panchayats have also been entrusted with post-project sustainability. In China, the Xining Flood and Watershed Management Project has improved the management of critical watersheds to reduce the impacts of flooding. By introducing improved breeds of grazing animals, the project has been able to engage communities in reducing grazing land and increasing forestation in ecologically fragile and eroded areas. (MoSTE, 2011)

Summary

The evolution of development perspectives within the watershed approach have proven that a combination of policy instruments and practices is there to stay since operational flexibility has provided viable roles to local communities as well as other stakeholders apart from achieving impacts. Climate change is a new factor that has obliged development practitioners and policy makers to meet future challenges and leverage opportunities that can benefit the next generation of watershed development. Performance-based incentive mechanisms, payments for ecosystem services, and stakeholder dialogues between upstream-downstream groups are emerging as instruments that can support policy adjustments and strategic focus of investments and interventions from a national perspective. Similarly, the overlap between climatic and non-climatic issues warrants risk management strategies to counter potential disasters.

The Research Perspective

Watershed management involves the complex integration of biophysical externalities that stem from the flow of water,

Box 2: **Development projects can deliver tangible impacts**

One long-term, model project based on the participatory watershed approach is the Indo-German Changar Eco-Development project in Indian mountain state of Himachal Pradesh (1994-2006). During the project period, agricultural production increased, erosion and siltation reduced, and the management of the new forest plantations was transferred into the hands of the villages, rather than being determined by an outside government agency. In the process, poverty has been reduced, and women now play a greater role in decision making. The status of disadvantaged social classes has also improved.

During its first phase, the project was process-oriented, and when it moved into the second phase its scope widened to largescale implementation. The project's impacts, however, go well beyond its area. The participatory approach to resource management planning developed by the project and introduced in the project area's villages is now being emulated by other projects in Himachal Pradesh. It has also brought about and supported changes in thinking among the Forest Department regarding its forest policy, in particular with regard to joint forest management. The villages were served in terms of demand-oriented advice, training, and advocacy to integrate the services provided to villages by the Forest Department and other government line agencies with the resource management plans and to analyse and disseminate experiences and results through training, conferences, publications and general networking. All this was accomplished with an economical and efficient use of funds and human resources. The benefits that accrued annually were compared with the costs invested by the project over its 12-year term. On the basis of the conservative estimates, the return on investment is over 17% per year, equivalent to a payback period of less than five years (Arnold Bergstraesser Institute, 2006). The final evaluation of the project found that target populations in the villages perceived an overall improvement in their position. The above project was supported by German Ministry for Development and Economic Cooperation through German International Cooperation (GIZ).

sediment, and nutrients, as well as institutional arrangements that embody the interactions between government agencies, service providers, and users such as farmers, landless rural families, non-governmental institutions, and people living in urban areas. The critical nature of watershed resources, as well as related challenges, to these various users has drawn increasing attention to participatory research in integrated watershed management. The participatory research approach engages both biophysical and socioeconomic research at multiple scales. However, integrating results between disciplines and transferring results between different scales is a challenge. This has resulted in fragmentation between different studies and has prevented cumulative learning. There is also limited research on the influence of ecosystem interfaces (e.g., between forests and rangelands or forests and agricultural land) on ecosystem services.

Recent research has enriched the knowledge available on watershed-based management approaches (Box 3). For example, for approximately ten years ICIMOD conducted research on the dynamics and relationships between socioeconomics and natural resources in selected middle mountain watersheds across the Himalaya (China, India, Nepal, and Pakistan). The People and Resource Dynamics Project (PARDYP) aimed to harvest learning to design future interventions and to scale up successes (MoSTE, 2011). To do this, it adopted a framework that gradually moved from basic research to applied research on livelihoods and socioeconomic approaches for policy influencing through broader networking. In addition to technical findings, the project identified future challenges, such as increasing local incomes in rainfed areas, issues of equitable access and benefit sharing and governance, and the dissemination and upscaling of good practices (ICIMOD, 2007).

Box 3: **Development at the crossroads**

Started in the 1970s, the Tarbela Watershed Management Project (TWMP) was initially launched to control siltation of the Tarbela Dam with the participation of local communities. Gradually the project evolved into a community-based natural resources management and sustainable development project in Pakistan. Alongside field activities related to integrated watershed development and creation of alternative livelihood opportunities, the field stations of the project also generated knowledge about sustainable development of mountain ecosystems. As a result, Watershed Management as a discipline has been incorporated in the curriculum of the Pakistan Forest Institute. The results show that the achievement of the TWMP has been significant. An area of more than half a million acres has been brought under soil conservation and tree cover, and check dams have had a positive impact on reducing silt load into the reservoir. Meeting the main objective of the TWMP – reduction of silt load through participatory watershed management – has been successfully achieved. However, progress could have been more holistic and sustainable had the concerns of biodiversity conservation been incorporated in the project design. Ignoring conservation of 'natural cultural landscapes', has led to degeneration of biodiversity zones for communities, and biological corridors for wildlife. After completion of three decades of work of watershed management under different phases, community expectations for securing livelihood benefits have been far from fulfilled. (HKH Assessment for Rio+20, SDC/ ICIMOD 2011)

Experience shows that while research may begin with practical and technical focus, which is often essential for catalysing local participation, the focus of a project should eventually shift from 'doing' to 'facilitating' by helping to establish linkages between local user groups and external resources, organizations, and service providers. From the beginning of a project, its limits should be identified and links should be created with other actors that can maintain activities beyond the project's duration (Bhuktan, Denning, & Fujisaka, 1999; Krause & Meléndez, 1999)

However, the authors below (Brooks, 2010) warn "That is not to say local people always know best; and romanticizing tradition can prevent necessary changes". The rationale behind local practices needs to be better understood. Moreover, local knowledge and traditional practices are not static; "they may not change fast, but neither do they change randomly. They change when, and only when, people see the value of change" (Brooks, 2010).

In this participatory approach, which can be complemented by action research, stakeholders are full partners in the research process at all stages: from identification and design, to implementation and evaluation. Technologies and best practices are offered as a range of choices to be adopted rather than as prescriptions (Box 4) (Merz et al., 2002; Nakarmi & Shah, 2000; Shrestha, Bajracharya, & Pradhan, 2001). However, embracing mixed

methodological approaches requires careful organization and the capacity to coordinate research agencies at various levels and factor in other stakeholders, including farmers and the private sector. Despite the strength of participatory approaches, some issues merit consideration.

First, the watershed approach allows scientists to clearly outline the study area, making it easier to conduct input-output studies. Research (e.g. what is the cost of overall investments and what would be tangible and intangible benefits) should spend time clearly defining their role in relation to three key areas of activity: implementation of applied research, institution building, and policy influence.

Watersheds are not simply hydrological and physical phenomena. They encompass biophysical hierarchies of scale that differ substantially from sociological or administrative hierarchies. Researchers need to identify and develop methodologies that accommodate this complex array of scales to better understand the interaction between natural resources and associated factors.

Box 4: **Participatory action research**

In Nepal, ICIMOD's People and Resource Dynamics Project (PARDYP) combined modern modelling and remote sensing tools with 'citizen science'. Before the project selected the appropriate geospatial tool, local people were involved in determining what information is needed and how it relates to specific outcomes. This resulted in innovative work using GIS and global positioning system (GPS) outputs to support participatory community forest mapping. PARDYP also initiated detailed forestry mapping by introducing orthophoto images along with intensive field verification in collaboration with district forest offices (Shrestha, Bajracharya, & Pradhan, 2001). Forestry users groups in the watersheds have used this tool to prepare inventories of natural resources, resolve conflicts between different forestry user groups, prepare forest management plans, and plan reforestation activities (Nakarmi & Shah, 2000).

In addition, there is increasing recognition of the value of participatory research, but knowledge and experience with participatory methodologies is still limited. Since participation is usually complex in a watershed context because of the intricate overlap of multiple uses and users, means must be found to accommodate diverse stakeholders and create forums for effective negotiation.

Finally, watershed researchers focusing on issues of property rights or tenure security must evaluate the impact of project interventions, government policies, and other factors on the livelihoods of people inhabiting watershed communities (both those with and without property rights) and on the sustainable use of natural resources to meet the needs of future generation.

Differences in the scale and scope of different watershed projects also create problems in data interpretation. A study of eight watersheds under the Himalayan-Andes Watershed Comparison project demonstrated that participatory data collection is key to developing the long-term datasets needed for proper analysis. Partnerships are often required with government agencies and universities for training and coordination amongst several stakeholders which include local institutions (Van den Brand, 2000). On the other hand, research findings indicate that good watershed management is neither community-based, nor at regional levels, but rather a combination of both.

The High Mountain Agribusiness and Livelihood Improvement (HIMALI) participatory action research project of ICIMOD in two remote districts of Nepal took the promotion of agribusiness as a key entry point to justify the watershed approach, from both management and community perspectives. In the project's working sites, a host of non-climatic factors were considered in order to ensure sustainability and the quality of yields required for markets. When addressed, the above factors act as a functional bridge between how changes are managed locally on an equitable and inclusive basis, and the way in which external services are leveraged in a timely and proactive manner. The project demonstrated the key role the private sector can play in promoting and sustaining agribusiness in terms of providing technical backstopping, market linkages, and innovation in an increasingly dynamic and demanding market. Climate change adjustments for mountain agribusiness in HIMALI project showed that watershed management needs to be done differently rather than doing too many things in it (Kotru, Subedi, & Sthapit, 2014). In other words, research perspectives need to be refocused. Climate change adaptation in agribusiness related action research under the HIMALI project proved that we are only in the beginning of understanding climate change and that research areas need to be looking in to interdisciplinary areas.

Summary

Data gaps and inadequate long term applied research in watershed management have been key issues in the HKH while there are obvious differences in scale and scope of such an approach. On the other hand, creating critical learning for policy and practice based on integrated research has obviously been high on demand. However since participatory and integrated watershed management has been widely applied, over two decades now participatory approach to generate applied research learning has manifested itself mostly through development projects. Increasingly also socio-ecological impacts and aspects of research are getting focus since large interventions are related to livelihoods and soil and water conservation. Nevertheless, research has yet to look in to disaster aspects of climate change and therefore little is known as to how watershed approach in HKH can build resilience among communities and their systems. The need of interdisciplinary applied research in watershed management was never so urgent.

The Political-Economy Perspective

While watershed development has shown promise, it has not been without its share of criticism. This criticism has been generally framed within the parameters set by the policy frameworks within a country itself. The lack of emphasis on drinking water, livestock security, and the skewed distribution of cost and benefits between the wealthy and the poor are common criticisms of the watershed approach (Kerr, 2002; Kolavalli & Kerr, 2002). Procedural elements of the approach, especially those that are part of public schemes, have also been criticized, primarily for the diminishing the role of civil society in building the capacity of communities (Shah, 2006) for inclusive approach among communities during participatory processes (Chhotray, 2007).

In the 1980s, state development narratives (e.g. national development strategies, public scheme concepts and designs) described the watersheds as erodible, ecologically fragile, and unproductive landscapes. 'So many of our modern concerns – empire, nation, freedom, and enterprise - have invoked topography to give their ruling ideas a natural form' (Schama, 1995). Thus, the transformation of landscapes has been a constant purpose of both the colonial and postcolonial states (NAI, 1906, 1945, 1989). In this context, a watershed has been a reflection of that transformation within the context of a neo-liberal economy. Post-liberalization era is marked by a policy shift from food self-reliance to profit-generation agriculture, articulating the expansion of value-generating interventions to semi-arid areas, the uplands, and coastal and mountainous regions (Bank, 2008). Watershed development constitutes this expansion of the spatial frontiers of 'value'- developing a system that justifies investment.

Policy narratives frame landscapes in particular ways to meet specific ends, and landscapes are political products. The redistributive imperative of the postcolonial state denoted semi-arid landscapes 'erodible', setting in motion soil and moisture conservation strategies of afforestation and soil regeneration that generated large-scale wage-employment. For instance, the value-generation imperative of the neoliberal state labels semi-arid areas 'water-scarce' calling forth irrigation expansion in the drylands to improve local livelihoods.

Problematization - identifying something as deficient and requiring transformation - is critical to the operation of governmentality (Li, 2007). Representations of landscapes often underscore lack or excess, and policy documents now articulate water scarcity as the chief problem of the drylands and wet areas alike. New narratives impose the nomenclature 'water-scarce' on an inherently mixed landscape comprising forests, grasslands, valleys, streams, tanks, flat lands and sloping fields. While the water cycle is 'a hydro-social cycle' (Swyngedouw, 2013) where non-human and human processes are intertwined in shaping water flows, official discourse divorces the hydrological landscape from social, political and economic processes that shape it. In the context of new generation of watershed projects, aimed at cushioning growing downstream economies against perils of climate change, watershed will represent a new enterprise within the growing market of ecosystem services as the scaffolding of policy design and even new political economy.

Summary

Watershed approach in terms of quantum of investments and scope of bringing in new narratives such as imposing the nomenclature 'water-scarce' on an inherently mixed landscape comprising forests, grasslands, valleys, streams,

tanks, flat lands and sloping fields gains huge attention of governments. Climate change discourses have only brought yet another expansion of the spatial frontiers of 'value' - developing a system that justifies investment. Accordingly, policy narratives frame landscapes in particular ways to meet specific ends, and landscapes are political products. Hence politically new generation watershed projects will remain attractive since paradigms for forming new enterprise are lined up (e.g. climate resilience, IES) and donors as ready investors download their funding targets.

The New Generation of Watershed Management

Across the Hindu Kush Himalaya, projects have demonstrated that the watershed management approach can, under the right mix of instruments and investments, create the synergy required to support both sustainable soil and water conservation and the optimized resource use to improve local livelihoods (Box 5).

Box 5: **New generation of watershed management**

The new generation of watershed management is built on the tested strengths of existing participatory and integrated approaches. It responds to climatic and non-climatic factors, involves a wider set of stakeholder demands, and bridges existing knowledge gaps. It sets forth strategic outcomes that need to be delivered on natural resource governance and management leading to higher resilience, and outlines the need to explore local financing mechanisms, such as those based on payment for ecosystem services or integrated biodiversity management systems. Finally, it relies on capacity building and partnerships that harness knowledge and ensure its wide dissemination.

FAO, 2006

When watersheds are highly degraded, projects have had fewer problems in achieving both conservation and livelihood objectives, as trade-offs are not required. Similarly, participatory approaches have helped in developing and encouraging the adoption of the most locally appropriate technologies. Incentives to participate are improved by focussing on generating positive income streams through natural resource use intensification, agricultural diversification, value-added processing, and marketing (Darghouth, Ward, Gambarelli, Styger, & Roux, 2008). For example, in some cases farmers and herders living in upstream areas have adopted new technologies without subsidy. However, this only happens when it has yielded tangible benefits with manageable risk and when they had the resources to invest.

The Watershed Organisation Trust (2014) captures the ground realities of smallholder farmers in rain-fed and drought prone areas of Maharashtra, Andhra Pradesh, and Madhya Pradesh in India. The paper presents WOTR's approach to climate-resilient agriculture, and shows the integrated and participatory watershed development improves the natural resource base around which other development initiatives are founded, particularly in semi-arid and arid regions of the country. As such, and given the current global discussion on the nexus of water-food-energy security, watershed development should be central to agricultural development activities. Similarly, the stories of the recently revived watershed-villages of Kachner Tanda and Kasarvadi, located in the heart of drought-hit Marathwada (India), make a strong case for watershed development as way to build resilience to drought. The watershed approach is viable for countering drought-like situations as well as climate variability.

There is a growing focus on the role of customary institutions in managing watersheds (Kotru et al., 2014). As the demand for water increases in a changing climate, users must shift to more efficient water management approaches. In some cases, traditional water management practices must be changed because of increasing demand from different users, especially from those related to industrialization and urbanization.

The advent of climate change has brought about a new dimension to the watershed approach. It is widely accepted that rising frequency of extreme events (e.g., floods and droughts) is likely to increase the vulnerability of poor communities, and especially women (Molden, Verma, & Sharma, 2014). This situation is already complex due to prevailing non-climatic factors (e.g., poor water governance) that push degradation and resilience-reduction of many key ecosystems and their human populations in the HKH beyond critical thresholds.

Early indications of climate change impacts in the region amplify the need to reduce knowledge gaps and scientific uncertainty in order to identify long-term challenges and options for ecosystem and community resilience. A recent study on the impacts of climate change on future water availability using the state-of-the-art climate models has shown that increased runoff is projected at least until 2050 (Lutz et al., 2014). This is caused primarily by an

increase in precipitation in the upper Ganges, Brahmaputra, Salween, and Mekong basins and from accelerated melt in the upper Indus Basin. These findings have immediate consequences for climate change policies, where a transition toward coping with intra-annual shifts in water availability is desirable.

Although these changes have economic and social costs, an integrated set of management responses within a broader integrated watershed management framework can mitigate these costs while sustaining a broad range of ecosystem services, including water availability. Ensuring equitable access to water and its benefits, now and in the future, is a major challenge as scarcity and competition continue to increase. The amount of water allocated to agriculture and water management will determine, to a large extent, whether societies achieve economic and social development and environmental sustainability (Molden et al., 2010). Similarly, trade-offs between 'agricultural water' and 'ecological water' are needed to support conservation and the ecological restoration of important landscapes, like wetlands.

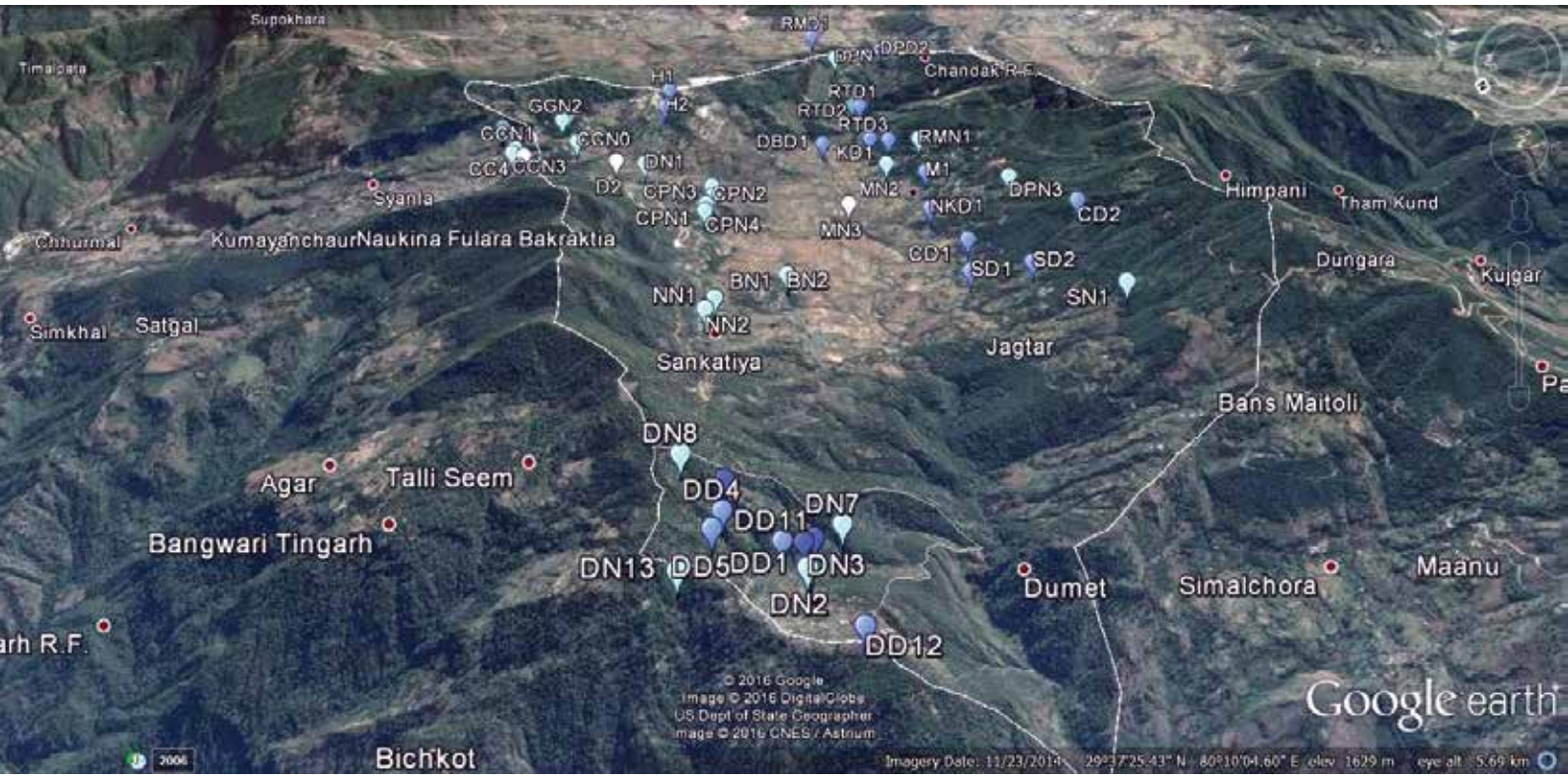
While it is important to plan for climate change and address non-climatic factors, there is limited information on the frequency of floods and landslides, changes in vegetation and weather patterns, and the potential impacts of climate change, particularly at the local level in terms of water availability. Uncertainty about the future impacts of climate change make it difficult to plan incremental measures, including those considered to be routine requirements of poverty alleviation and sustainable development. Countries across the HKH have mostly focused on the latter, and have hardly promoted investments in comprehensive research in already treated watersheds.

The exploration of incentives for ecosystem services (IES) – an innovative tool for financing investments in conservation and sustainable land use – is increasing, particularly when looking at hydrological services at the watershed level. Through IES mechanisms, producers in the uplands can receive important incentives for ensuring the quality and regular flow of water, which benefits people in the lowlands (UNESCO, 2003). However, these mechanisms must be supported by interdisciplinary scientific research that helps to develop applicable options for land use and management activities. They must span multiple scales and decision-making hierarchies, integrating learning from community-based management and networking at regional levels.

The Himalayan Context

The watersheds of the HKH support the world's most sensitive and highly diverse ecosystems, which provide valuable ecosystem services to large populations downstream. Global climate change is exacerbating the impacts of several existing drivers of change such as globalization, economic policies, and increased pressure on local land and mountain resources caused by population increase, economic growth, and lifestyle changes. As the cumulative effects of climatic and non-climatic factors increase, so will life-threatening risks to some of the world's most important watersheds, including in the HKH. As compared to the Tibetan Plateau, mid-Himalayan ranges (e.g. Mahabharata Range in Nepal, Upper Shivaliks and lesser Himalaya in India) are densely populated and influenced by monsoon precipitation. Ecosystems here are subjected to complexities of impacts originating from climatic and non-climatic factors.

Watershed complexities in the HKH are further compounded by the fact that upstream communities are not only resource poor, but are often vulnerable to political conflicts. The dynamics of politics, both local and external, has affected watershed projects across the region. Mechanisms to overcome externalities, or manage them to promote better overall productivity, have become imperative to realize the promise of watershed development. Externalities can be successfully addressed when projects are designed to first share the benefits of enhanced natural resource productivity with upland communities, which would provide sufficient incentives for poor and landless to conserve common lands in upper watershed areas. Addressing watershed externalities requires a proactive implementation agency that can capitalize on demographic dividends in upland areas.



Strategic Watershed Framework for the Hindu Kush Himalaya

The proposed framework for a future approach to watershed management in the HKH emerges largely from conclusions outlined in the previous sections, from deliberation during workshop on New Generation Watershed Management (NGWM) organized jointly by ICIMOD and FAO in 2011, and ICIMOD's learning from adaptation pilots in selected mountain watersheds. This framework also falls within the broader approaches of transboundary landscape and river basin management promoted through ICIMOD's strategic results framework (ICIMOD, 2012) (Box 6).

Box 6: **Goal of new generation watershed management workshop**

A workshop on new generation watershed management was organized to review, discuss, enrich, and validate the contents of a new generation watershed management proposal at global scale by key countries and partners in the Asia Pacific region. Accordingly, FAO partnered with ICIMOD to host a regional validation workshop at Kathmandu for the Trust Fund Project on NGWM in March, 2011. The overall goal of the workshop was to produce a consensus project document which was endorsed and owned by all stakeholders including participating countries and partner organizations. Furthermore the workshop was to build on the good experiences and lessons learned from past watershed management programmes and projects.

Strategic Orientation

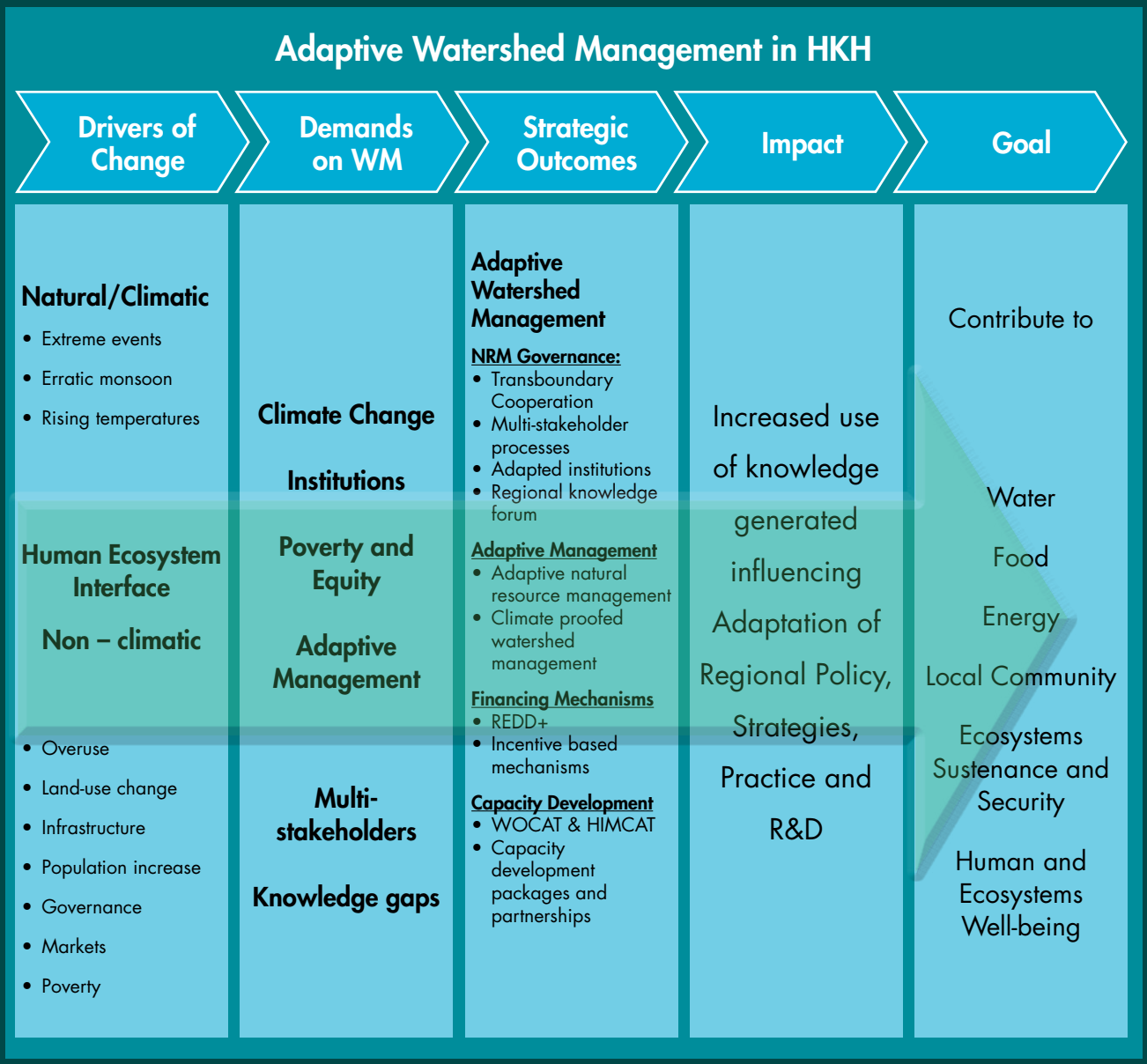
The proposed strategy draws from the experiences of a large number of stakeholders at different levels. It follows the principles of partnership and collaboration, similar to those adopted by ICIMOD and FAO. New generation watershed management initiatives must be tested and applied on-the-ground for the benefit of local communities, and, as such, must establish viable working relationships with participating governments. In each geographical location, activities should focus on four strategic outcomes (See Figure 1 below). These strategic outcomes are built to counter drivers of changes that are increasing demands on the current form of watershed management. By focusing on these strategic outcomes, it is expected that ecosystem can be conserved, protecting the welfare of human systems when it comes to water, food, energy, and livelihood security, as well as supporting local economic security. The achievement of these strategic outcomes sets out four pathways – institutional, knowledge, economic, and resilience – to positive impacts.

Institutional Pathway: Improving institutional capacities to address cumulative climatic and non-climatic issues in critical river basins and watersheds

The different management systems and flexible institutional agreements adopted by farmers and herders in mountain regions throughout the centuries have often proved an effective response to extreme environmental conditions, unpredictable disturbances and limited resources, the restoration of and learning from these adaptive arrangements and co-management patterns provide interesting alternatives that are worth exploration. Restoring communal approaches requires the devolution of power from centralized states to local authorities and community groups; the identification of new forms of governance, dialogue, and participation in decision making; and adequate policy incentives and innovative technologies to facilitate the integration of traditional systems into current socioeconomic and political contexts. However, this also needs to overcome the challenge of converging administrative boundaries across governmental institutions.

The institutional pathway can bring together combined wisdom and vision of (a) local communities including vulnerable groups, (b) interdisciplinary experts, scientists, development planners, resource managers and donors (c) other stakeholders such as specialized agencies in the region, centres of excellence, INGOs, NGOs, research institutions by organizing forums, interdisciplinary task forces, policy working groups and user's groups to cope with the impacts of cumulative changes including climate change in various watersheds within critical RBs in the regions

Figure 1: **Proposed Adaptive Watershed Management**



that are characterized by diverse bio-physical setting and socio-economic situation. The objective is to establish a stable system that would check soil erosion, ameliorate the chemical and physical properties of the soil and lead to increased income for mountain dwellers. These insights have implications on appropriate **policy, legislation, and other regulatory measures for responding to natural as well as unpredictable changes**. In its regional programmes ICIMOD can assist to revisit present status, innovative approaches, develop dynamic but consistent policy, update regulatory measures and adapt them to the impacts of cumulative changes as they come. It is also important to adapt, harmonize, disseminate and implement updated policy, law, and regulatory measures consistent to the international declarations and national commitments (e.g. with respect to water and environment such as those listed in RIO+20 recommendations and International Climate Conventions).

Adapting the capacities of different stakeholders at different levels across HKH through improved curricula of training, regional consultations and knowledge exchange, and awareness creation to produce informed and trained cadres of specialist and extension workers will enable them to manage assemblage of sub-watersheds in different RBs and Watersheds. The ultimate goal could be to strengthen the implementation capacity of service delivery agencies and intermediaries including media personnel to enable them to respond to the needs of the rural

communities. Capacity building need to be treated as a system, which will not look only in to training of personnel but also in adaptive capacities of RBM/WM institutions to change and produce future-oriented capacity-building material. Climate resilience curricula and focus need to be inbuilt in such a capacity-building system.

Choosing the most effective institutional pathway to guide the development of watersheds across landscapes is one of the more complex decisions that a country has to decide. This is especially the case since administrative boundaries and departmental rigidities are often difficult to overcome. However, regional, national, and local level WM experiences can be optimised by linking vertical and horizontal networks of specialized agencies, service delivery agencies and various intermediaries.

Knowledge Pathway: Building a dynamic knowledge base through regional river basin management and water management practices and mainstreaming of knowledge in next generation projects

There is an urgent need to identify, test and validate knowledge on adaptation measures in the conservation and management of the natural resources of mountains before current threat lead to irreversible losses. However, a precautionary approach is required, so as to avoid the undesirable consequences of adaptation options with high uncertainties and a weak scientific basis. In most cases, a successful adaptation strategy should promote and restore agro-ecological diversity at all levels, diversify land uses, complement income generating activities, and support the cultural richness of traditional management systems. Knowledge on adaptation measures will necessarily involve the development of innovative solutions, including new technologies, changes in management systems and institutions, and workable economic incentives, to fit the conditions of modern life, rural out-migration and face the greater environmental constraints caused by climate change.

Understanding how RBs and watersheds react to cumulative effects of climate change (changes in temperature, rainfall, and other extreme events) and other human stressors contributing to water stress (population growth, industrial development, urbanization, agriculture expansion etc.) is a growing challenge to be addressed by new generation of watershed management activities. Attracting investment, delineating adaptation and prescribing mitigating measures dealing with climate change issues demand convincing evidence and in-depth knowledge about the terrestrial ecosystems as well as atmospheric component of the watershed hydrology. While developed countries have consolidated the latest state of the art techniques in this direction, the countries in the HKH are at different stages of development. This framework envisages developing and applying new and innovative techniques to assess, plan, implement and monitor the national and trans-boundary watersheds resources. While doing so it envisages combining scientific knowledge with the local wisdom involving intimately specialist as well as community leaders. Transboundary initiatives need to be encouraged in all major shared watersheds to support the joint management of water resources as a tool to achieve sustainable development and regional stability, under a sound local and institutional framework agreed by all parties.

In response to the conclusion of several lead studies on the performance of the past watershed management initiatives and good practices there is a need to better connect knowledge with policy and science to avoid perverse outcomes triggered by WM based on unfounded myths and speculations. WM initiatives must support sound understanding of land and water interaction and various other techniques and practices consistent to right objectives through cumulative results of various action researches.

Economic Pathway: Exploring on local self-sustaining financial mechanisms to ensure perpetual investments in RB and WM and their upscaling

Watershed organization in the HKH could increase their impact through long-term financial planning. Market based mechanisms have gained attention in HKH especially since CoP 13 as reduced emissions through deforestation and forest degradation (REDD) was accepted as a means to incentivise good practices in forest management reducing greenhouse gas emissions. It has also taken on board the learning from regional pilots on IBMs/IES schemes. However, in order to most effectively protect individual countries waters and realize optimum benefits from the watershed ecosystem services, the new projects should assist watershed organizations in the countries and the watershed communities to develop and implement strategies to obtain, diversify, and leverage sustainable sources of funding. It is assumed that the valuation of bundle of services originating from a watershed or a river-basin have the

favourable chance of demonstrating economies of scale, when it comes to performance based ecosystem payments/ incentives along a watershed landscape. The knowledge about the economic value of most goods and services in mountain region should be promoted alongside pilot projects to demonstrate the benefits of payment schemes for watershed protection.

Opportunities for carbon markets linked to reduction of emissions from deforestation and degradation, and the enhancement of carbon stocks through conservation and sustainable management of land-use systems, are very promising initiatives to attract intergovernmental organisations' support as part of the REDD+ negotiation process. Agribusiness development of niche products from the mountains has the potential to attract private investments in watershed development. The challenge is to scale up such innovative initiatives for creative financing of projects and/or sub-activities within the watershed projects. Hitherto unexplored, private financing or co-financing is an emerging area that has yet to be suitably explored and tested. However, critical is to demonstrate tangible gains from ecosystem services emanating out of investment in watershed projects.

Resilience Pathway: Building on surface and sub-surface services for water or bio-diverse services such as carbon stocks through improved base flows from non-arable sections of the watersheds

Well-endowed with rich biodiversity, both natural and human-managed, conservation-linked sustainable development of mountain systems is critical in order to address sustainability concerns, not only of the mountain systems themselves, but also in finding solutions to global concerns. With rapidly emerging environmental uncertainties arising from global environmental change and economic globalisation, societies living in fragile mountain environments are no doubt more vulnerable to biodiversity loss. However, the adverse impacts of climatic and non-climatic changes in the mountains will not only be felt within the mountain regions but elsewhere too. This is the context in which maintaining mountain ecosystem resilience assumes regional as well as global significance for emerging disasters.

One of the greatest challenges faced by mountains is the need to rethink the management of freshwater resources which include springsheds as essential drinking water for millions, because the combined effect of land degradation and habitat loss on one hand and climate change on the other hand, will severely alter their hydrologic regimes. Even in the best climate change scenario with no precipitation decrease, higher temperatures and more frequent and intense extreme weather events will substantially enhance the water deficit – lower capacity of eroded soils to retain water and reduced runoff during the dry season – with important consequences for the whole hydrologic cycle. Emerging insights from the adaptive and community based WM practices in the past suggest that building resilience both within human and ecological systems is an effective way to cope with environmental changes characterized by future surprises or unpredictable risks.

Since sustaining agro-biodiversity in the mountains is both economic and ecological imperative, surface and sub-surface carbon stocks can be ensured through improved base flows. In addition to building resilience, it makes economic sense for the communities to sustain biodiversity which can act as an incentive for slope protection to maintain base flows. For an ecosystem to pass the test of resilience, its hydrologic cycle needs to be kept functional. In the context of building river basin integrity, sustaining base flows with adequate biodiversity cover assumes critical significance.

Adopting the Watershed Framework

The adoption of the watershed framework requires national watershed authorities and institutions to reorient their existing human resources and approaches for planning, implementing, and monitoring, including:

- Capacity building and training to identify gaps in current approaches in order to implement the proposed framework for watershed development. Providing methodologies and tools for restructuring existing watershed projects and/or designing new projects should be included in the training.
- Use of new tools for conducting field work under local conditions; assessment of the consequences of various influences on a watershed; and developing risk management strategies for watershed projects.
- Developing the interface between science, policy, and development to ensure comprehensive watershed development, especially in transboundary contexts.
- Regional and international networking for information exchange and exposure visits to increase the capacity of professionals, administrators, and local stakeholders to manage intersectoral processes and to understand new approaches.

Conclusions and Key Messages

The proposed framework has clear links to validated knowledge from the experience made in river basin and watershed management across the HKH. It is understood that this new generation of watershed management must consider both climatic and non-climatic issues, which in combination have exacerbated the complexity in managing the watershed landscapes. Several key structural and reform processes (e.g., decentralization in water governance, institutions) in the HKH have been slow, and inherent issues of good governance, participatory management of natural resources, use of value-added technologies, and productive involvement of private sector have not been resolved. Climate agenda has been added only off-late and hence a huge demand of innovating upon the current watershed management practices has emerged. The new watershed initiatives in HKH need to network key institutions to collaborate on testing NGWM in critical RBs/Watersheds. The 'Strategic Results Framework' of ICIMOD provides a wider scope to do that by bridging with its strategic programmes such as transboundary landscapes, adaptation to change and river basin management at vertical and horizontal levels of knowledge generation initiatives. Networking with other institutions such as with "Mountain Partnership" which offers a global platform of advocacy and knowledge exchange on sustainable mountain development and watershed management can only enrich learning. The new concept can rely on the above 4 strategic pathways as aligned to regional and global demands for finding answers to: How should transboundary cooperation work?; How adaptive management can be practiced?; Can local financial mechanisms be the panacea for sustainability of impacts and financial investments at scale made?; and How modern institutions for capacity building should look like?; and which are the promising capacity building packages for tackling regional challenges thrown by climatic and non-climatic factors? The new concept is designed to involve HKH countries, government interventions and range of institutions and communities. The concept, however, needs to integrate in existing institutional structures and thus avoid duplicity and needless complexity and confusion. Formal and informal local government structures can provide viable entry points for broad-sector collaboration. The concept is timely as transboundary cooperation in HKH – as realized by all nations - is the key to secure and sustain watershed based ecosystems for the benefit and welfare of massive populations across upstream-downstream boundaries having transnational character.

Key Messages

- Runoff composition and regimes projected to be increased until 2050 have immediate consequences for climate change policies on watersheds where a transition towards coping with intra-annual shifts in water availability is desirable.
- Watershed research, planning, management and monitoring in the HKH should embrace the diversity and complexity of situations across the region, from the western part and high-altitude areas to the world's wettest place on Earth in eastern subtropical areas.
- Watershed management with focus on gender and inclusiveness need to adjust to the emerging dynamism in the HKH viz., economic transition, demographic shift, growing urbanization, increasing conflicts, damage to agriculture, disasters, unorganised infrastructure investments.
- Next generation watershed projects need to be adaptive in nature, accommodating reliable predictions on climate, socio-demographic and political changes by embedding potential risk management features at the design stage.
- Post-project impact assessment need to provide objective assessment on approaches, instruments and investments that made lasting impact for drawing and adopting driving principles for future projects.
- Owing to frequent changes in the political composition of administrations, national governments should institutionalize watershed as a 'program' for project implementation, post-project impact assessment and knowledge building.
- Watershed need to be pursued as a policy for developing participatory land use planning which should act as basis for policymakers and practitioners to develop the menu of choices for site specific watershed management.
- Participatory watershed management can provide entry point for climate resilience focus and should be promoted for providing holistic solutions to counter degrading factors at landscape levels as well as building of resilience.
- Networking with ongoing programmes to understand how new instruments including incentives for ecosystem services are performing (e.g. inclusion of REDD+, CDM in forest sector) is must and a regional networking amongst such programmes under the aegis of ICIMOD should be pursued.

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International Centre for Integrated Mountain Development
GPO Box 3226, Kathmandu, Nepal
Tel +977 1 5003222 **Fax** +977 1 5003299
Email info@icimod.org **Web** www.icimod.org

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