



# Expert Symposium on Koshi River Basin Management in a Federal Context: Efforts and Opportunities



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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 (HKH) – Afghanistan, Bangladesh, Bhutan, China, India, Myanmar, Nepal, and Pakistan – based in Kathmandu, Nepal. Globalization and climate change have an increasing influence on the stability of fragile mountain ecosystems and the livelihoods of mountain people. ICIMOD aims to assist mountain people to understand these changes, adapt to them, and make the most of new opportunities, while addressing upstream and downstream issues. ICIMOD supports regional transboundary programmes through partnerships with regional partner institutions, facilitates the exchange of experiences, and serves as a regional knowledge hub. We strengthen networking among regional and global centres of excellence. Overall, we are working to develop economically and environmentally-sound mountain ecosystems to improve the living standards of mountain populations and to sustain vital ecosystem services for the billions of people living downstream – now and in the future.



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## **Expert Symposium on Koshi River Basin Management in a Federal Context: Efforts and Opportunities**

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# Foreword



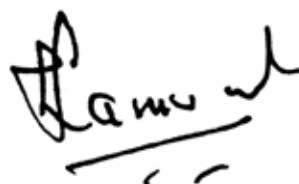
The Government of Nepal (GoN) is working to achieve sustainable development and poverty alleviation goals through the proper management of natural resources to meet growing food, water, and energy demands, and realize conservation and climate objectives. However, its reliance on natural resources for economic growth has resulted in widespread environmental degradation and presented a significant challenge to balancing competing stress on its natural resources, likely to be further exacerbated by climate change and climate extremes. These problems have undermined long-term economic growth in Nepal and threatened ecological systems essential to sustainable development.

A focus on sustainable development fully integrating watershed management has become a priority for Nepal. Careful management of watershed resources is essential for investments in development to yield sustainable benefits. Unpolluted and undegraded watershed resources are required for long-term economic growth and food security. Addressing environmental issues requires partnerships among stakeholders, coordination between horizontal and vertical layers of government, public awareness, and enhanced institutional capacity.

Thus, in order to tackle these challenges, the 39th meeting of the National Development Action Committee chaired by the Right Honourable Prime Minister formed a high-level body to adopt an integrated approach towards the management of river basins. This committee is working on developing priorities and programmes on integrated river basin management so as to align them with the country's federal restructuring process. With the restructuring of the states, there are now multiple policies and stakeholders so this is the right time to address these pressing issues and discuss integrated river basin management options.

In order to focus on the integrated river basin management approach, the government has already established river basin management offices in all the major river basins of the country. These new institutional structures aim to bring coordination among relevant stakeholders and institutions for a collective and integrated approach to managing resources. The engagement of stakeholders, both vertically and horizontally, and collective coordination are fundamental requirements for integrated river basin management. The Department of Forests and Soil Conservation and the International Centre for Integrated Mountain Development (ICIMOD) jointly organized an expert symposium on the Koshi River basin. The symposium gave fundamental inputs on managing resources using an integrated management approach for the Koshi basin.

On behalf of the Department of Forests and Soil Conservation, I would like to thank each and everyone involved in the symposium and ICIMOD for collaborating with us in organizing this important event.



**Ram Prasad Lamsal, PhD**

Director General

Department of Forests and Soil Conservation

Date: April 2019

# Acknowledgement

The “Expert Symposium on Koshi River Basin Management in a Federal Context: Efforts and Opportunities” was jointly conducted by the Department of Forests and Soil Conservation, Ministry of Forests and Environment, and the International Centre for Integrated Mountain Development (ICIMOD).

The organizers would like to express their sincere gratitude to the symposium’s chair, the presenters, and the participants for their contributions to the various sessions. We also greatly appreciate the efforts of the Ministry of Industry, Tourism, Forest and Environment (Province 1) for its support to this symposium.

The symposium was organized by ICIMOD's Koshi Basin Initiative, which is supported by the Australian Government through its Sustainable Development Investment Portfolio for South Asia.

# Acronyms and Abbreviations

BCRWME	Building Climate Resilience of Watersheds in Mountain Ecoregions
BMC	Basin Management Centre
CBOs	Community-based organizations
DFO	Division Forest Office
DoFSC	Department of Forests and Soil Conservation
GLOF	Glacial lake outburst flood
GoN	Government of Nepal
ICIMOD	International Centre for Integrated Mountain Development
IES	Incentive for ecosystem services
IRBM	Integrated River Basin Management
IWM	Integrated Watershed Management
IWRM	Integrated Water Resource Management
KBI	Koshi Basin Initiative
MPID	Ministry of Physical Infrastructure Development
MoFE	Ministry of Forests and Environment
MoITFE	Ministry of Industry, Tourism, Forests and Environment
NAP	National Adaptation Plan
NDAC	National Development Action Committee
NPC	National Planning Commission
NPR	Nepalese Rupees
SDGs	Sustainable Development Goals
sq. km	Square Kilometre
VA	Vulnerability Assessment
WECS	Water and Energy Commission Secretariat
WMO	Watershed Management Office
WTP	Willingness to pay



# Executive Summary

Nepal recently adopted the federal governance system. This new structure is being institutionalized on numerous fronts, including that of sustainable management of natural resources. Clarity on the governance and stewardship of these resources is urgent as millions of people in the country, especially the poorest, depend directly on natural resources and river basins for their survival and livelihoods.

The effective management of river basins whereby the water can be used for domestic and agricultural purposes, as well as for energy, is one of the key priorities of the Government of Nepal (GoN). The country faces multiple challenges such as the degradation of land and water resources, increasing resource conflicts, and gaps in collective management and coordination of these shared resources. With the recent state restructuring, and multiple policies and stakeholders, this is the right time to address these pressing issues and discuss the options on integrated management for the Koshi basin, which would also lay the foundation for other river basins in the country.

In this context, a two-day symposium was held in Biratnagar on 21–22 December 2018 to share current knowledge on river basin management and good practices, and discuss a possible framework for integrated management in the Koshi basin. The symposium was jointly organized by the Department of Forests and Soil Conservation (DoFSC) and the International Centre for Integrated Mountain Development (ICIMOD). The event brought together nearly 70 policymakers, senior government officials, academics, and relevant practitioners from Province 1 and across Nepal.

The chief guest at the inaugural session was Subodh Pyakurel, the Vice Chairman of the Provincial Planning Commission (Province 1). This session was chaired by Ram Prasad Lamsal, the Director General of the DoFSC. The others who addressed the session were: Badri Raj Dhungana, the Provincial Secretary of the Ministry of Industry, Tourism, Forest and Environment (MoITFE); Sagar Kumar Rai, the Provincial Secretary of the Ministry of Physical Infrastructure Development (MPID); and Kanchan Shrestha, the Programme Coordinator of the Koshi Basin Initiative, ICIMOD. Prem Prasad Paudel, the Undersecretary of the DoFSC, welcomed the participants and presented the objectives of the two-day programme.

In his remarks, Subodh Pyakurel stated that developmental work without considering watershed management may bring in disasters and become counterproductive. So, he emphasized on the crucial need for a collective response in terms of policy interventions, institutional support, and research. Ram Prasad Lamsal stated that the GoN has already adopted the river basin approach and was working on incorporating possible modalities in river basin management in the present federal context.

On the first day, the symposium held three technical sessions with 12 presentations. The second day focused on group work.

Session 1: Integrated River Basin Management: Concepts, Principles, and Practices

Session 2: Thematic Presentation on Climate Change, Soil Erosion, Sedimentation, and Water Infrastructure

Session 3: Thematic Presentation on River Basin Management for Sustainability

Through these presentations, interactive discussions, and group work, the participants highlighted the fact that in the context of the new federal system, it was only through collective response and collaboration at all levels of government that effective management of river basins can take place which then paves way for multiple benefits. The key outputs of the deliberations were as follows:

- Koshi River basin has multiple value and provides diverse ecosystem services. It not only has transboundary significance, but also national strategic importance. Therefore, integrated river basin management (IRBM) is the way forward—by combining the different aspects of the river, its uses and overall environment, as well as by forming cross-sectoral linkages which would have a harmonizing effect.

- IRBM promotes the coordinated development and management of water, land and related natural resources in order to maximize economic and social welfare without compromising on the sustainability of vital ecosystems.
- Complex geographical setting, climate change, infrastructure development, lack of proper understanding of landslide and sedimentation, and the impact of natural events on livelihood are the major challenges in river basin management at different scales and in different regions.
- The local communities can adapt to existing and possible challenges through: impact assessment at relevant scales; a multisectoral and integrated planning approach with careful consideration given to upstream–downstream linkages at various scales; contingency planning; availability of reliable information on weather; setting up of early warning systems; alternative energy use; action research; and policies and regulations.
- An appropriate mechanism has to be developed to share benefits and minimize risk in accordance with the federal system.
- Springshed management approach needs to be considered to enhance water availability throughout the year by increasing groundwater recharge during the monsoon period.
- An incentive for ecosystem services (IES) scheme designed under a multisectoral approach could supplement the existing resource management approaches for the welfare of both service providers and water resource users.
- Researchers and planners should work together to set up useful mechanisms such as community-based early warning system, IES scheme, and springshed management—these will have a direct and positive impact on the livelihoods of the local communities and will reduce the risk of disasters.
- The Koshi basin can be sustainably managed through: improved data collection and monitoring; validation and developing indicators for river basin management; participatory decision-making; identifying upstream–downstream linkages and development pressures at different scales; improving risk mapping of the communities/infrastructure; and by protecting natural and other resources.
- As the Koshi River basin management will largely be driven by economic interests and political priorities, there’s a need to follow four orders of outcomes: enabling conditions (support for institutional capacity building); behavioural change of stakeholders/institutions (reducing stress); attaining programmatic goals (social, economic and environmental targets); and ensuring sustainable and resilient ecosystems.
- Since a balance has to be maintained between conservation and development, a certain amount from the development budget should be allocated for conservation and environmental protection.
- When all three levels of government are involved in policy formulation, it is the right time to streamline traditional and scientific knowledge and incorporate all the solutions to the challenges, and take immediate actions to institutionalize them.

Moving beyond river basin management, the symposium also drew the attention of the participants to the inherent linkages between land use and ecosystems. It was pointed out that the resolution of complex and heterogeneous issues/challenges of the Koshi basin can be achieved by formulating clear policies and plans at all the three levels of government with identified roles and responsibilities.

# Background

The GoN emphasizes on integrated management of land and water resources while ensuring multiple uses of water (i.e., for energy and irrigation), reduction of climate- and water-induced disasters, and sustainable development through integrated river basin management. While state policies focus on the sustainable use of the available natural resources, the country faces multiple challenges such as degradation of land and water resources, increasing conflicts regarding the use of these resources, and gaps in multi-stakeholder coordination. Realizing these challenges, the 39th meeting of the National Development Action Committee (NDAC), chaired by the Prime Minister, formed a high-level body to look at river basin management approaches. In line with the NDAC's decision, the Ministry of Forest and Environment (MoFE) has formed a task committee to execute this agenda under the stewardship of a National Planning Commission (NPC) member (from the forestry and environment sector). In the meantime, the GoN has also established four major river basin offices to manage the Koshi, Gandaki, Karnali and Mahakali rivers.

The Koshi River basin is one of Nepal's major river systems and provides multiple ecosystem services for national economic development and community livelihoods. As the state is being presently restructured, and as there are now multiple policies and stakeholders, it was found that this was the appropriate time to discuss integrated river basin management options for the Koshi basin, which would also lay the foundation for other river basins in the country.

The two-day expert symposium was designed to share current knowledge on river basin management and good practices, and arrive at a possible framework for integrated management in the Koshi basin.

## Specific Objectives

The symposium aimed to bring together relevant policy and decision makers, scientists, and practitioners to engage in consultative discussions in order to:

- Share updates on the current state of knowledge in Nepal with regard to river basin management, and to identify gaps and ways forward, with particular focus on the Koshi River basin.
- Discuss and receive feedback on a possible framework for river basin management plans and programmes, which will feed into the national-level policy formulation process.



# Day One

## Inaugural Session

Subodh Pyakurel, the Vice Chairman of the Provincial Planning Commission (Province 1), was the chief guest at the inaugural session, which was chaired by Ram Prasad Lamsal, the Director General of the DoFSC.

### Messages from the Speakers

Prem Prasad Paudel, the Undersecretary of the DoFSC, welcomed all the participants. He introduced the two-day programme and presented the symposium objectives. He highlighted the features of the Koshi River basin and its importance at the transboundary level. He mentioned that the MoFE and ICIMOD have collaborated to generate knowledge and evidence-based policies and programmes at the river basin level. He said that the expectation was that this two-day interactive exercise would create a platform to all the relevant stakeholders to provide feedback on integrated river basin management during this period of transition in the country.

Kanchan Shrestha, from ICIMOD, the Programme Coordinator of the Koshi Basin Initiative (KBI), said that the KBI has been working on managing and protecting the Koshi River basin and its ecosystems within the framework of integrated river basin management. She stated that there has to be a collaborative approach with the GoN for the integrated management of the Koshi basin. And for this, she said, the foundation must rest on strong, evidence-based decision-making with the help and use of pertinent data as well as regular monitoring at different scales.

Badri Raj Dhungana, the Provincial Secretary of the MoITFE (Province 1), highlighted the need for interprovincial collaboration for policy coherence, especially in the case of managing the shared Koshi River basin. He said that suggestions and feedbacks from this symposium would help in bringing about consistency in implementing actions from the central to the local levels.

Sagar Kumar Rai, the Provincial Secretary of the MPID (Province 1), applauded the whole initiative. He drew attention to the importance of interlinkages, coordination and strategic discussions among the implementing agencies. He also stressed on the active engagement of all the stakeholders involved in the scheme.

Subodh Raj Pyakurel, the Vice Chairman of the Provincial Planning Commission (Province 1), commended the initiation of a river basin management system which links not only upstream and downstream communities, but also institutions and governments at all levels. He, however, said that developmental work without considering watershed management may bring in disasters and become counterproductive. Similarly, he said that if the issue of watershed management is not addressed, the navigation plan proposed by the government may turn out to be a failure. He also laid stress on the need for a collective response in terms of policy interventions, institutional support, and research.

Such collaboration will be instrumental in shaping effective ways of managing river basins in a federal system, he said. Concluding his remarks, Pyakurel expressed his commitment towards implementing the findings from the symposium.



## Remarks from the Chair

Ram Prasad Lamsal, the Director General of the DoFSC, said that the Koshi basin has multifold aspects: transboundary significance; upstream–downstream linkages; ecosystem and biodiversity issues; livelihood matters; and climate change challenges. All these aspects need to be addressed simultaneously while managing this river basin, he said. He further stated that the GoN has already adopted the river basin management approach with the establishment of dedicated river basin management institutions in all four major river basins in Nepal. The respective provincial governments are also committed to take this further, he said. He also informed that a high-level team under the leadership of Nepal's National Planning Commission is working to suggest a possible modality on river basin management in the context of the new federal system. He concluded the session by thanking all the participants for attending the symposium.



## Technical Session

### Session 1: Integrated River Basin Management: Concept, Principles, and Practices

Session Chair: Ram Prasad Lamsal, DoFSC

#### Presentation 1: River Basin Management in a Federal System: An Analysis of the Transition Plan, Policies, and Programmes – *Prem Prasad Paudel, DoFSC*

Prem Prasad Paudel spoke about the concept of IRBM and its importance. He said that it is only through this approach can several factors be combined—uses of a river, environmental issues, cross-sectoral linkages, and overall harmonization. Presenting past plans and policies that have adopted the IRBM approach, Paudel informed that the 39th meeting of the NDAC, chaired by the Prime Minister, has decided to form a high-level committee, coordinated by the MoFE, to look at river basin management approaches. For the same, the MoFE has formed a task committee under the stewardship of NPC member. Presenting facts and figures about the Koshi basin, Paudel informed that the river carries between 80 million to 120 million cubic metres of sediment per year, and that it had migrated over 100 km westward between the mid-eighteenth and mid-twentieth centuries.

He said that during the current transition period towards a federal structure, several efforts have been made in the area of river basin management, such as the establishment of four basin offices under the MoFE, and the formulation of a central-level strategic policy by the NPC. He also informed about policies and plans in the pipeline—such as the formulation of a water resource policy, the drafting of a master plan related to hydropower and irrigation (by the Water and Energy Commission Secretariat—WECS), and the preparation of province-level policies and programmes. In addition, he said that small-scale initiatives are in the offing, such as a multi-hazard management project in Dudhkoshi. Looking even further ahead, he said that the DoFSC has a plan to develop an integrated watershed management (IWM) framework to address floods and droughts induced by climate change. He also talked about the importance of scaling up IWM practices. Finally, he said that the Koshi River basin has multiple value and provides diverse ecosystem services. The basin, he stated, has not only transboundary significance, but also national strategic importance. Therefore, he called for integrated multiple interventions, and collaborative and harmonized plans and policies.

## **Presentation 2: Integrated Water Resources Management; Approaches, Plans, and Policies – Maheswor Shrestha, WECS**

Maheswor Shrestha mentioned that WECS is the apex body for the water sector in the country, and is also responsible for developing river basin plans. He said that three provisions have to be made simultaneously for effective water resource management: legal, policy and administrative provisions. He added that water resource management depends on two aspects: demand and supply management. Informing about different existing water-related constitutional provisions, he said that the National Water Resources Policy and the Water Resources Act are in the final-draft form and in the drafting phase respectively. He added that integrated water resource management (IWRM) principles have been embedded in these legal documents. Furthermore, the World Bank is lending its support for the preparation of river basin plans, a hydropower development master plan, and in carrying out strategic environmental and social impact assessments. The aim, he said, is to incorporate IWRM principles in all the river basin plans, taking into account, among others, the capacity development of all the relevant stakeholders. He apprised that the river basin plan formulation process comprises data collection and analysis, participatory stakeholder assessment, a decision support system, scenarios of future conditions in the basin, and development and analysis of water resource management options.

## **Presentation 3: Multi-scale Integrated River Basin Management in Nepal: Challenges and Opportunities – Santosh Nepal, ICIMOD**

Santosh Nepal explained about the upstream and downstream linkages of river basins where different opportunities and threats exist. Upstream and downstream relationships occur at different levels, he said, where the nature and the magnitude of the problems and related effects differ. He stated that both IWRM and IRBM promote the coordinated development and management of water, land and related resources in order to maximize economic and social welfare without compromising on the sustainability of vital ecosystems. Pointing out the different challenges that exist in river basin management, Nepal said that the processes/impacts of these challenges dominate at different scales, and in different regions. So, he said it is important to look at these processes in an integrated way. He further stressed that the impact assessment has to be done at relevant scales, as the scales are connected in a nested approach. He then pointed out the need for developing an appropriate mechanism so that the benefits and risks can be shared in the context of a federal system. He emphasized that the IRBM approach minimizes risk and maximizes benefits related to water resources and their uses. Elaborating on IWRM issues, he cited that temperatures are rising, glaciers are decreasing, springs are drying, and disaster risks across the basin are increasing. In all this, he said, the women are the most affected. The complexity and the heterogeneity of the issues/problems increase across different scales, he said. The above issues can be addressed, he said, by adopting a multi-scale integrated management approach with careful consideration given to upstream–downstream linkages at various scales. Nepal concluded by saying that though there are challenges in balancing the integration among different sectors, seasons and geographical regions, as well as in addressing the issue of climatic uncertainty, pragmatic water management solutions at the local level have to be scaled up.

## **Presentation 4: Incentive for Ecosystem Services (IES) for Drinking Water: Lessons Learnt from Dhankuta – Laxmi Dutt Bhatta, ICIMOD**

Laxmi Dutt Bhatta said that the demand for ecosystem services is growing rapidly around the world. However, climate change, anthropogenic pressures on the ecosystem, and a range of unsustainable development activities continue to degrade ecosystem services. The availability of water, one of the major ecosystem services, is decreasing, while at the same time, water-induced disasters are increasing, said Bhatta. Giving the example of Dhankuta, he said that 80 per cent of the water that's supplied to Dhankuta town comes from the Tankhukhola watershed. He informed that the willingness to pay (WTP) for 24-hour supply of water in Dhankuta town is NPR 632.20/household/month, while additional WTP for erosion control and water source protection stands at NPR 0.52 and NPR 0.35 respectively. An IES mechanism is now under operation to protect upstream forests, he said. Each household in Dhankuta town pays NPR 25/household/month to upstream communities. He stressed that for the effective implementation of the IES scheme, a tripartite institutional structure ought to be in place, involving existing local institutions, and that this should be considered as a supplementary scheme to the existing resource

management approaches. He stated that designing the IES scheme under the multisectoral approach would prove more beneficial to both service providers and water resource users. Winding up his presentation, he suggested that if the service providers could be rendered support in kind, it may enhance the efficacy of the IES scheme.

## Discussions

After each presentation, the floor was opened for discussions. The participants expressed concern regarding the coordination between the WECS and the DoFSC in terms of harmonization among policies. To this, Prem Prasad Paudel clarified that the DoFSC and the WECS are indeed working in close coordination. He said as many of the policies were still in the preparatory stage, this was the right time to synergize them. Highlighting the multiple uses of watershed, a question was raised as to how it could be managed when overlapping roles and interests are at play. Maheswor Shrestha answered that the WECS is fully aware about the multiple uses of water, and accordingly, it is currently estimating the quantity of river water through the modelling approach and this information will help in the further planning of water use. The participants requested that the Triyuga River too should be part of this modelling scheme of the WECS so that the local government could get detailed data on the river which would be of help in the planning process. Expressing curiosity about the IES scheme, the participants said that sand mining, gravel collection, and encroachment are having a deteriorating effect on river health and ecology. They said that while the concept of IES may be useful in terms of small-scale projects, it would be challenging when it comes to large-scale projects. The IES model, they said, should be based on the output that is obtained. Responding to this, Laxmi Dutt Bhatta said that the IES mechanism is voluntary and can be adopted taking into consideration the natural boundary of the watershed—from sub-watershed level to basin level. Those who are using the services, he said, should pay for it. He added that there should be an effective monitoring and evaluation mechanism to minimize the degradation of the ecosystem and to properly utilize the money allocated for the conservation of the ecosystem.

## Closing Remarks from the Chair

Ram Prasad Lamsal said that river basin management should start with the management of small rivers as it would be difficult to manage a whole river basin. For the management of a river at the basin level, watershed-level conflict and vagueness among different levels of government may arise which must be resolved based on past experience and collaboration, he said. He also mentioned that a climate projection scenario is important from the perspective of watershed management. Further, he stated that a balance could be achieved between conservation and development activities if a certain amount from the development budget is allocated for conservation and environmental protection. He closed the session by thanking all the presenters and the participants.

## Session 2: Thematic Presentation on Climate Change, Soil Erosion, Sedimentation, and Water Infrastructure

Session Chair: Badri Raj Dhungana

### Presentation 1: Climate Change, Water Availability, and Drought in the Koshi River Basin – Santosh Nepal, ICIMOD

Santosh Nepal said that the signs of climate change are very visible in the Koshi River basin in the form of increasing temperature and variations in rainfall intensity and frequency. He said that climatic extremes are going to be increasingly felt in the future. Saying that the warming trend will adversely affect snowfall, snowmelt and glacier melt, he predicted more severe floods in the future. Talking of the Koshi River basin, he said it is vulnerable to droughts and increasing temperature trends which will cause the drying up of springs and a higher degree of droughts related to soil moisture. These issues, he said, need to be dealt with in the integrated river basin management approach which would require a flexible and adaptive framework. He also mentioned that the National Adaptation Plan (NAP) can support local adaptation options against climate change impacts.



## **Presentation 2: Irrigation Infrastructure in the Koshi basin – *Hareram Shrestha, Sunsari Morang Irrigation Project***

Hareram Shrestha stated that many small and medium irrigation systems have been built by local farmers, government, and other agencies in the Koshi River basin. The major existing irrigation systems are the Sunsari Morang Irrigation Project and the Chandra Nahar Irrigation Project, he said. The Sunsari Morang Irrigation Project, he informed, was set up in 1970, and irrigates 68,000 ha of land, while the Chandra Nahar Irrigation Project came into existence in 1928, and irrigates 10,500 ha of land in Saptari district. He also referred to other projects in the Koshi basin that not only support year-round irrigation but also generate electricity. Talking about projects in the pipeline, he cited the barrage construction at Chatara, which is expected to add irrigation facilities to more than 50,000 ha of land in the Koshi River basin.

## **Presentation 3: Soil Erosion and Sedimentation in Koshi Basin – *Basanta Raj Adhikari, TU and Prakash Singh Thapa, DoFSC***

Basanta Raj Adhikari said that most of the Himalayan rivers are snow-fed, while they also receive a strong monsoon. This results in river bank failure, landslides, and dam bursts. The Koshi River covers an area of about 88,000 sq km, and is one of the major river systems in the Himalaya which starts from China and flows to the Indian Ocean. This river has witnessed major natural events: glacial lake outburst flood (GLOF) in Bhotekoshi in 1981 and 2016; and the earthquake of 2015. Adhikari said that the major challenges to dealing with the whole dynamics of this river basin in terms of integrated management are: a complex geological setting; lack of proper understanding of landslide and sedimentation; and the occurrence of natural events that impacts livelihood. He said that most of the governmental agencies as well as NGOs and INGOs are working on post-disaster management in the downstream area, and very little attention is being paid to the source area and to disaster prevention; and, as for the agencies working on prevention and mitigation measures, these are too fragmented and inefficient. Then citing some of the positive aspects, Adhikari pointed to community-based risk-reduction measures like early warning systems on landslide, and ecosystem-based adaptation approaches.

## **Presentation 4: Koshi Basin Information System: Increasing Access to Information for Decision-making – *Kanchan Shrestha, ICIMOD***

Kanchan Shrestha presented some basic information about the Koshi basin. In a two-decade period (from 1990 to 2010), the basin recorded nearly 170 per cent increase in the built-up area. She pointed out that erosion risk has increased in 9 per cent of the area, while it has decreased in 3 per cent. As for glacial lakes, they have increased by 18 per cent in the area, and 42 potentially dangerous glacial lakes have been identified in the basin. She said that the basin also has 86 critical freshwater ecosystems, but while there are a high number of springs, they are gradually dying. Referring to statistics from 1992–2010, she said that the number of landslides had decreased, but the basin still remains prone to landslides. Therefore, she stressed on landslide risk management by preparing a common landslide inventory in order to identify critical areas and hotspots. She also suggested formulation of policies that embed landslide issues, and the sharing of information and technology in order to engage the local communities in landslide-control activities. Providing an example of community engagement in disaster-risk reduction, she said the simple technology of a community-based early warning system has been effective in minimizing flash floods, while it has also been able to link the upstream and downstream communities. She also pointed out measures that can be taken towards the sustainable management of the Koshi basin: improving data collection; monitoring, validating, and developing indicators for river basin management; participatory decision-making; identifying upstream–downstream linkages and development pressures at different scales; and improving risk-mapping.

## **Discussions**

After the presentations, the participants asked different questions to each presenter. They asked as to what might be the reason for the projection of increase in drought when rainfall is supposed to increase by 2100. Santosh Nepal explained that the rainfall pattern is becoming erratic and that the rains are mostly taking place only in the monsoon



season, which means less rainfall during the pre-monsoon and winter seasons. This, he said, is the most important factor that will contribute to droughts in the future. Participants also asked questions concerning water-related infrastructure. They sought guidance on ways through which potential conflicts between provincial governments can be resolved. The discussion focused on the associated environment costs of development projects, including a cost-benefit analysis of river diversion and on ways to account for downstream disasters resulting from the collapse of big dams. Hareram Shrestha answered that while river diversion may prove to be environmentally costly, its benefits far outweighed its demerits. He asserted that the issue of environmental impact was considered while analysing the project and not all the water has been diverted. He then stated that enough safety precautions have to be taken while developing mega projects. In terms of benefit sharing, he said one could learn from good models developed through research, and by learning from international experiences. Regarding soil erosion and landslides, the participants asked whether the scenarios presented during the technical session actually reflected on-the-ground realities. Basanta Raj Adhikari said that it does not reflect the ground reality completely. He said a model is being developed and other factors such as earthquake-triggered landslides need to be incorporated into it. Similarly, the participants asked about the time taken to instal an early warning system for flood and its effectiveness, as also about the tentative cost to instal such a system. Kanchan Shrestha answered that the system will deliver messages to the communities on time, preventing loss of lives and valuables. The installation cost for this early warning system for floods, she said, differs from location to location, and the tentative amount is USD 4,000.

### Closing Remarks from the Chair

Badri Raj Dhungana said that the session was very informative and that it provided insights into the need to link all the sectors when it comes to formulating policies and programmes. He said that climate change and human interventions might trigger many disasters in the future, so there's a need to plan for it in the present time. The Watershed Management Office (WMO), in collaboration with the local government, can implement low-cost and sustainable technological solutions such as the early warning system, he said. As the province is in the process of formulating provincial plans, he said, all the solutions presented in the session ought to be incorporated in these plans. He concluded the session by expressing his hope that the group work would provide suggestions and feedback to the provincial ministry.

## Session 3: Thematic Presentation on River Basin Management for Sustainability

Session Chair: Hareram Shrestha

### Presentation 1: Introduction to Basin Management Centre, Koshi, and Watershed Management: Upstream–Downstream Linkages in the Koshi Basin – *Uddhaw Bahadur Ghimire, Basin Management Centre, Koshi*

Uddhaw Bahadur Ghimire mentioned that watershed management requires a multidisciplinary approach involving supporting partners, the use of sound sciences, and well-planned actions. Saying that watershed management and the farming system are interrelated, he specified that the Koshi watershed is under threat due to the decline in soil fertility, natural hazards, forest degradation, etc. Highlighting the importance of watershed management in the basin, he said that a basin is the perfect geographical unit for developing natural resources as flowing water follows physical laws, creating an interrelationship between upstream and downstream. The upstream–downstream relationship occurs at different scales, and generates both opportunities (water availability) and threats (flooding and sedimentation), and this linkage could be environmental, institutional, cultural or socio-economic. He also presented a brief profile of the Basin Management Centre (BMC), Koshi, Udayapur, which aims to link upstream and downstream, facilitate integrated watershed management, support in policy formulation, conduct research and study at the basin level, and coordinate, collaborate and involve local communities in basin management.

### Watershed Management: Experience from Building Climate Resilience in the Mountain Ecoregion (BCRME) – *Ram Singh Thapa, Basin Management Centre, Gandaki, Pokhara*

Ram Singh Thapa said that climate change has multidimensional effects on livelihood, agriculture, water, biodiversity, and human health. Water scarcity in the dry period is one of the key challenges of Nepal, he said.

Springs, the only source of water in the mountains, are dying, and the rural people, especially the women, are the most affected. He said that the project called BCRME (2014–20) aims to address the issue of dying springs and its impact on the livelihood of the vulnerable communities living in the far western province of Nepal. He informed that after the assessment of springs and their prioritization and catchment delineation, the project carried out different key activities in resilience building which involved water collection structures, catchment restoration, capacity building, and income-generation schemes. This, he said, has provided benefits to 42,882 households, out of which 33 per cent are headed by women. He said that the key learning from the project is that a valley-to-valley approach (the spring shed approach) needs to be considered rather than a ridge-to-valley approach (the watershed approach) if the objective is to enhance water availability in the dry period by increasing groundwater recharge in the monsoon period. He stated that socio-ecological resilience could be built in Nepal by identifying the dry zones, enhancing capacities at the community level, linking water source conservation with livelihood options, ensuring smart coordination among stakeholders and partners, and promoting research and development.

### **Presentation 3: Koshi River Basin Management Initiatives from Province 1 – *Badri Raj Dhungana, MoITFE***

Badri Raj Dhungana gave a brief introduction about the MoITFE and the natural resources of Province 1. The forest cover in Province 1 is around 43 per cent of the total land area. There are more than 103 wetlands and lakes. This province comprises many high Himalayas, important protected areas, and Ramsar sites. The MoITFE is responsible for managing, protecting and conserving these natural resources. Dhungana said that the provincial government has given priority to the integrated watershed conservation programme, chure area conservation, climate change mitigation, integrated water-related disaster risk reduction, flood management, drought-area identification, landslide-area mapping, research on water resources, and inland navigation. Presenting the organogram of the MoITFE, Dhungana said the soil and watershed section is in charge of coordinating, formulating and implementing watershed-related programmes and plans in collaboration with the watershed management and coordination section under the provincial forest directorate and watershed management offices. He also presented a road map on possible future activities, such as adding more watershed management offices, formation of an implementation committee for watershed management, promoting and strengthening interrelationship between watersheds at different scales, and formulating policies, plans, programmes, and conducting relevant research. He also informed that the provincial government is now in the process of formulating policy process so in which the IRBM approach will be integrated.

### **Presentation 4: Livelihood Challenges and Opportunities in the Koshi Basin: Key Findings – *Nilhari Neupane, ICIMOD***

Nilhari Neupane presenting the key demographic features of the Koshi River basin, Nilhari Neupane informed that agriculture and livestock are the main livelihood options. The farming system of the basin varies with slope, and so does the challenges and opportunities. He said that variable rainfall, floods, droughts, and poor crop performance undermine sustainable development goals (SDGs) such as poverty reduction, food/nutrition security, and water and energy security. Meanwhile, the number of women-headed households and the area of fallow land are increasing in the basin. Displaying vulnerability mapping, he said that the whole basin is vulnerable, especially the mountain region followed by the mid-hills and plains, in terms of resource stress, ecological degradation, and water-induced disasters. The result of vulnerability analysis was also triangulated at local level. He said the local people perceive an increase in water scarcity, change in rainfall trend, and spread of invasive species, frost occurrence, and human–wildlife conflict; similarly, an increase in diseases and cases of infertility have been observed in livestock. Though different autonomous and planned adaptation measures have been taken up at the local level, he suggested some specific interventions such as multipurpose water use, rehabilitation and construction of ponds, improved vegetable farming, and plantation of appropriate trees along the river banks. Likewise, he said a multisectoral and integrated planning approach, contingency planning, the availability of reliable weather information, early warning systems, alternative energy use, action research, relevant policies and effective regulations, will help the local communities to adapt water-livelihood related existing and future challenges.

## Discussions

After each presentation, different questions and suggestions were put forward. It was suggested that the BMC, Koshi, should play a clear and concerted role in minimizing the conflicts that may arise in the process of benefit sharing. One of the options to resolve the conflicts in benefit sharing is by implementing WTP for ecosystem services on a larger scale, which requires more focused research. The participants also asked about the provincial government's role in issues such as sand deposition at the riverbed which causes flood, and in the initiation of the river diversion project. Badri Raj Dhungana responded that as a number of policies are in the formulation and amendment stages, this is the right time to incorporate these local-level issues into the policy. He said the provincial government welcomes such research outputs/knowledge while developing the policies. The participants also asked about selection of variables in vulnerability assessment (VA). Nilhare Neupane said that there are various ways to study the important variables that contribute to VA, such as regression analysis, holding consultation workshops, and relying on expert judgement. In this particular case, he said, they used expert judgement for selecting the variables and gave equal weightage to the VA parameters. In this regard, he said an article has been published, and interested participants could access it online to get detailed information.

## Closing Remarks from the Chair

Hareram Shrestha said that watershed management requires a multisectoral and interdisciplinary approach. As the country is undergoing restructuring, he said all the relevant policies, acts, and regulations should be coherent. He hoped that group work will provide more details regarding this. Appreciating all the presentations, Shrestha announced closure to the session.

# Day Two

## Reflection

### **Policy Issues and Challenges, and Anticipated Management Response to Enhance Upstream–Downstream Linkages in the Koshi River basin – *Resham Bahadur Dangi, FAO Nepal***

Resham Bahadur Dangi said that the policy related to watershed management has shifted gradually from focusing on engineering to that of adopting a holistic approach. Presenting the river basin management policy and its institutional landscape, he informed that the river basin management approach has been internalized in the policies as a development framework and that the GoN established four river basin offices in 2018 to address the problems and seek solutions. Regarding the distribution of state power, he said that river basin management gives priority to polycentric governance. Saying that the Koshi River basin stretches from the Himalaya to the sea, he said that major anthropogenic activities have taken place in the middle zone, which have impacted the lower zone. He listed out the issues that might arise in river basin management: economic–ecological–equity conflicts evolving from the transfer of political power; minimal coordination and coherence; and capacity gaps. These issues, he said, could be resolved through the legal instrument by legitimizing decentralized power to address conflict and accountability, and by identifying the key factors that benefit and impact the system. He also stressed on a coordinated governance system. He stated that as the Koshi River basin management will be largely driven by economic interests and political priorities, there's a need to follow four orders of outcomes: enabling conditions (support for institutional capacity); changing behaviour of stakeholders/institutions (reducing stress); attaining programmatic goals (social, economic and environmental targets), and ensuring sustainable and resilient ecosystems.

### **Developing Climate-Resilient Livelihoods in Vulnerable Watersheds in Nepal – *Vijaya Prasad Singh, UNDP Nepal***

Vijaya Prasad Singh presented the objectives and outcomes of the UNDP project for developing a climate-resilient livelihood in the vulnerable watersheds of Nepal. He said the objective is to safeguard the vulnerable communities and their physical and economic assets from climate change disasters. He then explained about the outcomes. "Outcome 1", he said, seeks to establish an integrated watershed management framework to address the issue of floods and droughts induced by climate change. "Outcome 2", he said, seeks to introduce and scale up integrated watershed management practices in at least one of the watersheds. He also spoke about the project implementation modality, and project organizational structure and functions at the federal, provincial and local levels.

## Group Work

For the group work, two groups were formed to discuss the key issues in the thematic area presented on day one. Group 1 focused on the upstream–downstream mechanism and linkages and actor engagement. Group 2 focused on plans, policies, and programmes.

## Group 1: Upstream-Downstream Linkages

### Issues

1. Haphazard construction of road, high dam, irrigation canal and drinking water.
2. Change in pattern of farming systems, increase in fallow land and invasive species, decline in traditional farming system, and unscientific farming.
3. Promotion of conservation and development together such as homestay, religious tourism etc.
4. Encroachment of river bank and management of river reclamation area, river bank and river products (such as sand, boulders, stones etc).
5. Increase in drought area, landslide, flood, soil erosion and sedimentation, forest fire, GLOF, dying springs, disease and insects, irregular precipitation and hail.
6. Coordination among the three tiers of government.
7. Coordination among NGOs, INGOs, and community-based organizations (CBOs).
8. Coordination among the BMC, WMO, DFO, physical infrastructure office, tourism and industry office, and local government offices.
9. Formulation and implementation of watershed policy, land management, agriculture, forestry, water and sediment yield activities.
10. Control of forest fire, unmanaged grazing, and invasive species.
11. Management of unproductive forest, non-timber forest products (NTFP), human–wildlife conflict and chure conservation.
12. Increase workload of women, less time for productive work, women's security, less access to decision-making and resource utilization.
13. Effective transboundary cooperation and coordination for river basin management.

### Actors and Roles

Level	Agencies	Roles
<b>Local</b>	<ul style="list-style-type: none"> <li>▪ Metropolitan/Municipality/ Rural Municipality</li> <li>▪ NGOs/CBOs/Club/Federation</li> </ul>	<ul style="list-style-type: none"> <li>▪ Local-level policies, and law formulation and implementation</li> <li>▪ Budget management</li> <li>▪ Monitoring</li> <li>▪ Royalty collection</li> </ul>
<b>Provincial</b>	<ul style="list-style-type: none"> <li>▪ WMOs</li> <li>▪ Division Forest Offices (DFOs)</li> <li>▪ Ministry of Infrastructure Development</li> <li>▪ Agriculture learning centre</li> <li>▪ Veterinary hospital</li> <li>▪ Ministry of Internal Affair and Law</li> <li>▪ Industry</li> <li>▪ Tourism sector</li> </ul>	<ul style="list-style-type: none"> <li>▪ Policy and laws formulation</li> <li>▪ Budget management</li> <li>▪ Tax and royalty collection</li> <li>▪ Implementation</li> <li>▪ Monitoring</li> </ul>
<b>Federal</b>	<ul style="list-style-type: none"> <li>▪ Ministry of Forest and Environment</li> <li>▪ WECS</li> <li>▪ Ministry of Irrigation</li> <li>▪ Ministry of Infrastructure Development and Transport</li> <li>▪ Ministry of Agriculture and Livestock</li> <li>▪ National park and reserves</li> <li>▪ Basin Management Centre, Koshi</li> </ul>	<ul style="list-style-type: none"> <li>▪ Policies, law and plans formulation</li> <li>▪ Inter provincial collaboration and relation development</li> <li>▪ Budget management</li> <li>▪ Tax and royalty collection</li> <li>▪ Research and study</li> <li>▪ Monitoring</li> </ul>

### Intervention

- To address the identified issues.

## Group 2: Policies, Plans, and Complementary Programmes

### Main Issues

- Uncertainties in policy formulation at the federal and provincial levels.
- Lack of infrastructure at the local level.
- Coordination among the relevant sectors such as agriculture, industry, environment, watershed, forest, and irrigation.
- Coordination and collaboration among federal, provincial and local governments (work division and prioritization).
- Preparation of a Koshi River basin master plan.
- Formulation of a bottom-up, scientific, people-oriented and demand-based programme.
- Intergovernmental (at the provincial and local levels) coordination.
- River reclamation and river flow management.

### Existing Programmes

- Wildlife reserve area/conservation programme.
- Soil and watershed management programme on a small scale.
- President Chure Conservation Programme.
- National forest, community forest, leasehold forest, collaborative forest, religious forest, non-timber forest products, Terai Madhes Hariyali Karyakaram, private forest development, research, training, and capacity-building.

### Harmonization Gaps

- Local government's priorities on development without taking into account environmental concerns.
- Lack of implementation of activities as per plans.
- Lack of formulation of policies, regulations, and organograms for river basin offices.

### Harmonization Suggestions

- Need to have a formal system for coordination (with acts and regulations).
- Need to make the district coordination committee more effective through formulation of policies and plans.
- Need strict laws on allocating a certain amount of the development budget to environment/watershed conservation.
- Need for a concrete and clear policy arrangement for coring and export of river-related products such as stones and boulders.
- Need to set up an information centre for disseminating and sharing information about landslides, flood, erosion, etc., and implement risk-reduction measures accordingly.

### Future Plans

- Formulation of policies, plans and regulations (with a top-down approach, such as a Soil Conservation and Watershed Management Act, Forest Act, etc.).
- Formulation of need-based, research-based plans with a bottom-up approach.

## The Way Forward

These groups focused on getting conducive and coordinated policies and programmes for a sustainable Koshi River basin from three levels of government, which are as follows.

### Local Government

- Formulation of local-level policies, acts, laws, and guidelines.
- Coordination with other local governments and with provincial governments.
- Formulation of a master plan for the Koshi River basin.
- Implementation of an awareness and capacity-building programme.
- Mobilization of facilitators and NGOs at the local level.
- Operation, monitoring and evaluation of environment-friendly industry within the watershed.
- Formation of watershed management unit/section at the local level.
- Setting up of a waste management programme at the local level.
- Management and equitable distribution of natural resources.
- Development of a mechanism at the downstream level for siltation control.
- Database management and installing an early warning system.
- Implementation of an appropriate programme at the river reclamation area.
- Development and implementation of a fair tax mechanism in any of the thematic area.
- Development of watershed-friendly tourism.
- Setting up of an appropriate forest conservation system.
- Establishment of a research centre.

### Provincial Government

- Formulation and implementation of provincial watershed policies and working plans.
- Formulation of acts, regulations, and working plans (related to forest, watershed, climate change, etc.).
- Coordination and collaboration among intersectoral agencies (related to forest, agriculture, industry, tourism, infrastructure, energy).
- Coordination and collaboration among local-level networks.
- Formulation, prioritization and implementation of provincial plans and programmes.

### Federal Government

- The Basin Management Centre should be backed up by legal provisions: revision of the Soil and Watershed Management Act 2039 BS (1982); approval of the terms of reference and working procedure of the basin management office; formation of a basin management coordination committee by the federal government.
- Development and management of a watershed information system.
- Implementation of a large-scale and interprovincial programme.
- Carrying out research and study related to watershed management.
- Revision of land-use policy.
- Identification of biodiversity hotspots.
- Mapping and management of landslides and springs.
- Transboundary coordination and networking.

## Closing Session

Laxmi Dutt Bhatta, ICIMOD, thanked the DoFSC for jointly organizing this symposium. He also thanked all the participants for their proactive participation. He informed that this partnership in the Koshi River basin would continue, especially for research-based piloting at the river basin, and to achieve landscape synergy.

Resham Dangi, FAO Nepal, said that there should be clarity on the overarching goal for Koshi so that activities could be streamlined accordingly. If the goal is not clear, it is difficult to design result-based projects, set benchmarks and develop indicators to evaluate the achievements, said Dangi. If the Koshi River basin is of high priority for Province 1, then the provincial government should play a role in project-screening. If the overarching goal is clear, then the provincial government could select a project—funded by donors—which would be complementary to the set goal and add value to it. Dangi also said that the local government should list out the kind of support that is required to implement the identified activities.

Santa Maya Shrestha, DFO, said that different sectors have been involved in the management of the watershed, but now it's important to manage the river and its ecosystem at the basin level in an integrated way. Shrestha added that coordination among all the relevant stakeholders is crucial for integrated river basin management.

Uddhaw Bahadur Ghimire, BMO, Koshi, said this workshop was timely in the context of the new federal system. He said that now the time has come to formulate plans and implement activities at the local level, and that there should be effective coordination and mainstreaming of activities at all the three levels of governance.

Prem Prasad Paudel, DoFSC, mentioned that this workshop has provided a platform to share and learn about the different aspects of the Koshi River basin management. Pointing out the issues raised in the workshop, he said that coordination among the different sectors and organizations is vital for the proper management of the Koshi basin. He also laid emphasis on the need for clarity at all the three levels of government in terms of their roles and responsibilities.

Bal Dev Chaudhary, Mayor, thanked the organizers for providing a platform that brought together three different levels of government to discuss about the management of the Koshi basin. Emphasizing the need for coordination to ensure the successful implementation of policies and plans, he said that the Koshi River basin would be a means of prosperity for the nation.

Badri Raj Dhungana, MoITFE, said that this workshop has provided information about the Koshi basin, which will help formulate different policies and plans at the provincial level. He stated that the federal government was in the process of formulating a strategic basin plan, so issues raised at the local level should be addressed in this plan. Saying that the Koshi River basin is a high priority for Province 1—the site of the mega Arun III project—he expressed his concern about the balance that needs to be struck between development and conservation. Drawing attention to the lack of a streamlined plan at different government levels within the province, he emphasized on immediate action towards institutionalizing the whole process. He closed the session by thanking all the participants and organizers.



# Annex I: Programme

## DAY ONE

<b>Time</b>	<b>Activity</b>	<b>Remarks</b>
09:00–09:30	<b>Registration</b>	DoFSC/ICIMOD
<b>Inaugural Session</b>		
09:30–10:30	<ul style="list-style-type: none"> <li>Session Chair: Ram Prasad Lamsal, Director General, DoFSC</li> <li>Chief Guest: Subodh Pyakurel, Vice Chairman, Provincial Planning Commission, Province 1</li> <li>Guest: Badri Raj Dhungana, Provincial Secretary, MoITFE Sagar K. Rai, Provincial Secretary, MoFID Kanchan Shrestha, Programme Coordinator, KBI, ICIMOD</li> <li>Formal inauguration</li> <li>Objectives and welcome remarks</li> <li>Closing remarks</li> </ul>	MC: Prakash Singh Thapa  Prem Prasad Paudel
10:30–10:45	<i>Group photo and tea/coffee Break</i>	
<b>Technical Session 1: Integrated River Basin Management: Concept, Principles, and Practices</b>		
10:45–12:30	<ul style="list-style-type: none"> <li>Presentation 1: Integrated River Basin Management Initiatives: Contemporary Programmes, Plans, and Policies (Prem Prasad Paudel, DoFSC)</li> <li>Presentation 2: Integrated Water Resource Management: Approaches, Plans, and Policies (Maheswor Shrestha, WECS)</li> <li>Presentation 3: Multi-scale Integrated River Management in Nepal: Challenges and Opportunities (Sanotsh Nepal, ICIMOD)</li> <li>Presentation 4: Koshi River Basin Management Initiatives from Province 1 (Badri Raj Dhungana, MoITFE)</li> <li>Discussions</li> </ul>	Session Chair: Ram Prasad Lamsal
12:30–13:30	<i>Lunch break</i>	
<b>Session 2: Thematic Presentation on Climate Change, Soil Erosion, Sedimentation, and Water Infrastructure</b>		
13:30–15:00	<ul style="list-style-type: none"> <li>Presentation 1: Climate Scenarios, Water Availability, and Drought in the Koshi Basin (Santosh Nepal, ICIMOD)</li> <li>Presentation 2: Irrigation Infrastructure in the Koshi Basin (Hareram Shrestha, Morang Irrigation Project)</li> <li>Presentation 3: Soil Erosion and Sedimentation in the Koshi Basin (Basanta Raj Adhikari, TU and Prakash Singh Thapa, DoFSC)</li> <li>Presentation 4: Koshi Basin Information System: Increasing Access to Information for Decision-making (Kanchan Shrestha, ICIMOD)</li> <li>Discussions</li> </ul>	Session Chair: Badri Raj Dhungana
15:00–15:15	<i>Tea break</i>	

### Session 3: Thematic Presentation on River Basin Management for Sustainability

15:15–16:30	<ul style="list-style-type: none"> <li>▪ Presentation 1: Introduction to the Koshi Basin Management Centre, Watershed Management, and Upstream and Downstream Linkages (Uddhaw B Ghimire, Basin Management Centre, Koshi, Udayapur)</li> <li>▪ Presentation 2: Water Management: Experiences from Building Climate Resilience in Mountain Ecoregions (Ram Singh Thapa, Basin Management Centre, Gandaki, Pokhara)</li> <li>▪ Presentation 3: Incentive for Ecosystem Services for Drinking Water: Lessons Learnt from Dhankuta (Laxmi Dutt Bhatta, ICIMOD)</li> <li>▪ Presentation 4: Livelihood Challenges and Opportunities in the Koshi Basin: Key Findings (Nilhari Neupane, ICIMOD)</li> <li>▪ Discussions</li> </ul>	Session Chair: Hareram Shrestha
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## DAY TWO

09:00–09:30	<b>Reflections</b> Policy Issues, Challenges and Anticipated Management Response to Enhance Upstream–Downstream Linkages in the Koshi River Basin	Facilitator: Prem Prasad Paudel Resham Dangi
09:30–11:00	<b>Group Work</b> The idea is to engage in discussions and receive suggestions relevant to the thematic areas—eventually feeding into river basin policies and programmes  <b>Group 1:</b> Upstream–Downstream Linkages (issues and its effects and impacts, actors and their roles, and interventions)  <i>Facilitators:</i> Laxmi Dutt Bhatta and Prakash Singh Thapa  <b>Group 2:</b> Policies, plans, and complementary programmes (main issues, existing plans, harmonization gaps, suggestions, and future plans)  <i>Facilitators:</i> Prem Prasad Paudel and Kanchan Shrestha	Each group supported by facilitators
11:00–11:15	<b>Tea break</b>	
11:15–12:15	<b>Group Work Presentation</b> 10 minutes each (presentation followed by discussion)	Chair: Resham Dangi Facilitator: Laxmi Dutt Bhatt
12:15–13:15	<b>Lunch break</b>	
13:15–14:15	<b>The Way Forward</b> A Sustainable Koshi River Basin in the Federal System: Conducive and Coordinated Policies and Programmes  Actors' perspectives at three levels of governance: <ul style="list-style-type: none"> <li>▪ Local government</li> <li>▪ Provincial government</li> <li>▪ Central government</li> </ul>	Group Facilitator Prem Prasad Paudel and Kanchan Shrestha
14:15–15:00	<b>Closing Session</b> Remarks <ul style="list-style-type: none"> <li>▪ Representative from ICIMOD</li> <li>▪ Representative from MoFE/DoFSC</li> <li>▪ Representative from DFO</li> <li>▪ Representative from WMO</li> <li>▪ Representative from local government</li> <li>▪ Closing Remarks: MoITFE</li> </ul>	Prakash Singh Thapa

## Annex II: Participants' List

Subodh Raj Pyakurel  
Provincial Planning Commission, Province 1

Ram Prasad Lamsal  
DoFSC

Badri Raj Dhungana  
MoITFE, Province 1

Hareram Shrestha  
Morang Irrigation Project

Sagar K. Rai  
Ministry of Physical Infrastructures Development,  
Province 1

Chintan Tamang  
Dhankuta municipality, Dhankuta

Baldev Chaudhary  
Triyuga municipality Udaypur

Durga Kumar Thapa  
Belka municipality, Udaypur

Kamala Magar  
Barakhshetra municipality, Sunsari

Prem Prasad Paudel  
DoFSC

Sharad Babu Pageni  
MoFE

Prakash Singh Thapa  
DoFSC

Indira Mulapati  
DoFSC

Maheswor Shrestha  
WECS

Basanta Raj Adhikari  
IOE/TU

Vijay Singh  
UNDP

Kiran Timislina  
GGN

Uddhaw Bahadur Ghimire  
BMC, Koshi, Udayapur

Ram Singh Thapa  
BMC, Gandaki

Raj Kishor Mandal  
BMC, Koshi, Udayapur

Hriday Kumar Jha  
WMO, Okhaldhunga

Sher Bahadur Shrestha  
WMO, Dhankuta

Diwakar Maskey  
WMO, Okhaldhunga

Raj Kumar Gupta  
WMO, Okhaldhunga

Santa Maya Shrestha  
Division Forest Office, Okhaldhunga

Ram Chandra Kandel  
Division Forest Office, Dhankuta

Devi Chandra Pokhrel  
Division Forest Office, Sindhupalchowk

Upendra Prasad Patel  
Division Forest Office, Siraha

Bishnu Prasad Acharya  
Division Forest Office, Gaighat, Udaypur

Bishal Ghimire  
Division Forest Office, Biratnagar Morang

Dambar Rogue  
Dhankuta municipality, Dhankuta

Ram Kaji Shrestha  
Forest Research and Training Centre

Krishna Poudel  
MoITFE, Province 1

Anurudha Kr. Sah  
MoITFE, Province 1

Shilpa Shrestha  
Naya Nepal

Dev Nandan Mandal  
WRIDO Morang

Resham Dangi  
FAO, Nepal

Md. Sadaraf

Shiva Kr Rai  
Nepal Biodiversity Society

Kul Prasad Ghimire  
Nepal Biodiversity Society

Tej Narayan Mandal  
PG Corp

Deo Narayan Sah  
Kantipur daily

Kumud Adhikari

Dr. Tilak P. Gautam  
MMAH, Campus

Ram Lakhan Thakur  
DFO, Morang

Rangnath Chapagain  
Nijiban Sanjal

Pravin Kumar Singh  
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