PROCEEDINGS OF THE
Narayani River Conclave 2023

Healthy Rivers: Healthy Lives

Gaindakot, Nawalparasi Bardaghat Susta East, Gandaki Province

February 13-14, 2023
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Narayani River Conclave 2023

Healthy Rivers: Healthy Lives

Nawalparasi Bardaghat Susta East, Gandaki Province
February 13-14, 2023

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Sneha Tamrakar, Communication Officer, WWF Nepal

Reviewed by
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Karun Dewan, Freshwater Officer, WWF Nepal

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Citation
Message from Chair

Dear Esteemed Participants,

It is with great pleasure and a sense of accomplishment that I address you as the Chair of the Narayani River Conclave 2023. The maiden conclave focused on the vital theme of "Healthy Rivers: Healthy Lives," with a strong emphasis on the conservation of water resources in the Narayani Basin through increased cross-functional collaboration among diverse stakeholders.

The conclave successfully brought together academicians, policymakers, researchers, and graduates, providing them a platform to present their research, review each other's work, and share their experiences in the regulation of water recycling, utilization, and reuse. We discussed essential topics such as water flow regulation, establishment of efficient institutional mechanisms, strengthening of basin management offices, upstream-downstream linkages, and the implementation of technological advancements like wastewater treatment, water harvesting, and climate change adaptation at the local and watershed levels.

I am proud to announce that the Narayani River Conclave acted as a podium to discuss and formulate policy and institutional settings, watershed management components, wetland conservation strategies, community mobilization efforts, capacity development initiatives, livelihood improvements, and other important aspects outlined in our collective action plan. This conclave also provided a valuable networking opportunity for experts and professionals in the field.

The Narayani River Conclave-2023 concluded with the formulation of a 12-point declaration for the conservation of the Narayani Basin. I am pleased to inform you that SAHAMATI is committed to implementing the declaration and ensuring its realization within the next two years. This commitment reflects our dedication to sustainable water conservation practices and the shared vision of all participants.

I would like to express my sincere gratitude to WWF Nepal for their continuous support and motivation in our water conservation endeavors and for their invaluable assistance in organizing this conclave. I extend my heartfelt appreciation to our main organizing partners, the Basin Management Centre, Gandaki, Tribhuvan University, Gaindakot Municipality, and World Lutheran Relief, whose contributions played a significant role in the success of this event.

Moreover, I would like to extend my gratitude to our diligent working team, Advisor Committee, Management Committee, and Technical Committee for their unwavering commitment and hard work in making this conclave a resounding success. I also express my deepest appreciation to our plenary talk speakers, session chairs, keynote speakers, oral and poster presenters, and all the participants who graciously accepted our invitation and joined the conclave.

In closing, I am confident that the outcomes of the Narayani River Conclave 2023 will serve as a catalyst for positive change and further collaboration in the field of water resource management. Together, let us continue our efforts to safeguard our precious rivers and ensure a sustainable future for all.

Thank you.

Homnath Subedi
President, SAHAMATI
Dear Participants,

On behalf of the Advisory Committee of the Narayani River Conclave 2023, it is my honor to address you and express our appreciation for your valuable contributions to this significant milestone. As a committee comprising of esteemed members from various fields, we had the privilege of guiding and supporting the conclave's organizing team in shaping a successful and impactful gathering and commitment to integrated river basin management.

I would like to extend my sincere gratitude to each member of the Advisory Committee: Prof. Dr. Subodh Sharma, Professor at Kathmandu University; Mr. Homnath Subedi, President of SAHAMATI; Prof. Dr. Janardan Lamichhane, Dean of the School of Science at Kathmandu University; Sujan Maharjan, Chief of the Basin Management Centre, Gandaki; Kiran Ojha, Country Representative of Lutheran World Relief; and Mukti Ram Rijal, Chief Executive Officer of Gaindakot Municipality. Your expertise and guidance have been instrumental in shaping the direction and success of this conclave.

We are immensely proud of the fruitful outcomes that have emerged from this conclave. The valuable discussions, research paper presentations, and sharing of experiences regarding water and other natural resources management of Narayani Basin have been truly enlightening. The 12-point declaration made during the conclave for the conservation and improved management of Narayani Basin provides optimism and reinforces our belief in the power of collective actions.

We extend our heartfelt appreciation to Hon' Bed Bahadur Gurung, Minister for Agriculture, Energy, and Water Resources of Gandaki Province for his valuable presence during the opening ceremony of the conclave and showcasing his commitment towards coordinated efforts and setting up a roadmap for future initiatives in the conservation and management of the Narayani River. I have huge gratitude towards SAHAMATI for their constant support and motivation in promoting water conservation and for their pivotal role in organizing this conclave successfully. We also express our gratitude to the Basin Management Centre-Gandaki, Tribhuvan University, Gaindakot Municipality, and World Lutheran Relief for their invaluable contributions as the main organizing partners.

Our gratitude further extends to the working team, Management Committee, and Technical Committee for their dedication and hard work in ensuring the smooth functioning of the conclave successfully. We also commend the plenary talk speakers, session chairs, keynote speakers, oral and poster presenters, and all the participants who actively engaged in the conclave and enriched the discussions with their knowledge and insights.

As the Advisory Committee, we are inspired by the commitment and enthusiasm displayed during the Narayani River Conclave 2023. We are confident that the collaborations and networks formed during this event will serve as a strong foundation for future endeavors in Narayani Basin Management.

Let us continue to work together, harnessing the spirit of collaboration and shared responsibility, to pollution free river conservation for the benefit of the people and nature.

Thank you.

Ghana S. Gurung, Ph. D.
Country Representative, WWF Nepal
Conclave Brief from Organizing Secretary

The Narayani River Conclave 2023 was organized jointly by WWF Nepal and SAHAMATI for the first time on February 13–14, 2023. The conclave received great support from the Basin Management Centre, Gandaki, Gaindakot Municipality, Central Department of Environmental Science, Tribhuvan University, Kathmandu University, and Lutheran World Relief.

The Conclave brought together experts and young researchers from all around Nepal to share their learnings and experiences on the current trends in river conservation and water resource management. The Narayani River Basin, one of the most significant river basins in Nepal, was the main topic of discussion, and the conclave's main goal was to propose solutions for its conservation and sustainable management. The participants talked about a range of topics, including climate change, biodiversity preservation, water quality, and community-based river management. The event was historic in and of itself because it was the first regional conclave on river basin conservation.

This initiative, I am sure, will be a steppingstone for fostering collaboration and partnerships among various stakeholders to promote sustainable management of the Narayani River Basin, which is crucial for the ecological and socio-economic well-being of the region. We are pleased to have endorsed the 12-point declaration that seeks to preserve the Narayani River Basin in a long-term, sustainable manner. This, we hope, will also assist in bridging the gap between researchers, decision-makers, and academics in the region.

I want to express my sincere gratitude to the advisory committee for their insightful recommendations and support in developing this initiative. I appreciate the Technical Committee's review and suggestions on the abstract submissions and the preparation of the declaration points. I would like to thank Mr. Sujan Maharjan, Mr. Rajesh Sada, Dr. Deep Narayan Shah, and Dr. Ram Devi Tachamo Shah for helping to shape the Conclave from the very beginning.

I am equally thankful to the management team, which helped and assisted me throughout the Conclave preparation. Special thanks to Mr. Karun Dewan and Mr. Dinesh Bastakoti for being at the forefront of the preparation throughout the Conclave. It is safe to say that the management team left no stone unturned to ensure the success and long-lasting result of the conclave.

Lastly, I would like to thank the distinguished guests for attending our event, the plenary and keynote speakers, the oral and poster presenters for sharing their knowledge with the audience, the chair, rapporteurs, and volunteers for their outstanding efforts and preparation for their respective sessions, and the young students for energizing the Conclave.

Roshani Shrestha and Dinesh Bastakoti
Conclave Secretariat
Narayani River Conclave 2023
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Ashok Kumar Yadav

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Narayan Gyawali

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Babu Ram Lamichhane

Breeding Success and Conservation Status of White-Rumped Vulture in Nawalpur District, Nepal

Saroj Chaudhary

Snakes of Narayani River Basin: Implications and Opportunities

Sunil Sapkota
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2 NAME OF VOLUNTEERS INVOLVED IN THE NARAYANI RIVER CONCLAVE 2023
3 LOGISTICS TEAM
4 PHOTOS OF THE NARAYANI RIVER CONCLAVE
Overview

The Narayani River Conclave 2023 brought together participants from different backgrounds and areas of expertise over the course of two days on February 13–14, 2023, to talk about the long-term preservation of the Narayani River Basin. Participants included all three tiers of government stakeholders, academicians, researchers, policy makers, high-level government officials, students, and emerging scholars. The central theme of the event was “Healthy Rivers: Healthy Lives” and included presentations from experts and researchers as well as a planned discussion of the opportunities and challenges the Narayani River is currently facing.

The objective of the conference was twofold:

- To bring together academicians, policy makers, decision makers, experts, researchers, graduates, and other groups to share their experiences and research findings,
- To build agreement/consensus on the road map for improved Narayani basin management

Conclave Structure

The conclave was designed to encourage discussion among experts and participants about the event’s central theme. The main supporting partners were Basin Management Centre, Gandaki, Gaindakot Municipality, Tribhuvan University, Kathmandu University, and Lutheran World Relief. Local colleges and universities including Agriculture and Forestry University, Rampur, Sapta Gandaki Multiple College, Bal Kumari College, and Siddhanta College were other supporting partners of an event.

The two-day event featured five different sessions with five keynote speakers, three plenary speakers, and 4-5 speakers per session, one panel discussion, one opening and closing session. Following each session, a Q&A session was scheduled to allow for interaction between experts and participants.
Conclave Theme (2023): Healthy Rivers: Healthy Lives

Thematic Areas
Theme I: Interdisciplinary Science and Policy
Theme II: Wetland Health in changing world
Theme III: Livelihood
Theme IV: Terrestrial Biodiversity
Theme V: Aquatic Biodiversity and Species Conservation

Conclave Team

Advisory Committee
- Ghana S. Gurung, PhD, Country Representative, World Wildlife Fund Nepal
- Subodh Sharma, PhD, Professor, Kathmandu University
- Homnath Subedi, President, SAHAMATI
- Janardan Lamichhane, PhD, Dean, School of Science, Kathmandu University
- Sujan Maharjan, Chief, Basin Management Centre, Gandaki
- Kiran Ojha, Country Representative, Lutheran World Relief
- Mukti Ram Rijal, Chief Executive Officer, Gaindakot Municipality

Technical Committee
- Rajesh Sada, Head of Freshwater Programs, WWF Nepal
- Deep Narayan Shah, PhD, Assistant Professor, Central Department of Environmental Science, Tribhuvan University
- Ram Devi Tachamo, PhD, Assistant Professor, Department of Life Sciences, Kathmandu University
- Rahul Ranjan, Assistant Professor, Department of Aquaculture, Agriculture and Forestry University,
- Dambar Chemjong, PhD, Head of Department, Central Department of Anthropology, Tribhuvan University
- Deepak Rijal, PhD, Freshwater and Climate Change Specialist, Li-BIRD
- Subash Subedi, PhD, Senior Scientist, NARC

Management Committee
- Karun Dewan, Freshwater Program Officer, WWF Nepal
- Sneha Tamrakar, Communication Officer, WWF Nepal
- Dinesh Bastakoti, Program Coordinator, SAHAMATI
- Daya Sagar Subedi, Executive Board Member, SAHAMATI
- Hari Prasad Sapkota, Executive Coordinator, SAHAMATI
- Nagendra Rijal, Vice President, SAHAMATI
- Anup Bajracharya, Lecturer, Bal Kumari College
- Dhruba Acharya, Assistant Lecturer, Saptagandaki Multiple College
**Day 1**

**Opening ceremony**

**MC:** Ms. Roshani Shrestha & Mr. Hari Sapkota

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<th>Activity</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>08:00 - 09:10 AM</td>
<td>Registration/ Breakfast</td>
<td>All</td>
</tr>
<tr>
<td>09:10 - 09:15 AM</td>
<td>Introduction of Program</td>
<td>MCs</td>
</tr>
<tr>
<td>09:15 - 09:20 AM</td>
<td>National Anthem</td>
<td>All</td>
</tr>
<tr>
<td>09:20 - 09:35 AM</td>
<td>Project Overview: Wetland Restoration and Basin Collective Action Plan in Narayani River</td>
<td>Dinesh Bastakoti, Program Coordinator, Sahamati</td>
</tr>
<tr>
<td>09:35 – 09:50 AM</td>
<td>Welcome Remarks</td>
<td>Dr. Ghana Shyam Gurung, Country Representative, WWF Nepal</td>
</tr>
<tr>
<td>09:50 -10:00 AM</td>
<td>Remarks</td>
<td>Dr. Maheshwor Dhakal, Director General, Department of National Park and Wildlife Conservation</td>
</tr>
<tr>
<td>10:00 - 10:10 AM</td>
<td>Remarks</td>
<td>Madan Bhakta Adhikari, Mayor, Gaindakot Municipality</td>
</tr>
<tr>
<td>10:10 - 10:40 AM</td>
<td>Plenary Talk: Rivers, Rhythm and Resilience; Harmonizing Ecology, Economy and Equity</td>
<td>Ajaya Dixit, Founder &amp; Advisor, ISET-Nepal</td>
</tr>
<tr>
<td>10:40 - 10:50 AM</td>
<td>Remarks</td>
<td>Chitra Sen Adhikari, Deputy Mayor, Bharatpur Metropolitan City</td>
</tr>
<tr>
<td>10:50 - 10:55 AM</td>
<td>Remarks</td>
<td>Bhim Prasad Sharma, Deputy Chairperson, NGO Federation Nepal</td>
</tr>
<tr>
<td>10:55-11:00 AM</td>
<td>Remarks</td>
<td>Chhatra Raj Poudel, Former Mayor, Gaindakot Municipality</td>
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<tr>
<td>11:00 - 11:10 AM</td>
<td>Remarks</td>
<td>Laxmi Devi Pandey, National Association of Rural Municipalities Nepal</td>
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<tr>
<td>11:10 - 11:20 AM</td>
<td>Remarks</td>
<td>Er. Ganesh Shah, Former Minister, Ministry of Science and Technology</td>
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<td>11:20-11:25 AM</td>
<td>Remarks</td>
<td>Baburam Bishwakarma, Coordinator, District Coordination Committee, Nawalpur Bardaghat Susta East</td>
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<tr>
<td>11:55 - 12:10 PM</td>
<td>Closing of Inauguration Session by Conclave Chair</td>
<td>Homnath Subedi, Chairman, SAHAMATI, Gaindakot</td>
</tr>
<tr>
<td>12:10 - 12:30 PM</td>
<td>Group Photo</td>
<td>All</td>
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**Lunch (For an hour)**
Session I

**Theme: Interdisciplinary Science and Policy**

**Time: 01:30 PM - 02:55 PM**

**Chair:** Dr. Deepak Rijal

**Rapporteur:** Pawan Poudel

**Volunteer:** Prabesh Poudel

<table>
<thead>
<tr>
<th>Time</th>
<th>Presenter</th>
<th>Title</th>
<th>Organization</th>
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</thead>
<tbody>
<tr>
<td>01:35 - 01:40 PM</td>
<td>Dr. Deepak Rijal</td>
<td>Introduction of the session</td>
<td>Li-Bird</td>
</tr>
<tr>
<td>01:40 - 01:55 PM</td>
<td>Dr. Deep Narayan Shah</td>
<td>Keynote Presentation: Current Status and Future Perspective of Aquatic Biodiversity and River Conservation in Nepal</td>
<td>Tribhuvan University, Central Department of Environment Science</td>
</tr>
<tr>
<td>01:55 - 02:10 PM</td>
<td>Bishnu Prasad Acharya</td>
<td>Awareness Campaign for Community Ownership and Sustainable Conservation of Pangolins in Makwanpur District</td>
<td>Divisional Forest Office, Rapti, Makwanpur</td>
</tr>
<tr>
<td>02:10 - 02:25 PM</td>
<td>Mukti Ram Rijal</td>
<td>Water Resource Management Act Formulation in Gaidakot Municipality</td>
<td>Chief Administrative Officer, Gandaki Municipality</td>
</tr>
<tr>
<td>02:25 - 02:40 PM</td>
<td>Bhabisya Adhikari</td>
<td>Water Quality Analysis of Narayani River</td>
<td>Saptagandaki Multiple Campus, Bharaptur</td>
</tr>
</tbody>
</table>

**Time**

- 02:40 - 02:55 PM: Session Chair
- Closing

**Tea/Coffee break for 15 minutes**

Session II

**Theme: Wetland Health in changing world**

**Time: 03:10 PM - 04:35 PM**

**Chair:** Dr. Chiranjibi Bhattarai

**Rapporteur:** Pabitra Pandey

**Volunteer:** Prabesh Poudel

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<th>Title</th>
<th>Organization</th>
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<tr>
<td>03:15 - 03:20 PM</td>
<td>Dr. Chiranjibi Bhattarai</td>
<td>Introduction of the session</td>
<td></td>
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<tr>
<td>03:20 - 03:35 PM</td>
<td>Dr. Ram Devi Tacham Shah</td>
<td>Keynote Presentation: Integrated River Health Assessment Framework and Narayani River</td>
<td>Kathmandu University</td>
</tr>
<tr>
<td>03:35 - 03:50 PM</td>
<td>Rakesh Kumar Yadav</td>
<td>Present status of fish passages in hydroelectric projects of Nepal</td>
<td>Central Department of Environmental Science, Tribhuvan University</td>
</tr>
<tr>
<td>03:50 - 04:05 PM</td>
<td>Laxmi Karki</td>
<td>Wetland Health and Economic Valuation for the Sustainable Management of Wetland in Lake Cluster of Pokhara Valley</td>
<td>Central Department of Environmental Science, Tribhuvan University</td>
</tr>
<tr>
<td>04:05 - 04:20 PM</td>
<td>Anupa Ghimire</td>
<td>On culture potential of local prawn species in Nepal</td>
<td>Agriculture and Forestry University</td>
</tr>
<tr>
<td>04:20 – 04:35 PM</td>
<td>Session Chair</td>
<td>Closing</td>
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**Tea/Coffee break (15 Minutes)**
Plenary talk: Dr. Badri Bastakoti, Economist on *Municipalities in federal system: an inquiry into the program and budget of municipalities in Narayani River Basin* (04:35 PM - 04:50 PM)

**Poster Presentation Session**

**Time:** 4:50 PM - 6:05 PM

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<tr>
<th>Presenter</th>
<th>Title</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Susan Subedi</td>
<td>Five easy ways to help protect our rivers</td>
<td>Kathmandu Forestry College</td>
</tr>
<tr>
<td>Bipana Gurung</td>
<td>Potential impact of climate change and fish habitat</td>
<td>Naya Aayam Multidisciplinary Institute (NAMI), University of Northampton, Kathmandu, Nepal</td>
</tr>
<tr>
<td>Bijaya Dallakoti</td>
<td>Fish Community Structure in the Fragmented River</td>
<td>Central Department of Environmental Science, Tribhuvan University</td>
</tr>
<tr>
<td></td>
<td>Habitats of Hydropower-dominated Trishuli and</td>
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<td></td>
<td>Marsyangdi River Basins of Nepal</td>
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<tr>
<td>Salma Shrestha</td>
<td>Culture of Mixed Sex Tilapia (<em>Oreochromis niloticus</em>) and Catfish (<em>Heteropneustes fossilis</em>) in Cemented Tank</td>
<td>Agriculture and Forestry University</td>
</tr>
<tr>
<td>Binita Acharya</td>
<td>Fry Rearing of Sahar (<em>Tor putitora</em>) in Periphyton Enhanced System</td>
<td>Agriculture and Forestry University</td>
</tr>
<tr>
<td>Susmita Poudel</td>
<td>Ornamental fish rearing with different feed</td>
<td>Agriculture and Forestry University</td>
</tr>
<tr>
<td>Manisha Bhattari</td>
<td>Climate change and thereby induced impact on Narayani River and People’s Livelihoods</td>
<td>New Millennium College, Kathmandu</td>
</tr>
<tr>
<td>Junu Maharjan</td>
<td>Effects of Riparian Landscape Setting on Water Chemistry of the Narayani River and its major tributaries in Nepal</td>
<td>Kathmandu University</td>
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**Gala Dinner with Panel Discussion**

**Time:** 6:30 PM - 9:30 PM

**Moderator:** Bashudev Neupane, Green Pixel

<table>
<thead>
<tr>
<th>Panelist Name</th>
<th>Designation</th>
<th>Organization</th>
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<tbody>
<tr>
<td>Raju Ghimire</td>
<td>Assistant Conservation Officer</td>
<td>Chitwan National Park</td>
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<tr>
<td>Prakash Dhungana</td>
<td>Chairperson, Buffer Zone Management Council</td>
<td>Buffer Zone Management Council, Chitwan National Park</td>
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Day 2

Breakfast: 08:00 - to 09:00 AM

Session III

Theme: Livelihood
Time: 9:20 AM - 10:45 AM
Chair: Prof. Dr. Subodh Sharma
Rapporteur: Narayan Niraula
Volunteer: Prabesh Poudel

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<tbody>
<tr>
<td>09:25 - 09:30 AM</td>
<td>Prof. Dr. Subodh Sharma</td>
<td>Session Introduction</td>
<td>Kathmandu University</td>
</tr>
<tr>
<td>09:30 - 09:45 AM</td>
<td>Dr. Deepak Rijal</td>
<td>Keynote Presentation: Assessment of impacts of climate change in agriculture and adaptation measures from the southern plains of Nepal</td>
<td>Local Initiatives for Biodiversity (LI-BIRD)</td>
</tr>
<tr>
<td>09:45 - 10:00 AM</td>
<td>Rajan Subedi</td>
<td>Rafting: Tool for Trans-boundary Water Cooperation between Nepal and India</td>
<td>Oxfam Nepal</td>
</tr>
<tr>
<td>10:00 - 10:15 AM</td>
<td>Ashok Kumar Yadav</td>
<td>Wastewater treatment plant’s efficiency in Hetauda Industrial District Management Ltd.</td>
<td>Hetauda Industrial District Management Ltd.</td>
</tr>
<tr>
<td>10:15 - 10:30 AM</td>
<td>Narayan Gyawali</td>
<td>Flood Management and Community Actions for Biodiversity Conservation. LWR's 10 years’ experience in Narayani River Basin</td>
<td>Lutheran World Relief (LWR)</td>
</tr>
<tr>
<td>10:30 – 10:45 AM</td>
<td>Session Chair</td>
<td>Closing</td>
<td></td>
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</table>

Tea/Coffee break (15 Minutes)

Plenary talk: Dr. Kulraj Chalise, Petrologist and Kaligandaki activist on ‘Culture of Krishna Gandaki’ श्रीकृष्णागण्डकी संस्कृति (11:00 AM - 11:20 AM)

Session IV

Theme: Terrestrial Biodiversity
Time: 11:20 AM - 12:30 PM
Chair: Ajay Dixit
Rapporteur: Sunil Sapkota
Volunteer: Prabesh Poudel

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<tr>
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<th>Title</th>
<th>Organization</th>
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</thead>
<tbody>
<tr>
<td>11:25 - 11:30 AM</td>
<td>Ajaya Dixit</td>
<td>Session Introduction</td>
<td>ISET-N</td>
</tr>
<tr>
<td>11:30 - 11:45 AM</td>
<td>Dr. Chiranjibi Bhattarai</td>
<td>Keynote presentation: River management in the context of changing policy landscape: Issues and Challenges</td>
<td>Nepal Water Conservation Foundation</td>
</tr>
<tr>
<td>11:45 - 12:00 PM</td>
<td>Dr. Ramesh Kumar Sapkota</td>
<td>Changes in Vegetation Composition and Diversity due to Restoration Interventions in the Mixed Dipterocarp Forests of Nepal.</td>
<td>Central Department of Environmental Science, Tribhuvan University</td>
</tr>
<tr>
<td>12:00 - 12:15 PM</td>
<td>Junu Maharjan</td>
<td>Interactions between Rivers and Riparian Vegetation: A case of Kathmandu University,</td>
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Session Chair

Lunch (for an hour)

Plenary Talk: Prof. Dr. Subodh Sharma on *Past Present and Future Perspectives of River Bioassessment in Nepal* नारायणी नदी र अनुगमनको महत्त्व (01:30 PM - 01:50 PM)

Session V

**Theme: Aquatic Biodiversity and Species Conservation**

**Time: 01:50 PM - 03:15 PM**

**Chair:** Rahul Ranjan

**Rapporteur:** Sushma Tiwari

**Volunteer:** Prabesh Poudel

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<tr>
<td>01:55 - 02:00 PM</td>
<td>Rahul Ranjan</td>
<td>Session Introduction</td>
<td>Agriculture and Forestry University</td>
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<tr>
<td>02:00 - 02:15 PM</td>
<td>Prof. Dr. Dilip Kumar Jha</td>
<td>Keynote Presentation: Fish Diversity in the Trisuli, Rapti and Narayani River Systems</td>
<td>Department of Aquaculture, AFU</td>
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<tr>
<td>02:15 - 02:30 PM</td>
<td>Dr. Babu Ram Lamichhane</td>
<td>Status of gharials in Chitwan National Park, Nepal</td>
<td>NTNC-BCC, Chitwan</td>
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<td>02:30 - 02:45 PM</td>
<td>Saroj Chaudhary</td>
<td>Breeding success and conservation status of White - Rumped vulture in Nawalparasi District, Nepal.</td>
<td>Golden Gate International College, Kathmandu</td>
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<td>02:45 - 03:00 PM</td>
<td>Sunil Sapkota</td>
<td>Snakes of Narayani River Basin: Implications and Opportunities</td>
<td>Raise Hands Nepal, Bharatpur</td>
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<td>03:00 - 03:15 PM</td>
<td>Session Chair</td>
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Closing ceremony (Hosted by MCs)

**03:30 PM - 04:50 PM**

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<td>3:30-3:40 PM</td>
<td>Award for the best oral and paper presentation</td>
<td>Mr. Homnath Subedi</td>
<td>Chairperson, Sahamati</td>
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<tr>
<td>3:40-3:55 PM</td>
<td>Reflection of the two days conclave (from participants)</td>
<td>Uma Pandey</td>
<td>Representative, Community Forest User Groups (CFUGs) Secretary, Gaindakot Pumping Drinking Water Scheme</td>
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<td></td>
<td>Keshav Raj Poudel</td>
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<tr>
<td>3:55 - 4:15 PM</td>
<td>Conference summary</td>
<td>Mr. Rajesh Sada</td>
<td>Head of Freshwater Programs, WWF Nepal</td>
</tr>
<tr>
<td>4:15 - 4:20 PM</td>
<td>Remarks</td>
<td>Mr. Raju Ghimire</td>
<td>Assistant Conservation Officer, Chitwan National Park</td>
</tr>
<tr>
<td>4:20 - 4:25 PM</td>
<td>Remarks</td>
<td>Mr. Prakash Dhungana</td>
<td>Chairperson, Chitwan National Park Buffer Zone Management Council</td>
</tr>
<tr>
<td>4:25 - 4:40 PM</td>
<td>Declaration points from First Narayani River Conclave 2023, (Narrate and signature from all)</td>
<td>Mr. Madan Bhakta Adhikari</td>
<td>Mayor, Gaindakot Municipality</td>
</tr>
<tr>
<td>4:40-4:50 PM</td>
<td>Vote of thanks</td>
<td>Mr. Homnath Subedi</td>
<td>Chairperson, Sahamati</td>
</tr>
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Keynote

Presentations
Keynote Presentation 1.1

Current Status and Future Perspective of Aquatic Biodiversity and River Conservation in Nepal

Deep Narayan Shah 1 and Ram Devi Tachamo-Shah 2
1 Central Department of Environmental Sciences, Tribhuvan University
2 Department of Life Sciences, School of Sciences, Kathmandu University
*Corresponding author: dnshah@cdes.edu.np

Freshwater ecosystems including rivers are critical habitats for many endangered species in the world. These ecosystems provide numerous ecosystem services to wildlife and people. However, due to water pollution, construction and operation of dams, clearance of riparian zones, expansion of human settlement, and exploitation of riverbed materials have deteriorated the river ecosystems and imperiled aquatic species’ habitats. In Nepal, all the rivers that flow through the urban settlement have been massively polluted and devoid of sensitive instream organisms and fish and the pollution scenario is even worse during the baseflow season. Similarly, climate change has been posing other inevitable threats to the aquatic biota. Studies reveal that many aquatic species will expand their current habitats to higher elevations. Moreover, species’ suitable habitats will shrink dramatically in the next 50-80 years and may disappear from native habitats. Therefore, systematic monitoring across space and time is essential for a better understanding of species’ auto ecological knowledge and for combatting the pressures that exist in rivers at the present context. Similarly, the designation of river sanctuaries would also help to maintain and preserve the river ecosystems and their biota for future generations.

Keywords: Critical habitats, Monitoring, river sanctuaries, water pollution,
Keynote Presentation 1.2

Integrated River Health Assessment Framework for Narayani River, Nepal
Ram Devi Tachamo-Shah\(^1\) and Deep Narayan Shah\(^2\)
\(^1\) Department of Life Sciences, School of Sciences, Kathmandu University
\(^2\) Central Department of Environmental Sciences, Tribhuvan University
*Corresponding author: ramdevi.shah@ku.edu.np

Today, rivers have become one of the most threatened ecosystems around the world due to lack of scientific water resources developments, exploitation of river-based resources, expansion of urban areas along the rivers and river training works threatening the lives of aquatic species and other species that depend on the water resources for their growth and breeding. Narayani River is one of the important rivers in terms of biodiversity, physical settings, and spiritual and cultural values. However, the river is highly influenced by many anthropogenic activities along its courses impeding the services to people and wildlife. Therefore, a regular assessment is essential that can ensure the river’s health. In this project, we proposed an integrated river health index (IRHI) framework that comprises the physical-chemical-biological properties of rivers and ecosystem services provided by the rivers. We integrated a total of 8 parameters such as long-term stability in river flow, dissolved oxygen, total phosphorus, macroinvertebrate-based biotic index, diversity index of fishes, riparian diversity index, longitudinal riparian connectivity, and provisioning and cultural services of the rivers. This IRHI framework is a state-of-art that reflects a relatively long-term health state of the river.

Keywords: Aquatic environment, cultural and provisioning services, water quality parameters
Keynote Presentation 1.3

Assessment of Climate Change Impacts in Agriculture and Adaptation Responses:
Findings of a Study Conducted in Southern Plains of Nepal

Deepak Rijal, Ph.D.
Local Initiatives for Biodiversity (LI-BIRD)
rijal.deepak@gmail.com

Changes in normal temperature and precipitation patterns affect agriculture performance differently. Nepal is rated highly vulnerable to climate change impacts. The rises in temperature and altitudinal gradients go together; however, their impacts are observed to be opposite. In this paper, we assess the impacts of climate induced hazards and estimate loss and damage to agriculture in the western plains of Nepal. The data from primary and secondary sources are analyzed using qualitative and quantitative methods. The paper also discusses the relationship between forest cover and temperature rise. The primary data was collected through focus group discussions; transect walks, direct observation, and household surveys. The temperature, crop yield, and crop cut data from farmers’ plots were statistically analyzed, and the results obtained from the latter were cross-validated with the farmers’ perception data. In all study sites, there were common climatic trends observed over time, including prolonged dry spells and a rise in summer temperatures leading to a shift in cropping seasons. Rising climate-related hazards such as landslides, floods, and deposition is wreaking havoc on agriculture. The impacts of localized climate across the Tarai region are minimal. However, there are massive impacts of infrequently observed climate-induced hazards such as heat waves, cold waves, and outbreaks of crop diseases, as well as the massive losses of agriculture caused by infrequently observed floods, that should be seriously considered. Small-scale farmers adjust impacts by changing crop varieties, shifting planting dates, and improving resource efficiency. The rich farmers adjust to climatic stresses by adapting high-input agricultural technologies. Growing widely adapted and diversified options ideally help minimize climatic risks. Further research is required to categorically identify factors that affect agriculture performance, including climate change, farm innovations, and early warning systems. In conclusion, losses and damage caused by climate induced hazards must be reduced through policy and technological interventions.

Keywords: Climate change impacts, hazards, adaptation options
Keynote Presentation 1.4

River Management in the Context of Changing Policy Landscape: Issues and Challenges

Chiranjibi Bhattarai
Nepal Water Conservation Foundation (NWCF), Kathmandu
chiranjibi.bhattarai@gmail.com

River management has been a complicated sector worldwide in the modern era, and the unpredictable policy landscape compounds it further. A major problem lies in understanding the rivers. Rivers have been viewed by people as natural resources that should be used for human benefit and exploitation until their resources run out throughout history. Multiple uses like drinking water supply, irrigation, energy generation, biodiversity conservation, waste dumping, and discharging sewer lines are common to most of the Nepali rivers. The Narayani River basin, a centrally located transboundary river, has gone through an unprecedented level of human interference, leading to several complications, disasters, and governance challenges. In this context, the paper aims to review the policy framework and governance structure and explore and suggest suitable models of conjunctive use of water and riverine resources as well as river conservation to ensure intergenerational equity and justice. For this, relevant policy texts and governance aspects will be reviewed using the rights of rivers and nature, bioregionalism, and sustainable development lenses.

Key words: intergenerational equity and justice, rights, bioregionalism, transboundary
Nepal possesses a series of rocky and inaccessible hilly terrains with more than 6,000 rivers. The watersheds with different altitudinal variations from 60 m to 8848 m represent a total of 252 fish species. Among them, 236 species are indigenous, while 16 are exotic. The Nepalese fishes belong to 15 orders (Anguilliformes, Anabantiformes, Beloniformes, Cichliformes, Clupeiformes, Cypriniformes, Cyprinodontiformes, Gobiiformes, Mugiliformes, Osteoglossiformes, Perciformes, Siluriformes, Salmoniformes, Synbranchiformes, and Tetraodontiformes), 40 families, 120 genera. A total of 111 fish species were collected from different sampling sites in several tributaries of the Trisuli, Rapti, and Narayani river systems in Chitwan district and adjacent areas from August 2011 to July 2016. These species belong to 9 orders, 27 families, and 72 genera. Among the orders, Cypriniformes had the highest number of species (49%), followed by Siluriformes (30%), Perciformes (12%), Synbranchiformes (3%), and Osteoglossiformes (2%), while Anguiliformes, Beloniformes, Clupeiformes, and Tetraodontiformes each had about 1%. Cyprinidae has the highest number of species (40%) among the families, followed by Sisoridae (12%), Bagridae (7%), Cobitidae (5.4%), Schilbeidae (4.5%), Channinidae (3.6%), Balitoridae (2.7%), Mastacembelidae (2.7%), Siluridae (2.7%), Notopteriidae (1.8%), Ambassidae (1.8%), Nandidae (1.8%), and Mugilidae (1.8%). Other families that accounted for about 1% were Anguillidae, Belonidae, Clupeidae, Psilorhynchidae, Anabantidae, Gobiidae, Belontidae, Synbranchidae, Amblycipitidae, Pangasidae, Clariidae, Heteropneustidae, Chacidae, and Tetraodontidae. The Botia geto was reported for the first time from the Rapti River of Chitwan and adjacent areas. Different fish species are naturally maintained in aquatic systems and support the livelihoods of the people. Catches of major food fish are declining due to overexploitation of resources; therefore, appropriate measures are needed at once to maintain and conserve the indigenous stock.

**Keywords:** Fish diversity, Botia geto, Pseudolaguvia, Chitwan
Oral Presentations

Theme I: Interdisciplinary Science and Policy
Awareness Campaigns for Community Ownership and Sustainable Conservation of Pangolins in Makwanpur District

Bishnu Prasad Acharya and Dr. Tulshi Laxmi Suwal
Division Forest Office, Rapti
bpa1971@gmail.com

Pangolins, also known as scaly anteaters, are the only mammals with large protective keratin scales covering their bodies. Pangolin comprises eight species in the world (IUCN, 2019). Nepal is home to two of these species: the critically endangered Chinese pangolin (*Manis pentadactyla*) and the endangered Indian pangolin (*Manis crassicaudata*). Pangolins are the most heavily trafficked mammals in the world. Makwanpur is a famous district for pangolin conservation, but most of the interventions are short-term projects, and there is a severe lack of funding. To ensure sustainable conservation, the Government of Nepal, in collaboration with partners and stakeholders, developed the "Pangolin Conservation Action Plan for Nepal (2018-2022)". It will be the first time in Nepal that any small mammals are designated as "pride animals," with district-level stakeholders taking responsibility for conservation. We recommend that research and conservation of these species be included in the annual activities, agendas, and strategy plans of respective government bodies and community forest user groups for long-term pangolin conservation. A more detailed study should also be conducted to ensure the type of species present in Nepal's Makwanpur district.

Key Words: Community Ownership; Pangolins; Pride Animal; Sustainable Biodiversity Conservation
Oral Presentation 1.2

Water Resource Management Act, 2079 Gaindakot
Mukti Ram Rijal
Gaindakot Municipality

The Water Resource Management Act, 2079 Gaindakot (गैंडाकोट नगरपालिका जलग्राह व्यवस्थापन एन, २०७९) is an initiative of Gaindakot Municipality to improve water resource conservation outcomes in its jurisdiction. Given the critical need to conserve water resources, WWF Nepal critically studied and explored specific issues related to water conservation and opportunities for ensuring conservation, sustainable use, and equitable benefit sharing of water resources in the lower Narayani River Basin, Nepal. Recognizing the gaps and shortcomings in existing natural resource conservation policy and its implementation at the local level of governance, the goal of this study was to draft a Water Resource Conservation/Management Act. Within this study, the perspectives of ward members, legislative committees, community forest user groups, indigenous communities, local non-government organizations, academic institutions, radio station, and resource center were gathered through three levels of discussion, and the perspectives of local people were gathered through a two-step discussion program. On September 27, 2022, the final meeting was held, and the policy brief was handed over to the Gaindakot Municipality. The act includes the creation and implementation of a joint water resources management plan, awareness and capacity building, instruction and details, award-related arrangements, delegation of rights, and the ability to create, defend, and repeal rules, procedures, and guidelines.

Key Words: Water resource management, conservation, policy, governance.
Oral Presentation 1.3

Water Quality Analysis of Narayani River

Bhabishye Adhikari, Dhruba Acharya, Keshab Acharya
Department of Environmental Science
Saptagandaki Multiple Campus, Bharatpur, Chitwan, Nepal

bhabishyeadhikari@gmail.com

The Gandaki River System is one of the three major river systems in Nepal. It has seven tributaries and is therefore called the Sapta-Gandaki. The Kali Gandaki, which originates on the Tibetan plateau, is regarded as one of the major tributaries. At Devghat, it joins the Trishuli in a significant confluence, at which point it is referred to as the Narayani River. The proper management of river water quality in Nepal's main rivers has evolved into a crucial issue. This study attempted to study the water quality of the Narayani River by measuring the Water Quality Index (WQI). Water samples were taken from five different locations between the Devghat Confluence and the Gorkha Brewery. Eleven physicochemical parameters such as temperature, pH, DO, alkalinity, chloride, electrical conductance, total dissolved solids, calcium and total hardness, turbidity, nitrates, etc. were analyzed by the American Public Health Association (APHA) methods. The calculated WQI of the Narayani River was 785.78. A WQI above 100 is considered unfit for any purpose. The landfill site in the Narayani River had the highest WQI, followed by Devghat cremation and the Gorkha Brewery Site. Since only the post-monsoon season of 2021 was sampled, more research on the Narayani River's water quality is necessary.

Key words: physicochemical parameters, water pollution, water quality index
Oral Presentations

Theme II: Wetland Health in changing world
Oral Presentation 2.1

Present Status of Fish Passages in Hydroelectric Projects of Nepal

Rakesh Kumar Yadav and Deep Narayan Shah
Central Department of Environmental Science, Tribhuvan University, Kirtipur, Kathmandu, Nepal

Rapid dam and weir construction pose serious ecological challenges in Nepal. River fragmentation degrades the riverine environment and subsequently stops or delays fish migration. This contributes to the decline and sometimes the extinction of species that depend on the longitudinal ecological corridor for movement across the dam to complete their life cycle. The construction of fish passages could be one of the most effective tools for reducing the impact of hydropower on river ecology in hydropower-regulated rivers. Nepalese rivers harbor at least 186 indigenous and 11 exotic fish species of high economic, environmental, and academic value. It is likely that all such species migrate to some extent between breeding and feeding areas to complete their life cycles and avoid seasonally unfavorable environmental conditions. The study evaluated the effectiveness of fish passage in Nepal's hydroelectric projects. Out of 121 hydroelectric projects, only 13 have fish passages constructed. Among them, five fish passages were chosen for monitoring considering different elevations, locations, fish species diversity, and types of fish passages. According to the study, the fish passages weren't working properly. They were constructed in accordance with legal requirements, but environmental effects received no consideration. Additionally, the fish passages were not used all year long. The entrances and exits were also shoddily built. The study recommends that the fish passages be redesigned with a focus on considering their environmental impact and that proper maintenance and monitoring be put in place to ensure their effectiveness.

Keywords: rivers, fish pass, hydroelectric projects, migration, efficiency.
Oral Presentation 2.2

Wetland Health and Economic Valuation for the Sustainable Management of Wetlands in Lake Cluster of Pokhara Valley

Laxmi Karki and Deep Narayan Shah
Central Department of Environmental Science, Tribhuvan University, Kirtipur, Kathmandu, Nepal

This study aims to assess the health and economic value of wetlands in the Lake Cluster of Pokhara, which provide various ecosystem services and are essential for sustaining the livelihoods of local communities and maintaining biodiversity. The rapid increase in population, urbanization, wetland resource exploitation, and pollution has led to the degradation of wetlands, which necessitates the need for sustainable management. The study involved collecting 40 samples from five wetlands, conducting household surveys, stakeholder consultations, and key informant interviews to identify key ecosystem services, and using multiple methods to calculate the economic value of the wetlands. The results showed that the wetland condition index (WCI) value of Begnas and Khaste Lake demonstrated the best wetland condition in the winter season, and Gunde maintained the best wetland condition in the post-monsoon season, while other lakes in both seasons need restoration and conservation efforts. The total economic value of studied wetlands ranged from 0.009 million US$ year\(^{-1}\) in Deepang to 3.92 million US$ year\(^{-1}\) in Begnas. The study highlights the need for policies and strategies towards wetland conservation and the wise use of wetland resources to maintain their multiple ecosystem services.

**Keywords:** Wetlands, Ecosystem services, Economic valuation, Pokhara Lake Cluster, Sustainable management
Oral Presentation 2.3

Collection and Rearing of Indigenous Prawn (*Macrobrachium sp.*) species

Anupa Ghimire and Rahul Ranjan
Faculty of Animal Science, Veterinary Science and Fisheries, Agriculture and Forestry University
anupa.ghimire01@gmail.com

Although raising prawns is a lucrative business, modern prawn farming is uncommon in Nepal. The lack of knowledge and resources available for prawn farming in the country has rendered farmers helpless. A few efforts have been made to study the potential of *Macrobrachium rosenbergii* for large scale adoption, but more research seems to be the need of the moment. Thus, the objective of the study was to learn about the collection and culture of the indigenous prawn (*Macrobrachium* sp.). The research was conducted at the aquaculture farm of the Agriculture and Forestry University in Rampur, Chitwan. During the period, indigenous prawn species were collected using different methods from the earthen ponds of the Fisheries Program at the University of Agriculture and Forestry University and cultured in the cemented tank. The stocking density of the prawn was 182/m² toward the end of the culture. The feed was prepared using locally available mustard oil cake and rice bran with 25% CP. The prawns were provided with feed balls. They were fed 3% of their body weight once a day. The average weight gain of the prawns was 0.52±0.073 g. The survivability was only 50.9%, with the total harvested weight being 1.073kg. The average of the water quality parameters measured at 7:00 am were 9.37±0.33 for DO, 9.01 for pH, 23.41±0.46 for temperature. The average transparency and total alkalinity are 22.67±5.51 and 52.06 ± 0.06 respectively, with a gross margin of NRs 1860 which shows this culture system is profitable as an enterprise and can be a sustainable approach to developing aquaculture in Nepal.

**Key words:** prawn farming, indigenous prawn, aquaculture, water quality
Oral Presentations
Theme III: Livelihood
Oral Presentation 3.1

Rafting: Tool for Trans-boundary Water Cooperation

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The nature of transboundary rivers touching multiple borders has the greatest impact on water resource conservation, its uses, and the associated communities. The Mahakali River, which serves as a border between India and Nepal, is one such instance. The purpose of this study was to investigate the potential role of rafting in increasing transboundary river cooperation between Nepal and India, as well as the multi-dimensional use of the Mahakali River. A four-year project period was selected to better understand the contribution made by rafting in transboundary water cooperation. The major analysis included key informant interviews, field observations, and focus group discussions from 10 Mahakali dialogues, 30 lobby meetings, and 1030 reflection classes. The analysis of data before and after the application of rafting in the Mahakali River through the Transboundary Rivers of South Asia (TROSA) project demonstrated a significant contribution to water cooperation. Despite the political sensitivity of the issue, rafting companies and riverine communities were able to easily access resources and contribute to river conservation. The analysis revealed that rafting companies, in collaboration with local governments and CSOs, were at the forefront of initiating rafting ventures. It was also further supported through ongoing dialogues and meetings between communities and local governments following the implementation of citizen science, which contributed to the exploration of various ideas to control river pollution. The study indicated that rafting as a standalone project cannot contribute to transboundary cooperation but must be linked with tourism and other business plans in the tourism sector.

\textbf{Key words}: Transboundary rivers, Mahakali River, rafting, water cooperation, tourism sector.
Oral Presentation 3.2

Hetauda Industrial District Wastewater Treatment Plant

Ashok Kumar Yadav
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Water pollution caused by wastewater has been a serious environmental problem. To avoid contaminating natural water sources and to maintain a safe environment for aquatic life and human consumption, wastewater must be properly treated and disposed of. The maintenance of the ecosystems on our planet depends on the application of efficient wastewater management techniques. Thus, with the technical and financial support of the Danish government, a natural stabilization wastewater treatment plant (WWTP) at Hetauda Industrial District (HID), Hetauda, was constructed in 2002–2003. The industrial and sanitary wastewater from the HID industries and buildings is treated in the wastewater treatment plant before it is discharged into the nearby Karra River. The use of aerobic and anaerobic lagoons, along with sludge retention ponds and constructed wetlands, in the treatment process helps to remove pollutants from the wastewater, thus reducing the negative impact on the surrounding environment and improving the overall health of the ecosystem. The waste treatment plant has worn down over the years and needs major restoration.

Keywords: wastewater treatment, industrial area, waste treatment plant
Oral Presentation 3.3

Flood Management and Community Actions for Biodiversity Conservation

Narayan Gyawali
Lutheran World Relief
ngyawali@lwr.org

This presentation focuses on the increasing flood risks in the Narayani and Koshi River Basins due to population growth, urbanization, and economic development in hazard-prone areas. The detrimental impact of floods on life, economy, and insured losses calls for a shift towards resilience-building rather than focusing solely on relief and recovery efforts. The importance of investing in prevention is emphasized, as it has been found that every dollar invested in prevention saves five dollars in future losses.

The presentation highlights key issues and challenges in flood risk management, such as unplanned construction obstructing early warning systems and the dangers posed by small tributary rivers and poor watershed management. To address these challenges, a comprehensive approach is proposed, known as LWR's Six Pillars Approach. This approach encompasses early warning systems, community-based disaster risk reduction institutions, disaster-resilient infrastructure, safety nets, flood-resilient livelihoods, and public-private support, forming the foundation for developing flood-resilient model communities.

The way forward involves adopting a holistic and multi-stakeholder approach, working closely with government entities for policy advocacy and sustainability. Educating and empowering communities to take proactive actions is crucial, and integrating livelihood components into flood risk management initiatives is recommended. The presentation underscores the significance of a comprehensive approach to foster flood resilience in the Narayani and Koshi River Basins and emphasizes the lessons learned from Lutheran World Relief's 10 years of experience.

Keywords: flood risks, resilience-building, comprehensive approach, community actions, biodiversity conservation.
Oral Presentations

Theme IV: Terrestrial Biodiversity
Oral Presentation 4.1

Changes in Vegetation Composition and Diversity due to Restoration Interventions in the Mixed Dipterocarp Forests of Nepal

Dr. Ramesh Kumar Sapkota
Central Department of Environmental Science
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This study explores the impact of restoration practices on species assemblage and diversity in the mixed dipterocarp forests of Nepal. With a focus on the Buffer Zone Community Forests of Parsa National Park, the study evaluates the effectiveness of restoration efforts in terms of both quality and quantity. The aim is to assess the impact of these interventions on vegetation composition and diversity.

The study area covers a total of 627.4 sq. km, consisting of restored and natural stands. Woody plants with a diameter at breast height (DBH) greater than or equal to 1.5 cm were identified and recorded in 60 sampling sub-plots established across 6 hectares of land. The data collection method involved assessing quantitative vegetation characteristics, including the identification and count of trees, seedlings, and saplings.

The findings suggest that despite the increase in coverage and stem densities, existing forest management and restoration practices require improvement to enhance alpha diversity and heterogeneity of species assemblages. Intensive efforts to increase the density of Shorea robusta have resulted in a deflection in density diversity within restored stands, indicating signs of homogenization. This homogenization may have consequences for ecosystem conditions and services, impacting both humans and wildlife in the future.

Keywords: restoration interventions, vegetation composition, diversity, mixed dipterocarp forests
Oral Presentation 4.2

Effects of Riparian Landscape Setting on Water Chemistry of the Narayani River and its major tributaries in Nepal

Deep Narayan Shah¹, Ram Devi Tachamo-Shah²,³, Aakriti Adhikari¹, Junu Maharjan², Rajesh Sada⁴ and Subodh Sharma²

¹Central Department of Environmental Science, Tribhuvan University, Kirtipur, Kathmandu
²Aquatic Ecology Center, Kathmandu University, Dhulikhel, Nepal.
³Department of Life Sciences, Kathmandu University, Dhulikhel, Nepal.
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The Gandaki river system starts from Photu pass to the Mustang area in the Northern Tethys zone, and from Devghat onward is known as the Narayani River. The Narayani River provides enormous ecological services as the river is uniquely important to several endangered species such as the Ganges River Dolphin (Platanista gangetica), the Gharial (Gavialis gangeticus), the Muggar (Crocodylus palustris), and others. The water quality of rivers and tributaries is crucial for the health and sustainability of ecosystems and freshwater species. Therefore, this study aims at assessing physical and chemical parameters using standard methods to understand the spatial and seasonal variation in the water quality of the Narayani River and its tributaries. Altogether, 16 sampling sites were sampled along the Narayani River (from Devghat to Tribeni-Gandak barrage) and its tributaries in 3 different seasons, i.e., during the pre-monsoon season, monsoon season, and post-monsoon season. On the field, physiochemical parameters; pH, Temperature, Turbidity, Electrical Conductivity (EC), Total dissolved solids (TDS), Dissolved Oxygen (D.O), Total hardness, Total alkalinity, and Chloride (Cl) were tested. Water samples were taken to the lab for analysis of Nitrate (NO₃), Phosphate (PO₄), Ammonia (NH₄), Sodium (Na), Potassium (K), Magnesium (Mg), analysis. Trace metals, Iron (Fe), Manganese (Mn), Cadmium (Cd), Lead (Pb) and Arsenic (As) were also measured. The results indicated that the water quality of the river system and its tributaries generally met the permissible limits for drinking water and freshwater life, except for cadmium, which exceeded the guideline limit (0.003 mg/l) in sites influenced by industrial effluents. The study also evaluated the suitability of water for irrigation based on various parameters, including EC, Na%, Sodium Absorption Rate (SAR), Potassium Ratio (KR), and Magnesium Absorption Ratio (MAR). The water was generally safe for irrigation, except for three sites that had MAR values above 50. Water quality at those 3 sites shows a negative influence on crop production, as these sites had either industrial effluent or barrages as stressors. Cluster Analysis classified rivers into 3 different clusters in 3 different seasons that represent changes in chemical composition, and the PCA results showed that the sampling locations principal sources of contamination and regulating factors accounted for 78.50% of the overall variance. In order to gain a thorough understanding of the ecological health of the river, additional in-depth research at spatiotemporal levels is necessary.
Keywords: Water quality, aquatic biodiversity, large rivers, seasonal variation

Oral Presentations
Theme V: Aquatic Biodiversity and Species Conservation
Oral Presentation 5.1

Conservation Status of Gharials in Chitwan National Park, Nepal

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Gharial (*Gavialis gangeticus*) is a highly threatened keystone species of freshwater ecosystems, confined to a few tributaries of the Ganga River in India and Nepal. Their population also declined drastically due to anthropogenic as well as natural causes. Governments and conservation organizations have initiated various programs on gharial conservation, including breeding centers. A large number of gharials have been released in different river systems of Nepal from 1981 to 2018. Although it contributed to sustaining the wild gharial populations in the rivers, the wild populations haven’t yet recovered to the level of a viable breeding population. The survey was conducted in February and March 2018 in Rapti, Narayani, and their tributaries to assess the gharial population. A population survey of gharials was assessed through a direct count of basking gharials. The entire river stretch with potential gharial distribution was divided into 16 km (10-25) segments. All segments (except two) were surveyed simultaneously and repeated three times. Three replicate counts on a total of 221.39 km of segments of the Rapti and Narayani counted a minimum of 219 gharials in Chitwan National Park and adjoining river stretches, including 118 in the Rapti and 101 in the Narayani. Although the size of the gharial population has increased compared to previous surveys, the number of adult gharials has not increased. Gharials were not uniformly distributed but concentrated in a few locations with undisturbed natural sand banks, low anthropogenic pressures, and a healthy lotic ecosystem. Monitoring of the gharials should be continued. It is recommended to prepare and implement a river management plan to protect such sites.

Key words: gharial conservation, breeding centers, population decline, river systems, survey
Breeding Success and Conservation Status of White-Rumped Vulture in Nawalpur District, Nepal

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The white-rumped vulture (Gyps bengalensis) has been listed as a critically endangered (CR) species in the IUCN Red List owing to the decline of nearly 99% of its population in the late twentieth century, and the decline is usually attributed to the consumption of non-steroidal anti-inflammatory drugs (NSAIDs), including Diclofenic. There are reports of a partial recovery of the population of the White-Rumped Vulture (WRV), in response to conservation interventions such as the banning of diclofenic, the operation of community-based vulture restoration, etc. However, breeding success of the species is only about 15.6–88%, meaning individuals from only 15.6–88% of the eggs successfully hatch and reach the fledging stage, and the factors affecting this success are poorly understood in the case of Nepal. Thus, this study aimed to understand the breeding success and people’s perception of the WRV in selected three buffer zone community forests and two community forests in Nawalpur district. The nesting locations were purposefully surveyed, geo-tagged, and monitored monthly from January to May 2021, and habitat related variables such as tree species, tree size and height, nesting height, and anthropogenic factors such as noise level, grazing, and proximity to settlement were collected using a standard checklist. People’s perceptions were collected from 123 households, where interviews were conducted using a standard questionnaire. Logistic regression was used to understand the correlates of breeding success, and the chi-square test was used to understand the interdependence of socio-economic variables and people’s perceptions. A total of 58 nests were recorded in 52 trees, of which WRV chicks from 48 nests survived till the fledging stage, meaning the breeding success rate was 79.31 percent. Breeding success was significantly associated with tree height, with an odds ratio of 1.21, meaning that for every 1 meter increase in the height of the tree, the probability of breeding success increases by 21%. Where Simal (Bombax ceiba) was mostly used by WRV for nesting, which accounts for 74.13% of the total nest recorded, followed by Saaj (Terminalia elliptic), Karam (Adina cordifolia), Sal (Shorea robusta), and Bhadahar (Artocarpus lacucha). Some people believed it had cultural significance since they used vulture feathers in Kul Pooja. The use of chemical fertilizers and a lack of understanding of carcass handling techniques could be potential threats to the species. However, the role played by Jatayau restaurants and the use of traditional remedy measures for treating cattle are some positives for vulture conservation.

Keywords: Vulture conservation, nesting success, breeding success, tree height, Critically Endangered (CR)
Oral Presentation 5.3

Snakes of Narayani River Basin: Implications and Opportunities

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This study aims to investigate the effect of snakebites on the livelihood of people living along the Marsyangdi-Narayani Basin in Nepal. The study will document snakebite incidents and collect ecological variables, genetic and venom samples, as well as analyze snake diversity and venom composition along altitude and forest type. The collected venoms will be identified using mass spectrometry, and antivenom efficacy will be tested. The study is expected to provide insights into the diversity and composition of snake venom and the efficacy of antivenom being used in Nepal. The research has implications for the conservation of snake populations and the prevention and treatment of snakebites, which can have a significant impact on health and livelihoods.

Keywords: Mass spectrometry, River basin, Snake venom, livelihood
Status of Decision Making at Domestic and Public Spheres: A Case Study Among the Tharu Women in Sundarbasti Village in Chitwan District.

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Tharus are the second largest population among the indigenous peoples, holding about 6% of the total population in Nepal. They inhabit all across the Tarai district, and they are the indigenous and dominant population in the Narayani river basin, particularly Chitwan district. This paper will showcase the social status of Tharu women in Bharatpur Metropolitan City, ward no. 14, erstwhile Patihani VDC. Tharu women’s social status may be expressed through decision making processes in the public and domestic spheres. Tharu women of the study area are institutionalizing their decision making capacity at the public level through a saving and credit scheme formed by the women themselves. The decision-making capacity at the domestic level may be seen in the processes of decisions made in everyday life situations and family activities, including farming and livestock raising.

Key Word: Tharu women, Decision-Making, Gender Relations
**Best Presentation Awards**

The presenters were judged for both oral and poster presentations on the basis of their topic innovation and creativity, clarity in the background, methodology, findings, discussion, and conclusion, effective use of visual aids, organization, and delivery skills.

The **Best Oral Presentation** award was given to:

- Rakesh Kumar Yadav (Central Department of Environmental Science, Tribhuvan University) for his presentation, “Present status of fish passages in hydroelectric projects of Nepal”

The recipient of the **Best Poster Presentation** was:

- Bipana Gurung, (Naya Aayam Multi-Disciplinary Institute (NAMI), University of Northampton, Kathmandu, Nepal) for her presentation, “Potential impact of climate change on fish habitat in Narayani River”.

Narayani River Conclave Declarations 2023
for Realizing Healthy Rivers: Healthy Lives

February 13-14, 2023, Gaumukhott,

1. Healthy rivers are essential to support and maintain vital ecological processes and provide ecosystem services for societies. Maintaining the state or health of rivers is a critical part of sustainable development.

2. The degradation of Narayani River, an ecologically and culturally important river by sand mining, waste disposal, discharge of untreated sewage and ritual activities must be prevented.

3. Establish a system of monitoring the quality and quantity of water at critical points of the river to inform water resources management strategy for healthy rivers.

4. Engage concerned stakeholders such as local governments, industries, academic and civil society organizations for effective implementation of constitutional and other legal provisions for protecting river health and freshwater biodiversity.

5. The ownership and rights over the water and other river resources must be recognised so that the benefits can be equitably shared among the custodian stakeholders and rightholders.

6. Local, provincial and federal governments must increase their investment in research and education for maintaining river health. This should lead to establishment of a "Centre of Excellence" for documenting data of rivers and its watershed in terms of river health, biodiversity, water quality, water availability and utilization, conservation and management practices. This must be publicly accessible to researchers, academicians, policymakers and community and interested parties for use and knowledge generation and regeneration.

7. Help establish Narayani sub-basin water network to foster cooperation among local communities, local organizations, private sectors, academics and different tiers of governments for river and water conservation initiatives.
8. Endorse and promote community ownership of "The Collective Action Plan of Narayani sub-basin 2023" and upscale its scope coverage with recognising the value of upstreams- downstream connectivity.

9. Integrate the adaptation and mitigation measures incorporated in the Collective Action Plan in planning and policy formulated for healthy rivers.

10. Implement co-management approach in river stretches by involving local communities, government, academia, religious, cultural and social institutions, civil society organizations and private sector for maintaining river health.

11. Local and indigenous knowledge of the river must be documented, promoted and integrated into planning and implementation of co-management strategies.

12. Advocate for declaring Narayani River as 'heritage river' in all national levels that it must flow freely and healthy and river banks between Annapurna Conservation Area and Chitwan National Park be developed as a green corridor.
1. The Narayani River Conclave 2023 proceedings.

2. The proceedings discuss various aspects of the Narayani River and its management.

3. The Narayani River is a significant water body in the region and is being discussed in detail.

4. Various stakeholders are participating in the conclave to discuss the river's management.

5. The conclave aims to promote the sustainable use of the Narayani River.

6. The discussions cover the river's hydrology, ecology, and the challenges faced in its management.

7. The conclave is an opportunity for experts and policymakers to share insights and solutions.

8. The Narayani River is a vital resource for the local communities.

9. The proceedings highlight the importance of collaborative efforts in river management.

10. The conclave concludes with a call for actions to protect and manage the Narayani River effectively.

11. The discussions also cover the impacts of climate change on the river.

12. The proceedings end with a commitment to ongoing efforts in river conservation and management.
Annexes
1 Name of Rapporteurs

<table>
<thead>
<tr>
<th>Name</th>
<th>Affiliated Organization</th>
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<tbody>
<tr>
<td>Pabitra Pandey</td>
<td>Agriculture and Forestry University</td>
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<tr>
<td>Narayan Niraula</td>
<td>Sapta-Gandaki Multiple Campus-Tribhuvan University (SMC-TU)</td>
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<td>Pawan Poudel</td>
<td>Bal Kumari College -Tribhuvan University (BKC-TU)</td>
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<td>Sunil Sapkota</td>
<td>Raise Hands Nepal</td>
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<td>Sushma Tiwari</td>
<td>SMC-TU</td>
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2 Name of Volunteers

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<tr>
<td>Bimala Khanal, SAHAMATI</td>
<td>Rubina Thapaliya, Golden Gate International College, Kathmandu</td>
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<td>Prabesh Poudel, BKC-TU</td>
<td>Anita Adhikari, SAHAMATI</td>
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<td>Buddhisagar Kumal, SAHAMATI</td>
<td>Aabha Khanal, Oxford College of Engineering and Management</td>
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<td>Prabina Raut, Golden Gate International College, Kathmandu</td>
<td>Sanam Kumal, Sagar Honeybee</td>
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3 Logistics Team

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<td>Hari Prasad Sapkota, SAHAMATI</td>
<td>Kshitij Sharma, SAHAMATI</td>
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<td>Sobit Bhandari, SAHAMATI</td>
<td>Nagendra Prasad Rijal, SAHAMATI</td>
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<td>Deepak Ranabhat, SAHAMATI</td>
<td>Bel Prasad Poudel, SAHAMATI</td>
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<td>Bishal Sharma, SAHAMATI</td>
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4 Photos of the Narayani River Conclave