



Proceedings of

Graduates' Workshop on Wetlands on WORLD WETLANDS DAY 2011

2 February 2011 | Kathmandu, Nepal



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Background

Wetlands are those areas where water is the primary factor controlling the environment and the associated plant and animal life. As defined by the convention on wetlands, also known as Ramsar Convention, wetlands include a wide variety of habitats such as marshes, peatlands, floodplains, rivers and lakes, and coastal areas such as saltmarshes, mangroves, seagrass beds, coral reefs and other marine areas no deeper than six meters at low tide, as well as human-made wetlands such as waste-water treatment ponds and reservoirs. These are considered as one of the world's most productive ecosystems.

World Wetlands Day is celebrated internationally each year on 2nd February. It marks the anniversary of an important day of the signing of the Convention on Wetlands of International Importance (Ramsar Convention) in Ramsar, Iran, on 2nd February 1971. The theme for World Wetlands Day 2011 is 'Wetlands and Forests', chosen because 2011 is the UN International Year of Forests. The theme **Forests for Water and Wetlands** highlights the intricate links between forests and wetlands.

Graduates' Workshop on Wetlands was a great opportunity for graduate researchers, academics and policy makers to get together to learn, debate and share knowledge on wetlands of Nepal. The workshop was jointly organised by The Small Earth Nepal (SEN) and Central Department of Environmental Science (CDES), Tribhuvan University and was supported by WWF Nepal, Nepal Academy of Science and Technology (NAST) and National Lake Conservation Development Committee (NLDC).

Program Summary

A half day workshop was organized on 2nd of February 2011 in Kathmandu to provide a platform to graduate students and young researchers to expose their work among academicians and colleagues and motivate them to carry out their research activities on wetlands. It was jointly organised by The Small Earth Nepal (SEN) and the Central Department of Environmental Science (CDES), Tribhuvan University.

Objective of the workshop

The major objectives of the workshop were:

- To provide a platform to young researchers to expose their work among academicians and colleagues
- To identify the research gap on wetland focusing to Nepal
- To motivate young researchers and graduate students to carry out their research activities on wetland sector
- Capacity building of young researchers and students on the research field

Participants

A total of 67 individuals from different academic institutions, NGOs and media houses participated in the workshop.

Inaugural Session

The Graduates Workshop on Wetlands which was chaired by Professor Dr. Surya Ratna Gubhaju, Central Department of Zoology, TU, was incepted with the welcome and brief introduction of the workshop by Mr. Dilli Ram Bhattarai, coordinator for the workshop. Mr. Bhattarai on his welcome remarks pointed that the workshop was a platform for young researchers to share their research outcomes and findings which would otherwise have been just limited in the libraries of their own institutions. Mr. Bhattarai said that the workshop basically aimed to capacitate and motivate graduate students for further research in this field through the interaction with experts. He applauded WWF Nepal, Nepal Academy of Science and Technology and National Lake Conservation Development Committee for supporting the workshop.

During the opening remarks, Mr. Dhiraj Pradhananga, President of The Small Earth Nepal (SEN) highlighted the activities of SEN and the modality of its STS (Students-Teachers-Scientists) network. He expressed that the workshop was also an outcome of the STS network. On his remarks, Mr. Pradhananga announced the upcoming research grant program that is a joint effort of UNESCO and The Small Earth Nepal to promote the studies and researches on climate change and water in Nepal. The grant shall be awarded to 5 to 10 researchers each year with the grant sum extending from 300 to 500 US Dollar to each research. On behalf of the organizers, he also gave sincere thanks to all the supporters and participants.

Technical Session

The technical session kicked off with the first presentation on 'Wetland and Lake Studies in Nepal: Review and Opportunities' by Dr. Dinesh Raj Bhujju, Chief, Faculty of Science of Nepal Academy of Science and Technology (NAST) followed by the presentation on 'Emerging Governance for the Sustainable Conservation of Himalayan Lakes of Nepal' by Mr. Shailendra Pokharel, Coordinator of National Lake Conservation Development Committee (NLCDC). All together eight research papers were presented in the workshop. Among them three papers were presented by the experts and five research papers were presented by young researchers. The young researchers presenting in the workshop were Mr. Jeeban Panthi from The Small Earth Nepal (SEN), Mr. Pawan Kumar Neupane, Ms. Sarita Karki, Mr. Sajan Neupane and Mr. Nabin Aryal from Central Department of Environmental Science (CDES), TU. The National Lake Strategic Plan for Nepal was presented and discussed by Mr. Ukesh Raj Bhujju, Coordinator of National College and consulting advisor of NLCDC. Below are the abstracts of each papers presented in the technical session of the workshop.

Presentation I

National Lake Strategic Plan for Nepal

Ukesh Raj Bhujju [Consulting Advisor of National Lake Conservation Development Committee]

The National Lake Conservation Development Committee (NLCDC) prepared a lake strategic plan through a process of Conceptualization, Literature Review & Lake Inventory, Appreciative Inquiry & Experts Consultations, Field Consultations & Observations, and Consultative Workshops & Documentation in 2010. Supported by the academic organizations, the process mobilized 113 researchers who conducted 97 focus group discussions with over 1,700 participants in 49 districts. Rapid ecological surveys of 229 lakes were also carried out.

Background papers covered the areas of Conceptual Framework, Map Based Inventory Report, Law & Policy, Natural Science, Socio-Economy, and Issues & Suggestions. The map based lake inventory listed 5,358 lakes in Nepal, of which 51% are in lowland (below 500m altitude), 42% in highland (above 3,000m altitude) and 8% in midland (between 500m and 3,000m altitudes). There are over two dozens of Acts and Regulations pertinent to lake. It is estimated that nearly one fourth of Nepal's biodiversity is wetland/lake dependent. About 17% of the population of Nepal from 21 ethnic communities traditionally depends on wetland and lakes for sustaining their livelihood.



The plan contains Context, Programs, Business plan, and Annexes that were presented in line with a logical framework. The vision and goal were compatible to those of NLCDC. The outputs grouped in three major sectors are as follows:

Governance: umbrella legislation, institutional transformation, partnership and coordination among lake stakeholders, formation of lakes community user groups.

Conservation: indicator aquatic species stabilization, water quality maintained, water bodies maintained, database and documentation.

Sustainable Development: lake communities' standard of living enhanced, community management of lakes, lake tourism enhanced, physical infrastructures built.

The total budget for the implementation of the activities is NRs. 1,369,100,000 of which 32% for construction, 28% for equipment, 12% each for remuneration and human resource development, 9% for travel and 7% for office running costs.

Wetland and Lake Studies in Nepal: Review and Opportunities

Dinesh R. Bhuju [Chief, Faculty of Science, Nepal Academy of Science and Technology]

Water bodies cover 5.06% of the total land area in Nepal, of which river systems (55%) and paddy fields constitute major portion (98.6%). A list of 5,358 lakes has been reported from Nepal which are distributed in varied ecological conditions from subtropical lowland Terai to alpine high altitude providing opportunities for wide array of studies. Over 160 study reports including masters' thesis on the lakes and ponds in Nepal have been listed till date. Eighty three percent of the study reports were based on scientific objectives with 35 master degree thesis in different disciplines of science, mainly botany and environmental sciences. The first such report is credited to Loffler published in 1969. The studies increased gradually in the beginning and at faster pace in the later part with eight studies during 1970s, 20 during 1980s, 58 in 1990s, 76 studies during 2001-2009. By physiographic zones, majority of Nepal's lakes and ponds are located in the high altitudes (51%) and lowland (42%); however, much of the studies were conducted in the middle mountains with over 50.3% of the total studies. Most of these studies were carried out in Pokhara and Kathmandu Valley. There were 41 studies conducted in Churiya-Terai region. From the remote high mountains, 21 publications were listed, half of which were based in Mount Everest region. Thus, there exists a stark discrepancy in the lakes studies in Nepal. Of the total studies, majority (76%) was conducted by Nepali researchers, 15% by foreigners and the rest jointly. Looking at the scope of scientific research studies, they covered various aspects of limnology, plankton, macrophytes, macro invertebrates, diatoms, seasonal change in physico-chemical parameters of lake waters, composition of vegetation surrounding the lakes, etc. Some studies have focused on the relationship between floral composition and water quality while only few literatures can be found in environmental change of lakes. These studies have raised issues related to encroachments, pollution, overexploitations and underutilization, ownerships and management. It would be fruitful to focus future studies in integrated/holistic study, morphometric analysis, resource mapping, ecosystem services including carbon sequestration, water chemistry in increased temperature condition, rehabilitation of degraded lakes, livelihood options and benefit sharing mechanism of the lakes development and conservation.



Presentation III

Emerging Governance for the Sustainable Conservation of Himalayan Lakes of Nepal

Shailendra Pokharel [Coordinator, National Lake Conservation Development Committee, Nepal]



Nepal's lakes are globally recognized as the Himalayan lakes that numbers 5,358 in total. Good lake governance is often sought to contribute to development paradigm which Nepal initiated from 2006 with the establishment of the National Lake Conservation Development committee (NLDC) following Integrated Lake Basin Management (ILBM) approach to address the issues of lakes. This approach is propounded by Sigh (Japan) based International Lake Environment Committee Foundation (ILEC). ILBM basically is a management prescription that consists of six governing pillars such as Institution, Policy, Participation, Information, Technology and Finance. NLDC stands as an institution at center which is in a rapid progress in extending its district networks in Kaski, Kapilvastu, Rupandehi, Morang, Sunsari, Ilam and Dhankuta. A national lake conservation strategy has been prepared as policy document that eventually would regulate scales and depth of intervention. Participation of people and institution has been gradually rising from conservation of 36 lakes of 23 districts in 2008 to 25 lakes of 18 districts with addition of 9 districts in 2009 and 37 lakes of 22 districts in 2010 making a direct benefit to estimated ten thousands households. Nepal has already established a good working linkage with global community like Japan, China, Malaysia, Bhutan,

India, Pakistan, South Korea, Australia, USA, Philippines, Uganda, New Mexico and Russia. However, sustainability of Himalayan lakes relies more on information and knowledge that Nepal has to generate about lakes and their resources; appropriate technology that fits best to lake environment; and adequate finance that NLDC has to explore to reach different candidate lakes in high mountain, mid-hill and Terai. A successful learning of Nepal from integrated water resource management, integrated watershed management and community forestry may add flavour on emerging lake governance in Nepal.

Biodiversity Assessment of Wetland, a Study on the Mardhar Wetland, Rautahat, Nepal

Nabin Aryal [Central Department of Environmental Science, TU, Kirtipur, Kathmandu, Nepal]

The Nepali term for wetlands is "Simsar", which means lands with perennial source of water. Swampy rice fields, water logged areas and ponds are also understood as wetlands in the country. Productive environment of wetland and its associated resources are going to be wiped out because of haphazard use of natural resources, introduction of alien species, extensive use of chemicals on agricultural land and climate change. Mardhar wetland is situated at the Santapur-6, Rautahat, Eastern part of Nepal. Identification and determination of number of species of fish, bird, and vegetation of Mardhar wetland were main objective of the study including the water quality analysis. To achieve the study objective; worldwide accepted standard laboratory analysis methods were adopted. To support and verify the study; sampling, field observation, focal group discussion, interview and questionnaire survey were done within the six months period.

The area of study site, Mardhar wetland, is of 10.24 ha. Twenty one types of fishes, ninety-five types of birds and twenty-eight types of vegetation species were recorded and identified within the Mardhar Wetland. Result of water quality analysis, showed that all the physical and chemical parameters were within the standard range except the concentration of Iron (0.79 mg/l), Nitrate (1.65 mg/l), Phosphate (0.98 mg/l) and the concentration of Dissolved Oxygen (4.12 mg/l) were found below the tolerance limit of biodiversity survival. Excessive use of chemical fertilizers namely; Urea, Potash, Phosphate (DAP), Vitamin, Metacid, Thrimet, Formadene, and Fored, flood in the Chadi River, introduction of alien species, human encroachment around the lake catchments and water runoff from agricultural land as well as Bagmati irrigation canal were the major threats for Mardhar wetland. The study recommended to maintain the proper boundary on the lake, prohibit the chemical containing water runoff from agricultural land and promote the community-led supportive program from different NGOs, INGOs, and Governmental agencies.



Presentation V

Lake Water Quality and Surrounding Vegetations in Dry Churiya Hills, Far-Western Nepal

Pawan K. Neupane [Central Department of Environmental Science, TU, Kirtipur, Kathmandu, Nepal]



Mudka Tal, Bedkot Tal and Jhilmila Tal are natural lakes in dry Churiya hill of Kanchanpur in far-western Nepal. A study was carried out to prepare the baseline information on water quality, floristic and structural features of adjoining forest vegetation, socio-cultural importance and threats to help support their sustainable use. The study was carried out in March 2008 (pre monsoon) and November 2008 (post monsoon). A significant seasonal variation ($p \leq 0.05$) in physico-chemical properties of the lake waters were recorded. Adjoining forests of Mudka contained 23 species at canopy, 13 species at shrub and 27 species at herb strata, while that of Bedkot had 31 species at canopy, 9 species at shrub and 37 species at herb strata, and Jhilmila had 23 species at canopy stratum, no species at shrub and 47 species at herb strata. The most frequently observed trees were *Mallotus philippensis* and *Shorea robusta* in the forest surrounding Mudka and Bedkot Tal where as Jhilmila's surrounding the forest contained *S. robusta*, *Semicarpus anacardium*, *Syzigium cumini* and *Anogeisus latifolius*. At shrub stratum, in the forest surrounding Mudka, *M. philippensis* had the highest density (633.30 no./ha) where as in case of Bedkot, *Solanum erianthum* had the highest

density (144.00 no./ha). At herb stratum the species with highest coverage at the respective forests were *Ageratum conyzoides* (7.14%), *Viburnum contifolium* (8.50%) and *Themeda triandra* (16.09%). All the three lakes possessed cultural values and people frequently visit those sites during religious festival. However, unsustainable utilization of resources from the surrounding forest results in the flow of massive amount of sediments from fragile Churiya Hill towards the lake shrinking its area and depth. This calls for the urgent conservation and management activities on the lakes.

Carbon Stock in Ghodaghodi Lake and its Loss due to Lake Drainage

Sajan Neupane [Central Department of Environmental Science, TU, Kirtipur, Kathmandu, Nepal]

Assessment of carbon stock is being determined mostly in forests. As wetlands can store more carbon than forests and grasslands, quantitative assessment of carbon storage is required. The present study is one of the steps towards the assessment of carbon stock in wetlands. Stable hydroperiod and anaerobic environment are the most important factors for the carbon storage in wetlands. Ghodaghodi Lake (138 ha) was selected for the study purpose. Soil sampling was done by Grab Sampler in lake and Core Sampling in forests and grasslands. The carbon stock was determined by wet-oxidation method for determination of organic carbon in sediments of lake and soils of adjoining forest and grassland. The carbon stock was found to be 36.33 ton/ha, 21.28 ton/ha and 14.72 ton/ha in sediments of lake, forest soil and grassland soil respectively. Carbon stock of the wetland sediments was found to be higher than the adjoining forest and grassland. The bulk density of the soil was found to be higher in the forest soil and soil organic carbon was found to be the highest in the sediments from the center of the lake than the periphery. The water quality analysis found the mean value of dissolved oxygen to be 5.00 mg/l. The mean phosphate and nitrate concentration was found to be 0.20 mg/l and 0.60 mg/l respectively which indicated the lake is eutrophic. Rapid succession and sedimentation is contributing the reduction of lake area and the carbon stock is decreased due to its conversion into grassland and forest that resulted carbon emission helping to accelerate climate change.



Presentation VII

Baseline Study of Rampur Ghole, Chitwan, Nepal

Jeeban Panthi [The Small Earth Nepal]



Wetland ecosystems are unique for conserving biodiversity and sustaining livelihood so they support wide range of cultural, economic and biological values. In Nepal, wetlands are the means of survival for almost 13% of the ethnic groups so they are also called as the supermarkets and the natural filters too.

The Rampur Ghole area (marsh land) lies into the premises of the Institute of Agriculture and Animal Sciences (IAAS), Rampur, Chitwan and covers an area of 15 ha with tropical climate. The area has been managed by the IAAS for a long time as it has the sole authority for managing. The Ghole area was found to be a shallow water body as the maximum depth of the area ranges from 10 cm to 79 cm. The flow discharge at the mid is quite low than at the end of the boundary of the IAAS as some water is mixed through a fishery farm in between. The physiochemical parameters of the water are in the tolerable range so that the fishes were observed swimming into the water body. Thirty four species of herbs were recorded during the survey carried out in December 2010 dominated by *Commelina diffusa*, *Eragrostis gangetica*, *Persicaria*

barbata, *Gonostagia pentundra*, and *Schoenoplectus juncooids*. According to the local community, the major types of fishes available were *sidra*, *andhe bam*, *gadaula machha*, *kande* etc. The people living there are having number of benefits like wild vegetables, fishes, grazing land for livestock, fodder for domestic animals, raw materials for *marcha* and also for medicinal as well as recreational activities. Preliminary findings of the research showed that tourism is potential in and around the Ghole area and dam construction could be done for recreational and for aquaculture purposes but a comprehensive study is necessary. Banning the use of pesticide in agricultural fields should be taken as an immediate action because it is harming the fish species in the Ghole area.

Economic Valuation of Wetlands: A Case Study in Panchpokhari Wetland, Indrawati Sub-basin

Sarita Karki [Central Department of Environmental Science, TU, Kirtipur, Kathmandu, Nepal]

Ramsar convention (1971) defined wetland for the Convention purpose as “Wetlands are areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide doesn’t exceed six meters”. Valuation is the system of expressing goods and services in economic terms. Economic value is one of the many possible ways to define and measure the work of a good or service. The Contingent Valuation Method (CVM), Market Price Method (MPM) and Travel Cost Method (TCM) have been used to estimate economic values of all kinds of ecosystem and environmental services. CVM method was used for evaluating the cost benefit analysis and willingness to pay which includes the focus group discussion and a questionnaire survey in a community. Similarly, TCM was used to evaluate the recreational value of the Panchpokhari wetland.

The study area, Panchpokhari wetland, is one of the important inputs of Indrawati River. The study area lies at the core area of the Langtang National Park in Bhotang VDC of Sindhupalchowk district. However, the survey was conducted one at the upstream of Indrawati River at Bhotang VDC (67 households) as a major study area and the other at the downstream at Tipeni, Bhotenamlang-9 (25 households) at the catchment area of the Indrawati River.

The total monetary value of the wetland was found to be NRs. 1,331,569 per year by calculating the services provided by the wetland as livestock grazing (NRs. 247,500 per year), water feeding for livestock (NRs. 468,750 per year) and recreational value (NRs. 615,319 per year). It was found that the level of awareness about the wetland among the respondents/locals was quite higher and most of them were willing to pay for the conservation and management of the wetland up to NRs. 50 per month per household.



PROGRAM SCHEDULE

Date	: 2 February 2011
Time	: 09:45 AM to 14:00 PM
Venue	: Lecture Hall, Nepal Tourism Board, Bhrikutimandap, Kathmandu
Chairperson	: Prof. Dr. Surya Ratna Gubhaju, Central Department of Zoology, TU

Time(hrs)	Agenda	Remarks
09:45-10:00	Registration	Confirmed participants/presenters and guests
10:00-10:05	Welcome and Introduction of the Workshop	Mr. Dilli Ram Bhattarai, Program Coordinator, SEN
10:05-10:10	Remarks and Grant Announcement	Mr. Dhiraj Pradhananga, President, SEN
10:10-10:15	Remarks by the Chairperson	Prof. Dr. Surya Ratna Gubhaju, CDZ, TU
Technical Session (presentation and discussion)		
Time (hrs)	Titles of Presentations	Presenters
10:15-10:40	Wetlands and Lake Studies in Nepal: Review and Opportunities	Dr. Dinesh Raj Bhuju, Chief, Faculty of Science, NAST
10:40-11:00	Lake Water Quality and Surrounding Vegetations in Dry Churiya Hills, Far Western Nepal	Mr. Pawan Kr. Neupane, CDES, TU
11:00 -11:20	Baseline Study of Rampur Ghole, Chitwan, Nepal	Mr. Jeeban Panthi, SEN
11:20-11:40	Economic Valuation of Wetlands: A Case Study in Panchpokhari Wetland, Indrawati Sub-basin	Ms. Sarita Karki, CDES, TU
11:40-12:05	Emerging Governance for the Sustainable Conservation of Himalayan Lakes of Nepal	Mr. Shailendra Pokharel, Coordinator, NLCDC
12:05-12:25	Carbon Stock in Ghodaghodi Lake and its Loss due to Lake Drainage	Mr. Sajan Neupane, CDES, TU
12:25-12:45	Biodiversity Assessment of Wetland: A Study on the Mardhar Wetland, Rautahat, Nepal	Mr. Nabin Aryal, CDES, TU
12:45-13:10	National Lake Strategic Plan for Nepal	Mr. Ukesh Raj Bhuju, Coordinator, National College
13:10-13:40	Discussion with Presenters	Facilitation by the Chair
13:40-14:00	Concluding Remarks and End of the Workshop	By the Chair
14:00-14:15	Networking Session (Refreshment & interaction)	

Closing Session

The technical session concluded with the discussion on the papers presented. The discussion was followed by distribution of letter of appreciation and token of love to the presenters. Young researchers were rewarded with the letter of appreciation and the invited experts were appreciated with the token of love. The workshop ended with the concluding remarks from the chairperson Dr. Surya Ratna Gubhaju. On his concluding remarks, Dr. Gubhaju said that he was overwhelmed after listening the research presentations. He commented the program as the best endeavour to upgrade the review, research and strategic planning of wetlands in Nepal.



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Layout, Design and Photos: Nammy Hang Kirat

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The Small Earth Nepal (SEN) develops and enhances students-teachers-scientists (STS) network that promotes sustainable lifestyles through educational outreach and knowledge sharing. It supports activities that reduce the impacts of human activities on local, regional and global environment.



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FINANCIAL SUPPORT
OF
WWF NEPAL