ROYAL THIMPHU COLLEGE
Inspiring Education in Bhutan

ASIA-PACIFIC NETWORK FOR GLOBAL CHANGE RESEARCH

Workshop Proceedings

Scoping Workshop to Develop Proposal on Identification of Carbon Rich Wetlands in Bhutan

Venue: Executive Centre, Royal Thimphu College
Date: 4 & 5th May, 2018

Organized by Royal Thimphu College
Kuenzang Tshering & Tshewang Dorji, Faculty of Environmental Science

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Executive Summary

With funding support from Asia Pacific Network for Global Change Research, Royal Thimphu College's Environmental Science Department has organized two days scoping workshop at the college campus. The main objective of the workshop was to bring together key organizations involved in wetland management in Bhutan to understand wetland management issues and national policies and plans related to wetland ecosystem.

The workshop was successful in gathering all relevant national level key stakeholders for the workshop. There were representatives from National Environment Commission Secretariat, the apex body for environmental policy making; various representatives from Department of Forest and Park Services, the representative from Royal Society for Protection of Nature and experienced researchers from Ugyen Wangchuck Institute for Conservation and Environmental Research. There were also experienced researchers who have been involved in studying the invertebrates in wetland ecosystem in the country for the past decade. In addition, faculty members of environmental science from Royal Thimphu College has also made meaningful contribution during the workshop. The final year undergraduate students have also participated during the group discussions, which was firstly aimed at identifying areas of collaboration and at the same time the platform served as an opportunity for the students to have face-to-face discussion on key environmental issues with their potential future employers.

On completion of the two-day workshop, there was unanimous consensus that very little has been done for wetland conservation in the country. Lack of baseline ecological data was identified as one of the key challenges working towards development of wetland management plans. The need for establishing the groundwork was agreed as a major step in moving towards developing national level wetland conservation and sustainable use of the wetlands in long-term.

The only wetland ecosystems with some kind of management regimes were the three RAMSAR sites. However, even for those sites numerous challenges are hindering achievement of sustainable wetland management goals. Loss of wetland areas for infrastructure development like road construction, schools, tourism industry development like hotels were identified as key drivers of change of wetlands. Agriculture activities like indiscriminate grazing by large number of cattle herds, reclaiming wetland for agriculture use and heavy use of chemical fertilizers, pesticides and herbicides were also cited as the challenges for wetland ecosystems. Wetlands along the tourist hiking trails were also reported to be under intense pressure from grazing by horses from porter services and increasing number of people along those trails increases pressure

on the surrounding natural resources. There were also localized case of invasive weeds taking over the wetland system like in a freshwater lake at Samtegang. In addition, there is a higher level of threats from climate change which would eventually altogether alter the functioning of the wetlands. For example, annual flashfloods and monsoon rainfall washes away huge areas of wetland in Bumdeling RAMSAR site.

The underlying principles for management of wetland ecosystem in those 'managed wetlands' in the country seems to be solely based on habitat protection for flagship species like Black-Necked Cranes. In the recent years, another bird species like White-Bellied Heron has led RSPN to begin working towards conservation of its riparian wetland habitats in the central region of the country. Thus, there seems to be lacking holistic approach for ecosystem based management.

The national drive towards development of integrated water resource management plan and developing watershed management plan for critical watersheds might somehow address the challenges. Key agencies like National Environment Commission Secretariat and Watershed Management Division for 12th Five Year National Development Plan, has planned to implement major wetland management activities with the goals for ensuring water security and management of critical watersheds. Hopefully the plan materializes with limited interference from various dimensions of socio-political influences.

For the workshop organizers, it was a fruitful workshop for being able to bring in key national stakeholder and consolidated existing cooperation and partnership with them. The next line of actions mapped out by the participants were;

- The key national stakeholders for wetland management, namely; Watershed Management Division, Ugyen Wangchuck Institute for Conservation and Environmental Research, Royal Society for Protection of Nature and National Environment Commission Secretariat agreed to partner with Department of Environmental Science of Royal Thimphu College to prepare a proposal on wetland study in Bhutan.
- To develop a proposal to investigate functioning and dynamics of carbon rich wetlands in Bhutan with a focus on sample wetlands from RAMSAR sites, nearby urban areas and wetlands from various altitudinal ranges. In the study areas, wetland classification can also be done if needed.
- Royal Thimphu College would draft the concept note in collaboration with the partners to complete the proposal by the end of the project period.
- For conducting Carbon related studies for the wetland ecosystem, challenges of not having appropriate laboratory instruments, testing kits, and other equipment

required for data collection would be a major stumbling block. The partners would list the laboratory facility and equipment available at their facility while remaining equipment will have to be budgeted into the proposal.

Acknowledgement

We would like to take this opportunity to acknowledge, with gratitude and appreciation, the support and generosity of all the agencies and offices mentioned herein. We would like to thank all our valued partners agencies and offices for their kind support and participation in the workshop. We are very grateful to Watershed Management Division (WMD) of Department of Forests and Park Services, Minister of Agriculture and Forestry, National Environment Commission Secretariat (NECS), Ugyen Wangchuck Institute for Conservation and Environmental Research (UWICER), Royal Society for Protection of Nature (RSPN) for all their kind cooperation and unstinting support.

Our special thanks are extended to all our esteemed participants and representatives from WMD, NEC, UWICER, wetland focal persons from Ramsar sites like Phobjikha & Bumdeling and wetland biodiversity researchers for their invaluable contribution to the workshop. We are very grateful to all those who participated and contributed to this workshop either by initiating discussions or presenting their views to the workshop.

We would like to express our heartfelt gratitude to the management of Royal Thimphu College (RTC) for the warm amity and support. We would like to thank Hon'ble president, esteemed Deans, Lecturers and support staff for their kind support. We would like to thank the final year undergraduate students of BSc Environmental Management for their active participation in the workshop.

We would like to sincerely thank Asia Pacific Network for Global Change Research, for the financial support, without which it would have not been possible to conduct the scoping workshop. We are equally grateful to wetland experts at UNESCO-IHE in the Netherlands for the technical support.

Introduction

The scoping workshop was conducted to understand wetland management issues and policies and plans for wetland ecosystems across Bhutan. Based on the proceedings of the workshop, way forward for developing a proposal on wetland ecosystems in Bhutan will be developed with technical assistance from wetland experts at UNESCO-IHE in the Netherlands. Proposal will be submitted for APN's 2018 CRRP call by end of September, 2018.

The workshop hosted participants from key wetland agencies like Watershed Management Division of Department of Forests and Park Services, wetland focal persons from Ramsar sites like Phobjikha & Bumdeling, researchers from Ugyen Wangchuck Institute for Conservation and Environmental Research, Wetland biodiversity researchers and faculty of environmental science at Royal Thimphu College. The final year undergraduate students of BSc Environmental Management also participated during the group discussions for the two-day workshop. The workshop is organized by Royal Thimphu College with support from Asia Pacific Network for Global Change Research with technical support from UNESCO-IHE in the Netherlands.

Minutes of the Workshop

Day 1: 4th May, 2018
Workshop began at 9:30 A.M

Welcome Address
Mrs. Ngawang Yangden, the Associate Dean of the Royal Thimphu College

Associate Dean Ngawang Yangden opened the workshop by welcoming the esteemed participants from key wetland agencies to the two-days scoping workshop. The Dean, in her introductory speech highlighted the current issue of global warming and climate change which is mainly happening due to modernization, urbanization and rapid development. This is a matter of serious concern to Bhutan as its vital industries like hydropower is sensitive to climate change. The biggest threat to Bhutan's hydropower comes from loss of glaciers and erratic precipitation patterns. The risk from Glacier Lakes Outburst Floods (GLOFs) to downstream human settlement and biodiversity is beyond comprehension. In the recent past, Bhutan witnessed numerous flash floods in Southern and Eastern parts of the country.
The natural water reservoirs like wetlands ecosystems is known to play critical role in mitigating the climate related risks. Royal Government of Bhutan and various line ministries and agencies have been taking various initiatives to mitigate and adapt to such environmental challenges.

The Dean highlighted that the current scoping workshop is expected to develop a holistic understanding on the issues and concerns surrounding wetland ecosystems in Bhutan. She underscored the importance of such stakeholder workshop in forging collaborative efforts to bring in a new knowledge to pursue effective management strategy for conservation and management of wetland ecosystems. She also mentioned that RTC as an academic institution has a major role to play in this front. She emphasized that hosting this scoping workshop can be the beginning, for RTC, to initiate many more such important events in the future. She assured her confidence in getting the scoping workshop successful and that it would go a long towards protecting and conserving Bhutan's aliening wetland ecosystems in the face of global climate change.

National Wetland Management Policy and Strategy

Presenter: Ms. Sonam Choden, Watershed Management Division (WMD), Department of Forests and Park Services, Ministry of Agriculture and Forests, Royal Government of Bhutan

Watershed Management Division of Department of Forest and Park Services was established to manage critical watersheds. Water and Wetland Program was founded under the vision for effective management of riparian ecosystems across the country. Although Bhutan is faced with numerous challenges to protect wetland ecosystems in the country, the scale of the problem is insignificant when viewed from a global scale. It was the main reason why wetland conservation is not gaining much of attention in Bhutan. She further emphasized that "Planting of trees" being the core intervention from the government to create a carbon sink may not be an efficient solution. To the contrary planting certain tree species for increasing carbon stock has produced detrimental effects on underground water resources.

Among the various wetlands types across the country, marshes are the most threatened due to urbanization and various other infrastructure development. But the main challenge is low level of understanding on of wetland ecosystem both among the policy makers and the general public. For majority of them wetland ecosystem is a synonym for rice fields. Therefore, Watershed Management Division has proposed a comprehensive Wetland Inventory in the upcoming 12th Five Year Nation Developmental Plan (2018 to 2023) with the aim of establishing the first comprehensive baseline data for wetlands in the country.

As far as Watershed Management Division is concerned, there are no documents exclusively for the wetland management till date. However, few documents pertaining to few interventions and strategies aimed at specific wetland conservation sites were available. For instance, one of the pioneer approaches to wetland conservation was issuance of the notification in 2009 which aimed to limit the issuing of forestry clearance if the particular project site proposed is located nearby wetland ecosystems. Other strategies like the Watershed Management Strategy (WMS), looks into threatened, changing or effected watershed areas and makes conservation plans for those watershed including wetlands. Further, Bhutan being signatory to international wetland conservation conventions like RAMSAR, currently three RAMSAR sites were being managed as per RAMSAR recommended management approaches. This program however, requires a specific theme for highlighting significance of the RAMSAR site

wetlands in the country. Thus for Bhutan, significance of the sites was managed based on presence of Black-necked Cranes only. Of course the bird has huge cultural significance to the local community and it is also one of the main attraction to international tourists visiting the area.

As of now, the identification of RAMSAR was only based on habitat service of the wetland. There is a potential for identifying the RAMSAR sites with the theme of carbon rich wetlands in the future.

Despite these strategies and interventions for wetland management, the implementation of management activities wasn't effective due to the underlying challenges like rapid construction of infrastructures, low level of awareness on significance of wetland, land use changes and limited financial support. On behalf of Watershed Management Division, presenter shared the future opportunities for wetland management through public private partnership, ensuring effective implementation of the policies on the ground level and advocate the people on the issues of water and watershed management and work on evaluating the forest ecosystems (both standing tree forests and wetlands). Typical cases studies related to wetland management issues was also presented;

Case Study I: Introduction of Invasive Species at Samtengang Freshwater Lake

The freshwater lake at Samtengang under Wangdi Phodrang district was pristine and served as one of the main waterhole on the ancient east-west 'highway' trails. In the recent years, local communities have introduced lotus (variety of water hyacinth) thinking that the lotus bloom would become one of the touristic sites in their locality. However, it became a nightmare when the plant proved to be invasive and degraded the lake's water quality. Eventually increase in nutrient accumulation has led to lake eutrophication. Currently efforts are being made for manually removing the invasive species through support from various funding sources. In addition, long-term management of wetland was put in place with more focus on constant monitoring of water quantities and qualities in the wetland.

Case Study II: Incomplete Assessment of Risk from Glacier Lake Outburst Floods

Vulnerability assessment of Punatsangchu basin to Glacier Lake Outburst Flood was done to come up with mitigation measures. GLOF in 1994 caused huge economic damage and biodiversity loss. It was later found that earlier flood vulnerability assessment hasn't considered risk to almost 170 households living near the Lunana lake. Thus, there is need to have multi-sectoral approach in assessing environmental vulnerability.

Case Study III: Need for Selective Planting Near Water sources

Yangneer community under Trashigang district with assistance from government agencies planted trees near the water source as means of protecting water sources from land degradation and climate change. However, in few years' time the tree species planted to protect water sources led to drying up of the sources. All these case studies prove that there is limited knowledge on wise management of wetland across the country.

Discussion

Clarification on use of term 'wetland with significance' was sought. The representative from Watershed Management Division responded that for a wetland to be identified as a RAMSAR site, it was necessary to consider the size and scale of a wetland and its potential significance be it in economic or ecological terms. Wetlands that are threatened or are in its pristine form are both qualified to be identified as wetlands of international significance as RAMSAR sites.

Participants raised concerns over agriculture waste mainly though release of pesticides and excess nutrients may lead to reduced water quality in the wetland, which could result in subsequent ecological changes in an ecosystem. The representatives from Watershed Management Division pointed out that agriculture wastewater was one of the major water polluter but as of now no measures were taken by the concerned authorities. The Ministry of Agriculture and Forests in collaboration with other relevant agencies are making an effort in promoting organic agriculture, which is expected to control the flow chemicals entering into the wetland systems. However, a baseline data still needs to be strengthened be it in terms of quantifying carbon or chemical pollutants entering into the wetlands. Only with those baseline data further assessment can be built on.

Sharing Experience on Inventory and Assessment of Wetland Ecosystems in Bhutan

Presenter: *Dr. Norbu Wangdi, Ugyen Wangchuck Institute for Conservation and Environmental Research (UWICER), Department of Forests and Park Services, Ministry of Agriculture and Forests, Royal Government of Bhutan*

Dr. Norbu Wangdi representing Uygen Wangchuck Institute of Conservation and Environmental Research (UWICER) gave an in-depth background of his organization. The possible areas for future collaboration in areas such as water resources, climate change and adaptation, and environmental policy were also deliberated.

Details on high-altitude wetland (HAW) inventory for Bhutan by UWICER was shared. An inventory of HAWs titled 'Saving Wetlands Sky High' conducted in 2010 funded by WWF, recorded 3027 HAWs in Bhutan which totals up to 0.26 percent of the total land area. The survey was done using GIS mapping tools with physical verification of ground trothing carried out after that.

Another study was also carried out in Northern areas of Bhutan in relation to large freshwater lakes like Nub Tshonapatra, Tshokar-Tshona, Tampe Tsho and Jigme Langtsho in the year 2011-2012. The main objective of the study was to understand the ecological and socio-cultural significance of these HAWs. These wetland system has been reported to be key water sources and also has significant cultural values to communities living nearby.

And in 2016, a project titled "Asia High Mountains Project" was initiated with support from WWF and USAID. This project was carried out to revalidate the findings of the inventory of HAWs done in 2010. The research recorded 3339 HAWs, an increase of 312 HAWs from the previous record in 2010. However, Dr. Norbu reminded that all those research were more of a desktop based using various GIS mapping tools and therefore there is a need to create a concrete baseline data for the HAWs or the wetland ecosystems across the country for designing appropriate management approaches.

Discussion

One of the participants requested UWICER representative to share future plan for wetland research at the institute. Dr. Norbu responded that the main goal of the high altitude wetland inventory was to create awareness on wetlands and its importance in the country. In addition, UWICER being one of the leading offices on environmental research, wanted to come up with a clear picture of HAWs in the country as often there is a lot of discrepancies on information of wetlands given by different agencies.

UWICER is closely working closely with Watershed Management Division on future wetlands projects. For example, UWICER and WMD are planning to conduct similar inventory on low altitude wetlands across the country. For the upcoming 12th Five Year National Developmental Plan (2018 to 2023), UWICER in collaboration with WMD has proposed to come up with a comprehensive inventory of wetlands with useable classification system. Need for such information is the main hurdle as of now for developing any wetland management plans.

Carbon Sequestration and Linkages to Forest and Wetlands

Presenter: *Ms. Sonam Choden, On behalf of REDD+ Readiness Program, Watershed Management Division (WMD), Department of Forests and Park Services, Ministry of Agriculture and Forests, Royal Government of Bhutan*

Currently Bhutan is at Readiness Phase of REDD+ (Reducing emissions from deforestation and forest degradation). REDD+ Readiness Program of Bhutan is working towards establishing facts and figures regarding carbon sequestration capacity of the country. As per latest official figures from Department of Forest and Park Services, Bhutan has a forest cover of 70 percent of the total land area. Being able to exactly calculate carbon sequestration in the 70 percent forest of Bhutan's total land area might bring immense benefit through mechanisms like REDD+ and various other emission trading schemes in the global market.

However, as of now REDD+ Readiness Program is yet to carry out a proper inventory of forest for the valuation of ecosystems services like carbon sequestration. The initiative is challenged by the fact when that Bhutan is not able to compute carbon sequestration capacity of the forest cover. Thus as determining the sequestration capacity of the complex ecosystems like wetland are far from being even targeted.

Discussion

The workshop participants agreed that lack of human-resource capacity both in terms of technical knowledge and number of capable professionals as one of the challenges of implementing REDD+ in the country. The need of REDD+ Program to reach a larger scale of ecosystem related issues not just carbon sequestering services was also agreed by the participants. Some participants also cautioned that REDD+ scheme for placing too low monetary values of the ecosystem services, which might eventually may not be helpful in sustainable management of the natural resources.

Sharing Experience on Management of Ramsar Site, Phobjikha Wetland

Presenter: Mr. Jigme Tshering, Royal Society for Protection of Nature (RSPN), Environmental NGO registered under Civil Society Act of Bhutan

Gangtey-Phobji wetland is the largest and the most significant wetland in the country with a rich biodiversity with over 55 tree species and 100 recorded bird species. It is also designated as a RAMSAR site due to being the largest Black Necked Cranes' (BNC) wintering ground in Bhutan. However, wetland in the recent years has been under pressure from encroachment by local communities and infrastructure

development for tourism industry. In addition, grazing by livestock and increase in use of pesticides and herbicides by the local community has increased pressure on the wetland ecosystem. RSPN for the past decades has been conducting research for better understanding the underlying causes that exert pressure on the wetland. Based on the findings from the studies, community partnership was found crucial for conservation of wetland ecosystem and its rich biodiversity. With support from RSPN, Community Environmental Management Committee was established which gives the community sense of ownership through active involvement in the wetland conservation programs. Community members have also been immensely benefited through community based tourism group rendering various nature-based tourism services to the international tourists. Thus, through such livelihood program RSPN was able to garner support from local community in protecting the natural wetland which is one of the most critical habitat for Black-Necked Cranes in the world.

On behalf of RSPN, Mr. Jigme mentioned that they are looking for more partnership with various wetland stakeholders for ensuring their conservation. RSPN would also be interested to collaborate with any partners in livelihood enhancing program in critical crane habitats, development of green-smart infrastructure in sensitive natural habitats and also partner with any organization for wetland related researchers.

Sharing Experience on Management of Ramsar Site, Bumdeling Wetland

Presenter: Ms. Sonam Choden, Bumdeling Wildlife Sanctuary, Department of Forests and Park Services, Ministry of Agriculture and Forests, Royal Government of Bhutan

The representative from Bumdeling Wildlife Sanctuary presented on the core objectives and conservation significance of the RAMSAR site at Bumdeling in Eastern Bhutan. Current issues and conservation approaches being undertaken at the RAMSAR sites were also presented in detail. The site is a riverine wetland lying on the floodplain of Kholung chu river and has rich biodiversity with 11 globally vulnerable species including Black-Necked Cranes. Bumdelling wetland is a low altitude wetland as compared to two other RAMSAR sites in Bhutan.

The flood plains have been the main area for rice cultivation for the local communities living around the wetland. However, in the recent past due to swelling river during rainy seasons, most of the plain area were flooded. With sand covering the wetland area people were not able to use it for paddy cultivation. This has led to increased pressure on remaining arable land. Further, infrastructure development and colonization of

wetland by fast growing tree species like *Alnus* sp. pose a huge challenge in effectively managing the wetland.

With support from key agencies such as Watershed Management Division and Bumdelling Wildlife Sanctuary under Department of Forest and Park Services wetland support group has been formed for communities living within the critical wetland area. The Department of Forest and Park Services has also carried out rigorous advocacies and awareness programs on significance of wetland conservation. With funding support from numerous donor agencies, Bumdeling Wildlife Sanctuary in collaboration with the local government has constructed wall of various designs to control the flooding. However, as of now it has been so effective and every year huge area of wetland gets flooded and filled with sand while some parts of the wetland are washed away.

So, building more effective protection walls to protect the floodplains, strengthen existing wetland conservation support groups through technical backstopping, studies on effects of *Alnus* sp. colonization are some of the urgent management issues identified by the local authority. Since the wetland site falls under the protected area systems i.e. Bumdelling Wildlife Sanctuary, management of this particular wetland have been easier as compared to other RAMSAR sites like Phobjikha and Khotokha wetlands.

Discussion

All RAMSAR sites in Bhutan is wintering habitat for migratory bird, the Black-Necked Cranes. Thus, both representative from Royal Society for Protection of Nature (RSPN) and Bumdeling Wildlife Sanctuary pointed out that conservation on wetland based on pretext of protecting the winter habitat of the birds is becoming challenging. How would the wetland management change if the cranes do not arrive in their winter habitats? The representative from RSPN pointed out that maintaining a viable population of cranes is a transboundary issue and yet as of now there is no proper ties with the regional countries for effective management of the bird's population.

The status of White Bellied Herons (WBH), another water bird was also reported to be in grave danger due to increased human disturbance in its natural habitat. Representative from RSPN pointed out that there are only 24 documented WBHs in the country with only one nesting site. And as of now there are no studies conducted about its habitat and thus there are no appropriate conservation measures developed for protecting one of the most critically endangered bird species in the world.

Challenges in managing wetlands lying outside and within protected area were compared and deliberated. There was common consensus that wetlands are easier to

protect when they are located under the jurisdiction of protected area system. It has been observed that there are considerable number of cases of exploitation of resources in non-protected areas as compared to wetlands inside a protected area system.

Day 2 Workshop

Workshop began at 9:30 AM

Sharing Experience on Management of Wetlands by NEC

Presenter: Ms. Jigchen Lhazom Norbu, National Environment Commission Secretariat, Royal Government of Bhutan

The National Environment Commission (NEC) of Bhutan is an apex body entrusted to implement National Environment Protection Act. The representative from NEC shared latest information on water resource management in the country. The primary challenge of water resources in Bhutan is high availability per capita but with very low accessibility. In addition, inadequate water supply infrastructure both in terms of quality and quantity creates a huge challenge in management of water resources. In the recent past, unpredictable climate and increasing population and urbanization has further increased pressure on natural waterbodies. Ms. Norbu also briefed the participants on National Integrated Water Resources Management (IWRM) Plan of 2016, which was formulated as required by Water Act of 2011. The Act identifies integrated water resources management as the approach in ensuring that the water resources are protected, conserved and/or managed in an economically efficient, socially equitable and environmentally sustainable manner. For this, the Act requires NEC in consultation with competent authorities to prepare and periodically update a National Integrated Water Resources Management Plan for the conservation, development and management of water resources. As per the IWRM plan of 2016, it has identified protecting and placing natural wetlands under sustainable utilization as one of the key focus areas for water security in the country. Further Ministry of Agriculture and Forests, was placed as the custodian for wetland management.

Discussion

When briefed on the details of IWRM Plan (2016), some of the participants questioned on the purpose of having to have 'water clearance certificate' for use. Representative from NEC revealed that it was to ensure water security be it for ecological or household uses. However, for household purposes such clearance isn't required as a provisioned in the act. In regards to Hydropower projects, minimum of E-flow is required. The main principle of the act stressing on water source as the state's property is that there shouldn't be such as privately owned water sources. NEC monitors the usage and water security by dissemination of its responsibilities to competent authorities to ensure that the key dimensions in the water security index is used effectively.

Understanding Wetland Ecosystems – A case study on natural wetland in Thimphu valley

Presenter: Ms. Pema Eden, Ms. Lhaka Dem and Mr. Jigme Palden, BSc Environmental Management, Royal Thimphu College

Three students undergoing undergraduate degree in Environmental Management has undertaken the study as their dissertation topic. The team carried out the research with goal of classifying wetlands types and investigating the drivers of change for the wetland ecosystem.

The team recorded only three wetland types, namely, marshes, swamps and bogs. The researchers also found that tourism, livestock grazing and developmental activities have significantly impacted on the wetlands. The information was collected by interviewing yak herders, monks and tourist guides who have known the state of wetland for a very long time; the study area being located along one of the most popular trekking routes for both national and international tourists. The recent construction of ropeway to Phajoding monastery has also led to clearance of natural vegetation along the rope way line. Further due to ropeway line some walking trails were diverted increasing pressure on wetland and forested areas.

Discussion

Lack of baseline data on wetland was once again deliberated among the participants. There was a common consensus that the impact of climate change would be felt at greater degree in the sensitive and fragile mountain ecosystems like wetlands in the Himalayas. To understand such impacts there should be wetland related studies capturing both spatial and temporal variation of sensitive and dynamic ecosystems like the wetlands.

Recording Wetland Biodiversity in Bhutan

Presenter: Mr. Thinley Gyeltshen, Food and Agriculture Organization of UN (The presentation was experience sharing on the project carried out with National Biodiversity Center of Bhutan)

Mr. Thinley reported that understanding biodiversity in an ecosystem can be key to investigating the change in an ecosystem. According to him, dragonflies are essential for determining the condition and quality of an ecosystem. This is because some of damselflies from dragonfly family are sensitive to pollution and is a good indicator of water quality and status of an ecosystem. Dragonflies are also a medical indicator

especially for malaria, the speaker gave an example of Bangkok city where malaria cases were very high, in order to control the mosquito population, dragonfly larvae were released into the waters so that it can feed upon the mosquito larvae. Currently, in Bhutan, there are over 115 recorded species of dragonflies. The latest new species of a dragonfly has been recently discovered in Trongsa (Central Bhutan) and it was named Gyalsey Emerald Spreadwing Dragonfly (Gyalsey means 'prince' in Bhutanese) in the honour of the birth of the crown prince of Bhutan. Mr. Thinley also highlighted the challenges in conducting such studies. The study requires collecting the insect specimens, which often hurts the religious sentiments of general Bhutanese population.

Way Forward

The scoping workshop established a clear map on status of wetland management systems in the country. Challenges and issues faced by wetland managers under Royal Government of Bhutan and Non-governmental organizations were also deliberated. The participants were also made aware of the wetland management plans of Royal Government of Bhutan as reflected into the 12th Five Year National Development Plan (2018 to 2023). Afternoon sessions of two days workshop brought participants together for more informal discussion among the groups and then mapped out the following next line of action;

- The key national stakeholders for wetland management, namely; Watershed Management Division, Ugyen Wangchuck Institute for Conservation and Environmental Research, Royal Society for Protection of Nature and National Environment Commission Secretariat has agreed to partner with Department of Environmental Science of Royal Thimphu College to prepare a proposal on wetland study in Bhutan.
- Comprehensive wetland inventory across the country has been already proposed by Watershed Management Division as one of their key target for the upcoming 12th Five Year National Plan (2018 to 2023). Further, classifying and conducting inventory of wetland at national level may not be possible at this partnership level due to time constraint and limited resources. On the other hand, conducting inventory and classification at small scale pilot study is possible but such studies would be able to produce any visible impacts.
- It was unanimously agreed by all the participants to develop a proposal to carry out a study on carbon rich wetlands in Bhutan with focus on sample wetlands from RAMSAR sites, nearby urban areas and wetlands from various altitudinal ranges. The data from the study sites would at-least give sense of the carbon sequestering services provided by the wetlands in across the country. In the study areas, wetland classification can also be done if needed.
- Royal Thimphu College would draft the concept note who will then share it with the partners, and by the end of the project period proposal will be ready to be submitted.
- For conducting Carbon related studies for the wetland ecosystem, challenges of not having appropriate laboratory instruments, testing kits, and other equipment required for data collection would be a major stumbling block. The partners would list the laboratory facility and equipment available at their facility and then finally remaining equipment was decided to be budgeted into the proposal.

Annex I: Participant list

Sl. No.	Name	Designation	Organization
2.	Mrs. Sonam Choden	National Wetland Program Coordinator	Watershed Management Division, Department of Forests & Park Serves
4.	Dr. Norbu Wangdi	Head of Research for Climate Center at UWICER	Ugyen Wangchuk Institute for Conservation and Environmental Research
5.	Mr. Kelly Dorji	Research officer UWICER	Ugyen Wangchuk Institute center for Environment and Research
6.	Mr. Jigme Tshering	Researcher, Black Necked Crane Conservation Programme for RSPN	Royal Society for Protection of Nature
7.	Mrs. Jigchen Lhazom Norbu	Environment officer	National Environment Commission
8.	Mr. Thinley Gyelthsen	Project officer (Dragonfly Expert)	Food and Agriculture Organization: Bhutan Office
9.	Mr. Tshewang Dorji	Lecturer	Royal Thimphu College
10.	Mr. Kinley Dorji	Lecturer (Biologist)	Royal Thimphu College
11.	Mr. G.P Sharma	Lecturer (Ecologist)	Royal Thimphu College
12.	Ms. Kausila Timsina	Lecturer (Watershed Expert)	Royal Thimphu College
13.	Jigme Palden	BSc. 6th Semester Environmental Management Student	Royal Thimphu College
14	Pema Uden	BSc. 6th Semester Environmental Management Student	Royal Thimphu College
15	Lhaka Dem	BSc. 6th Semester Environmental Management Student	Royal Thimphu College
16	Kuenzang Tshering	Project Focal Person	Royal Thimphu College

Note: 35 students of BSc Environmental Science undergraduate programme attended workshop for 2 days

Annex II: Workshop Schedule
Venue: Executive Centre, Royal Thimphu College

Date: 4 & 5th May, 2018

Concept Note

The scoping workshop will be conducted to understand wetland management issues and policies and plans for wetland ecosystems across Bhutan. Based on the proceeding of the workshop, wetland classification and assessment method applicable for wetland ecosystems in Bhutan will be developed with technical assistance from wetland experts at UNESCO-IHE in the Netherlands. Using this method, a proposal will be submitted for APN's 2018 CRRP call by end of September, 2018. The possible collaboration among the workshop participants for proposal submission will also be explored.

The workshop is expected to host participants from key wetland agencies like Watershed Management Division of Department of Forests and Park Services, wetland focal persons from Ramsar sites like Phobjikha & Bumdeling, researchers from Ugyen Wangchuck Institute for Conservation and Environmental Research, GEF/LDCF project focal at GNHC and UNDP-GEF representative.The faculty of environmental science and final year students of BSc Environmental Management will also attend two days workshop. Thus, the workshop would also serve as a forum for creating awareness on significance of wetland ecosystem.

The workshop is organised by Royal Thimphu College with support from Asia Pacific Network for Global Change Research with technical support from UNESCO-IHE in the Netherlands.

Workshop Schedule

Day 1 (4th May 2018)	Program	Roles
9 to 9:30 am	Registration of participants	
9:30 to 9:35 am	Introduction to Wetland Scoping Workshop	Kuenzang Tshering
9:35 to 9:50 am	Welcome address by Chief Guest	President of Royal Thimphu College

Day 1 (4th May 2018)	Program	Roles
9:50 to 10:15 am	Presentation on National Wetland Management policy/strategy	Department of Forest & Park Services
10:15 to 10:30 am	Discussion	
10:30 to 11:00 am	Tea Break	
11:00 to 11:20 am	Presentation on Carbon sequestration & Linkage to Forest/wetlands	Department of Forest & Park Services
11:20 to 11:40 am	Presentation on UWICER's experience on conducting wetland inventory	Ugyen Wangchuck Institute for Conservation & Environmental Research
11:40 to 12:00 noon	Discussion	
12:00 to 12:20 pm	Presentation on RSPN's experience on management of Ramsar site, Phobjikha Wetland	Royal Society for Protection of Nature
12:20 to 12:40 pm	Issues and challenges for managing Ramsar site at Bumdeling	Bumbling RAMSAR site focal person
12:40 to 1 pm	Discussion	
1:00 to 2:00 pm	Lunch	
2:00 to 2:05 pm	Present guidelines on Group work (Identifying challenges in management of wetland ecosystem in Bhutan)	Kuenzang Tshering
2:05 to 3:05 pm	Group work	All participants
3:05 to 4:05 pm	Group Presentation	
4:05 to 4:40 pm	Discussion	

Day 2 (5th May, 2018)	Program	Roles
9:30 to 9:40 am	Recap	Kuenzang Tshering

Day 2 (5th May, 2018)	Program	Roles
9:40 to 10:00 am	NEC's experience of wetland ecosystem management in Bhutan	National Environment Commission
10:00 to 10:20 am	A case study Wetland classification & assessment	RTC research team
10:20 to 10:30 am	Discussion	
10:30 to 11:00 am	Tea Break	
11:20 to 12:40 pm	Group work (Identifying way forward for wetland management in Bhutan)	All participants
12:40 to 1:00 pm	Group Presentations & Discussion	
1:00 to 2:00 pm	Lunch	
2:00 to 3:30 pm	Group Presentations & Discussion	
3:30 to 3:35	Vote of thanks	Mr. Tshewang Dorji, RTC
3:30 to 4:00	TA/DA disbursement	

Note: Chief Forestry Officer from WMD will be requested to chair the session on day one while head of climate centre at UWICER will chair the session for day 2. Mr. Tshewang Dorji from EVS department at RTC will take the lead role in workshop preparation in collaboration with relevant offices at Royal Thimphu College. Mr. Kuenzang Tshering, as a project focal person shall oversee the overall conduct of the workshop and record the discussion.

Annex III: Pictures from workshop

Group Picture with core workshop Members

Group Picture with Student Participant


Vision
"Secure an environmentally sustainable future through the promotion of science and education"


Landuse Landcover Map of Bhutan
Legend
APN
Scoping Workshop to Develop Proposal on Identifying Carbon Rich Wetlands in Bhutan


APN
ASIA-PACIFIC NETWORK FOR GLOBAL CHANGE RESEARCH
ROYAL THIMPHU COLLEGE
Inspiring Education in Bhutan
Scoping Workshop to Develop Proposal on Identifying Carbon Rich Wetlands in Bhutan
Venue: Executive Centre, Royal Thimphu College
Date: 4th & 5th May, 2018
Organized by Royal Thimphu College with support from Asia Pacific Network for Global Change Research