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PROCEEDINGS

Virtual Regional Dialogue on

Agricultural Water Pollution & Water Management in South Asia

November 17 – 19, 2020

ARTHACHARYA FOUNDATION

DHAN Foundation

CARITAS BANGLADESH

LI-BIRD

PROCEEDINGS

Virtual Regional Dialogue on

Agricultural Water Pollution & Water Management in South Asia

November 17 – 19, 2020

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PROCEEDINGS

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Agricultural Water Pollution & Water Management in South Asia

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Foreword

Caritas Switzerland was pleased to host and organise the Virtual Regional Dialogue on Agricultural Water Pollution and Water Management in South Asia in cooperation with the United States Department of State and partners Arthacharya Foundation, Sri Lanka; Caritas Bangladesh, Bangladesh; DHAN Foundation, India and LI-BIRD, Nepal.

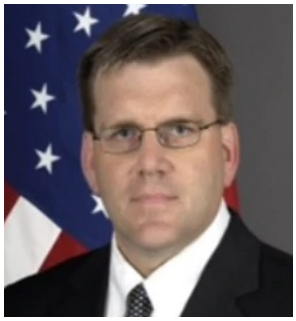
The three-year project South Asia Capacity Building – Agricultural and Water Pollution implemented in Bangladesh, India, Nepal and Sri Lanka has derived remarkable lessons, achievements and recommendations for the sector. We, at Caritas Switzerland, feel proud bringing together relevant actors in the sector for knowledge exchange, the elaboration of lessons learnt and ways forward by organising this platform. The event has been a milestone for Caritas Switzerland to contribute to knowledge building and policy uptake in the sector of Agricultural Water Pollution. Some of the lessons learned are – (I) partnerships in research with farmers lead to sustainable behavior change; (II) civil society organisations and academic institutions contribute substantially on convergent issues through trainings, courses and researches; and (III) engaging key policy actors (farmers, communities, government, market actors, researchers) at the local level gradually paves path for macro level changes through demand driven plans.

The knowledge shared and developed during the virtual regional conference remains documented in this proceeding and will be widely disseminated through regional networks and Caritas Switzerland's own communication channels.

Caritas Switzerland has been active in South Asia for the last 50 years and we are honoured having contributed to enhance and disseminate knowledge in the agriculture and water sector and touched the lives of farmers and the communities positively. In three years, the project has reached to over 3'426 people (1'955 men and 1'471 women) including farmers, students, experts, and agriculture extension service providers in South Asia through its capacity building initiatives. Through partnership in action research, the project has touched the lives of over 1'400 farmers in Bangladesh, India, Nepal and Sri Lanka. We extend our best wishes to actors, stakeholders and beneficiaries in the sector to build on to the knowledge and continue working for the betterment of farming practices and enhancing water quality.

Many thanks to all partners, participants, experts, government officials, farmers, entrepreneurs and project staff for joining hands. Special thanks to the United States Department of States for the opportunity to avail such platform and supporting the endeavour of bringing rich, diverse knowledge in agricultural water pollution and water management in South Asia.

Peter Marbet
Director Caritas Switzerland



Foreword

The U.S. Department of State was pleased to partner with Caritas Switzerland and local partners Arthacharya Foundation, DHAN Foundation, Caritas Bangladesh, and LIBIRD to co-organize the Virtual Regional Dialogue on Agricultural Water Pollution and Water Management in South Asia, November 17-19, 2020. We were encouraged to see so many participants engaged on this transnational issue that has long term impact on the population's health, as well as on agricultural productivity, landscape degradation, and water quality. The conference highlighted the importance of bringing people together from across the region and demonstrated that agricultural water pollution is a common issue that requires cross-sectoral engagement.

Agricultural water pollution and water management is a significant environmental challenge in South Asia. The activities of the three-year consortium project of Caritas Switzerland and country partners in Bangladesh, India, Nepal and Sri Lanka- South Asia Capacity Building- Agricultural and Water Pollution Project , in addition to the regional dialogue, created a foundation for further progress going forward. Raising awareness with farmers and civil society is an important first step in tackling this regional challenge to encourage change. The consortium project trained over 500 farmers on the environmentally sustainable use of pesticides and reached approximately 2,000 others through awareness campaigns, trainings, and short courses. In addition, multiple magazine and newspaper articles and 15 community radio programs highlighted the project. The project is also educating the next generation of civil society and community leadership by partnering with three universities to incorporate agricultural water pollution courses either through curriculum, short course offerings, or master's degree research programs. This comprehensive awareness raising campaign will undoubtedly lead to additional conversations to manage agricultural practices more effectively.

During the conference, the project deliberations addressed the pressure population growth and urbanization puts on agricultural practices and identified potential remedies such as subsidies for bio-fertilizers and easing the registration process of bio-fertilizers for market access. Although behavioral change is a challenging intervention, the project team across four countries were able to convince farmers to increase the use of organic fertilizers by demonstrating the positive effects of proper pest management, the use of demo plots, and the value of organic practices that increases productivity and water efficiency.

Moreover, this is more than just an agricultural issue for farmers and civil society. Participants made clear that there is a need for engagement with policymakers. The consortium project team spent significant time preparing a regional policy brief and country-specific policy briefs to address gaps that can lead to substantive change. We encourage conference participants and coordinating organizations to review these briefs and further this discussion within your networks to advocate for change.

Dean R. Thompson
Principal Deputy Assistant Secretary of State
Bureau of South and Central Asian Affairs

Message

Arthacharya Foundation completed the implementation of the Land-Based Water Pollution project a few weeks ago. The project has effectively mobilized a large number of Ministries and Departments of the central government as well as semi-governmental, provincial and local governmental institutions for a common-track protocol on the prevention of water pollution. Added to this vast group of stakeholders are the knowledge institutions such as universities and research bodies, relevant international organizations, and local Non-Governmental Organisations.

The project has succeeded in creating an enabling environment for these stakeholders to interact among themselves in a dialogue to share experiences, thereby leading - eventually - to develop a water pollution prevention policy that needs to be offered to the central government of Sri Lanka. Similarly, the project has encouraged many institutions and individuals in the scientific community to undertake the development and refinement of practices that would reduce existing water pollution levels.

Another significant achievement is the publication of research supported by Arthacharya and conducted by eminent personnel involved in research and community development. This activity embodied research staff from four major universities and two outstanding research institutions. Areas of priority for such focused studies had to be based on the inception workshop's recommendations held in November 2019, which identified Uva, North Central, North Western, and Northern Provinces as the areas where water pollution problems need to be addressed urgently.
Furthermore, the project effectively publicized the best practices developed by various institutions that prevent water pollution, such as the good agricultural practices of the agriculture department. Besides, the series of workshops conducted in all different parts of the country created awareness on the subject among many stakeholders who are keen to participate in future activities that will continue the project's process.

To take the project results primarily to the farming community, Arthacharya has decided to explore the possibilities of designing a follow-up program for farmer mobilization, especially in the dry zone of Sri Lanka, where the negative impact of agriculture-based water pollution is higher. Arthacharya is hopeful that it would launch a new project before the end of this year.

We wish to thank the institutional heads and project implementers who worked in the four provinces for their hard work and for developing recommendations. We trust that our support has helped these partners develop and strengthen the human and material resources of the institutions. This outcome will undoubtedly contribute immensely to a more environmentally secure future for water users, especially the farming community. We trust that these outputs would significantly contribute to the development of a sustainable water pollution policy soon. Arthacharya Foundation appreciates the Sri Lankan Government's support, the Department of State of the US Government, and Caritas Switzerland to make this exercise a reality.

Sathis de Mel
Executive Director
Arthacharya Foundation

Message

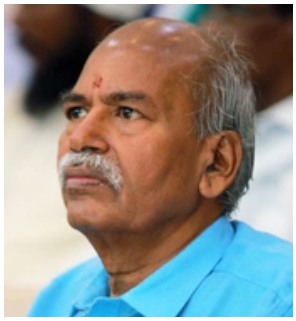
As the farming systems transition from subsistence to commercial agriculture, farmers often tend to over-spend on the purchases and application of agrochemicals on their crops. There is also increased demand for water to irrigate crops. This has resulted into increased agriculture induced water pollution globally and South Asia is not an exception. The lack of policy coherence and weak implementation coupled with limited access to knowledge/information on good agricultural practices also contributes to increased agriculture water pollution, with serious human health hazards.

The 'South Asia Environmental Capacity Building - Agriculture and Water Pollution' project was designed to identify key policy gaps and offer solutions through: (i) raising awareness about agriculture water pollution; (ii) Building the capacity of key stakeholders to fill the gaps; and (iii) identifying good agricultural practices for up-scaling to minimize the use of agrochemicals and hence reduce agricultural water pollution. Throughout the project period, partners from India, Sri Lanka, Bangladesh and Nepal worked together to bring the attention of key stakeholders in the South Asia region to recognize and acknowledge the serious issues surrounding agricultural water pollution by conducting action researches to generate evidences and by strengthening the regional and country capacities.

The project concluded by organizing three-day virtual policy dialogue as an integral part of learning and influencing key stakeholders in the South Asia region and beyond. The key recommendations generated by the workshop is documented in the proceedings, and we hope the policymakers, planners, researchers and development professionals will find these recommendations useful for designing future policy making processes aimed at minimizing agriculture induced water pollution, and restoration/conservation of agricultural biodiversity and ecosystem for better ecosystem services for sustainable food production and consumption.

The three-day virtual policy dialogue event was a great success. On behalf of Local Initiatives for Biodiversity, Research and Development (LIBIRD), I would like to thank and extend my appreciation to all country partners, workshop organizers and our funders for their excellent support and cooperation. I am affirmative that this proceedings will emerge as a useful reference and will spark many more innovations and solutions related to reducing agricultural water pollution in days to come.

Balaram Thapa, PhD
Executive Director
LI-BIRD



Message

India, the biggest country in the South Asian region is marred with multifarious environmental concerns from Land, Water to Air. Among them, Water Pollution is one of the key environmental issues. Human settlement, Agriculture and Industry are the major contributors to the water pollution due to unchecked discharge of waste water, plastics, industry effluents and nitrate, synthetic pesticides and veterinary drugs. Water pollution in India also adds to half of the morbidity problems. Approximately 70 per cent of surface water and ground water is contaminated irrespective of checks and controls by the regulating body namely the state pollution control boards.

The Project, first of its kind, funded by US Department of States and Caritas Switzerland, brought four consortium partners viz. DHAN Foundation, India, Li-Bird, Nepal, Caritas Bangladesh and Athacharya Foundation, Sri Lanka together in one of the unique South Asia Regional Capacity Building Programmes on the highly alarming issue of Agriculture Water Pollution.

The Consortium helped all the partners to cross learn each other from Policies to Best Practices in farming to address the issues and assess the needs of capacity gaps among the relevant stakeholders. DHAN Foundation could design a robust Regional Training of Trainers and also virtual certificate course on Agriculture Water pollution to the benefit of regional participant in an open source platform. The project helped DHAN to reach more than 5000 farmers through innovative process like People Workshop, social media and Community radio.

The Regional dialogue facilitated by the Green Pro agro paved a Platform for all the consortium partners to come together and share the Knowledge gained out of four main goals of the project. DHAN Foundation intends to sustain the initiative by establishing a network with consortium partners, government, academia & Research, Government, Corporates and NGOs.

M. P. Vasimalai
Executive Director
DHAN Foundation

Message

Bangladesh is vulnerable because of climate change which pollutes the land and water. Furthermore, poor sewage system, persistent organic pollutants, heavy metals, oils, nutrients and sediments take a severe toll on human health and environment. Thus, South Asia Environmental Capacity Building-Agriculture and Water Pollution (SAECBAWP) Project is very much relevant in our country context and also produced some good practices.

Regional Conference on AWP is a jointly efforts of experienced people which gathered 88 delegates representing 49 organizations from South Asia Europe and States of America that is really appreciable. Caritas Bangladesh as an organization learned how to organize and conduct a successful virtual regional program. Side by side, CB SAECBWP Project team was enriched through interaction of resourceful people in various way, such as sharing good practices of agricultural and water pollution issues in the context of south regional zone. They also received opportunity to gain more knowledge in terms of policy, market, technology and capacity building sector of agriculture and water pollution matter. The Regional conference proceedings are crucial subject for documentation and also for future study for people, who are interested in this area or field. A strong organizing committee and experienced resource persons delivered research based information which is helpful for designing need based activity plan.

On behalf of Caritas Bangladesh, we express our sincere thanks and gratitude to the organizing committee for their wonderful coordination with the support of sub-committees. We also would like to thank Caritas Switzerland for their heartiest cooperation and financial support for making this conference successful.

Ranjon Francis Rozario
Executive Director
Caritas Bangladesh

Message

The Virtual Regional Dialogue on Agricultural Water Pollution and Water Management, held during the 17-19 of November 2020, was an online platform that aimed at bringing together a diversity of professionals and engaged community members from the NGOs, Think Tanks, Government, Farmer Communities, Accademia and Media, to discuss and exchange on this topic in the region of South Asia. Caritas Switzerland, through the support and funding of the United States Department of State, was happy to co-organise this event together with the implementing regional partners, Arthacharaya Foundation, Caritas Bangladesh, DHAN Foundation and LIBIRD.

During the conference, we were able to share the project's achievements, challenges, recommendations and way forward along its 3 main components: Capacity Building, Policy Scenario and Action Research. Furthermore, the experts brought key insights and helped broaden our understanding on agrochemical and biological options, on approaches to incentivise efficient practices related to water, on payment of ecosystem services as one of the ecosystem based best practices, and on various advanced tools, technologies and infrastructures used in the developed world for water quality assessment. The combination of knowledge and experience gathered from the project and the experts in the sector, helped to identify a way forward and make recommendations for future work and engagement in the sector.

The enthusiast engagement of scientists, government officials, academics, researchers, development practitioners, farmers, entrepreneurs and students, added great value to the outcome of the event. The exchanges and discussions during the event, have paved the way forward for stakeholders in the sector of agricultural water pollution. Partner organisations in the host countries are now getting a clear roadmap for the future, which they will pursue either together or in collaboration with like-minded organisations.

We are pleased to have disseminated the project learning, challenges and recommendations, and to have engaged with broader stakeholders in the sector and identify a way forward for the future. We are looking forward to see further advancements and success stories on Agricultural Water Pollution in the South Asia Region.

Viola Buli
Programme Director, South Asia
Caritas Switzerland

Anupama Mahat
Regional Project Manager, South Asia
Caritas Switzerland

Abbreviations

AWP	Agricultural Water Pollution
CEC	Contaminant of Emerging Concern
CGIAR	Consultative Group on International Agricultural Research
COVID	Coronavirus Disease
CSO	Civil Society Organisation
FAO	Food and Agriculture Organisation
FIO	Faecal Indicator Organism
FYM	Farm Yard Manure
GAP	Good Agricultural Practice
GHG	Greenhouse Gas
IAEA	International Atomic Energy Agency
ICIMOD	International Centre for Integrated Mountain Development
ICM	Integrated Crop Management
IDM	Integrated Disease Management
INDC	Intended Nationally Determined Contribution
INM	Integrated Nutrient Management
IPM	Integrated Pest Management
IUCN	International Union for Conservation of Nature
IWQI	Irrigation Water Quality Index
IWRM	Integrated Water Resource Management
IWRM	Integrated Water Resources Management
IWM	Integrated Water Management
LBWP	Land-Based Water Pollution
LEISA	Low External Input Sustainable Agriculture
LI-BIRD	Local Initiatives for Biodiversity, Research and Development
NARS	National Agriculture Research Systems
NDC	Nationally Determined Contributions
NGO	Non-Government Organisation
NPM	Natural Pest Management
NRCS	Natural Resources Conservation Service
NRSA	National Rivers and Streams Assessment
PES	Payment for Ecosystem Services
PPP	Public Private Partnerships
RLRFC	Rupa Lake Restoration and Fisheries Cooperative
RLW	Rupa Lake Watershed
SA	South Asia
SAARC	South Asian Association for Regional Cooperation
SACEP	South Asia Cooperation for Regional Programme
SDG	Sustainable Development Goal
SLS	Sri Lanka Standard
SRDI	Soil Resources Development Institute
SSA	Sub Saharan Africa
STM	Scanning Tunneling Microscopy
USA	United States of America
USDA	United Stated Department of Agriculture
USDOS	United States Department of State
WHO	World Health organisation

Executive Summary

The Virtual Regional Dialogue on Agricultural Water Pollution & Water Management in South Asia held from November 17–19, 2020 brought together a host of organisations and enthusiastic individuals working in the field of agricultural water pollution and water management. The event was organised with a goal to collect and disseminate the learning from Caritas' Agricultural Water Pollution initiatives in South Asia and to create a stakeholder network of related professionals and organizations working in the area of Agricultural Water Pollution & Water Management. 88 delegates representing 49 organisations from South Asia, Europe and the United States of America participated in the event.

Funded by the United States Department of State and Caritas Switzerland, the South Asia Capacity Building Agricultural and Water Pollution Project (October, 2017-December,2020) is a three-year consortium project led by Caritas Switzerland and including Arthacharya Foundation, Sri Lanka; Caritas Bangladesh, Bangladesh; Local Initiatives for Biodiversity, Research and Development (LIBIRD), Nepal; and The DHAN Foundation, India. The Virtual Regional Dialogue on Agricultural Water Pollution & Water Management in South Asia jointly organised by United States Department of State, Caritas Switzerland and the partner organisations.

Apart from the learning and recommendations from the South Asia Capacity Building- Agricultural and Water Pollution Project (SACB-AWP), participants deliberated on the following four areas to generate comprehensive recommendations for the policy, research, capacities and practice areas:

- Agrochemicals vs Biological options: The subsidy regime.
- Agricultural Water: Incentivizing efficient practices.
- Ecosystem based best practices: Integrated Water Resource Management (IWRM), Payment for Ecosystem Services (PES).
- Tools, technology and infrastructure for water quality assessment.

The major recommendations from the three day Virtual Regional Dialogue on Agricultural Water Pollution & Water Management in South Asia are:

Policy Sector

- Assign quota on chemical fertiliser consumption based on landholding.
- Strengthen enforcement to control excessive use of agrochemicals.
- Integrate control of agricultural water pollution in water policy frameworks and basin strategies.
- Attention and initiatives on water quality and quantity.
- Integrated management of water, soil and energy.
- Policy audit for AWP.
- Acknowledge and address AWP, non-point source of water-pollution as regional policy issues.
- Effective regulation and monitor agro-chemicals use, supply and demand.
- Connect research, practice, evidence and policy.
- Introduce holistic river basin water management policy.
- Scale-up of good polices in the region.
- Scale-up of Good Agricultural Practices (GAPs) in the region through government funded Public Private Partnership (PPP), corporate sector partnership, etc.
- Removal of subsidies and introduction of environmental taxes on chemical fertilizers and energy inputs.
- Audit all policies and identify the gaps.

Market Sector

- Introduce crop insurance.
- Initiatives for availability and access to bio-inputs for farmers (incentives, hassle free certification/ licensing, technological and capacity building support).
- Promotion and scale-up of GAPs and technologies that reduce land-based water pollution (LBWP).
- Support market linkage for organic products and bio-products.

Technology Sector

- Regularly monitor water quality and pollution of water bodies at local level.

- Support innovative technologies to ease preparation / use of bio-fertiliser / compost and farmyard manure in less labour intensive manner and create friendly environment to obtain certification/licensing for organic / bio products.
- Awareness and action research on key drivers of agricultural expansion and intensification – e.g. sustainable dietary shifts.
- Limit movement of pollutants from farms, i.e. zero waste from the farm.
- Encourage / incentivize for sustainable and healthy diets.
- Develop local indicators to monitor residue of agrochemicals and nutrients found in soil and water.
- Enhance laboratories for soil and water tests.
- Conduct wider action research with farmers and with the involvement of multi-stakeholders for sustainable behavior change.
- Provide conducive environment for on-farm innovation.
- Producer as consumer: Practice needs to be demonstrated and initiated.
- Conduct research towards scalable, sustainable and integrated agricultural practices.
- Reduce the uncertainty through use of technology to advice the farmers.
- Undertake initiatives for dissemination and scale-up of GAP identified through action research such as:
  - Production and application of bio char at farm level for increasing water holding capacity of soil and for increasing yield.
  - Nature based system to improve pH.
  - Application of half chemical along with Farm Yard Manure (FYM), earthworm compost, Tricho-compost, Trichoderma for Nutrient Management of crops and reduction of AWP.
  - Promote Integrated Crop Management (ICM): Reduce agrochemicals and promote foliar spray, live perching, date perching, light trap and botanical pesticides for minimizing cost, increase yield and reduce AWP.
  - Introduced disease tolerant/resistant variety to reduce the application of agrochemicals on crops.
  - Promote IPM tools to reduce the use of insecticides, yellow sticky traps, pheromone traps, etc.
  - Promote the rehabilitation and development of Irrigational Tank Cascade Systems for water purification and retention in particular.
  - Develop model and conduct research on Zero Waste Farm production.

Local approach

- Involvement of CSOs (Civil Society Organisations) and academic institutions to contribute through trainings/ courses/ researches on convergent issues.
- Initiatives for changing practices – regulation, incentives, education, and cooperative agreements.
- Support changes in farmer behavior – advisory services, demonstrations, economic benefits.
- A measured approach should be adopted to dissipate the general fear while practicing non-chemical agriculture that it will result in low production and affect the food security.
- Collaboration among private sector, universities, inter-governmental organizations (eg. South Asian Association for Regional Cooperation - SAARC).
- Policy and Research (Scattered research, less acknowledgement in these areas, lack of research facilities- lab, equipment.
- Develop a platform for knowledge exchange among partners to cross fertilise learning in different contexts.
- Investment in creating greater public awareness, research, and generation & dissemination of knowledge in the region.
- Foster regional cooperation for exchanging knowledge, technology, and practices for reducing agricultural water pollution and for better water management across the region.

Capacity / Knowledge Management

- Capacitate human resources on AWP research.
- Organise training of trainers on AWP.
- Connect researchers, practices & behavior changes.
- Empower demand side – farmer's capacity building, consumers' awareness.
- Train farmers to adopt and implement their traditional and organic farming practices.
- Continuous awareness and knowledge programs by NGOs for bringing attitudinal changes among farmers and general public.
- Reduce knowledge gap in agrochemical use: Conduct a series of capacity building training programmes to raise awareness on the use of agrochemicals.

Introduction

The once abundant water resources of South Asia are becoming scarce due to the growing population and drought. As a result, water insecurity is growing in the region. Poor policies that incentivize water waste in India are one of the major problems. Increasing water scarcity combined with prevalent unsustainable water use behaviour in agricultural practices and numerous transboundary water resources in South Asia have intensified the problem and posed threats to water quality at a regional scale.

Agriculture contributes to water quality degradation through various pollutants, including nutrients such as nitrate, ammonia, or phosphate; pesticides; salts; sediments; organic matter; pathogens; metals; drug residue; hormones, and feed additives (FAO, 2017). Toxic pesticides, chemical fertilizers and other matter saturate farmlands, leach into ground water source, rivers, lakes, and oceans, and spread toxic chemicals. The land and water are then contaminated with harmful toxins. These toxins, which enter the water we drink and the food we eat, result in health hazards for human beings and animals. This cycle also has negative effects on livelihoods, the environment, ecosystem, economy, health, and well-being.

Funded by the United States Department of State, Caritas Switzerland has been implementing a South Asia Agricultural and Water Pollution consortium project in collaboration with Arthacharya Foundation – Sri Lanka, Caritas Bangladesh, DHAN Foundation –India, and Local Initiatives for Biodiversity, Research and Development – Nepal.

The project consortium, in collaboration with the United States Department of State hosted a regional dialogue on Zoom platform from November 17 – 19, 2020, convening stakeholders working on Agricultural Water Pollution and Water Management in South Asia, to forge alliances for collective learning and action on agricultural water pollution.

Goals

Collect and disseminate the learning from Caritas' Agricultural Water Pollution initiatives in South Asia and create a stakeholder network of related professionals and organizations working on the theme.

Objectives

- Disseminate lessons learned from Agricultural Water Pollution project with wider stakeholders.
- Learn from the experience of Agricultural Water Pollution stakeholders
- Generate a collective way forward.

Theme

Agricultural Water Pollution & Water Management in South Asia

Sub Themes

- Agrochemicals Vs Biological options: the subsidy regime
- Agricultural Water: incentivizing efficient practices
- Ecosystem based best practices: Integrated Water Resource Management (IWRM), Payment for Ecosystem Services (PES)
- Tools, technology and infrastructure for water quality assessment

Deliverables

- Knowledge Sessions
- Expert Opinions
- Project Visibility
- Knowledge Products – Theme Concepts, Proceedings, Way Forward
- Networking & Partnerships (Complementarity & Collaboration)

Participants

- Farmers
- Policy Makers
- Government Officials
- Non-Government and Think Tank Experts
- Researchers / Academicians
- Students
- Media Personnel
- Project Team - South Asia Capacity Building Agricultural and Water Pollution Project
- Caritas
- U.S. Department of State

This document captures the proceedings and highlights the results of the "Virtual Regional Dialogue on Agricultural Water Pollution & Water Management in South Asia". Moderators and speakers of the sessions have helped the delegates to brainstorm and identify the major issues and challenges in the South Asia Region, good practices and future prospects in the field of agricultural water pollution. The document includes session-wise highlights and the overall recommendations and way forward generated through extensive discussions and deliberations on various aspects of the agricultural water pollution and water management in South Asia.

Beyond discussions, the participating organisations and individuals have developed better understanding of the multi-sectoral policy perspectives and the importance of multi-stakeholder engagement in taking forward the work around agricultural water pollution in the region. Their commitment to come together more frequently would pave way to further their work collectively to solve the new challenges of agricultural water pollution and water management in this region.

Session 1

[Inaugural Session]

Moderator's Note

Sunil Simon
Director,
Greenpro Natura

We all are here to attend the virtual regional dialogue on Agriculture Water Pollution and Water Management, which is organised by Caritas Switzerland and the United States Department of State, in collaboration with the Arthacharya Foundation, Sri Lanka, Caritas Bangladesh, The Dhan Foundation, India, and LI-BIRD, Nepal and co-hosted by Greenpro Natura.

I am coordinating this virtual regional dialogue on behalf of Caritas Switzerland and the United States Department of State. I am grateful to receive this opportunity. But more than that I am happy and delighted that there are organizations and individuals with great capacities and strengths, having experience of the plural context of our region, coming together to discuss and find solutions for agricultural water pollution and water management.

The conference video showcasing the background of the Agricultural Water Pollution in South Asia is available at https://youtu.be/pc2tIV7KWu8.

When I was doing my research as part of my Bachelor dissertation on 'Impact of Saline Water Irrigation on the Growth, Productivity and Water Use Efficiency of Wheat Crop', I got to learn a lot about the issues related to water pollution. While interacting with the farmers, I learned that this problem added on to the other issues that they already faced. However, effective water management in agriculture is yet to be streamlined in the region and this regional dialogue is being organized as a step towards that. The major goal of this dialogue is to collect, disseminate and learn from water pollution issues in South Asia and create a stakeholder network of related professionals and organizations working on the theme. The theme we've taken for the conference is “Agricultural Water Pollution and Water Management in South Asia”.

The three-day dialogue will deliberate on the theme as well as the learning from the project that the organizations in the region have been implementing. The second day is focused on the four themes for which we have experts who will share with us their experience of working in different parts of the world. The third day is dedicated for consolidating the way forward which will come from the recommendations emerged out of the deliberations.

Through this conference, we expect a fruitful learning and sharing experience for the participants and delegates. Let us use this platform for more such dialogues and networking to address the problem of water pollution.

Welcome Address

Dr. Franziska Koller
Head of Section
International Cooperation
and Executive Board
Member, Caritas Switzerland

On behalf of Caritas Switzerland, Dr. Franziska Koller welcomed all the delegated to the three-day conference. Excerpts from her talk are given below:

Water pollution from agriculture is an emerging global issue and it is even more important for South Asia, due to the growing population. The region is experiencing growing water insecurity due to frequent drought conditions. Caritas Switzerland has been active in this region for fifty years with projects in climate change adaptation, disaster risk reduction as well as in water, sanitation & hygiene.

Our work has been focusing on adaptation and mitigation of climate change and disaster risk reduction. To reduce the agricultural water pollution, Caritas Switzerland has been implementing as a lead consortium, a regional programme in coordination with LI-BIRD in Nepal, Dhan Foundation in India, Arthacharya Foundation in Sri Lanka and Caritas Bangladesh in Bangladesh. This project is funded by the United States Department of State and their support and expertise has not only accompanied throughout this project but is present and strong during this event as well.

Many experts are joining us from various fields across South Asia and the United States of America to exchange experiences, to discuss current and future sector developments, to bring synergies and connect for future potential work.

I am looking forward to the outcomes of this event and I wish you a fruitful three days of discussions and networking.

Welcome Address

Dr. Ellen Connorton
Senior Science Advisor
Bureau of South &
Central Asian Affairs
U.S. Department
of State

I want to acknowledge the projects positive impact during the research phase. A team from the US state department was able to visit the LI-BIRD project area in Nepal and speak with the farmers. The farmers are extremely enthusiastic about the efforts being made under the project. Several farmers who are not direct participants have shared that they are also driven to reduce pesticides after watching their neighbors participate in the project.

Cost as we all know is a major concern for farmers. Farmers are willing to use alternatives and less pesticides in their agricultural practices, however they pointed that cost is a major factor and if these alternatives are expensive than the chemicals, they are less likely to opt for them.

Women appeared to play a key role in changing habits and farming methods, both as farmers themselves and as influencers. A farmer during the visit reported that he stopped using the pesticides primarily, after his wife suggested him to do so.

The project has also improved the livelihood of the farm laborer's and particularly the women. Through the efforts, women received training on cost-effective water friendly techniques to grow crops including disease and pest management, identification of solid and plant health, reading color codes, safe disposal of agro chemicals etc. project expert advisor was provided within the community. These are few examples of our efforts of the project.

I thank everyone for joining and coming together in this event.

Keynote Address

Dr. Mark Smith
Director General
International Water Management Institute

Water pollution and water pollution from agriculture are critical issues. It is important to discuss these issues as they affect our health, nature, farmers' production, wellbeing and development. The power of this kind of dialogue to create new conversation to solve problems is therefore immense.

To understand the issue, the basic structure of Drivers, Pressures, State, Impacts and Response will help us to unpack the issue.

While population and changing diets, population growth and changes in dietary preferences are key drivers in agricultural systems. Our cropping systems, livestock and aquaculture are all being expanded and intensified to meet increasing food demand, driven by population growth and dietary change. To have more food for consumption, more food need to be produced. We are in a situation of more erosion - more excreta from livestock and fish and more discharge of more polluted drain water. Use of untreated wastewater and sludge in agriculture increases risks of ground water and drainage water pollution and plays a key role in the dissemination of emerging pollutants such as microplastics, antibiotics and antibiotic resistance genes.

We have a tremendous load of pollutants like nutrients, pesticides, salts, sediments, organic matter, pathogens from crops, livestock and aquaculture which act as pressures on the water resources. The highest drivers of pollution loads are that of nitrogen and phosphorus and pathogens from livestock.

While looking at the state of water quality degradation, South Asia is a hotspot for agricultural water pollution. The trends are in the wrong direction with intensifying drivers, high pollution loads. Degradation is getting worse because of increasing municipal/industrial wastewater, intensification of agriculture, reduced dilution because of water extraction and climate change. The projections to 2050 shows that deterioration will be at its worst in South Asia, Sub-Saharan Africa and Mexico. The impact of this can be seen in our health, economy and environment.

Solutions:
The first place to start is with Good Practices. What are our good practices that we know about and what are the technologies we can bring to resolve the issues? Good practices for limiting water pollution from aquaculture include establishing suitable production biomass, based on the carrying capacity of the water body; standardizing feed inputs to avoid excess; using fish drugs correctly and avoiding prohibited drugs; and removing, treating and disposing of excessive nutrients in fishponds.

An example of the business model for resource recovery and reuse in zero-waste production systems where the "waste" from one sector (e.g. livestock) becomes an input for another sector (e.g. agriculture or aquaculture). Following are the suggestions for improvement:

Crops
- Optimizing fertilizer and pesticide use.
- Buffer zones for watercourses.
- Efficient irrigation to reduce return flows.
- Conservation tillage.

Livestock
- Restore rangelands.
- Better manage animal diets, feed additives.
- Improve manure management.
- Decentralize intensive production.

Aquaculture
- Avoid excess feed.
- Use drugs correctly.
- Remove, treat and dispose of nutrients.

Solutions – Policies and Investments
- Address key drivers of agricultural expansion and intensification.
- Change practices – regulation, incentives, education, and cooperative agreements.
- Limit movement of pollutants from farms.
- Restore affected aquatic ecosystem.
- Integrate control of AWP in water policy frameworks and basin strategies.
- Encourage/incentivize sustainable and healthy diets.
- Support changes in farmer behavior: advisory services, demonstrations, economic benefits.
- Economic instruments – taxes, payments for good practices, pollution caps.

Solutions – Priorities for Research
Suggested areas of future research (Evans et. al., 2019):
Markers and models
- o Development of locally appropriate STMs.
- o Tracers for water loss to improve water management.
- o Research on survival characteristics of FIOs and related pathogens.
- o Epidemiological studies to link STMs and risk.
- o Models for impacts of multiple contaminants and larger spatial scales (e.g. catchments).
- o Models of pollutants in different phases, not just water.
- o Development of accurate models to facilitate decisions on tolerable pollution loads, equitable sharing of pollution reduction and locally appropriate interventions.

Contaminant of emerging concern
- o Development of modeling frameworks for CECs including mixtures and interactions between CECs.
- o Research to understand processes in soil and sludge.
- o Data collection on antimicrobial use.
- o Reviewing voluntary schemes to reduce pharmaceutical use and adaptation for low and middle income countries.
- o Develop standardized techniques for data collection and sharing on microplastics.

Costs of AWP
- Agreement on how to value changes in water quality and ecosystems degradation.
- Data collection and sharing especially across transboundary catchments.
- Data collection for less developed countries where information is sparse, impacts not well understood and monetary values have not been assigned.

Pollution mitigation and adoption of good practice
- Assessment of voluntary schemes and design of approaches for other contexts example, less developed countries.
- Assess interventions in a consistent manner to provide fair and trustworthy results to farmers - develop best available measurement to assess interventions.
- Collaboration between researchers and farmers.

While solving AWP, we need to recognize that it should be aligned with other mega challenges like food and nutrition security, consumption, food wastage.

CGIAR has now the new mission of transforming food, land and water systems in the climate crisis. And when we start looking at AWP alongside these systems, we can see that these are aligned. While AWP is in itself a critical issue, it is important to bring change across the systems, for a broader sustainable development.

Lessons Learned & Key Recommendations:

South Asia Environmental Capacity Building - Agricultural and Water Pollution Project

Anupama Mahat
Regional Project Manager, South Asia
Caritas Switzerland

"South Asia Capacity Building- Agricultural & Water Pollution" Project, a three-year project funded by the United States Department of States and Caritas Switzerland implemented in India, Bangladesh, Nepal and Sri Lanka. Anupama shared an overview of the project and the background of AWP in the region. Following are the challenges, lessons learnt, recommend-ations and way forward from the project:

- Disconnected Policy space for AWP.
- Engaging with government meaningfully.
- Extension services yield focused.
- Seasonal gap on researched crop could dilute farmers' engagement.
- COVID-19 was a major challenge.

Lessons Learned

Project Component (Policy)

- Engaging key policy actors at the local level will gradually pave path for the macro level changes through demand driven plans.

Project Component (Capacity Building)

- Government extension services far and wide across the region is under-supplied and oriented towards increasing yield by increasing inputs.
- CSOs and academic institutions have roles to contribute through trainings / courses / researches on convergent issues.

Project Component (Action research)

- Partnership in research with farmers will lead to sustainable behavior change.
- Longitudinal study is a must.

Approach (Multi-country Partnership approach)

- Knowledge exchange among partners helped cross fertilise learning in different contexts.

Approach (Multi-stakeholder approach)

- Expertise in PAC helped accelerate the project.
- Awareness on AWP among higher level govt. officials, CSOs, academicians and policy makers could create a conducive environment for learning dissemination and its uptake.

Approach (Design vs. Implementation modality)

- The project was decentralised so required.
- frequent syncing of learning to foster cross fertilisation for a short-term project.

Recommendations

Project Component: Policy

- Involve govt/ intergovernmental agencies in design/planning/ review.
- Policy auditing for AWP.
- Acknowledge AWP as regional policy issues.
- Acknowledge non-point source of water-pollution in policies.
- Effectively regulate and monitor use supply and demand of agro-chemicals.
- Increase number and outreach of extension services/ experts to support farmers.
- Connect research-practice-evidence-policy.

Project Component: Capacity Building

- Prepare human resources on AWP research.
- Train trainers on AWP.
- Connect researchers, practices & behaviour changes.
- Empower demand side – farmer's capacity building, consumers' awareness.

Project Component: Action Research

- Avail and provide access to resources for good agricultural practices.
- Incentivize good agricultural practices.
- Develop local indicators to monitor residue of agrochemicals and nutrients found in soil and water .
- Enhance laboratories for soil & water tests.
- Provide Conducive environment for on farm innovation.

Intergovernmental agencies
Governments -4 countries
Donors
NGOs
Academicians/ Researchers/ Think tanks

Session 2

[Agricultural Water Pollution Programme learnings, challenges & recommendations]

Moderator's Note

Pranab R. Choudhury
Independent Consultant

To understand the context and opportunities, we have to understand the five Ps:

Problem: Expansion and intensification: The planetary boundary theory has been discussed for almost a decade now. There are nine planetary boundaries and nitrogen and phosphorus have exceeded the boundaries. The amount of pollution that we are producing, one earth is not enough to absorb it.

Policy: With respect to the policy space, we need to focus more on water quality, as currently, the focus is more on water quantity and air pollution. The discourse on water pollution in policy space takes very little space. Direct Policy Space in this niche & the inter-disciplinary sector is yet to evolve. This project looks at how agriculture pollutes water, but Mark's presentation highlights the fact that agriculture also receives polluted water. This is something that needs to be looked at in a bigger way. Indirect policy space, however, is fast expanding and provides critical traction

- NDC – reducing GHG through reduced chemical use.
- Safe and Healthy Food.
- Use of Bio-pesticides.
- IWRM, PES and Clean Rivers.
- Agriculture – Organic, IPM/NPM, LEISA.

Although these are not directly contributing to AWP, indirectly they do and this needs to be leveraged.

Project:

- Cross border and regional cooperation on shared waters .
- Improving policy & practice: secondary engagement.
- Building capacity among stakeholders, especially academia.
- Pilot and validate solutions.
- Behavioural change.

Partnerships: Diverse capacity of Implementers: Caritas Bangladesh (relief, ecological livelihoods, education, etc.), DHAN Foundation (Microfinance, livelihoods & Water), LI-BIRD (Agriculture), Arthacharya Foundation (social mobilization, poverty reduction).

Prospect: One health and SDG; Ecological Intensification and Pollution Monitoring

Way Forward:
we need to address the key pointers under the issues of expansion and Intensification:

- Land degradation
- Destruction of natural habitats
- Deforestation
- Genetically modified crops
- Increasing irrigation
- Increasing fertilization

Agricultural Water Pollution Policy Scenario in South Asia

Lakpa Sherpa
LI-BIRD

Opportunities

- In Nepal unlike in the west where the demand for organic producers is coming from consumers, “The push for organic products is coming for the producers instead of the consumers. More awareness needs to be created amongst the consumers.
- There is a negative impact of the high use of nitrogen. Awareness on the right use of chemical fertilizers will help to meet the production/demands of the farmers.

Good Practices

- There is no direct subsidy or any kind of incentives to the farmers. We introduced farmers to the biopesticide producer companies and now they have easy access. Demonstration plots were developed to motivate them on biopesticide use.
- There are also negative impacts of the high use of nitrogen. To overcome this challenge, we promoted improved varieties that have good yield and require less chemical input.

Way Forward

Biofertilizers are heavily expensive than chemicals. It needs a long term agricultural plan with a subsidy and risk-based insurance policies.

- **Farmers' motivation, options available and choices**
  - Farmers' awareness raising & capacity building for demand-driven agro-inputs.
  - Enhance risk-taking capacity – crop insurance.
- **Approaches to agriculture intensification**
  - Incentives for producers of bio-inputs.
  - Enhance access and availability of alternatives for farmers.
  - Promote good agricultural practices.
  - Champions among agro-vets.
  - Identify new actors in agriculture.
- **Regulatory and Governance**
  - Policy to acknowledge and address AWP including non-point source.
  - Holistic river basin water management policy.
  - Promote biofertilizer and other bio-inputs.
  - Address subsidy on chemical fertilizer.
  - Assign quota on chemical fertilizer consumption based on landholding.
  - Strengthen enforcement to limit the use of agrochemicals.
- **Research & Dialogue**
  - Avail/enhance research facilities for AWP.
  - Set up provision to regularly monitor water bodies at the local level.
  - Innovative technologies to ease preparation/use of biofertilizer/compost and farmyard manure in a less labour-intensive manner.
  - Research on disease resistant varieties.
  - Evidence and policy.

Action Research & partnership on Agricultural Water Pollution

Dr. Md. Giush Uddin Ahmed
University of Rajshahi

Best Practices

- The water holding capacity of the soil was increased by applying biochar alone as compared to control. The results are even better when biochar was applied along with FYM, vermin-compost, tricho-compost to the soil. The 5 to 9 percent increase of water holding in the rain-fed ecosystem and increases yield of 9 to 10 percent compared to control.
- The performance of 'nature-based system' is improving over the period. In December 2019, the pH has improved from 7 to 7.8 (with a jump of 0.8) but in June, 2020 pH has improved from 7.05 to 9.2 (with a jump of 2.15).
- The production of wheat was increased by applying top-dress of urea & MOP, half doses of chemical fertilizer and foliar spray as compared to control plots. This method is cost-minimizing and in favor of soil fertility.
- The Organic matter of the soil was increased 0.5% to 0.8% by applying Tricho-compost and earthworm compost together as compared to control plots of Potato field. The soil was tested from the laboratory of SRDI Dhaka, Bangladesh.
- The Irrigation Water Quality Index (IWQI) results showed that only 44% of the groundwater samples could be identified as good and excellent in the pre-monsoon seasons indicating the suitability for irrigation use.

Way Forward

- Production of biochar at the farm level is crucial for further development and scale-up of this sustainable agricultural practice for reducing land and water-based pollutions. Long-term research is required to analyze the full benefits of the Biochar.
- To increase productivity, farmers should adopt organic farming and integrated farming practices.
- The use of improved Biofertilizers, FYM and foliar feeding with chemical fertilizers should be increased.
- Eco-friendly strategies like live parching, light trap, Bordeaux mixture, Trico-compost and organic solution need to be adopted for pest management.
- Ensure safe natural water for conservation and use in agriculture.
- Promote the rehabilitation and development of Irrigational Tank Cascade Systems for water purification and retention in particular.

Capacity Building in South Asia on Agricultural Water Pollution

Mr. A. Gurunathan
DHAN Foundation, India

Opportunities

- New subject Area (Different stakeholders-different understanding).
- Long-term research needed: Inadequate expert knowledge (credible research) on the subject.
- Behavior change of farmers (expectation of more productivity and more income).
- Awareness: Low-level knowledge gap in the use and impact of agrochemicals on the environment and human health.
- Advocacy: for better planning, implementation and monitoring by ministry / government institution.
- Better human resources, infrastructure and planning in promotion of organic farming for a continuous period to bring a holistic and sustainable change by the government.

Way Forward

- Promotion and handholding farmers to change from inorganic farming to organic farming.
- Research towards scalable sustainable and integrated agricultural practices.
- Farmers using the recommended dosage of inorganic inputs and testing their soil samples.
- Farmers to adopt and implement their traditional and organic farming practices.
- Continuous awareness and knowledge programmes by NGOs for bringing attitudinal changes in farmers and the general public.

Session 3

[Breakout Sessions]

Agrochemical vs biological options: the subsidy regime

Moderator's Summary

There is a Narrative of fear: production is considered important as agriculture feeds the pollution. At the policy, scientists and farmer level there is a perception that you need chemical to produce more- and this perception may take a lot of time to transition.

Organic food market potential- this can be improved if there is an increase in the demand- also this area is very slow to grow. The policy regime is not open. Like in India, there is no subsidy regime - the organic market remains to the elite and smallholder farmers are unable to tap the market. A lot needs to be done under policy and collectivization:

- South Asia is mostly smallholder farmers. They use less chemicals and their impact on AWP is very less. Moreover, they are unable to access the subsidy. Their practices need to be strengthened.
- Other highlights were the discussion on subsidy and incentive regime, the need to ensure tenure security and the need to promote justice.

Pranab R. Choudhury
Independent Consultant

Dr. Md. Giush Uddin Ahmed
Professor, Faculty of Agriculture,
University of Rajshahi

Opportunities and Future Prospects

The discussions during the session highlighted the following areas with high opportunity and prospects:

- Integrated pest management (IPM).
- Organic farming.
- Pheromone technology.
- Government policy programs pest surveillance, monitoring pest attacks etc.
- Agroecology.
- Provision of subsidies, incentives and loans to promote Biological Agriculture.

Good Practices

Many good practices are happening in local scales and smaller pockets which are remarkable green practices. There are areas that have promoted organic farming, natural product and production and so on. Some of the good practices that can be implemented are ICM, INM, IDM, IPM (Sex pheromone, botanical pesticides, biological control, etc.), surface and rainwater utilization, utilization of solar energy in farm activities.

Recommendation

- Removal of subsidies and introduction of environmental taxes on chemical fertilizers and energy inputs.
- Enhance the nitrogen fertilizer use efficiency through modified application techniques.
- Introduction of short durational crop varieties that need less nutrition and irrigation facilities.
- Introduction of subsidies for the biological inputs to promote, mass production and wide use.
- Government should conduct land suitability analysis for which crop is more suitable for cultivation. So, that farmers can select the crops for cultivation and get benefits with low inputs.
- Alternative farming practice is needed and time demanding to insure food production without degrading the environment. In this regard, the overnment needs to formulate policies and programmes to promote the practice of biological inputs with great interest.

Way Forward

- Plan and implement sustainable agriculture which conserve resources, socially supportive, commercially competitive & environmentally sound.
- A partnership among the public, private and international organizations should be promoted to make sustainable agriculture work.
- Protecting and conserving environment by promoting ICM, INM, IDM, IPM, surface and rainwater utilization, utilization of solar energy in farm activities.
- Making use of alternatives such as Compost Fertilizers, Urea & Potash Overhead Apply, Trico compost, Vermicompost, Light trap, Perching pole, Neem leaf juice, Trichoderma spray etc.
- The government needs to play a pivotal role to formulate policies and put them into practice. There should be national missions promoting organic farming, IPM and other bio agricultural tools. They should regulate market and create an equitable market so that there is no disparity between the small scale farmers and big-scale farmers.
- Biological Agriculture creates the best perspectives for future development as it aims to maximize the quality of products and minimize the use of chemical intakes and mechanical implementation.
- Biological control agent do not leave behind long-lasting residues that remain in the environment. They don't leach into groundwater or create resistant strains of insects. Biological control minimizes environmental, legal and public safety concerns.

Agricultural Water: Incentivizing Efficient Practices

Moderator's Summary

The Issues presented: cut across all countries in South Asia.

- There is a greater dependency on groundwater. Declining ground water is a serious concern. Ground water pumping takes a lot of energy. This should be examined from the perspective of water, land and food nexus with the Climate Change lens.
- Soil and water degradation is common. It is not just the question of availability of water, it is also about access and management. Management assumes far greater focus.

Solutions:

- Integrated management of water, soil and energy.
- Recharge the depleting ground water resources.
- Participatory groundwater awareness.
- Promote energy-efficient water management.
- Promote efficient use of water.
- Soil moisture management is significant.
- Promote micro-irrigation, sub surface irrigation.
- Sedimentation: How do we incentivize: awareness and education is very important.
- There are some new and challenging schemes like direct transfer for fertilizer, electricity etc. the incentive should be given for energy saving.
- Incentivize the farmer to use less groundwater.
- Adopt nature-based solutions.
- Greater convergence to bring coherence across water and food policies.
- There are incentives and we need to debate whether to go for incentivization or subsidization.
- Integrate and coordinate all water storage practices.

Dr. A. K. Sikka
International Water Management Institute

Mr. Jon Brooks Fripp
USDA-NRCS

Good Practices

- In USA incentives used: -
  - Shame applied to misbehaving users increases the sense of equity and support by the population.
  - Increased flexibility in agricultural production and reduced costs.
  - Increased crop yield at a lower cost, lower labor costs and better soil health. Both low resource and high resource farmers can use this approach.

Following Good Practices are followed in India:

- Integrated Water Management program in India.
- Certain Government schemes in Punjab act as an incentive for the farmers and helps in saving electricity. According to one of the schemes, the farmer is provided with free electricity but if the farmer uses less than the limited quota, he can sell it to the grid.
- In Tamil Nadu, a scheme by the state government helps to regulate the use of fertilizers, awareness is created amongst the farmers through workshops and similar means. Also, before farming the soil and water samples are sent to the laboratories for testing.

Following Good Practices are followed in Bangladesh:

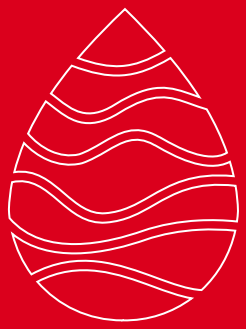
- Government provides a subsidy for electricity.
- Drip irrigation system is practiced in many places.
- Work going on 'water holding capacity'.
- Positive incentive: Support to farmers for organic farming leading to better water holding capacity.
- In coastal areas of Bangladesh, the farmers have been provided with saline tolerant seeds.
- In drought-prone areas, the farmers have been provided with drought-resistant seeds.

Following Good Practices are followed in Nepal:

- Rainwater harvesting is in place.
- Local Government efforts for construction of spring revival pits spread across watershed areas.
- Drip irrigation system.

Summary

- Solutions should be small-scale. The right use of fertilizers will save a lot of money of the farmers.
- Crop insurance, so that farmers have minimal risk.
- Mechanisms to measure the water quality at the local level.
- Implementing policies/ guidelines or schemes in the true spirit, wherever possible.
- Convergence/ Coordination among Government programmes, strict monitoring.
- Taking up long-term programmes rather than short-term projects.
- Public, Private and Community/ People Partnership Programmes.
- The concept of '4Rs' could be adopted for water, fertilizers, pesticides, subsides.
  - Right fertilizer source
  - at the Right rate
  - at the Right time
  - and in the Right place
- Sensitize people on water conservation system.
- Indirect way of incentivizing; for e.g., saving electricity automatically conserves groundwater.
- Encourage more surface water catchment.



Way Forward

- Access and management of water should be prioritized at all levels.
- Integrated management of water, soil and land.
- Need to recharge the depleted sources of water.
- Educate farmers to increase awareness.
- Efficient use of fertilizers and water.
- Integrated watershed management.
- Soil health management.
- There are a number of government schemes, we must put the best use of the incentives.
- Direct benefit transfer: Incentivization for energy saving. This will lead to the saving of groundwater sources.
- Use of economic instruments.
- Transfer of risk through crop insurance.
- Adoption of nature-based solutions.
- Lot of divergence taking place in policies and thought processes. So better coherence needs to be brought in water, energy, food programmes.
- All forms of water storage systems should be observed and looked into for better sustainability.
- The question of whether subsidy is better, or incentives is better for the farmers is still debatable.

Ecosystem based best practices - IWRM, PES

Moderator's Summary

- Promote integrated water management.
- Watershed: there are different ecosystem operating together - forest, agro and wetland.
- We see that there are three different ecosystems which people are using for livelihood. It is possible to re-generate the entire landscape of the watershed. Once you improve the watershed you also improve the agro and forest water systems. They all contribute to improve the degraded watershed system.
- Engage local people: work with them together.
- Work through the local institutions.

Best practice: the case of Roopa watershed: people taking ownership of cleaning- trying to conserve the local varieties.

- Regeneration of forest land.
- local institution groups protected the forest land, water bodies.
- Conservation of local crop varieties
- Minimalised chemical use.
- Adopted organic farming.
- Adopted environmental friendly practices.
- Migration reduced.

Dr. Herath Manthritilaka
International Water Management Institute, Sri Lanka

Dr. Yam Malla
Freelance Consultant, Nepal

Good Practices

Several good practices have been developed through the implementation of several projects in the Rupa Lake Watershed in Nepal over the past three decades that also lead to the development of a functional PES. Compared to many other landscapes and watersheds, Rupa Lake Watershed (RLW) is a micro watershed but it is a successful case and can be replicated the model in several watersheds within the country, region, and beyond. The major good practices are drawn from the process of transforming the degraded Rupa Lake Watershed into an improved watershed is as follows.

- Establishment and empowerment of inclusive local institutions and governance
- Inclusive Community-based management of wetland, agrobiodiversity, and forest resources
- Development of a market-led approach to conservation and management of wetland, forest, and agrobiodiversity
- Evidence-based policy advocacy for scaling up and wider impact
- Creation of trust fund for easy access to financial resources and enhancing household economy

Opportunities and Future Prospects

Though at a micro watershed level, Rupa Lake PES is a successful example, there are also opportunities to further improve the PES mechanism and ecosystem functioning. The discussion has raised some issues which can be considered as opportunities to further work on and improve the Rupa Lake PES mechanism.

- Equitable sharing of benefits: Though RLRFC is sharing some percentage of their benefits they generate annually through the production of freshwater fish, this has not been examined yet if the sharing is equitable in terms of contribution of upstream communities to protect the lake, control soil erosion, protect the forest and wetland biodiversity. It may need a rigorous study to quantify the contribution of different actors and sectors and also to quantify the benefits.
- Increase in the population of wildlife and its damage: Due to increase vegetation and greenery, the RLW inhabitants have started complaining about the increase in the population of wildlife such as deer, monkey, jackal, porcupine, bird, etc and damaging crops and livestock. This is another area to further explore if this can be transformed into other opportunities that are beneficial to both humans and wildlife.
- Impact of the dam construction project on biodiversity, livelihoods, and PES: The beautiful shape of the Rupa Lake is going to be changed as the government has been implementing a dam construction project. There might be several positive impacts on the local economy but will also need to assess its impact on the habitat of several species of wetland plants and animals, impact on fish production and marketing of RLRFC, and its share of benefits to pay to the up-stream communities in the form of PES.

Way Forward

- The Rupa Lake Watershed PES case is a result of several years of effort by many organizations, local people, and community institutions. It was not designed to develop this form of PES at the beginning but it was evolving and many projects added small elements to bring it into today's shape, size, and form. This is a successful example to learn from and replicate the model in other smaller watersheds within the country, region, and beyond.
- The other lesson learned from the case is that the organizations would like to work on the watershed-based PES need to address the local needs and priorities. The speaker highlighted that the model is successful because it has well mobilized local people, established and empowered local institutions, developed a mechanism that is acceptable to the local people and the interventions have been generating substantial livelihood opportunities. Some participants shared the failure case of the PES initiatives because of the lack of local ownership. The Rupa case is an example of how local ownership can be developed and the role to be played by the facilitating organization.
- Market-led approach to conservation: Generating financial incentives is key for payment of ecosystem services which is possible through the development of the market-led approach to conservation. The PES may not be sustainable in the absence of a well-functioning market-led approach to conservation.

Tools technology and infrastructure for water quality assessments

Moderator's Summary

- The technologies being followed in the USA as presented by Mr. Shaun has a set of nine plans.
- Follow the 165 practice standards as suggested by NRSA.
- Promote the Conservation system of water quality.
- Nutrient management- phosphorus and nitrogen- through nutrient mapping- the four r concept for conservation planning- Rs- Right source, Right weight, right time, right practice.
- Nutrient application- use of soil test and calculating nutrient application.
- Sediment deposition in reservoirs is a problem that needs focus.
- Buffer zone concept: whether it is cost-effective for the farmers in SA.
- Water quality monitoring is important for South Asia, although there is no comparable data on water quality.
- Many regulatory measures need to be adopted to improve the water quality.

Dr. Chowdhury Sarwar Jahan
University of Rajshahi

Mr. Shaun McKinney
Director, West National technology Support Centre, USDA

Opportunities

- There are demonstration projects that can be used around the world- scope for partnerships/collaboration.
- Watershed innovation labs will be launched soon- it is a huge opportunity to work together.
- There are opportunities office at the conservation centre has a programme of sending water experts oversees through the US embassies.

Good Practices

- The NRCS came into existence after the dust storm of 1935 that swept across the USA in the wake of a severe drought. The government formed the Soil conservation service that offered assistance to all landowners.
- Soil conservation the soil conservation mission was to protect and conserve the soil and water resources on privately owned land they worked with landowners through locally-led soil and water conservation districts and this was voluntary Hey assistance. It later became NRCS which has a broader emphasis and includes conservation of soil, increase the quality of water reserve, expand habitat and conserve energy. NRCS started offering technical assistance and financial incentives to the farmers who promoted conservation.
- NRCS staff are trained in soil agronomy engineering range management and biology and they have science-based conservation planning.
- Providing science and technology to the farmers through Conservation Planning has nine steps. Where the resource concern is addressed. The farmer is given a very specific plan according to their water quality conservation plan.
- The resource concerns include: Soil, water, air, plants, animals and energy.
- There are 165 Conservation practices standards.
- Importance of Precision Agriculture: keys to water quality.
- Innovation built on Proven Success: Classic instruments and methods- in field soil condition monitoring.
- Innovative approach: Remote telemetry data systems with cloud mapping- working with scientists, researchers, service providers - together as a team to address water quality issue.
- Nutrient Management: four R principle- Right - nutrient source, rate, time and placement.
    - Nutrient Management Plan
    - Maps and soil information
    - Nutrient budget
    - Soil sampling
    - Setbacks
    - Risk assessment
    - Record keeping
- Using onboard sensor we can figure out the exact need of the plant, variable rate nutrient application. Soil test nutrient results and crop needs to apply what is needed.
- Sediment accumulation: wind, sheet and gully erosion - these are the most difficult to handle.
- Each Pesticide is regulated in the USA.
- Some Apps that give 10 days prediction - helps farmers for nutrient application.
- Monitoring water quality at the local level- our practice standards are basic science. Which is used throughout the world and you don't need technology for that. You want to make sure that they are incorporated. They are basic and effective - published by the NRCS- can be used the right way.

Way Forward

- Along with the technologies, we need to figure out the social issues- to get people to adopt. Work at the local level to show success - because if you show, people believe.
- We have many examples to share - one of the greatest tool is showing people what works.
- Weather forecast: Major issues in forecasting especially for the farmers.

Summary & Highlights From the Breakout Sessions

Overall Summary

- **First session:** There is a challenge of food production in South Asia- alternate paradigms have not provided evidence that reducution in chemical use will lead to an increase in production but hopeful changes are coming in through organic certification and farmers are showing the way.
- **Second Session:** Water-food and energy nexus- solutions offered are a mix of integrated management approach- watershed approach, IWRM approach apart from solutions around science and economics- incentivization and subsidy.
- **Third Session:** Local based solution, local practices, local integration taking into local biodiversity. Addressed local problem through local solutions.
- **Fourth Session**: Water quality monitoring- using technology and science.based solutions to address the water quality.

Conclusion

- There are two verticals emerging.
- First-external solutions - coming from the government, scientists - researcher and markets.
- This paradigm is built on two things- profitability and efficiency. But they are not necessarily sustainable.
- Other vertical - local people with local solutions. The caring and sharing of farmers with local solutions- their water footprint is very less.
- The challenge is how we integrate these two verticals. Need to adopt an integrated approach - we bring in local people- local solutions and bring from the top marker people and connect with them.
- Convergence and coordination is the key at multi these level - from farmers, scientist and policy.
- Partnership and SDG focus - more focussed planning.

Session 4

[Plenary Session]

Presentation of the Conference Recommendations

Sukleash George Costa
Caritas Bangladesh

The first two days of the virtual regional dialogue have been very interactive. The discussions and deliberations have brought forward the following issues and recommendations for future action and deliberation:

Policy

- Assign quota on chemical fertilizer consumption based on landholding.
- Strengthen enforcement for to control excessive use of agrochemicals.
- Integrate control of agricultural water pollution in water policy frameworks and basin strategies.
- Attention and initiatives on water quality and quantity.
- Integration of management of water, soil and energy.
- Policy auditing for AWP, acknowledge and address AWP, non-point source of water - pollution as regional policy issues.
- Effectively regulate and monitor the use supply and demand of agro-chemicals.
- Connect research, practice, evidence and policy.
- Introduce holistic river basin water management policy.
- Scaled up of good policies in the region.
- Scale-up of GAPs in the region through government fund PPP, corporate sector partnership, etc.
- Removal of subsidies and introduction of environmental taxes on chemical fertilizers and energy inputs.

Market

- Introduce crop insurance.
- Initiatives for availability and access to bio-inputs for farmers (Incentives, hassle-free certification / licensing, technological and capacity-building support).
- Initiatives for promotion and scale-up good agricultural practices-and technologies contribute to reducing LBWP.
- Support market linkage for organic products and bioproducts.

Technology

- Set up mechanism for regular monitoring of pollution of water bodies and water quality at the local level.
- Support for innovative technologies to ease preparation/use of biofertilizer/compost and farmyard manure in a less labour intensive manner and create friendly environment for obtaining certification/licensing for organic/bioproduct.
- Awareness and action research on key drivers of agricultural expansion and intensification – e.g. sustainable dietary shifts.
- Limit movement of pollutants from farms i.e. zero waste from the farm.
- Encourage/incentivize for sustainable and healthy diets.
- Develop local indicators to monitor residue of agrochemicals and nutrients found in soil and water.
- Enhance laboratories for soil and water tests.
- Conduct wider action research with farmers and involvement of multi-stakeholders for sustainable behavior change.
- Provide conducive environment for on-farm innovation.
- Conduct research towards scalable, sustainable and integrated agricultural practices.
- Undertake initiatives for disseminating and scale-up of GAP identified through action research.

- Production and application of biochar at farm level for increasing water holding capacity of the soil and increase yield.
- Nature-based system to improve pH.
- Application of half chemical along with FYM, earthworm compost, Trichocompost, Trichoderma for Nutrient Management of crops and reduction of AWP.
- Promote ICM: Reduce agrochemicals and promoted foliar spray, live perching, date perching, light trap and botanical pesticides for minimizing cost, increase yield and reduce AWP.
- Introduced disease tolerant/resistant variety to reduce the application of agrochemicals on crops by providing disease tolerant and resistant variety.
- Promotion of IPM tools to reduce the use of insecticides yellow sticky traps, pheromone traps etc.
- Promote the rehabilitation and development of Irrigational Tank Cascade Systems for water purification and retention in particular.
- Develop model and research on zero waste farm production.

Local Approach

- Involvement of CSOs and academic institution to contribute through trainings/ courses/researches on convergent issues.
- Initiatives for changing practices – regulation, incentives, education, and cooperative agreements.
- Support changes in farmer behavior – advisory services, demonstrations, economic benefits.
- Collaboration among Pvt. Sector, Universities, inter-governmental organization (SAARC).
- Policy and Research (Scattered research, less acknowledgment in these areas, lack of research facilities- lab, equipment.
- Policy and Research (Scattered research, less acknowledgment in these areas, lack of research facilities- lab, equipment.
- Consists of a platform for knowledge exchange among partners for cross-fertilize learning in different contexts.
- Investment in creating greater public awareness, research, and generation and dissemination of knowledge in the region.
- Foster regional cooperation for exchanging knowledge, technologies, and practices for reducing agricultural water pollution and water management across the region.

Capacity/ Knowledge

- Prepare human resources on AWP research.
- Train trainers on AWP.
- Connect researchers, practices & behavior changes.
- Empower demand-side – farmer's capacity building, consumers' awareness.
- Train farmers to adopt and implement their traditional and organic farming practices.
- Continuous awareness and knowledge programs by NGOs for bringing attitudinal changes among farmers and the general public.
- Reduce knowledge gap in agrochemical use: Series of capacity building training to raise awareness on the use of agrochemicals was organized.

Session 5

[Way Forward]

Panel Discussion

Way Forward - Sustainable Future Action Around AWP

Dr. Balaram Thapa introduced the panelists to the audience and requested them to put forward their views on the following two areas:

- To what extent the recommendations made in the previous session is relevant to the South Asia context? From the various recommendations, what should be prioritized for action? Identify any missing link in the recommendations.
- What are the opportunities and pathways for strengthening regional cooperation in the area of Agricultural Water Pollution?

Each of the panelists was given time to share their thoughts on the above.

Dr. Balaram Thapa
LIBIRD

Julien Katchinoff
U. S. Department of State

Solving non-point source pollution is a daunting challenge. It's dispersed, it's additive, it's incremental. As a result, that can seem an impossible task/thing to change and if it does change, it's not a rapid shift, it's not fast enough to reverse environmental trends or keep track with additional development and it's even more difficult when it's matched with water stress. Two things, over the last couple of days and in the recommendation's sessions so far:

a) The idea of 'borders' needs to be understood not only geographically but administrative borders, jurisdictional, economic, sectoral borders. The implementation of these recommendations will take a good understanding, a good map of where these lines are drawn and a plan for how to translate these goals and objectives into the local context of each of these arenas.

b) The idea of 'change management'. We've heard that shifting from the status quo can be difficult, particularly when benefits are localized and impacts are dispersed downstream. Incentives, motivation for change are not set by default, they are not set to be allowed to change for the opposite. So, strategically adapting these recommendations to allow for various entities, the various actors, that we have learned about so far to change along their pathways, is going to be critical going forward.

Vasimalai
DHAN Foundation

- Promote Local management: We need to promote local initiatives and increase the local demand through proper and organized management. It, therefore, becomes crucial that the Community network and local systems like panchayats are taken forward who can take these initiatives forward.
- Promote Local digitalization: As witnessed during Covid-19, we can reach out to each individual to promote behavioural change. As part of the NGO and research network, we need to play the role of enablers, If we are enablers of sustainable change in these initiatives-they can be sustained.
- Networking is crucial to sustain our activities: A local and regional network needs to be set up and we should meet at least once every quarter for sharing and learning from our experiences.
- Scaling up: When we conceive new projects, we need to think of scaling up existing activities.
- Hotspots in urban cities are polluting the farmland.

The project partners should continue the network & work on the policy front. We should convert our good practices to knowledge product and briefs for the government and regional cooperation.

K. H. Muthukudaarachchi
Central Environmental Authority

There is a lack of monitoring of pollution, water quality and soil nutrients. We need to have regular and improved monitoring of pollution of water bodies and water quality at the local level. In order to limit pollutants from farms, we need to promote zero waste from the farms. It would be a better way of practicing farming.

- In the context of the Sri Lankan experience, there are 130 river basins, and several rivers are having drinking water limits.
- We have gazetted ambient water quality standards:
  a. Water, required for a simple treatment for drinking (a).
  b. Water for bathing .
  c. Water for aquatic life.
  d. Water source that requires general treatment process for drinking.
  e. Water suitable for irrigation and agricultural activities (e).
  f. Water with minimum quality but does not fall under categories A and E.
- Though we have these kinds of platforms, we lack regular monitoring. Pesticides are not being monitored regularly. They are still expensive and not affordable. But in drinking water standards, SLS 614, no limit values are given for pesticide residues but it only states that it shall not exceed the guideline values as specified in the WHO guidelines for drinking water quality. So as and when required, we do monitor pesticides, but not regularly.
- Talking about water quality monitoring, we have laboratory facilities throughout Sri Lanka. If we have test kits for quick spring testing, it would be a good idea for optical detection. We need to increase the capabilities of laboratory facilities in Sri Lanka.
- Collaborative approach should be made due to limited resources. Data can be gathered from limited research.
- One should identify the gaps and overcome them through a common platform and collaborate with others.

On “opportunities on promoting regional cooperation on water pollution” he said that as a regional body, we have a network for environmental matters called SACEP (South Asia Cooperation for regional Programme) which can be used by this forum. As a regional body, they can assist us to foster water pollution control. However, we should work out our network at the regional level.

Dr. Tista Prasai
Nepal Academy of Sciences and Technology

Most of the experts have emphasized on research activities. We can now move forward with the common problems identified in the region. There is no doubt that the water pollution is affecting the productivity and safety of agricultural products, therefore, we need to have not just situation analysis but also explore the mitigation measures. Another important area is cooperation that helps in reducing the impact of climate change on agriculture. Emphasis should be given on multi-disciplinary, integrated and collaborative research work. For example, we should link agriculture with public health and environmental sustainability. In order to actualize this, we should develop a research network among the experts and researchers working in various areas in our countries. We are aware that research demand for skillful human resource and adequate infrastructure. We should strongly advocate for the capacity development of our young research graduates.

On “opportunities on promoting regional cooperation on water pollution” she said that water management in agriculture is becoming more complex because of increasing water unavailability and the frequent extreme weather conditions. Therefore, we need an efficient network of water quality monitoring which is the requirement for the management of agricultural practice that can mitigate this harmful impact on water resources. Secondly, it is important to promote education and awareness is crucial for the management of good agricultural practices. Finally, we have to discuss how are we going to implement all these recommendations.

Syeda Rizwana Hasan
Bangladesh Environment Lawyers Association

We need a political vision that will guide the entire process of implementation of the recommendations that we are making. If the politics is in favour of only agrochemicals and growing more food, without emphasizing growing safe food, and if the politics is in favour of the markets of the agrochemicals while deciding on policy matters without taking into consideration the community, then we cannot envision a world that is less polluted and less contaminated supply of food. We should come together and define a vision that should guide the development of the agriculture sector more towards safer and less chemical-intensive sectors.

Without the political vision, the departments that are responsible for regulating the entire process of growing our food will not be able to contribute to the initiatives that aim for less pollution and safe food. For example, in the case of Bangladesh, the Department of Agriculture extension have the network of reaching out to the farmers and if the politics is such, that the Department of Agriculture extension is spokespersons for the giant agrochemical companies, then it is very difficult for the counter-campaign to sustain. Therefore, we should try to see that the government agencies play the role of regulators and not the promoters of agrochemicals.

We need to endorse the documentation of the damage that we are doing to our environment, our water bodies, our land and our farmers by using excessive pesticides. Right now, that documentation is not happening adequately. There are reports in the Bangladesh media about farmers dying while spraying pesticides but when we reach out to those affected, out of the seven farmers' families, only one family would say that the farmer died from pesticide contamination, while the other six would have certificates from the civil surgeon saying that the farmers had a massive heart attack. We are not documenting the adverse effects while on the other hand, those who are producing, distributing and marketing the chemicals are documenting their so-called 'success' stories in a very attractive way so their products sell whereas our arguments are often nullified. Currently, no policy in Bangladesh acknowledges the problem of pollution being caused by agrochemicals. This acknowledgment is extremely important and we should press hard for it and set an ambitious target for phasing out or limiting the use of agrochemicals.

South Asia needs a vibrant network that connects all the organic farming communities which will also give them a strong voice. We can also ask the government to go for agro-economic sensitive ecological areas consider freeing those areas.

Different Government departments need to be brought under the Department of Environment that can monitor the use of pesticides. Laws should talk about the responsibilities of the producers. Lastly, Nomenclature matters. The pesticide regulatory board should be for regulation and not for the promotion of pesticides.

On “opportunities on promoting regional cooperation on water pollution” she suggested working on changing the mindset.

Sujan Shrestha
Safe Food Alliance

We need to promote the concept of safe food for the sake of our environment, our consumers and also our growers. Looking at the gaps that we face, the water source is the biggest problem for our farmers. However, we suggest that the rectification of these problems should be done at the local government level and not at the individual level. The market is another major concern. Everything should be demand-driven rather than supply-driven, and for that, we need to endorse the concept of safe food among the consumers.

Kushal Gurung
Bio Fertilizer Entrepreneur

Being a producer of organic fertilizer, I don't think supply is an issue at all because right now the annual demand for fertilizer including chemical is just 700,000 tons whereas with all the potential organic waste we have in Nepal we can easily produce more than 2,000,000 tons of organic fertilizers. Creating the demand is the biggest bottleneck followed by irregular government policies and lack of awareness among the consumers. We should focus on creating demand-driven subsidies. Lastly, there is little awareness among the government on practices like bio-char and there is also a lack of criteria.

The main recommendation that we propose is to increase the awareness of consumers and the government and most importantly, shifting the philosophy from a supply-side demand to a more demand-driven supply.

On “opportunities on promoting regional cooperation on water pollution” he said that collaboration is the key: We need to establish the collaboration in each country before moving to regional. We need to promote the tripoded relation between the government, research institutions and private sector in this collaboration.

Concluding Session

Dr. Balaram Thapa thanked all the seven panelists for their insightful inputs. He also appreciated the delegates for actively engaging in the discussions. He also acknowledged the high-quality content and discussion points shared by the participants in the chat section.

There is a need to identify and work on the big issues which are emerged from the discussions. For example, how to put together and use the collation with a political vision and will like the communities of Great Lakes as shared by Mr. Julien. Ms. Syeda pointed out the need to have political will and engaging the political leaders to tackle the issues. This requires a concerted effort of the stakeholders.

Mr. Vasimalaai emphasized on the local-led initiatives to improve water quality management. His suggestion was how to scale these local-level initiatives. We should promote, support and scale up the local-led initiatives. We should look for both internal and external mechanisms to keep the momentum going on for financing the water pollution activities.

Some suggestions were operational suggestions like the importance and the urgency of human resource development. There is a low level of awareness at all levels, including the Government policymakers, consumers, producers etc. What appropriate action can be taken to enhance the awareness.

The low market demand for safe food. Work with market forces where producers can produce safe food and we generate the awareness on part of the consumers. We need more research on water quality monitoring and translate it into technology development.

It is equally important to sensitize the bureaucrats. as farmers struggle to get the permissions. Water use efficiency should be a major factor in deciding the utilization of groundwater.

Rotterdam convention, Stockholm convention, nitrogen convention etc. in place and there should be an emphasize to collaborate with the regional bodies.

Suggestions from the participants:

- Participants of the conference extensively discussed the issues, identified solutions and generated the way forward. The following points were shared by the participants.
- All the grassroots farmers must be brought under need-based and time-fitting training so that they can contribute a lot towards protecting both soil and water from pollution.
- DHAN Foundation has tested an application of biochar that retains moisture and nutrient in the soil.
- Low-cost water purification models used for polluted tanks in Tamil Nadu-floating wetlands!
- Rather than completely removing the subsidy from chemical fertilizers it might work better if can make it compulsory to use organic fertilizer along with chemical fertilizer to get the subsidized chemical fertilizer.
- Biochar reduces the toxicity of soil and slow-release nutrients to plants too and prevents leaching of excessive nutrients.
- Biochar also helps to decrease the pesticide residue in the product and holds and use the soil carbon, increase the nutrient (chemical and organic fertilizer) efficiency, soil moisture.
- www.frs-bd.com is a good site for an online fertilizer recommendation system for the agricultural land of Bangladesh.
- All the modern and latest technologies regarding soil and water protection should be reached to the farmers.
- Rainwater harvesting needs to be promoted among the farming households to reduce the gradually mounting pressure on underground water.
- Crop diversification must be concentrated. Area under less water consuming, pest and disease-resistant crops such as small millets must be increased. Dryland horticultural crops must be focused on.
- Climate change effects might increase pest and disease attacks on crops which will make increased use of agrochemicals.
- Would it be possible to organize a South Asia Wide data collection and information dissemination platform for agronomic, and climate data for all farmers?
- It is possible through an alliance among National Agriculture Research Systems (NARS) and also through the mediation of CGIAR institutions.
- There are low-tech drip irrigation techniques that facilitate good agronomic practices. Of particular note is the drip bucket low head drip systems.
- It is the most needed demand of time. There are small interventions in the regions. Funding is a major factor.
- There are also bilateral river basin agreements among countries, where quality dimension can be added, going beyond SAARC.
- Recommended to give subsidy to small and marginal farmers are very important. In Bangladesh, organic agriculture production and research institutions have been required to establish a policy for giving subsidies to organic farmers especially marginalized farmers.
- In addition to SAARC, there are some international organizations, such as ICIMOD and IUCN which could also help in bringing together institutions involved in agricultural research.

- INDC also provides scope to connect country-level commitments to regional cooperation.
- One policy for India may be the supply of rainfed food crops(less water consuming/ pest and disease-resistant crops) in the public distribution system.
- Participation, localization and partnerships should also be added as major cross-cutting factors across the areas of recommendations.
- International Atomic Energy Agency(IAEA) in the regional and national level programs run in nuclear technology in agriculture. There is the scope of a joint program to run on the reduction of agrochemicals.
- All the issues and challenges regarding soil-based water pollution in all the SA countries. So the challenges must be faced collectively instead of any scattered way. Please put the focus on this matter in this dialogue.
- Acknowledging that we have a problem from agriculture water pollution is the first step to finding the solution. We now have to step up the pace of our efforts to meet the goal of the 2030 Agenda to provide a more sustainable and fairer South Asia in particular and the world at large for all.
- We need agriculture for food security and nutrition as a whole so farming fields need to protected from pollution and contamination.
- Note that organic fertilizers can have some dangers as well. Training for users is still needed.
- The fact is that for self-consumption small farmers grow chemical-free food. It is due to the market demand, they produce food using agrochemicals. Pollution due to unsafe disposal and use of antibiotics, vaccines etc. should also be focused on.
- There is no emphasis on the water pollution by agriculture and non-point source, in agriculture Universities in Nepal in their curricula and should to request to put in revision curricula.
- People to people or farmer to farmer link should be established among the South Asian countries to share the best practices among each other.
- Advocate and ensure embedding of water quality issues in the cross-boundary and bilateral river basin agreements.
- Holistic approach instead of the project-based ones is very important to attain the cherished goal in this field.
- All people of the SA countries should be given equal access to the trans-boundary rivers without any obstruction and interventions.
- Establishing regional network with existing partners and stakeholders partners - providing an opportunity to share and gain knowledge on the subject area and strengthen the local people network with internal financing - DHAN Foundation.
- Initiatives must be taken to scale up the good initiatives. For example, the supply of food from rainfed crops through the Public Distribution System in Andhra Pradesh and Odisha of India.
- Networking of institutions in the region as well as within the country like agriculture, water resources, livestock etc to share knowledge and responsibility.

Session 6

[Closing Session]

Vote of Thanks

Dr. Ellen Connorton
United States Department of State

I would like to thank everyone for joining us for this virtual event from Switzerland, South Asia, USA or any other part of the world. The presentations and the discussions have highlighted the different policy and practice sectors of agriculture and water pollution as well as the broader environmental contexts which impact health, the economy as well as the environment. We have also addressed the questions of food and nutrition security, water security and good water management practice.

Agricultural water pollution will continue to be an important issue as growing populations and developing countries cope with an increasing demand for food, water and energy. This virtual dialogue has highlighted priorities for research and new avenues for potential collaboration. I hope we can continue the connections made through the project and this virtual dialogue and that we can foster regional cooperation on agricultural water pollution. I want to extend my deep thanks to Caritas Switzerland and the team for their leadership of this conference and the project and also for the Caritas partners - Arthacharya Foundation, Caritas Bangladesh, Dhan Foundation and LI-BIRD. I want to extend thanks to my colleagues at the US Department of State in Washington and our embassies in the field and those at the US Department of Agriculture for joining us at various times around the calendar. Thank you all very much.

Vote of Thanks

Ms. Viola Buli
Caritas Switzerland

Dear delegates, dear speakers and dear moderators, I'm very glad to have had the opportunity to join all of you during these three days of the virtual regional dialogue on Agriculture Water Pollution and Water Management in South Asia.

When we invited you to register for the conference, we asked each of you to give us a keyword that you are expecting out of this conference and the keyword that permanently showed was “Knowledge”. I hope that we have met this expectation and we were able to give you the right platform to share your valuable knowledge, your experiences and your best practices in agriculture water management in the region. I hope you have enjoyed the presentations and discussions during the sessions and could network for possible future work in the field. On behalf of Caritas Switzerland, I would like to express my gratitude to all of you, for actively participating and engaging during this virtual dialogue.

Our first thank you goes to our implementing partners- Arthacharya Foundation in Sri Lanka, Caritas Bangladesh, Dhan Foundation in India and LI-BIRD in Nepal, to their teams and my colleague Ms. Anupamma Mahat. Thank you very much for your intensive and excellent work and engagement to prepare for this regional dialogue. To all the moderators, to the speakers and the panelist's active participation in the sessions - a big thank you for your valuable expertise and taking time to share your knowledge with us and leading us with such interesting discussion throughout these three days. I've enjoyed all of your presentations and discussions. I was glad to actively participate in some of them as well. I want to take a moment to thank our funding partners of the project, the United States Department of State. I want to highlight your great support during this project and in this conference has been of great value to us and the team in the field. Last but not the least, I want to thank our host- Greenpro Natura. Thank you very much, Sunil for the hard work and to all the teams behind it.

Annexures

Annexure 1: List of Participating Organisation

Agriculture Information Service, Bangladesh
Agricultural Engineering College and Research Institute (AEC & RI), India
Arthacharya Foundation, Sri Lanka
Bangladesh Agricultural Research Institute, Bangladesh
Bangladesh Environmental Lawyers Association(BELA), Bangladesh
Bangladesh Sangbad Sangstha (BSS), Bangladesh
Bangladesh Wheat and Maize Research Institute, Bangladesh
Barind Integrted Landscape Transformation-Multistakeholder Platform (BILT-MSP), Bangladesh
Bureau of South & Central Asian Affairs, U.S. Department of State, USA
Caritas Bangladesh, Bangladesh
Caritas Switzerland, Bangladesh
Caritas Switzerland, Nepal
Caritas Switzerland, Switzerland
Central Department of Environmental Science (CDES), TU, Nepal
Central Environmental Authority, Sri Lanka
Department of Agricultural Extension, Bangladesh
Department of Agriculture, Sri Lanka
Department of Agronomy and Agricultural Extension, University of Rajshahi, Bangladesh
Department of Botany, University of Rajshahi, Bangladesh
Department of Geology and mining, University of Rajshahi, Bangladesh
Department of Law, University of Rajshahi, Bangladesh
DHAN Foundation, India
Faculty of Agriculture, University of Ruhuna, Sri Lanka
Faculty of Finance and Management, Sanasa Campus, Sri Lanka
Global Research Foundation, Sri Lanka
Grain Legumes and Oil Crops Research and Development Centre, Department of Agriculture, Sri Lanka
Greenpro Natura, India
Hector Kobbekaduwa Agrarian Research and Training Institute, Sri Lanka
International Water Management Institute, India
International Water Management Institute, Sri Lanka
Local Initiatives for Biodiversity, Research and Development (LI-BIRD), Nepal
Ministry of Land Management, Agriculture and Cooperative, Lumbini Province, Nepal
Nepal Academy of Science and Technology, Nepal
No 2 Huzuripara Union Parisod, Bangladesh
Office of Conservation and Water, U.S. Department of State, USA
Plant Quarantine and Pesticide Management Centre, Nepal
Rajarata University of Sri Lanka, Sri Lanka
Rajshahi Rakkha Songram Porishod (RRSP), Bangladesh
Safe Food Alliance, Nepal
Tamil Nadu Agricultural University, India
TERI School of Advanced Studies, India
The Dhan Academy, India
U.S. Consulate, Mumbai, India
U.S. Department of State, USA
U.S. Embassy, Delhi, India
USAID, Nepal
USDA Natural Resources Conservation Service, USA
Water Resource Science and Technology (WRST), Sri Lanka
Water Resources Department, India
West National Technology Support Center, USA
Wind Power, Nepal

Annexure 2

Schedule

17 Nov. 2020

Virtual Regional Dialogue on
Agricultural Water Pollution & Water Management In South Asia

November 17 – 19, 2020
www.waterdialogue.org

SESSION I — Inaugural Session

70 min — Bangladesh: 08:30am - 09:40am | Nepal: 08:15am - 09:25am | India/Sri Lanka: 08:00am - 09:10am | Switzerland: 03:30am - 04:40am | Washington DC: 21:30 - 22:40 (16/11/2020)

5 min	**Introduction**	**Mr. Sunil Simon,** Greenpro Natura
10 min	**Welcome Address - Caritas Switzerland & United State Department of State**	**Ms. Franziska Koller**, Caritas Switzerland **Dr. Ellen Connorton**, United States Department of State
5 min	**About the Conference - Agenda and logistics**	**Mr. Sunil Simon**, Greenpro Natura
15 min	**Key Note Address: Agricultural Water Pollution in South Asia**	**Dr. Mark Smith**, International Water Management Institute
15 min	**Lessons learned & key recommendations from "South Asia Environmental Capacity Building - Agricultural and Water Pollution" project**	**Ms. Anupama Mahat**, Caritas Switzerland
10 min	**Open Discussion**	All participants
10 min	**Vote of Thanks**	**Mr. Satish De'mel**, Arthacharya Foundation
15 min	**Session Break**	

SESSION II — Agricultural Water Pollution: Programme, learnings, challenges & recommendations

130 min — Bangladesh: 09:50am - 12:00am | Nepal: 09:35am - 11:45am | India/Sri Lanka: 09:20am - 11:30am | Switzerland: 04:50 am - 07:00am | Washington DC: 22:50 (16/11/2020) - 01:00 (17/11/2020) |

10 min	**Moderators remark**	**Mr. Pranab R. Choudhury**, Independent Consultant
35 min	**Agricultural Water Pollution Policy Scenario in South Asia** (Presentation & Video: 15 min | Participants response: 15 min | Concluding remark: 5 min)	**Ms. Lakpa Sherpa**, LIBIRD
35 min	**Action Research and partnership on Agricultural Water Pollution** (Presentation & Video: 15 min | Participants response: 15 min | Concluding remark: 5 min)	**Dr. Md. Giush Uddin Ahmed**, University of Rajshahi
10 min	**Session Break**	
35 min	**Capacity Building in South Asia on Agricultural Water Pollution** (Presentation & Video: 15 min | Participants response: 15 min | Concluding remark: 5 min)	**Mr. A. Gurunathan**, DHAN Foundation
5 min	**Concluding Remarks**	**Mr. Pranab R. Choudhury**, Independent Consultant

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18 Nov. 2020

Schedule

SESSION III Opportunities and future prospects of Agricultural Water Pollution in the context of South Asia

160 min — Bangladesh: 08:30am - 11:45am | Nepal: 08:15am - 11:30am | India/Sri Lanka: 08:00am - 11:15am | Switzerland: 03:30am - 06:45am | Washington DC: 21:30 (17/11/2020) - 00:45 (18/11/2020)

10 min — **Introduction of the sub-theme and instructions** — **Ms. Anupama Mahat**, Caritas Switzerland

60 min — **Break Out Session - 1**
Bangladesh: 08:40am - 9:40am |
Nepal: 08:25am - 9:25am |
India/Sri Lanka: 08:10am - 9:10am |
Switzerland: 03:40am - 04:40am |
Washington DC: 21:40 - 22:40 (17/11/2020) |

60 min — **Topic 1 Agrochemical vs biological options: the subsidy regime**
(Introduction: 5 min | Theme Setting: 10 min | Presentation: 10 min | Participants Remarks: 30 min | Concluding remark: 5 min)
Moderator: **Pranab R. Choudhury**, Independent Consultant
Speaker: **Prof. Mohamad Mizannor Rahman**, University of Rajshahi

60 min — **Topic 2: Agricultural water: Incentivising Efficient Practices**
(Introduction: 5 min | Theme Setting: 10 min | Presentation: 10 min | Participants Remarks: 30 min | Concluding remark: 5 min)
Moderator: **Dr. A. K. Sikka**, International Water Management Institute
Speaker: **Mr. Jon Brooks Fripp**, USDA-NRCS

60 min — **Topic 3: Ecosystem based best practices - Integrated Water Resource Management, Payment for Ecosystem Services**
(Introduction: 5 min | Theme Setting: 10 min | Presentation: 10 min | Participants Remarks: 30 min | Concluding remark: 5 min)
Moderator: **Dr. Herath Manthritilaka** International Water Management Institute
Speaker: **Dr. Yam Malla**, Freelance Consultant

60 min — **Topic 4: Tools, technology and infrastructure for water quality assessment**
(Introduction: 5 min | Theme Setting: 10 min | Presentation: 10 min | Participants Remarks: 30 min | Concluding remark: 5 min)
Moderator: **Dr. Chowdhury Sarwar Jahan**, University of Rajshahi
Speaker: **Mr. Shaun McKinney**, USDA

30 min — **e-caffe break / Networking Break**

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60 min	**Break Out Session - 2**	Bangladesh: 10:10am - 11:10am | Nepal: 09:55am - 10:55am | India/Sri Lanka: 09:40am - 10:40am | Switzerland: 05:10am - 06:10am | Washington DC: 23:10(17/11/2020) - 00:10(18/11/2020) |
60 min	**Topic 1 Agrochemical vs biological options: the subsidy regime** (Introduction: 5 min | Theme Setting: 10 min | Presentation: 10 min | Participants Remarks: 30 min | Concluding remark: 5 min)	Moderator: **Pranab R. Choudhury**, Independent Consultant Speaker: **Prof. Mohamad Mizannor Rahman**, University of Rajshahi
60 min	**Topic 2: Agricultural water: Incentivising Efficient Practices** (Introduction: 5 min | Theme Setting: 10 min | Presentation: 10 min | Participants Remarks: 30 min | Concluding remark: 5 min)	Moderator: **Dr. A. K. Sikka**, International Water Management Institute Speaker: **Mr. Jon Brooks Fripp**, USDA-NRCS
60 min	**Topic 3: Ecosystem based best practices - Integrated Water Resource Management, Payment for Ecosystem Services** (Introduction: 5 min | Theme Setting: 10 min | Presentation: 10 min | Participants Remarks: 30 min | Concluding remark: 5 min)	Moderator: **Dr. Herath Manthritilaka** International Water Management Institute Speaker: **Dr. Yam Malla**, Freelance Consultant
60 min	**Topic 4: Tools, technology and infrastructure for water quality assessment** (Introduction: 5 min | Theme Setting: 10 min | Presentation: 10 min | Participants Remarks: 30 min | Concluding remark: 5 min)	Moderator: **Dr. Chowdhury Sarwar Jahan**, University of Rajshahi Speaker: **Mr. Shaun McKinney**, USDA

SESSION IV Plenary Session

35 min	Bangladesh:11:10am - 11:45am | Nepal: 10:55am - 11:30am | India/Sri Lanka: 10:40am - 11:15am Switzerland: 06:10am - 06:45am | Washington DC: 00:10 - 00:45 |	
30 min	**Summary & highlights from the breakout sessions**	**All moderators**
5 min	**Concluding Remarks**	**Mr. Pranab R. Choudhury,** Independent Consultant

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19 Nov. 2020

Schedule

SESSION V Way Forward

135 min — Bangladesh: 08:30am - 10:45am | Nepal: 08:15am - 10:30am | India/Sri Lanka: 08:00am - 10:15am | Switzerland: 03:30am - 05:45am | Washington DC: 21:30 - 23:45 (18/11/2020) |

5 min	**Moderators Remarks**	Moderator: **Dr. Balaram Thapa**, LIBIRD
40 min	**Presentation of the Conference Recommendations** (Presentation: 30 min | Participants response: 10 min)	Speaker: **Mr. Sukleash George Costa**, Caritas Bangladesh
60 min	**Panel Discussion: Way Forward - Sustainable future action around Agriculture Water Pollution**	**Mr. Julien Katchinoff**, United States Department of State **Mr. K. H. Muthukudaarachchi,** Central Environmental Authority **Mr. Kushal Gurung,** Bio Fertilizer Entrepreneur **Mr. Sujan Shrestha,** Safe Food Alliance **Ms. Syeda Rizwana Hasan,** Bangladesh Environment Lawyers Association **Dr. Tista Prasai,** Nepal Academy of Sciences and Technology **Mr. Vasimalai,** DHAN Foundation
30 min	**e-caffe break / Networking Break**	
10 min	**Conclusions**	**Dr. Balaram Thapa**, LIBIRD

SESSION VI Closing Session

25 min — Bangladesh: 10:45am - 11:10am | Nepal: 10:30am - 10:55am | India/Sri Lanka: 10:15am - 10:40am | Switzerland: 05:45am - 04:45am | Washington DC: 23:45 (18/11/2020) - 00:10 (19/11/2020) |

15 min	**Feedback from the participants**	
10 min	**Vote of Thanks - Caritas Switzerland & United States Department of State**	**Dr. Ellen Connorton**, United States Department of State **Ms. Viola Buli**, Caritas Switzerland

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Annexure 3: Expectation Mapping - Word Cloud

knowledge
learn
management
Knowledge
Organic
Management
experience
Agricultural
Pollution
Learn
based
forward
land
project
learning
research
options
countries
farming
practices
Asia
South
Sharing
learnt
sharing
networking
lessons
techniques
measures
strategies
implemented
impact
principal
agrochemicals
farming
understanding
share
level
future
researchers
regional
information
interventions
Agri
improve
participants
policy
dissemination
Share
region
practice
Dialogue
Output
New
mitigation
various
biological
discussion
Networking
action
Gaining
experiences
treated
Sustainable
quality
Understanding
reducing
know
issues
flow
plan
influencing
Gain
sustainable
cases
areas
remedial
ideas
topic
local
avoid
Use
Output
Non-Point
Practices
Increase
Articulate
Detailed
Professional
pollution
rainwater
Integrated
consortium
production
stakeholders
approaches
horticulture
clean
health
institutions
sector
incorporate
Establish
mechanisms
field
Alternative
multi-stakeholders
Alternative
Discussions
Asian
India
Awareness
pollutionIncrse
development
disseminate
arena
better
country
successful
Contribution
latest
project,lesson
implementation
exchanging
extended
Exclusively
result
capacity
efficiency
reuse
responsibility
exchange
identifying
programme
Efficient
clear
irrigation
findings
stake
Reuse
outcomes
protecting
happened
current
acceptable
agrichemicals
regarding
National
theme
Irrigation
Generate
Groundwater
Agricultural
objectives
network
movement
title
profitable
Management-Aware
practises
expertise
Level
Government
mitigate
leads
barriers
minimize
regulating
implications
Prevention
activities
inter
solve
advances
approviately
seriously
number
recent
regional
available
Issues
find
Contribution
work
participate
researchers
future
sustainable
conference
developing
pollutionRegional
Gain
understanding
influencing
share
plan
project
flow
issues
know
reducing
Understanding
mechanisms
field
Establish
approaches
quality
forward
Sustainable
treated
discussion
biological
Pollution
Learn
Networking
action
Gaining
based
land
experiences
cultivation
influence
Reducing
enriched
increasing
Questions
building
following
increase
dissminateExchange
Practices
Increase
harvesting
activity
Lacks
Watershed
duration
initiatives
efficency
utilising
countrywise
Non-Point
Output
Dialogue
Agricultural
New
mitigation
provisions
situation
application
condition
professionals
formulate
global/stakeholder
awareness
Co-learning
understand
forum
Use
initiatives
Watershed
Practices
Increase
harvesting
activity
Lacks
following
increase
building
Questions
increasing
enriched
Reducing
influence
India
impact
mainstream
Learning
implemented
Asian
strategies
Discussions
measures
Awareness
principal
agrochemicals

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