

Addressing Water Pollution from Agriculture in South Asia

POLICY BRIEF

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HIGHLIGHTS

Agricultural water pollution has emerged as a critical issue in South Asia. Agricultural activities, particularly an excessive use of agro-chemicals, has increasingly become a leading contributor to water pollution among the land-based sources. Through agricultural intensification, South Asian countries are determined to enhance agricultural production to promote economic growth, and ensure livelihoods and food security, paying little attention to water pollution caused by agricultural activities.

Recommendations:

- » Reduce use of agrochemicals through promoting bio-fertilizers/bio-pesticides and good agricultural practices
- » Develop and enforce policies and laws to regulate agrochemicals use and promote good agricultural practices
- » Promote awareness, capacity building and collaborative action research

THE ISSUE

Agricultural water pollution has emerged as a global issue. Agriculture pollutes water through discharging large quantities of pollutants including agrochemicals, nutrients, organic matter, drug residues, and sediments into water bodies (Evans et al. 2019; UNEP 2016). Contributing to water-borne diseases, poisoning fish and birds, eutrophication, and loss of biodiversity, water pollution is not only reducing the quantity of safe water but also posing significant threats to human

health and ecosystems (Carpenter et al. 1998; FAO and IWMI 2018). This problem has been recognized in the 2030 Agenda for Sustainable Development, which includes a specific target for improving water quality in Sustainable Development Goal 6.

This policy brief focuses on water pollution from agriculture in South Asia, where agriculture is increasingly contributing to the degradation of water quality. While policy and public debate has largely focused on water availability or quantity, agricultural

activities, particularly use of agro-chemicals, has increasingly become a leading contributor to water pollution among the land-based sources (FAO and IWMI 2018). Largely overlooked until recently, it has exacerbated the already pressing problem of water pollution in the region. Drawing on evidences generated from the South Asia Capacity Building-Agricultural and Water Pollution (SACB-AWP) Project implemented in the four South Asian countries Bangladesh, India, Nepal and Sri Lanka (see Notes), this policy brief highlights important drivers of agricultural water pollution. Considering the drivers, it also provides key insights for regional stakeholders, national governments, farmers and local actors in South Asia to explore and scale up innovative interventions for addressing the problem, while fostering policy discussions within the country and South Asia region.

KEY DRIVERS OF AGRICULTURAL WATER POLLUTION

Agricultural intensification

South Asian countries – where agriculture remains the mainstay of rural livelihoods – share some common drivers of water pollution from agriculture. Through agricultural intensification, countries are determined to enhance agricultural production to promote economic growth, and ensure livelihoods and food security, paying little attention to water pollution caused by agricultural activities. To highlight, the National Agriculture policy (NAP) 2013 of Bangladesh aims to make the nation food self-sufficient through enhancing crop production. Nepal's Agri-business Promotion Policy (2006) and Agriculture Development Strategy (2015-2035) have focused on commercial agriculture. Nevertheless, extensive evidences, including those collected by the project partners, show that agricultural intensification is associated with excessive use of agrochemicals, including chemical fertilizers and pesticides (e.g. insecticides, herbicides, and fungicides) and unsafe disposal of containers and safety gears (FAO and IWMI 2018; Schreinemachers and Tipraqsa 2012). Through surface runoff and leaching, such chemicals release into the water environment including groundwater, rivers, lakes, and aquifers, causing water pollution. In



Experts monitoring action research trial plots on potatoes in Panchkhal, Kavre, Nepal. Photo: Lakpa Sherpa, LI-BIRD

Nepal, water sample tests revealed traces of synthetic pyrethroid and carbamate in Panchkhaal Municipality, a peri-urban site, near Kathmandu, with increased commercial agricultural activities. In Sri Lanka, high levels of nitrate and total dissolved solids (TDS) were found in groundwater, which may be associated with leaching of nutrients from soil due to excessive use of chemical fertilisers. Such high levels of TDS indicate that water is unsuitable for drinking, and long-term use of nitrate-contaminated groundwater could cause methaemoglobinaemia.

Providing subsidies for fertilizers and pesticides has been one of the important government policies in South Asia to enhance agricultural productivity. Such policy has encouraged farmers to use more agrochemicals. Scholarly resources as well as news reports (e.g. Dhital 2020; Hemming et al. 2018; Weerahewa et al. 2010) reveal corruption in tendering process to supply fertilizers and delivery of subsidies programs, indicating subsidy policies linked to disparate interests of a range of supply chain actors.

Farmers' motivations and choices

Farmers are increasingly applying fertilizers and pesticides in the region to enhance food security and household incomes through increased yields. Since a growing number of farmers in the region are oriented towards entrepreneurial farming, they tend to use more agrochemicals. Across the focal countries, excess use of fertilizer and pesticide is more prevalent among commercial farmers in peri-urban areas. While most



A farmer collecting soil sample for tests in Rajshahi, Bangladesh.

Photo: Caritas Bangladesh

farmers seem to have limited knowledge about the environmental effects of agrochemicals use including water pollution, many are aware of negative effects on human health. Despite some level of awareness of the negative health effects, action research with farmers undertaken as part of the project identifies several reasons responsible for the persistent use of agrochemicals. First, farmers rely on chemical inputs to enhance productivity amidst the problem of limited access to alternatives such as bio-fertilizers and bio-pesticides and where available, they are more expensive. The production of farm yard manure and compost, important alternatives to chemical fertilizers, has declined in many rural areas mainly due to the shortage of labor, created by the outmigration of young people (see Sunam 2020). Second, project partners across the focal countries found that most farmers have limited knowledge about an optimum and safe use of agrochemicals. This may be associated with limited access to agricultural/technical extension services provided by the respective governments as revealed by farmers across the focal countries. Finally, project partners' interaction with farmers involved in action research across all these countries revealed that they trust more the dosages recommended by local vendors/private agro-vets than the government recommended dosages for agro-chemicals. The local vendors/ agro-vets who, given their vested interest in promoting the sale of agrochemicals, are found recommending higher dosages to farmers across all the four countries. Related to this, manufacturers of agrochemicals and their agents promote their products aggressively through advertisements and

other marketing strategies, which is also inducing farmers to apply more agrochemicals in their farms.

Regulatory and governance issues

Policy analysis and consultations with experts and partner organizations indicate that specific legal instruments to address the non-point sources of water pollution are lacking in the focal countries. Since policies and laws target on industrial and point-source pollution, water pollution from agriculture has been neglected. For example, regulatory frameworks in India by and large focus on industrial water pollution but there is no regulation for addressing water pollution caused by agriculture. Nepal also lacks regulations to control non-point sources of water pollution. Similarly, Sri Lanka has no national regulatory instruments for managing land-based pollution despite it being a major issue that needs to be addressed in the country. In Bangladesh, the Fertilizer (Control) Order 1999 has emphasized on promoting the use of chemical fertilizers, without paying attention to the adverse effects of chemical fertilizers on water pollution, human health and the environment.

While there do exist some policies and laws to limit the use of agrochemicals particularly pesticides, enforcement and implementation remain weak. In India, the Central Insecticides Laboratory and State Pesticides Testing Laboratories are mandated to regulate the sale of unbranded pesticides in the market, where 20 different pesticides have been banned for sale since 2018. Yet, they are still reportedly accessible to farmers illicitly. Although there is no mention of water pollution, the Pesticides Rules 1985 (Amendment 2011) of Bangladesh aims to promote commercial production, marketing and use of bio-pesticides. Bangladesh's Integrated Pest Management Policy 2002 aims to train farmers on practices of growing healthy crops. This policy is generating some changes on the ground, but more needs to be done for wider impacts. Some policies in Nepal such as the Agri-business Promotion Policy 2006 and the Agricultural Bio-diversity Policy (2007) include promoting organic agriculture and integrated pest management and are promising. However, implementation and upscaling remain a challenge due to policy gaps in promoting the market for biological substitutes to agro-chemicals.

RECOMMENDATIONS

Reduce use of agrochemicals by promoting bio-inputs and good agricultural practices

To reduce an excessive use of agrochemicals, application of bio-fertilizers/bio-pesticides and good agricultural practices should be promoted in the region. Many farmers across the focal countries have been producing and using different kinds of farm-yard manure and compost. Small to large scale local producers of bio-fertilizers, vermicompost, trichoderma, and tricho-compost are also increasing. Insights from action research with farmers conducted by country partners have revealed that mixing chemical fertilizers with organic manure has resulted in more productivity and water efficiency than applying chemical fertilizers alone. In Sri Lanka, action research under this project revealed a reduction in nitrogen leaching by 39 percent with drip irrigation. There is also huge scope for enhancing the use of bio-pesticides and developing disease resistant varieties. In Nepal, the project has promoted a disease-resistant variety of potato for reducing pesticide use. In Rajshahi, Bangladesh, it has promoted eco-friendly strategies for pest management namely live perching (*Sesbania*) and dead perching in the Barind Tract region. It has also encouraged farmers to use high-quality vegetable seeds and seed purification techniques to prevent the spread of seed-borne fungal and bacterial diseases. This in turn has reduced excess pesticide use.



Water Hyacinth in an eutrophic village tank in Sri Lanka.
Photo: Arthacharya Foundation, Sri Lanka



Polluted irrigation water being treated through floating wetland method in Madurai, Tamil Nadu, India. Photo: DHAN Foundation India

Promoting organic agriculture is another important pathway to reduce the consumption of agrochemicals. For this, some incentives and favorable conditions are critical, for instance ensuring beneficial market conditions for farmers including the price premium for their organic products. Policy conditions should facilitate and sustain farmers' markets/fresh food markets to foster direct interactions between farmers and consumers.

Develop and enforce policies and laws to regulate agrochemicals use and promote good agricultural practices

Policy discourses in the focal South Asian countries are yet to consider agricultural water pollution a critical problem. Since these countries lack focused policies and laws to address non-point sources of water pollution, it is crucial to sensitize policy makers and promote policy discourses on the issue.

Sound policies and strong government support are key to promoting good agricultural practices while discouraging pollution-generating activities. Although governments may find removing subsidies for fertilizers politically unpalatable, they can formulate favorable policies including subsidies for producing and promoting bio-fertilizers and bio-pesticides. Governments should also ease the process of





A farmer using yellow sticky trap for monitoring pests in Panchkhal, Kavre, Nepal. Photo: Lakpa Sherpa, LI-BIRD

registration of bio-fertilizers and bio-pesticides as a way to promoting them. Equally important is to strictly regulate the trade of harmful agrochemicals while effectively monitoring and evaluating the demand and supply of agrochemicals for informed policy making. Policies should embrace integrated water resource management and integrated pest management, while also focusing on water monitoring system and wastewater reuse.

Given the transboundary nature of water problems and with enhanced trades of agrochemicals between countries within South Asia, intra-regional cooperation is becoming more important. Except Sri Lanka, other focal countries in the region share transboundary rivers, suggesting that polluted rivers in one country affect another. Intra-regional policy dialogues and initiatives will need to focus on regulating the trade of toxic agrochemicals and exploring alternative solutions through collaborative research.

Promote awareness, capacity building and action research

Given a limited understanding among farmers about the adverse effects of agrochemicals on human and environmental health, a range of multi-level actors including the government and civil society should help raise awareness among farmers as well as the public about the negative effects of agrochemicals. This

will improve the public debates on agricultural water pollution and other related issues.

Since not all farmers may be able to fully switch to bio-fertilizers and bio-pesticides in the near future, governments and aid agencies should provide farmers with trainings on proper application of fertilizers and pesticides in terms of doses and safety measures. It will help lower indiscriminate use of agrochemicals and thus reduce water pollution. At the local level, governments should also work with private agro-vets to disseminate information and technical advice about good agricultural practices to farmers. Local governments should also take responsibilities to monitor Soil and Water Quality periodically.

Action research with farmers should focus on developing new kinds of affordable and high quality bio-fertilizers and bio-pesticides as well as exploring disease-resistant varieties. Action research involving scientists and farmers should help develop local indicators to monitor residues of agrochemicals and nutrients in soil and water. Establishment of demonstration plots in collaboration with local universities and think-tanks is a promising strategy for promoting good agricultural practices and conducting longitudinal studies on the effects of agrochemical use on soil and water qualities.

NOTES

This policy brief is based on evidence and information collected through action research and policy analysis conducted by the South Asia Capacity Building-Agricultural and Water Pollution Project (SACB-AWP Project) in Bangladesh, India, Nepal and Sri Lanka. This brief uses complementary information obtained from a review of the relevant literature and discussions (online) with project team members from the country partners. The good practices mentioned in this brief are tried and tested. The details are documented in action research reports of the project. Special thanks goes to A. Gurunathan, Hemachandra Samaratunga, Lakpa Sherpa, Lily Gomes, Praveen Kumar, Seyed Azmy and Viola Buli for providing valuable inputs.

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Cover Photo: Pesticide application in paddy field, Tamil Nadu, India. Photo Credit: DHAN Foundation, India

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