International Water Resources Association
IWRA

POLICY BRIEF
Number 14
July 2021

ONLINE CONFERENCE IWRA 2021

One Water, One Health: Water, Food and Public Health in a Changing World

THEME II

How can managing water in agriculture contribute to food security and public health?

KEY POLICY MESSAGES

- Agricultural water management, always complex and multi-dimensional, is becoming more so
- New challenges require both teams of transdisciplinary experts and local knowledge
- Policy design and shared governance should target barriers and provide incentives to adopt best practices
- To improve water-food-energy management, engage and empower farmers.

IWRA Policy Briefs are published by IWRA in association with IWRA partners. They aim to provide high quality analysis and practical recommendations for policy makers on important development issues.

Water management in agriculture is becoming increasingly complex with climate change and other stressors, such as land use change and population growth. Sound water management is crucial to global food and nutrition security, for public health, and for poverty reduction.

Indian Farmer, India, 2021.
© Guru Moorthy Gokul

Agricultural practices, water, food, and public health are bound together to form a system and agricultural water management provides a set of system levers. Managing for water efficiency and quality in agriculture are key for food security and combating poverty, malnutrition, water-borne disease, and food-borne illness. Policy design and shared governance for agricultural water management should address barriers and provide incentives for adoption of management practices and innovation. In addition, tools for monitoring and understanding agricultural water use need to be accessible to farmers and local decision-makers.

Poverty alleviation is directly tied to water resource availability. Three of the top five indicators of the Food-Water-Security Index (FWSI) are related to water: arable land equipped for irrigation; population with access to safe drinking water; and, total renewable water resources per capita. Along with political stability, total renewable water resources per capita is a key contributor to public health. Research on the FWSI highlights water as a key resource to avoid malnutrition.

MULTIDIMENSIONAL LINKAGES REQUIRE NEW APPROACHES

Water, environment, food security, education, public health and poverty have multi-dimensional linkages, with many inter-dependencies, trade-offs, synergies, and interactions among these elements. Agricultural policy and programs can alleviate food insecurity and poverty, but require an integrated assessment of issues that are typically managed by various government departments and a range of stakeholders. To achieve desired outcomes, research and development and policies should examine the interdependencies among agriculture, environment, public health, and education, with assembled teams that can bring expertise from multiple disciplines. With such analyses, unanticipated interdependencies will be identified.

> *In a study of irrigation water sources in Ethiopia, farmers with access to irrigation water that also supplied household water needs had better hygiene practices and more time available for other tasks because they spent less time hauling water for domestic uses.*
> **Chloé van Biljon, Session 4**

Current agricultural production relies on the use of pesticides and other chemicals, that have impacts on the environment and human health. Awareness, outreach, and education programs for farmers alerting them to their

Accessible tools that save farmers money and effort are most effective.

Countryside, 2014
© Jordan McQueen

options for crop selection, related supply needs, best management practices, and monitoring technologies are important for food security, water security, human health, and environmental protection from the overuse of pesticides and other chemicals. Farmers who can better gather and apply knowledge provide co-benefits across the system of inter-related issues. Education and accessible tools provide important information that can save farmers money and effort, while also protecting water quality and augmenting crop production. Researchers are developing accessible techniques that are suited to the local needs of farmers.

SOUND AGRICULTURAL WATER MANAGEMENT BRINGS MULTIPLE BENEFITS

Monitoring technologies. Low-cost soil moisture and nutrient level monitoring technologies have been successfully deployed in Africa, with demonstrable improvements in crop yield and income, accompanied by reduced irrigation needs and increased nutrient retention in the root zone of crops. Systemic community improvements were also reported, with fewer perceived conflicts within the farming communities. A low-cost monitoring technique to assess health risks from pesticide exposure, deployed in Morocco, relies on passive sampling by field devices left in place for a season. Low-cost soil additives have been developed from rice husks, water hyacinth, coontail, or coconut shells, in a process that involves cleaning, shredding, heat treatment (i.e., pyrolysis), grinding and sieving to produce a material with active sorption properties. These additives take up pollutants in the soil, protecting water and crops while using source materials that are regionally available.

Supplemental sources. Springs and groundwater are important but often overlooked resources for irrigation, including in regions that rely primarily on rain-fed agriculture. With climate change, patterns of rainfall are changing and rain-fed regions can experience more frequent, extended periods of drought. Supplemental sources of water are necessary to maintain the agricultural productivity during drought. Protection and enhancement of recharge zones, through which groundwater stores are replenished, can be accomplished with both structural and non-structural measures. These aquifers can then be accessed during times of drought to supplement rain-fed needs and protect crops. Critical stage irrigation of rain-fed crops in the Himalayas with spring-sourced

Water and crop management yield co-benefits.

Kerala, India, 2021.
© Aboodi Vesakaran

water increased millet crop production, and enhanced community nutrition.

Tree planting. Tree planting in groundwater recharge areas is a structural measure that can improve water infiltration to the groundwater storage zone because trees help to improve the capacity of soils to take up water. Planting fruit and nut bearing trees has the additional benefit of producing valuable commodities, thereby encouraging local populations to do more afforestation in recharge areas.

Managed aquifer recharge. Another passive structural measure is the connection of roof drains to recharge underground water reserves. The drainage system can be designed so that household needs for rainwater are diverted, with the excess being stored as groundwater. More elaborate structural measures include managed aquifer recharge (MAR) infrastructure, which has been installed to improve water security, food safety, and public health. In Los Arenales, Spain, MAR is part of an integrated water resource management approach that also includes water reuse, with the participation of government, industrial, and agriculture sector stakeholders. The MAR infrastructure in Spain is a climate adaptation measure that can mitigate the impacts of floods by recharging aquifers when there is excess water in agricultural fields, and provide a source of water for irrigation during periods of drought.

ENGAGE FARMERS AND OTHER STAKEHOLDERS

Non-structural measures that are part of a sustainable watershed management plan to protect springs and groundwater resources include awareness programs, working groups and activities, monitoring tools, and modelling at the catchment or aquifer level to better understand the water-energy-food-environment nexus. Public engagement fosters ownership and contributes to the long-term viability of initiatives including capacity development, research, outreach, and digitalization for management system improvements. Capacity development of farmers helps them overcome perceived barriers and increases their confidence to use monitoring devices, to apply the information in their decision-making, and to follow water conservation measures. Engagement of local stakeholders in developing water budgets based on the local water resources is key to a bottom-up strategy that also provides access to local knowledge.

Pilot projects, use of lessons learned, and flexibility for adaptive management, with local farmers at the center of all interventions, lead to on-going measures to prioritize human welfare and ecosystem functionality.

The backbone of every program is community engagement.

ONE WATER, ONE HEALTH: WATER, FOOD AND PUBLIC HEALTH IN A CHANGING WORLD
IWRA/FAO/UNESCO-IHP Online conference, 7-9 June 2021
Proceedings (abstracts, presentations and posters).

ACKNOWLEDGEMENTS
IWRA Policy Brief Editor: **Mary Trudeau**
IWRA Policy Briefs Coordinator: **James E. Nickum**
Layout: **Nathalie Lyon-Caen**