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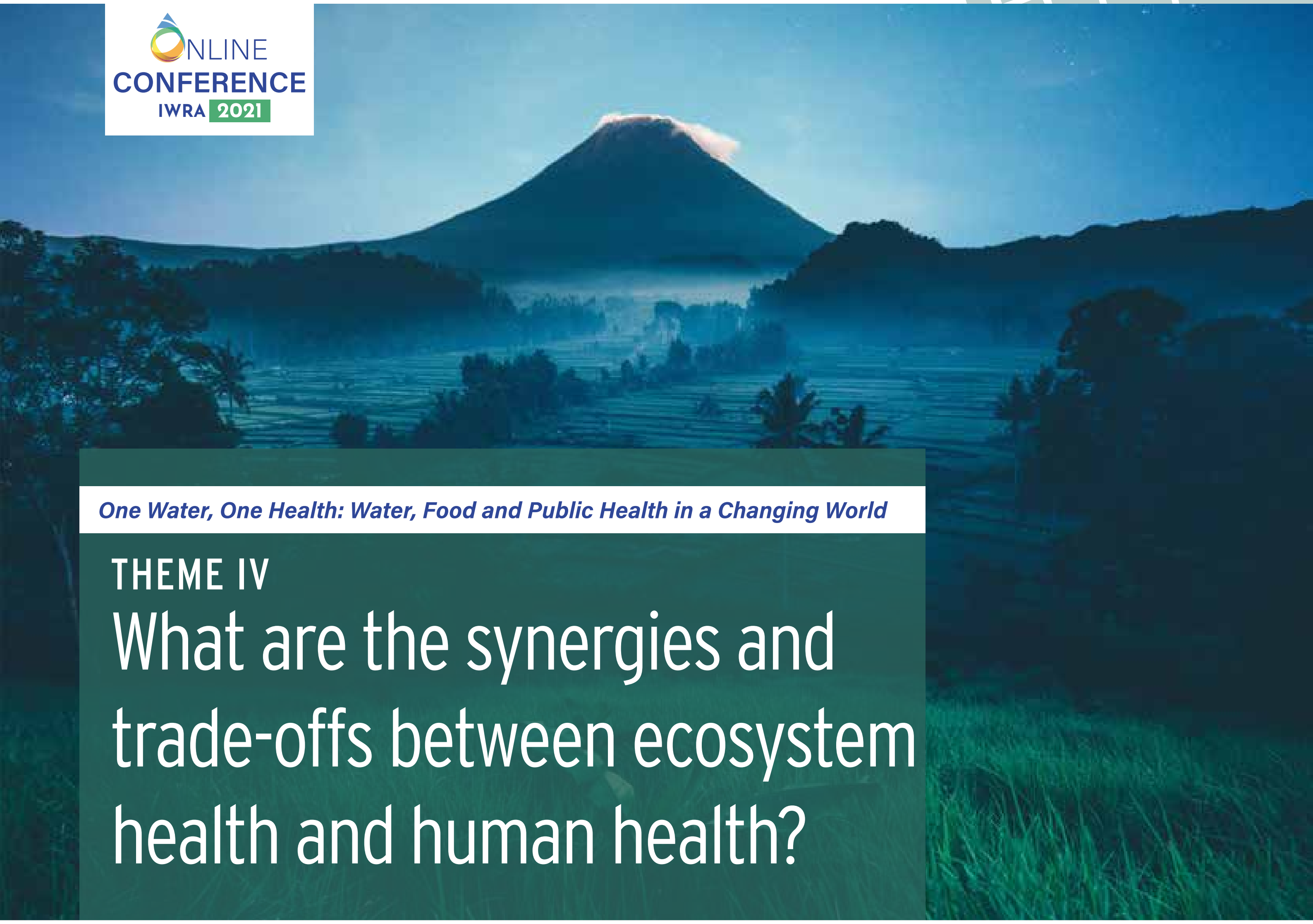

One Water, One Health: Water, Food and Public Health in a Changing World

THEME IV

What are the synergies and trade-offs between ecosystem health and human health?

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KEY POLICY MESSAGES

- Capacity development is needed to implement comprehensive water management processes, such as triple-bottom line and life-cycle cost analyses.
- Economic instruments, such as pollution trading and carbon credits, can stimulate improved agriculture and aquaculture practices that benefit human and ecosystem health.
- Well-drafted and well-implemented regulations can be a key to regulate human water demand and water supply to accommodate aquatic ecosystem needs.
- There is an urgent need to protect and restore, and to make difficult decisions that may have negative social or economic trade-offs.

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The carrying capacity of water resources is the maximum level of sustainable socioeconomic activity that can be supported by available water resources, while also protecting ecosystems. This idea is straight-forward conceptually but very complex in practice. To protect ecosystems, human water resource use must consider water quality, quantity, timing of flows, and the natural spaces that convey and store water resources, such as river corridors, riparian zones, and aquifers. For aquatic ecosystems to function, human demand-supply relationships need to be managed on an on-going basis, for example to release pulse flows at critical times of the year and to maintain minimum flows required to sustain aquatic biota.

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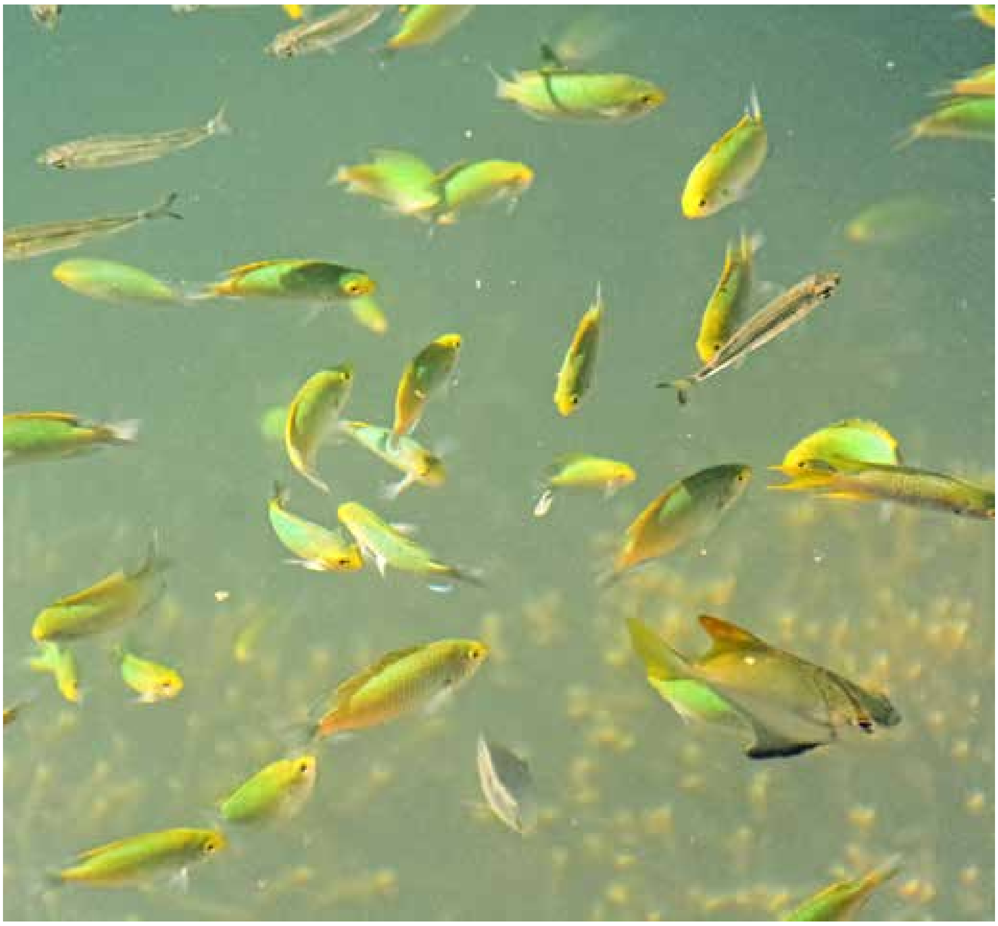
ECOSYSTEMS NEED HUMAN DEMAND-SUPPLY RELATIONSHIPS TO BE MANAGED ON AN ON-GOING BASIS

Where water demands exceed the local or regional capacity of water basins or aquifers, goals to support both human and ecosystem water requirements place constraints on socioeconomic activities. Measures to assist in managing human water demands include: promotion of water savings; enhanced water use efficiency; improved marketing mechanisms and water pricing policies; use of non-conventional and diverse water sources; optimized water allocation practices; flood control and drought relief initiatives; and, effective laws and regulations, including measures to control maximum water use. These elements need to be situated within a well-structured institutional setting, with appropriate management mechanisms, and functioning water infrastructure. Well-drafted and well-implemented regulations can be a key success factor to balance water demand and water supply.

NEW THINKING ABOUT WATER SUPPLY AND WASTEWATER MANAGEMENT IS NEEDED

Conventional thinking about water supply and wastewater management as a simple linear system needs to be replaced with a more comprehensive approach that includes a soil and water conservation (SWCM)

Timing and quantity of flow are both critical.



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Regulations are key to balance demand and supply.

Markets need to be created for water processing by-products.

model and that aims for a "no-harm" or net zero discharge in terms of environmental consequences. This approach takes into consideration environmental aspects of water on the landscape, and integrates conventional water supplies - surface and groundwater – with water from other sources, including water reuse, stormwater, and desalinization. The approach also includes creating markets to appropriately make use of resources from wastewater processing, including biosolids and effluents. In addition, community and stakeholder involvement are needed as part of an open decision-making process and transparent management.

A TOOLKIT

Zoning. A groundwater management classification scheme in China provides an example of a system that constrains development based on available resources. As an ecological service, groundwater helps to maintain the water quantity balance, regulate ecological hydrology, maintain the water-salt balance, and modulate the water-heat balance of the ecological environment. It also plays a role in hydrating vegetation and maintaining water levels in rivers, lakes, wetlands and other ecosystems. Sulfide in thermal springs has many therapeutic benefits for treatment of illnesses in body. Over-exploitation of groundwater can alter the stability of the geological environment with land subsidence and fissures, and can cause seawater intrusion into aquifers. A system of zonation that defines three types of land - protection zones, exploitation zones, and reserves - has been established by China to protect groundwater resources within defined conditions of recharge, reserve and renewal to safeguard water supply. Guiding principles for the zonation include a stable balance of groundwater recharge and discharge, water cycle protection, meeting water demand for the natural environment, retaining strategic reserves, and making groundwater uses efficient.

Analytical tools. Methods to assess synergies and trade-offs to improve water management include triple-bottom line and life-cycle cost analyses. Triple-bottom line is an approach that examines the social, economic and environmental costs and benefits of investments or other decisions. While triple bottom line analysis is needed to understand trade-offs and synergies, the many organizations need to build and foster the institutional capacity to use this and other analytical tools.

Technologies. Advanced and alternative technologies for wastewater treatment, stormwater storage and treatment, rainwater harvesting, biosolids processing, and decentralized water infrastructure are available or emerging, many with the potential to increase water reuse. One example of a wastewater treatment technology that makes use of local natural resources is a pilot project in the Philippines to use banana pseudo stems as activated carbon for pre-treating laundry water. Results indicate effective removal of surfactants and reduction in oxygen demand. Raw materials for banana pseudo stem treatment systems are abundant in the Philippines.

Nature-based solutions. Oyster, clam and kelp aquaculture remove nutrient pollution, leading to water quality improvements and, if undertaken in sufficient quantities, contribute to restoration of degraded aquatic ecosystems. Seaweed aquaculture beds sequester carbon dioxide and rice cultivation is an approved protocol for carbon credits. If properly managed, these activities have synergistic benefits for human health, food economies, and the environment.

Economic tools. Economic tools, such as nutrient trading and carbon credits, can be implemented to stimulate aquaculture activities with co-benefits for the environment and economy. Stakeholders can harness pollutant trading programs, earn and sell emission reduction offset credits, while simultaneously benefitting the ecosystem, for example through habitat and riparian improvement, and flood retention.

Public engagement. Public education and engagement also result in co-benefits for human health and environmental protection. For instance, farmers play a key role in water management since agriculture is one of the largest global consumers of freshwater resources. In addition, significant energy is expended on food production and supply, with implications for climate change. Improper or excessive pesticide applications have a negative impact on food security. Education, better instructions with pesticide packaging, monitoring, regulations, and investigations into best practices are needed to maximize co-benefits of healthy foods and ecosystems, and to minimize the negative effects of pesticide use.

Place-based solutions. A study in Lebanon examined the interconnections between water, energy, nutrition, and food systems, with a focus on the Lebanese-Mediterranean plant-based diet. Investing in local production of pulses (broad beans, lentils, chickpeas, and peas) results in increased nutritional value, reduced reliance on foreign markets, reduced pressure on fresh water, and greenhouse gas emission reductions. With strong knowledge transfer and locally empowered decision-makers, place-based solutions can be developed by stakeholders, including deployment of technologies, support for policies, leveraging incentive programs, and altering behaviour of producers and consumers.

More work is needed to effectively communicate scientific information to the general public. Also, more focus is needed on making difficult decisions regarding trade-offs that will benefit the environment but that have potential economic or social costs over the short-term, or on a local scale. Sound decisions to protect the environment ultimately also benefit society and the economy. There is an urgent need to protect and restore aquatic ecosystems. The rationale for making difficult decisions to protect ecosystems needs to be developed by governments and all stakeholders, and supported by communications and capacity development activities.

Farmers play a key role in water management.

ONE WATER, ONE HEALTH: WATER, FOOD AND PUBLIC HEALTH IN A CHANGING WORLD
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