

Agriculture and Fresh Water Pollution

We used to think that energy and water would be the critical issues for the next century. Now we think water will be the critical issue.

- *Mostafa Tolba of Egypt, former head of the United Nations Environment Programme*

Key Points

- Agriculture is the single largest user of freshwater on a global basis and a major cause of degradation of surface and groundwater resourcesⁱ through erosion, chemical runoff, and pollution from other organic and inorganic wastes.
- Pollution of inland waterways is inextricably linked to ocean and coastal pollution because rivers carry most land-based impacts into coastal areas and oceans.ⁱⁱ
- It is time for agricultural corporations to be held responsible for their environmental impacts. Tough regulatory systems are needed to prevent such impacts, underpinned by the precautionary principle. These should include action to ensure that products reflect the full costs of production, including fees for any allowable resource usage and wastes and disincentives/penalties for deleterious actions.
- Food policy and agricultural strategies must be reviewed and strengthened in order to move away from polluting and unsustainable foods and towards healthier and more environmentally-friendly options. This should be supported by best practice promotion; education and awareness for consumers; and incentives and disincentives for agricultural producers.

Background Information

Water Use

Agriculture uses a global average of 70% of all surface water supplies. While livestock directly use only 1.3% of total water used in agriculture, water for livestock feed requires a significant amount of water.ⁱⁱⁱ Comparing the water requirements per calorie of different foods, beef requires 20 times more water than cereals and starchy roots. If comparing the water footprint per gram of protein, milk, eggs and chicken meat require about 1.5 times more than pulses, while beef requires six times more.^{iv}

Water Pollution

According to the U.S. Environmental Protection Agency, the agricultural sector is “the leading contributor to identified water quality impairments in the nation’s rivers and streams, lakes, ponds, and reservoirs.” In particular, the agency has noted that water quality concerns are most pronounced in areas “where crops are intensively cultivated and where livestock operations are concentrated.”^v

Water quality issues generated by intensive agriculture include the release of various wastes, such as sediments, pesticides, animal manures, fertilizers and other sources of inorganic and organic matter. The most common cause of water pollution in the U.S. is excess levels of nitrogen and phosphorous, the main source of which is fertilizer runoff that occurs when rain carries fertilizer into waterways.^{vi}

Pollutants are transported over land and through the soil by rainwater and melting snow. These pollutants ultimately find their way into groundwater, wetlands, rivers and lakes and, finally, to oceans in the form of sediment and chemical loads carried by rivers.^{vii} Many pollutants reach surface and groundwater resources through over-application of

manure to available land resulting in nutrient run-off, overflow or leakage of manure storage tanks and lagoons, and aerosolized pollutants which condense into waterways.^{viii}

Additionally, because agricultural water is recycled back to surface water and/or groundwater, the use of these polluted waters in agriculture contaminate crops and transmit disease to consumers and farm workers.^{ix}

Aquaculture in Fresh Water

Aquaculture is now recognized as a major problem in freshwater, as well as estuarine and coastal environments, leading to eutrophication and ecosystem damage.^x Aquaculture is increasing worldwide in order to satisfy the increasing demand for animal protein due to the limitations of capture fisheries production. However, aquaculture has been found to have significant impacts on the environment and natural resources, with water pollution being cited as of most concern. Discharges from flow-through aquaculture systems such as raceways and tanks contain organic matter, nutrients, and suspended solids and directly impact oxygen depletion, eutrophication, and turbidity in receiving waters.^{xi}

Barrier to Sustainable Development

Experts predict that because pollution can no longer be remedied by dilution in many countries, freshwater quality will become the principal limitation for sustainable development in these countries.^{xii}

References

ⁱ Ongley, Edwin D. Control of water pollution from agriculture - FAO irrigation and drainage paper 55 (1996). Chapter 1: Introduction to agricultural water pollution. <http://www.fao.org/docrep/w2598e/w2598e04.htm>

ⁱⁱ Convention on Biological Diversity. Website. <https://www.cbd.int/waters/problem/>

ⁱⁱⁱ Pimentel and Pimentel, Sustainability of meat-based and plant-based diets and the environment. *The American Journal of Clinical Nutrition*. 2003. <http://ajcn.nutrition.org/content/78/3/660S.full>

^{iv} Water footprint of crop and animal products: a comparison. Water Footprint Network. <http://waterfootprint.org/en/water-footprint/product-water-footprint/water-footprint-crop-and-animal-products/>

^v An HSUS Report: The Impact of Industrialized Animal Agriculture on the Environment

<http://www.humanesociety.org/assets/pdfs/farm/hsus-the-impact-of-industrialized-animal-agriculture-on-the-environment.pdf>

^{vi} Carpenter, Stephen. "Nonpoint Pollution of Surface Waters with Phosphorous and Nitrogen," *Issues in Ecology*. September 1998. http://www.esa.org/science_resources/issues/FileEnglish/issue3.pdf

^{vii} FAO. Control of Water Pollution from Agriculture. Introduction to Agricultural Water Pollution.

<http://www.fao.org/docrep/w2598e/w2598e04.htm>

^{viii} Ongley, Edwin D. Control of water pollution from agriculture - FAO irrigation and drainage paper 55 (1996). Chapter 1: Introduction to agricultural water pollution. <http://www.fao.org/docrep/w2598e/w2598e04.htm>.

^{ix} Ongley, Edwin D. Control of water pollution from agriculture - FAO irrigation and drainage paper 55 (1996). Chapter 1: Introduction to agricultural water pollution. <http://www.fao.org/docrep/w2598e/w2598e04.htm>.

^x Ongley, Edwin D. Control of water pollution from agriculture - FAO irrigation and drainage paper 55 (1996). Chapter 1: Introduction to agricultural water pollution. <http://www.fao.org/docrep/w2598e/w2598e04.htm>

^{xi} Saremi et al., Iranian Journal of Fisheries Sciences. The effect of aquaculture effluents on water quality parameters of Haraz River (2012). <https://ijfro.ir/article-1-1001-en.pdf>

^{xii} Ongley, Edwin D. Control of water pollution from agriculture - FAO irrigation and drainage paper 55 (1996). Chapter 1: Introduction to agricultural water pollution. <http://www.fao.org/docrep/w2598e/w2598e04.htm>.