The risk of unsustainable agricultural practices should not be underestimated

According to More People, More Food, Worse Water? A Global Review of Water Pollution from Agriculture, launched by FAO and the International Water Management Institute at a conference in Tajikistan, the biggest source of water pollution today is found in agriculture - not cities or industry. The report cautions that unsustainable practices pose a serious risk to human health and the planet's ecosystem - a problem often underestimated by policymakers and farmers.

©Yodrak Thaketsree via 123RF

Most common chemical contaminants found in groundwater aquifers is nitrate from farming. Modern agriculture is responsible for the discharge of large quantities of agrochemicals, organic matter, sediments and saline trading into water bodies, the report says.

This pollution affects billions of people and generates annual costs exceeding billions of dollars.

"Agriculture is the single largest producer of wastewater, by volume, and livestock generates far more excreta than do humans. As land use has intensified, countries have greatly increased the use of synthetic pesticides, fertilisers and other inputs," writes Eduardo Mansur, FAO's land and water division director, and Claudia Sadoff, IWMI director-general, in their introduction to the report.

"While these inputs have helped boost food production, they have also given rise to environmental threats, as well as to potential human health concerns."

The agro-pollutants of greatest concern for human health are pathogens from livestock, pesticides, nitrates in groundwater, trace metallic elements and emerging pollutants, including antibiotics and antibiotic-resistant genes excreted by livestock.

The new report represents the most comprehensive review of the dispersed scientific literature on the issue complied to date and aims to fill information gaps and layout policy and farm-level solutions in one consolidated reference.

How agriculture affects water quality

The boom in global agricultural productivity that followed the Second World War was achieved in large part through the intensive use of inputs such as pesticides and chemical fertilisers.

Since 1960 the use of mineral fertiliser has grown ten times, while since 1970 global sales of pesticides climbed from around $1bn to $35bn a year. Meanwhile, the intensification of livestock production – world livestock numbers have more than tripled since 1970 – has seen a new class of pollutants emerge: antibiotics, vaccines and hormonal growth promoters that travel from farms through water into ecosystems and our drinking water.

At the same time, water pollution by organic matter from livestock farming is now significantly more widespread than organic pollution from urban areas.

And another booming sector, aquaculture (which has expanded twenty-fold since 1980) is now releasing ever greater amounts of fish excreta, uneaten feed, antibiotics, fungicides and anti-fouling agents into surface waters.

What can be done

Water pollution from agriculture is a complex challenge and effectively managing it requires a range of responses, according to More People, More Food, Worse Water.

The most effective way to mitigate pressure on aquatic ecosystems and rural ecologies is to limit the export of pollutants at the source or to intercept them before they reach vulnerable ecosystems. Once off-farm, the costs of remediation progressively increase. One way to do this is to develop policies and incentives that encourage people to adopt more sustainable diets and limit increases in demand for food with a large environmental footprint, for example, taxes and subsidies.

At the consumer level, reducing food waste can help. One study covered in the report estimated that nitrogen pollution from food waste adds up to 6.3tg per year.

"Traditional" regulatory instruments will also continue to be a key tool in reducing farm outputs of pollutants. These include water quality standards; pollution discharge permits; mandatory best practices; environmental impact assessments for certain farming activities; buffer zones around farms; restrictions on agricultural practices or the location of farms; and limits on the marketing and sale of dangerous products.

However, the report acknowledges that well-known principles for reducing pollution, such as "polluter pays", are hard to apply to non-point agricultural pollution because identifying the actual polluters is neither easy nor cheap.

Best practices to reduce pollutants

That means that measures that promote farmer "buy in" are critical to preening pollution at the source, such as tax breaks for the adoption of practices that minimise farm export of nutrients and pesticides or payments to for "landscape maintenance."

On the farm, a number of best practices can reduce the export of pollutants into surrounding ecosystems, for example: minimising the use of fertilisers and pesticides, establishing buffer zones along watercourses and farm boundaries, or improving drainage control schemes.

Integrated pest management, which combines the strategic use of pest-resistant crop varieties with crop rotation and the introduction of natural predators of common pests is another helpful tool

On livestock operations, traditional techniques such as restoring degraded pasturelands and better managing animal diets, feed additives and medicines are needed — while more also needs to be done with new nutrient recycling techniques and technologies, such as farm waste biodigesters.

Agricultural water pollution numbers of note

• Irrigation is the world's largest producer in the volume of wastewater (in the form of agricultural drainage).

• Globally, around 115 million tonnes of mineral nitrogen fertilisers are applied to croplands each year. Around 20% of these nitrogen inputs end up accumulating in soils and biomass, whereas 35% enters the oceans.

• Worldwide, 4.6 million tonnes of chemical pesticides are sprayed into the environment every year.

• Developing countries account for 25% of world pesticide use in farming, but 99% of the world's deaths due to pesticides.

• Recent estimates that the economic impact of pesticides on non-target species (including humans) is approximately $8bn annually in developing countries.

• Oxygen-depletion (hypoxia) resulting from man-made nutrient overloading affects an area of 240,000km² globally, comprising 70,000km² of inland waters and 170,000km² of coastal areas

• Worldwide, an estimated 24% of the area under irrigation is affected by salinisation.

• Currently, more than 700 emerging pollutants, their metabolites and transformation products, are listed as being present in the European aquatic environment.