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Integrated Solutions to the Water, Agriculture and Climate Crises

Integrated Solutions to the Water, Agriculture and Climate Crises

by Shiney Varghese
Institute for Agriculture and Trade Policy
Minneapolis, Minnesota

The Institute for Agriculture and Trade Policy works locally and globally at the intersection of policy and practice to ensure fair and sustainable food, farm and trade systems.

IATP thanks the Heinrich Böll Foundation and Oxfam Novib for their generous support of this report. Shiney Varghese would like to especially thank her colleagues Alexandra Spieldoch and Ben Lilliston for their contributions to this paper.

Executive summary

The dramatic convergence of multiple crises—global warming, hunger and depletion of natural resources such as water—compels us to shift from the dominant industrial agriculture model and consider a new way forward. Because agriculture is multifunctional (i.e., food, feed, fibers, biofuels, medicinal products, environmental services, landscape amenities, social and cultural values), it could play a critical role in addressing global challenges related to climate, water, social justice and food.[1] This year, three major international meetings seek to identify solutions to the water, food and climate crises: the World Water Forum (March), the UN Commission on Sustainable Development (May) and the United Nations Framework Convention on Climate Change (December). The time is ripe to identify the interconnections between the three crises and develop complementary policy options and action steps.

Reaching limits

In December 2008, the number of undernourished people worldwide stood at 963 million, an increase of more than 40 million since the last estimate.[2] Worldwide, 1.069 billion people do not have access to safe drinking water; 2.612 billion people do not have water to meet their basic sanitation needs.[3] Food deficit nations, almost all of them in the Global South and already water scarce, are further compromised by climate change, as they have limited resources for climate adaptation or to undertake mitigation efforts. Even as many global institutions recognize these limits, the strategies being proposed often involve simply more of the same approach that has brought us here in the first place.

Agriculture and climate change

While the IPCC estimates that agriculture's contribution to greenhouse gas (GHG) emissions is approximately 12 percent,[4] according to Greenpeace International,[5] the percentage is anywhere from 16-30 percent when land use, transportation, packaging and processing are included in the calculations. The percentage could very well go higher when cross-sectoral emissions are included.

Industrialized farming, which depends on intensive resources to produce crops and livestock for increased trade, is largely responsible for these high numbers. A shift from several practices associated with industrial farming systems to more sustainable agricultural systems (with greater use of organic matter) could be significant in terms of reducing agriculture's contribution to GHG emissions.

Irrigated agriculture

Globally, irrigated agriculture accounts for almost 70 percent of total water withdrawn for human use from rivers, lakes, reservoirs, ponds and aquifers (this does not include water used in rain-fed farming systems or water used in food processing). The needs of intensive industrial agriculture have driven a large number of massive water infrastructures and water diversions, damming rivers for irrigation, for hydro-electric power, and in some cases, for flood control. By the end of the century there were more than 45,000 major dams globally. Half of the world's large dams supply water for irrigation, with the largest number in China, India, Pakistan and the United States.[6] Another major technological transformation in the second half of the 20th century—the tube-well—enabled industrial agriculture to expand to areas where such massive water transfers for irrigation were not feasible. Unlike traditional wells, tube-wells gave access to water in large quantities by driving a tube into deep aquifers and using a pump to suck water up. Easy access to state-subsidized energy services and equipment enabled expansion of industrial farming to otherwise water-stressed areas of Asian countries such as China, India and Pakistan. There is much opportunity for improvement in irrigation water use efficiency both at the stage of delivery from source to farm gate (lining of the canal, repairing of leaks), and at the farm level (shifting to more efficient irrigation technology and better water management practices, including moisture management).

Rain-fed agriculture and food security

Rain-fed agriculture, practiced in many parts of the developing world and in temperate regions of the Global North, supports the livelihoods of many marginal groups that practice small-holder agriculture. Far more vulnerable to climate-related stresses, and accounting for over 80 percent of agricultural land, rain-fed agricultural systems not only require the greatest adaptation to climate change, but have also been identified as pivotal to addressing food crisis.

Agriculture and water quality

Intensive irrigation water use, in combination with industrial farming systems, has resulted in widespread soil and water contamination from pesticide and fertilizer runoff, affecting quality and quantity of water available for other uses and resulting in habitat degradation. Pesticide and fertilizer runoff is one of the biggest causes of water quality deterioration and environmental degradation in North America and Europe.

Women at the center

One cannot talk about the food, climate or water crises without talking about women and children. Women are the keepers of water in varying parts of the world. In many places they are responsible for getting it and using it for the multiple needs of their families, both in rain-fed and irrigated farming systems. They are particularly affected by the quality and reliability of local water sources, yet they often lack any control over water management because of their social status.

Comprehensive solutions

Solutions to the water crisis, food security and climate change need to be considered in terms of fairness and equity, rights, responsibilities and stewardship. Governments must act to:

1. Adopt a rights-based approach in national and regional water and agricultural policies and investment decisions, as per the General Comments on the Right to Food (UN General Comment 12) and the Right to Water (UN General Comment 15). These national measures must be coordinated to ensure water availability for ecosystem needs and for basic needs of people[7];

2. Support agro-ecological practices through the recommendations of the International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD, 2008). This should include an investment in research and extension outreach regarding the climate change mitigating potential of multifunctional agriculture;

3. Harmonize approaches to water, agriculture and climate at the World Water Forum Ministerial (March 2009), the UN Commission of Sustainable Development (UNCSD-17, May 2009) and the United Nations Framework Convention on Climate Change (UNFCCC, December 2009);

4. Ensure that water availability is prioritized for ecosystem needs and for basic needs of people;

5. Safeguard women's human rights. Recognize women's involvement in farming and other rural activities, including food production and water management in the current ecological and economic environment; and

6. Ensure that voices of small-holders are central to policy reform; their concerns must be part of any global, regional and national solutions for food and water security.

Conclusion

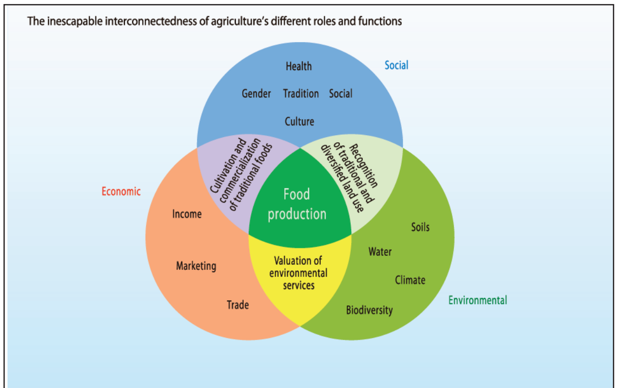
As the world continues its current patterns of production and consumption, the future is at great risk. It is no longer possible for us to seek solutions for individual problems in an isolated manner. What is most needed is the collective political will to move in a direction that is sustainable, equitable and fair.

"Observational records and climate projections provide abundant evidence that freshwater resources are vulnerable and have the potential to be strongly impacted by climate change, with wide-ranging consequences for human societies and ecosystems."

—Intergovernmental Panel on Climate Change (IPCC) Working Group II, in IPCC Technical Paper VI on Climate Change and Water, 2008

Introduction

The dramatic convergence of multiple crises—global warming, hunger and depletion of natural resources such as water—compels us to challenge the dominant industrial agriculture model and consider a new way forward. Because agriculture is multifunctional (i.e., food, feed, fibers, biofuels, medicinal products, environmental services, landscape amenities, social and cultural values), it could play a critical role in addressing global challenges related to climate, water, social justice and food.[8] This year, three major international meetings seek to find solutions to the water, food and climate crisis: the World Water Forum (March), the UN Commission on Sustainable Development (May) and the United Nations Framework Convention on Climate Change (December). The time is ripe to identify the interconnections between the three crises and develop complementary policy options and action steps.



IAASTD. 2009. Summary for Decision Makers of the Global Report. Island Press, Washington DC. Design: UNEP/GRID-Arendal, Ketill Berger.

Reaching limits in an unequal world

In December 2008, the number of undernourished people worldwide stood at 963 million, an increase of more than 40 million since the last estimate.[9] Worldwide, 1.069 billion people do not have access to safe drinking water; 2.612 billion people do not have water to meet their basic sanitation needs.[10] It has been estimated that if current water use patterns continue, by 2050 the world will not have enough water to meet the food and nutritional requirements of the growing population.[11]

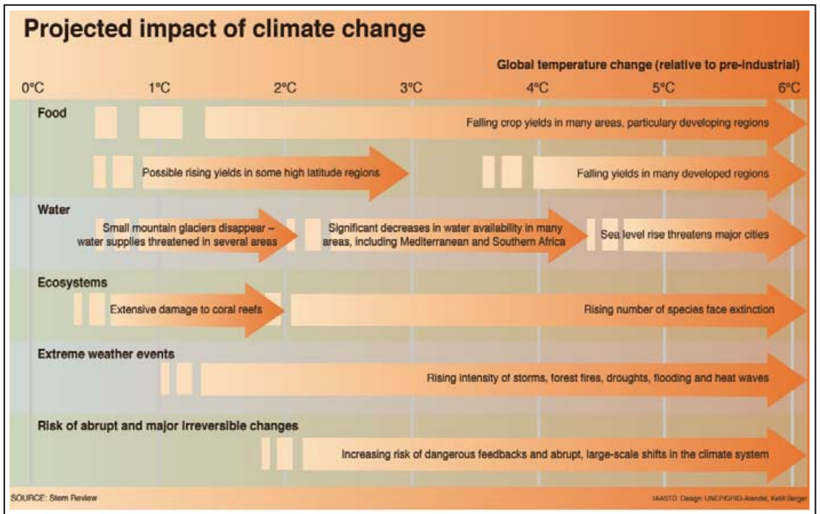
Food deficit nations, almost all of them in the Global South and already water scarce, are further compromised by climate change as they have limited resources for climate adaptation or to undertake mitigation efforts. The Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC, 2007) predicts that in some countries, "Yields from rain-fed agriculture could be reduced by up to 50 percent by 2020."[12] This will worsen the food crisis in water-stressed and poor countries in sub-Saharan Africa and Asia, with perhaps the worst long-term impact being in South Asia.[13]

There are not enough new land or water sources that can be diverted for agricultural production without incurring huge environmental and social costs. Solutions must be comprehensive and require a sharp departure from the way the agriculture system is functioning today. Even as many global institutions recognize these limits, the strategies being proposed often involve simply more of the same approach that has brought us here in the first place. A different path is needed that recognizes the multifunctional nature of agriculture in relation to food, water and climate.

Water, agriculture and climate change

While the IPCC estimates that agriculture's contribution to GHG emissions is approximately 12 percent,[14] according to Greenpeace International,[15] the percentage is anywhere from 16-30 percent when land use, transportation, packaging and processing are included in the calculations. The percentage could very well go higher when cross-sectoral emissions are included.

Industrialized farming, which depends on intensive resources to produce crops and livestock for increased trade, is largely responsible for these high numbers.



IAASTD. 2009. Summary for Decision Makers of the Global Report. Island Press, Washington DC. Source: The Economics of Climate Change: The Stern Review, 2007. Design: UNEP/GRID-Arendal, Ketill Berger.

In addition, the agricultural sector accounts for 60 percent of methane emissions and 50 percent of nitrous oxide emissions, two of the main components of anthropogenic GHG emissions (along with carbon dioxide).[16]

The climate impacts from GHG emissions include rising sea levels and rising temperatures, extreme variations in frequency and patterns of precipitation (be it rainfall, snowfall or snow melt) that result in floods and droughts, as well as an increase in pathogens and pests.[17]

These climate-related changes are expected to affect fresh water availability for a whole range of human uses, including agriculture. As a sector accounting for the lion's share of global water use, this will have tremendous implications for food security, and questions of adaptation have been high on the agenda. Adaptation, according to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, takes place through "adjustments to reduce vulnerability or enhance resilience in response to observed or expected changes in climate and associated extreme weather events."[18]

According to a recent FAO paper, "Climate Change, Water and Food Security," "rain-fed systems will continue to offer the greatest scope of adaptation in terms of area, number of farmers and overall contribution to global food production."[19] Far more vulnerable to climate-related stresses, and accounting for more than 80 percent of agricultural land, rain-fed agricultural systems not only require the greatest adaptation, but have also been identified as pivotal to addressing the food crisis. The report also recognizes that "there is a significant difference in adaptation potential between the large-scale mechanized production of rain-fed cereals from North America, Europe, Brazil and Australia and the small-scale systems that characterize cereal production in many developing countries." In other words, small-holder agriculture in the Global South is more vulnerable to sharp changes in the climate both from an economic and food production standpoint.

A glaring omission in these discussions, however, is the lack of attention to the climate impacts of current industrial agricultural practices that demand a high level of water use. This includes the climate footprint of the production of farm machinery and agro-chemical inputs, the transport of inputs from factories to farms, water diversion and ground water mining, confined animal feeding, and monocropping, among others.

Another FAO report published in mid-2007 suggests that organic agricultural systems have the potential to be less damaging to the climate, even when compared with industrial food production systems that adopt no-till agriculture. Carbon dioxide emissions from organic agricultural systems are 48-60 percent less than industrial agricultural systems, since adoption of conservation agriculture (CA) practices (the three principles of CA are no mechanical soil disturbance, permanent soil cover and crop rotations) in industrial farming systems still entails intensive agro-chemical use, as well as intensive livestock production off site.[20]

According to an IPCC Technical Paper I (1996) on "Technologies, Policies and Measures for Mitigating Climate Change," there are several appropriate agricultural technologies for mitigating GHG emissions.[21] For example, increasing carbon sinks through better soil management—especially restoring degraded land by adding organic matter—would account for close to 50 percent of the estimated potential reductions of annual emissions of carbon dioxide from agriculture. Improving livestock management—especially in terms of improved diet quality and the nutrient balance of ruminants (i.e., moving away from confined animal feeding operations)—would account for half the estimated potential reductions of annual emissions of methane from agriculture.

While these figures need to be updated, it is evident that shifting from several practices associated with industrial farming systems to agricultural systems (with high use of organic matter) could be even greater than the IPCC envisages. The IPCC estimates of the potential reduction of emissions from fossil fuel-based agriculture are based on very limited changes, mainly in energy use in farms. They envisage changes such as the use of minimum and no tillage, irrigation scheduling, solar drying of crops and improved fertilizer management. They do not consider the possible mitigation potential of converting fossil fuel-based food production systems to a more sustainable model.

Water trade

Faced with a water crisis and climate-related uncertainties, proponents of free trade have been advocating virtual water trade as an option. They advocate maximizing comparative advantage (in water) as one of the policy options for dealing with unequal spatial distribution of water and ignore the environmental footprint of such transfers. Trade in crops grown in water rich areas, they suggest, will free the water for more pressing needs or for more economically valued production processes in importing countries. But such dependence on large-scale food imports not only raise local food security concerns but also national security considerations. Trade will not resolve the water crisis, yet proposals to develop water markets and other economic instruments to maximize the economic efficiency of water use have been especially popular among institutions such as the World Bank and the World Trade Organization.

Water use in irrigated agriculture[22]

Globally, irrigated agriculture accounts for almost 70 percent of total water withdrawn for human use from rivers, lakes, reservoirs, ponds and aquifers (this does not include water used in rain-fed farming systems or water used in food processing). There are huge variations in irrigation water use across continents, countries and agricultural systems.

While irrigated agriculture has long been practiced around the world to a varying extent, its expansion in the 20th century coincided with the introduction of industrial agricultural practices. Substantial amounts of water were fundamental to the success of the new industrial agriculture. With the development and use of high yielding varieties of seeds (HYV seeds) with higher nitrogen absorption capacity, easy availability of water became an even more essential component of industrial agriculture.

Industrial agriculture requires an increasing amount of water. The continuous and exclusive application of chemical fertilizers gradually reduces the water retention capacity of soil, increasing the frequency of irrigation application. On the other hand, the application of organic compounds such as manure, ash, bone meal, plant wastes, and composts can help improve soil water infiltration and increase/maintain the water retention capacity of the soil, thus helping to reduce the need for frequent irrigation on farms.[23] Moreover, the use of organic matter in soil reduces surface flow of water, soil erosion and nutrient removals.[24] Of course, most traditional agricultural systems do not have access to modern water extraction mechanisms, and thus, their use of irrigation water is limited.

Depending on irrigation technology, type of irrigated agricultural systems, as well as humidity/aridity, temperature and soil type of the region, there are huge variations in water use efficiency in irrigated agriculture. While irrigation water use efficiency can be as low as 25 percent in some surface irrigation systems in South Asia (due to high seepage rates and high levels of evaporation during water storage and delivery), it is much higher in systems that use farm water-saving technologies such as drip irrigation or in traditional canopy farming systems.

There is much opportunity for improvement in irrigation water use efficiency both at the stage of delivery from source to farm gate (lining of the canal, repairing of leaks), and at the farm level (shifting to more efficient irrigation technology and better water management practices, including moisture management). These simple efficiency measures would provide some of the "low-hanging fruit" that could help many poor countries adapt to climate change's effects on irrigated agriculture. However, most developing countries lack the proper resources to do so. World Bank loans to help poorer countries tend to prioritize new, capital-intensive water infrastructural development rather than investment in training and extension for better water management practices.

Water transfers support irrigated agriculture

In the 20th century, governments around the world began building massive water infrastructure projects and water diversions, damming rivers for irrigation, for hydro-electric power, and in some cases, for flood control. By the end of the century there were more than 45,000 major dams globally. Half of the world's large dams supply water for irrigation, with the largest number in China, India, Pakistan, and the United States.[25]

A Pilot Analysis of Global Ecosystems (PAGE) by the World Resources Institute estimated that "dams, diversions or canals fragment almost 60 percent of the world's largest 227 rivers."[26] As a result of extreme modifications to river systems, many rivers, such as the Yellow River in China, Nile River in northeastern Africa, Amu Darya and Syr Darya in central Asia, and the Colorado and Rio Grande in North America, no longer reach the sea for at least parts of the year.

While such transfers help irrigation and enable several cities to accommodate populations far beyond their carrying capacity, the cost has been high. Freshwater systems around the world are modified to such an extent that their basic functions are affected. Such changes in the natural resource base affect the food security of vulnerable members of the community, such as the poor and women and children, who depend on these systems for their livelihoods. In many cases such water diversion projects also result in the massive displacement of communities, destruction of cultures and social disruption.

The most recent examples of such massive water diversions include the Three Gorges Dam in China and the Narmada Valley Project in central India. Similar projects are underway in the Amazon River system in Brazil and the Mekong in China, both home to some of the most diverse fisheries in the world. The Lower Mekong River Basin is one of the world's most culturally diverse (over 60 million people belonging to over 100 different ethnic groups) regions. Any water diversion to mainland China will not only displace these communities but will also impact livelihood sources downstream, in Laos, Cambodia, Vietnam and Thailand, affecting some of the largest rice producing regions in the world.[27]

The World Commission on Dams (WCD), a truly multi-stakeholder process (involving grassroots anti-dam protestors, multinational dam construction firms, government officials and representatives of multilateral development banks) initiated by the World Bank, in its report "Dams and Development" offer suggestions for future actions based on five core principles: equity, efficiency, participatory decision making, sustainability and accountability.[28] The WCD report advocates for small-scale irrigation and hydro power projects that are sustainable and supportive of the local economy. In spite of this, the World Bank's recommendations are for more large-scale hydro projects.

Irrigation drives excessive groundwater withdrawals

A major technological transformation in the second half of the 20th century—the tube-well— enabled the Green Revolution to expand to areas where such massive water transfers were not feasible. Unlike traditional wells, tube-wells gave access to water in large quantities by driving a tube into deep aquifers and using a pump to suck water up. Easy access to state subsidized energy services and equipment enabled expansion of industrial farming to otherwise water-stressed areas of Asian countries such as China, India and Pakistan.

In 2004, *New Scientist* reported that the tube-well revolution, whose technology is adapted from the oil industry, was driving Asian countries toward an environmental catastrophe.[29] Deep tube-well irrigation has resulted in most of the hand-dug wells and shallower tube-wells going dry, as ever-deeper wells get dug. Farmers, whose wells go dry, dig deeper, "chasing the deep waters" (at times to their economic peril) when their wells go dry yet again, as happened in coastal Gujarat in India.[30] In these areas, deep drilling has contributed to salinity ingress (seepage of sea water inland through underground water flows) resulting in the salinization of groundwater. Villagers are forced to use the saline water to meet their basic water needs, and when the salinity destroys the land's fertility, they end up abandoning their land/village in search of work and a new life. Often, over-drafting of groundwater for industrial agriculture comes at the cost of basic water needs of the poor and traditional farming systems.

Withdrawals exceeding natural recharge rates of aquifers are leading to the lowering of water tables, salinization of groundwater and land subsidence in many other parts of the world as well. For example in the United States, where 45 percent of irrigation water comes from underground, in the High Plains aquifer (which includes the Ogallala aquifer), water levels have declined more than 100 feet in some areas.[31]

Rain-fed crops and food security

Rain-fed agriculture is practiced in many parts of the developing world and in temperate regions of the Global North. Most rain-fed agricultural land in the developing world is in sub-Saharan Africa (96 percent of cultivated land in the region), Central America, South America, and South and Southeast Asia, and supports the livelihoods of marginal groups that practice small-holder agriculture. In 2002, it was estimated that about 1.4 billion people (75 percent in Africa and Asia) eke out a living from these marginal lands.[32]

The FAO recognizes "the vulnerability and food insecurity in poor countries that depend on rain-fed production"[33] and calls for specific efforts in these regions, such as adaptation techniques and capacity building. The Comprehensive Assessment of Water for Agriculture (IWMI 2006) also recognizes the importance of rain-fed systems to achieving food security, and advocates investing in such systems, in addition to achieving water use efficiency improvements in irrigated agriculture.[34]

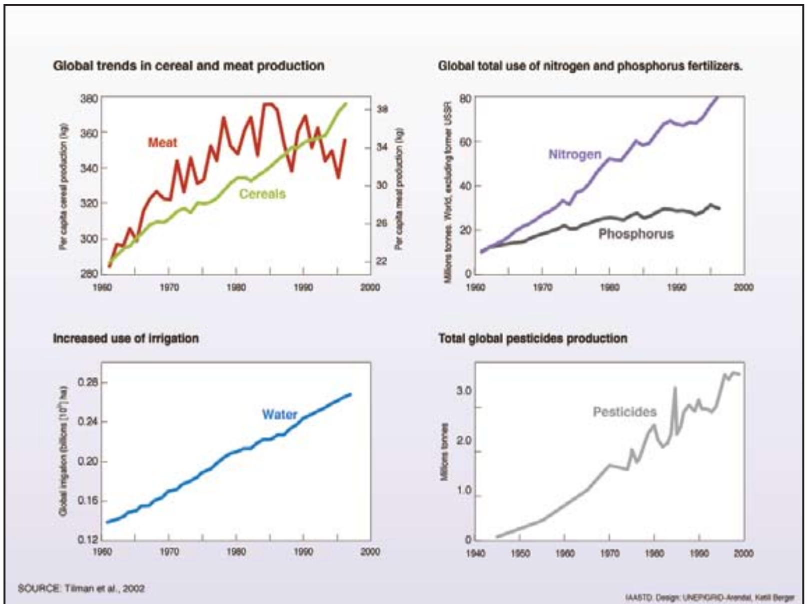
There are a myriad of rain-fed crops that are locally specific and that sustain communities living in marginal areas. It is estimated that about 600 million people in the world today depend on unmanaged natural systems for their livelihoods.[35] Similarly, a large number of forest products (wild tubers and fruits), and food gathered from natural systems, (such as fish from streams that contribute to food security of poor communities) are part of rain-fed ecosystems. Firewood, essential to ensure food security in most rural households, is also largely gathered from rain-fed systems.

Industrial rain-fed farming

Some corporations identify rain-fed farming as a new horizon for industrial agriculture and corporate profits. The heading of a recent advertisement by Monsanto asks, "How can we squeeze more food from a RAINDROP?"[36] The text says, "Non-irrigated agriculture produces 60 percent of the world's food supply." The advertisement goes on: "The challenge for farmers is squeezing the most out of unpredictable rain fall. That requires putting the latest science-based tools in farmers' hands, including advanced hybrid and biotech seeds" that "significantly increase crop yields and can help farmers use one third less water per unit produced…" While Monsanto seeks to strengthen rain-fed farming, it is via more industrial agriculture. Monsanto and other agribusinesses are focused on finding technological and infrastructural solutions to increase water use efficiency and drought resistance of crops through an array of biotechnological tools including genetic modification, or in terms of increasing water storage capacity and irrigation efficiency through infrastructural investments. This approach would not mitigate the climate crisis, solve the water crisis nor meet food security.

Water pollution

Intensive irrigation water use, in combination with industrial farming systems, has resulted in widespread soil and water contamination from pesticide and fertilizer runoff, affecting quality and quantity of water available for other uses and resulting in habitat degradation. It is one of the biggest causes of water quality deterioration and environmental degradation in North America and Europe.



IAASTD. 2009. Summary for Decision Makers of the Global Report. Island Press, Washington DC. Source: Tilman et al. 2002. Design: UNEP/GRID-Arendal, Ketill Berger.

In Australia, it is reported that more than 5.7 million hectares of land are at risk of salinity damage mostly due to over-irrigation and from salts present in agro-chemicals.[37] In India, intensive irrigation and other Green Revolution practices have resulted in large tracts of agricultural land in the irrigated areas becoming water-logged with saline/alkaline. Eutrophication (a consequence of over-enrichment of ecosystems with nutrients such as phosphorus and nitrogen) of water bodies is another problem associated with industrial agriculture. The increasing accumulation of phosphorus in soil associated with industrial agriculture threatens rivers and fresh water lakes with eutrophication.[38] In the United States, increased nitrogen concentration in the Mississippi River has resulted in the proliferation of algae (that block sunlight/impede photosynthesis), and toxic algae bloom outbreaks in the northern Gulf of Mexico. About half of the nitrogen reaching the Gulf comes from fertilizer; 15 percent comes from animal manure from confined animal feeding operations. Such industrial farming practices have played a huge role in causing hypoxia (a condition in which dissolved oxygen levels are too low to sustain marine organisms) in the Gulf of Mexico.[39]

Similarly, herbicides and fumigants applied directly to the soil are commonly found in groundwater sources in Europe and elsewhere.[40] In the United States, the most often detected herbicides are the ones mainly used for industrial farming—atrazine, metolachlor, cyanazine, alachlor and acetochlor—found in water samples from streams in agricultural areas with their greatest use.[41] Agro-chemical use in mono-cultural grain cultivation has resulted in high levels of surface water pollution and groundwater contamination in many Asian countries.

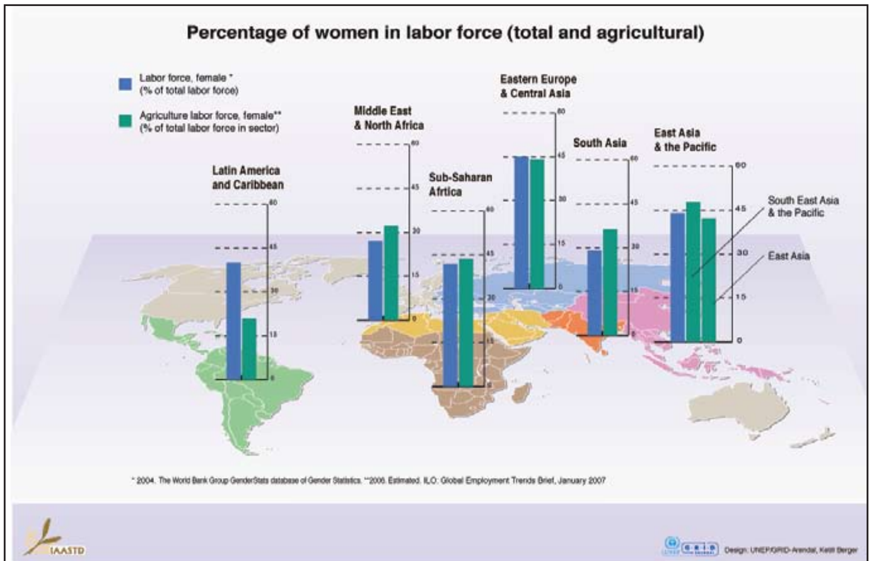
When such contaminated water is the only drinking water source or when it reaches the human food chain, it poses public health risks. In 2003, the Center for Science and Environment in India reported that bottled beverages produced by global firms such as Coca-Cola in India had pesticide residues at much higher levels than considered safe for human consumption, apparently as a result of their use of contaminated groundwater.[42] In countries such as Mexico, where about 75 percent of drinking water comes from groundwater, agro-chemical contamination is affecting ordinary peoples' access to clean water for meeting basic needs.[43]

World Bank: Stuck in the mud

The World Bank is calling for investment in agriculture and rural development to help alleviate poverty. Its "New Deal on Global Food Policy" promotes social safety nets, seeds and fertilizer for increased agricultural production, and trade reform to reduce distorting subsidies and barriers.[44] Its Strategic Framework on Climate Change and Development (SFCCD) is proposing to add mainstream climate change considerations into the World Bank's development strategy by integrating climate actions for adaptation and mitigation in development processes, and by promoting private sector financing, market mechanisms and concessional financing for innovative climate friendly projects. SFCCD rightly prioritizes "strengthening the resilience of communities and economies to climate risk," through "increasing resilience in agriculture and its linkages with food security," and through "water resource development including support to coastal areas and country-driven trans-boundary programs" in its country-led work. However, because of the World Bank's continuing focus on a few large infrastructure projects and capital-intensive technologies, its initiatives are likely to be at the expense of a multitude of smaller water investment initiatives that could benefit vulnerable communities more directly.

Women uniquely affected

One cannot talk about the food, climate or the water crisis without talking about women and children. Women are the keepers of water in varying parts of the world. In many places, they are responsible for getting it and using it for the multiple needs of their families—both in rain-fed and irrigated farming systems. They are particularly impacted by the quality and reliability of local water sources, yet they often lack any control over water management because of their social status.



The World Bank Group GenderStats Database of Gender Statistics (2004) and ILO Global Employment Trends Brief (2006). Design: UNEP/GRID-Arendal, Ketill Berger.

As mentioned earlier, climate change-related variability in precipitation results in droughts and floods. These extreme events disproportionately affect women. Longer hours spent in search of potable water increases the burden of their work, and traveling longer distances further away from their homes increases the risk of sexual abuse, already a problem in many regions. Lack of water and use of polluted water during floods and droughts also results in water-related diseases, and in increasing women's work burden as health care providers.

In terms of food production, women comprise the majority of small-scale producers in the developing world. They are the major food providers for their families. It is impossible to talk about food security without acknowledging the particular role that women play and the difficult challenges they face as food becomes unavailable or unaffordable. In this global food crisis that includes close to a billion people, women and children are disproportionately struggling.[45]

Global policymakers acknowledge the role of women and the need to target them more directly via policies to address scarcity, access, quality, control and stewardship. The International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD) report recognizes that "despite progress made in national and international policies since the first world conference on women in 1975, urgent action is still necessary to implement gender and social equity in agricultural knowledge systems and technology (AKST) policies and practices if we are to better address gender issues as integral to development processes."[46] Unfortunately, policymakers regularly ignore the fact that it is exactly the shift from locally oriented agriculture to export-oriented agriculture that has had such a negative impact on women.[47] More social safety nets are not what is most needed, but rather, a different model of production.

As the fourth assessment report on climate change says, "Gender differences in vulnerability and adaptive capacity reflect wider patterns of structural gender inequality. One lesson that can be drawn from the gender and development literature is that climate interventions that ignore gender concerns reinforce the differential gender dimensions of vulnerability."[48]

Comprehensive solutions

Reversing climate change and confronting global food and water insecurities are the pre-eminent social and environmental challenges of our time. Solutions to the water crisis, food security and climate change need to be considered in terms of fairness and equity, rights, responsibilities and stewardship. Governments must act to:

1. Adopt a rights-based approach in national and regional water and agricultural policies and investment decisions. This would include:
    a. Implementation of the Right to Food and the Right to Water. These two rights establish legally protected rights to water for poor people and all residents in a community to meet their basic needs, providing legally recognized access to water for practicing subsistence livelihood activities including food production; and
    b. Strengthened relationships with the UN Special Rapporteurs, the UN agencies and country missions to promote a rights-based approach.

2. Support agro-ecological practices through the recommendations of the International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD, 2008) by promoting:
    a. Policies that support research, extension services and investment toward agro-ecologically appropriate multi-functional agriculture;
    b. Local innovation;
    c. Protection of traditional knowledge and food systems;
    d. Recognition of farmers and producers as managers of ecosystems;
    e. More efficient use of scarce land, water and biological systems;
    f. Lower rates of agricultural expansion into natural habitats and increased efforts to avoid deforestation; and
    g. Vibrant local markets as a means to support producers and food security goals.

3. Harmonize policy approaches to water, agriculture and climate. This would include:
    a. Making these linkages at multiple fora such as the World Water Forum Ministerial (March 2009), in meetings to develop the Global Partnership on Food and Agriculture, in the UN Task Force on the Food Crisis, at the UN Commission of Sustainable Development (UNCSD-17, May 2009) and as part of the the UNFCCC climate talks (December 2009); and
    b. Establishing integrated measures within national offices so that policies are comprehensive and forward-looking.

4. Ensure that water availability is prioritized for ecosystem needs and for basic needs of people. Some examples include support for:
    a. Locally managed soil moisture in rain-fed areas;
    b. Rainwater harvesting structures;
    c. Small-scale community-based irrigation;
    d. Improved irrigation systems; and
    e. Available water for peri-urban producers and livestock production.

5. Safeguard women's human rights. Steps in this direction could include:
    a. Formal recognition of women's role in farming and other rural activities that include food production and water management;
    b. Required impact assessments of farming practices and new technology on women's health;
    c. Programs to guarantee education, science, credit, technology and resources to women producers;
    d. Laws to protect women's use and control of land and natural resources; and
    e. Ratify and implement the Convention on the Elimination of All Forms of Discrimination Against Women.

6. Ensure that the voices of small-holders are central to policy reform; their concerns must be part of any global, regional and national solutions for food, water and climate security. Some steps could include:
    a. Transparent, democratic decision-making processes in which small-holders can participate;
    b. Financial support to bring farmers, peasants, fisherfolk and farmworkers to all relevant meetings; and
    c. Established advisory committees that reflect the concerns of farmers, peasants, fisherfolk and farmworkers, and that are integrated into the official dialogues.

Political moments

There are different spaces where leaders, institutions and private initiatives are seeking to address the multiple crises.

The 17th session of the United Nations Commission on Sustainable Development (May 2009, http://www.un.org/esa/dsd/csd/csd_csd17.shtml) focuses on agriculture, Africa, rural development, drought and desertification issues directly affected by the crises. It offers tremendous potential to include multifunctional agriculture as the centerpiece of water security, food security and a sustainable development agenda.

The official climate talks taking place as part of the United Nations Framework Convention on Climate Change (UNFCCC) (December 2009, http://unfccc.int/2860.php) do not include agriculture. However, there will likely be a number of opportunities during the global climate talks to advance an alternative agricultural model to help address the triple crisis in water, food and climate.

The fifth World Water Forum in Istanbul (March 2009, http://www.worldwaterforum5.org/) is not established under the UN system, nor is it an official intergovernmental process, but it includes representatives from UN agencies and governments. It represents another space for policy discussion on an alternative vision for agriculture, climate and water.

Conclusion

As the world continues its current patterns of production and consumption, the future is at great risk. It is no longer possible for us to seek solutions for individual problems in an isolated manner.

Meeting challenges in climate and water calls for, among other things, switching to food systems that conserve water and that are net emission-mitigators. Today's leaders have the opportunity to invest in multifunctional agricultural systems and agro-ecological practices that will help mitigate climate change problems, help conserve land and water resources, and simultaneously build vibrant rural communities for whom agriculture is a rewarding way of life. We know how to chart this path. What is most needed is the collective political will to move in a direction that is sustainable, equitable and fair.

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