

New investments in agriculture likely to fail without sharp focus on small-scale 'mixed' farmers

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A new paper published today in *Science* warns that billions of dollars promised to fund programs to boost small-scale agriculture in developing countries are unlikely to succeed in feeding the world's increasing populations. This is due not only to increasing populations and changing environments, but also to little "intellectual commitment" to the ubiquitous small-scale "mixed" farmers who raise both crops and animals and are the source of much of today's food supplies and economic development.

The authors, who include scientists from the International Livestock Research Institute (ILRI), the International Food Policy Research Institute (IFPRI), and the International Water Management Institute (IWMI) of the Consultative Group on International Agricultural Research (CGIAR) and the World Bank, urge wealthy countries, which pledged US\$20 billion for developing-country agriculture at the G8 summit in Italy last year, to look beyond "business as usual" investments.

"In most regions of the world, farming systems are under intense pressure. But the problems are not the same everywhere," said Mario Herrero, ILRI senior scientist and the paper's lead author. "In the past, farmers have developed the ability to adapt to small changes, in terms of weather patterns and access to fertile land and water. But the rapid rates of change seen in many developing countries today outstrip the capacity of many to adapt."

Smallholder mixed farmers, particularly in Africa and Asia, have been overlooked by donors and policymakers because they typically cultivate small plots of land, where they grow modest amounts of staple [crops](#) such as rice and maize while also tending a few cows, goats or chickens. Yet collectively these farmers are feeding most of the world's one billion poor people and they are the key to any efforts to intensify production in the developing world, according to the paper.

The analysis reports that small farms that combine crop and livestock production supply much of food staples of developing countries—41 percent of maize, 86 percent of rice and 74 percent of millet—and most of the meat and dairy products consumed in these regions as well. These so-called "mixed systems" can be models of efficient farming, with livestock providing the draft power to till the land and leftover crop residues serving as feed for animals. Moreover, the eggs, milk and meat from livestock routinely serve as important sources of regular household income, of high-quality protein, as well as a buffer against failed harvests.

Herrero and his colleagues believe this mixed, or integrated, approach to farming offers many opportunities to increase food production sustainably in the developing world "where over the next few decades, agricultural systems, already facing a variety of stresses, will be expected to accommodate a massive population surge." But the authors caution that realizing the potential of the crop-livestock approach will require reorienting agricultural policies to support smallholder farmers facing an array of challenges that over the next 20 years will challenge farmers' ability to stay abreast of population growth.

These challenges include climate change, which will alter growing conditions among other factors; an explosion in demand for livestock products, particularly in Asia; and competition for finite natural resources, including water, arable land, and fossil fuels needed to

produce fuel and fertilizer. But perhaps most alarming is the fact that in many regions, the various pressures are creating a situation in which the most aggressively farmed lands in the high-potential regions are "tapped out" or close to their capacity for production.

The scientists warn that "the pressures currently acting on the intensively farmed lands of developing countries are large enough to slow and possibly end the substantial growth rates of crops seen in recent decades."

For example, competition for water resources looms as a "huge constraint" on rice and wheat production in South Asia, particularly in India. In the breadbaskets of Africa, exhausted soils and the loss of agricultural lands to urbanization all threaten yields. Meanwhile, over the next two decades, meeting rising demand for meat and dairy products in South Asia will require an additional 150 to 200 million cattle and 40 percent more pigs and poultry. Without proper planning and "smart investments", this growth is likely to damage ecosystems and divert food crop production to animal feed, ultimately imperiling rather than enhancing food security.

One attractive but neglected approach, according to the analysis, is to channel investments toward boosting productivity in areas that are not now seen as prime agricultural lands yet, with the right approach, could be the "next generation" of food suppliers. For example, the authors note that with proper land preparation and judicious use of fertilizers, lands lying between fertile regions and dry rangelands could triple production of "dryland" crops such as millet, sorghum and cowpea. Meanwhile, breeders are developing new varieties of these crops that offer both higher yields and better crop residues—such as more nutritious stalks and leaves—that can be used as livestock feed.

The authors also see a need for greater investments in the livestock

sector, which, they point out, has been much lower, "often by a factor of ten or more", than investments in crops, even though livestock are equally critical to the vitality of smallholder farms. For example, the authors note that farmers could benefit from livestock breeding for more efficient animals.

The authors also call for investments to redress poorly managed livestock intensification efforts that pollute water sources and encourage outbreaks of both animal and human diseases. The authors caution, however, that intensification also carries risks. For example, recent outbreaks of avian influenza in Asia might be the result of large concentrations of birds, coupled with poor disease control and underfunded veterinary services in the region. The authors recommend the development of disease surveillance and early warning systems to manage these risks.

Overall, the authors are asking the G8 countries to match their "commendable and significant" financial commitment to developing-country agriculture with an "intellectual commitment" to understanding the different systems producing food in the developing world and determining where farm yields are "maxed out" and where yields can still be increased.

"Feeding the growing populations of the developing world is a daunting challenge that also presents us with an opportunity to realize the untapped potential of small-holder mixed crop-and-livestock systems," said Carlos Seré, Director General of ILRI. "Smallholder farmers have always shown amazing ability to adapt to changing conditions," he added. "With the right kinds of support, these traditional mixed farming systems can be modified to become pathways out of economic and environmental poverty."

Provided by International Livestock Research Institute

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