

Food Security in Asia No Time for Complacency

Asia coped quite well with the 2007–2012 food crisis and world food prices seem to be stabilizing, albeit well above pre-crisis levels. Even so, underlying supply–demand problems laid bare during several years of price surges have not receded. Indeed, they present immense long-run hurdles for food security and inclusive rural growth. Slowing gains in agricultural productivity, overexploitation of natural resources, and increasing water scarcity are critical concerns on the supply side. As Asia becomes more urban and prosperous, this will push prices higher unless supply keeps pace with demand.

But climate change may well prove to be the greatest threat to food security over the next 10–20 years, and its impact on productivity is already being felt. The international community has not yet taken decisive action to control carbon emissions, increasingly considered the likely cause of climate

change. If the world’s regions cannot mitigate greenhouse gases, then countries must adapt, and adapt quickly. For food security, well-funded agricultural research, technology diffusion, and extension systems will be vital for climate change adaptation. Yet the funding situation is far from encouraging.

For securing more inclusive rural growth, Asia’s small, resource-poor farmers—an estimated 350 million of them—must be able to participate in modern food value chains. Tackling persistent malnutrition is the other big regional development challenge related to food security. Despite rapid economic growth and a big reduction in income poverty over the past two decades, Asia remains home to 67% of the world’s hungry, some 552 million people.

The food price crisis—after decades of declining real prices—was a major setback to the region’s poverty

reduction efforts. Indeed, a recurrence of escalating, volatile world food prices is one of three major risks facing Asia, alongside climate-related disasters and the impact of the global financial crisis.

Whether the food policy prescriptions of the past three decades are still relevant in a world where food security and international trade flows seem less assured is under intense debate. The view of many practitioners is that both food importing and exporting countries need to find efficient and politically acceptable policies that protect the poor without simultaneously suppressing price incentives to farmers.

This Topical Report is based on *Food Security Challenges in Asia*, a study by Independent Evaluation at the Asian Development Bank (ADB).

Prices Stabilizing, Red Flags Remain

Food prices have surged roughly every 30 years over the last century. But the pattern is changing: energy prices are “driving” food prices much more than they did a few decades ago

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and increased financial speculation in commodity markets seems to be stoking price volatility (although researchers are still debating the net impact on food prices).

The last major spike in food grain prices was for rice in mid-2012. Since then, prices appear to have stabilized and there are grounds for optimism that they will hold in the medium term. However, they are settling at a considerably higher level than before the crisis, a situation the World Bank calls the “new normal.” Its 2013 Commodity Market Outlook projects real world prices of corn and wheat rising 6%–14% from 2013 to 2020, but that they will gradually decline in nominal terms. The nominal price of rice is projected to remain fairly stable at about \$500 per ton over this period. Other institutions, examining a broader range of commodities, including livestock and fish, expect prices over the next several years to remain flat or decline in real terms from recent levels, although averaging 10%–30% above pre-crisis levels.

In Asia, the supply response of producers to higher prices and the replenishment of grain stocks suggests that volatility may be less of an issue, at least in the foreseeable future. Even though the role of rice in the Asian diet is changing—its income elasticity of demand is even negative in Southeast Asia—it remains an important barometer of the welfare of the region’s poor.

High economic growth in much of Asia and safety nets set up during the food price crisis should dampen price fluctuations. At the macro level, governments have generally more fiscal space to pay for safety nets and other social protection programs. But numerous potential sources of volatility exist, including weather shocks, biofuel policies, tighter links

between energy and crop markets, and speculation on commodity markets. The crisis was a loud wake-up call.

A Food Secure Asia

Major food scarcity did not trigger the 2007–2012 crisis. Rather, a witch’s brew of developments in the world food, energy, and financial markets did, exacerbated in Asia by poor policy choices related to rice. Even though the crisis has faded from the headlines, the challenges to sustaining food security and promoting inclusive rural growth in Asia remain. It is necessary to put in place policies and incentives to address these challenges. The biggest are (i) revitalizing agricultural productivity growth, (ii) addressing the impacts of climate change on agriculture, (iii) the participation of small farmers in modern food value chains, and (iv) tackling persistent malnutrition, especially in preschool children.

per unit of land and water used and, to some degree, help countries adapt to climate change using conservation agriculture. Over time, crop productivity growth has been declining (Figure 1). In addition, gaps in potential and actual yields in Asia are often quite large. Farmers are rarely able to achieve more than 80% of potential yields due to pests, drought, and other agronomic factors (gaps of 40% or more are often seen in rice and wheat).

Similarly, water use from irrigation, rainfall, and other sources is well below potential productivity. More efficient use of irrigation water is particularly critical in South and Central Asia. By 2030, 40% of developing Asia is projected to face severe water shortages, which, along with urban encroachment and soil erosion, will put a very significant stress on the region’s agricultural land base. And as climate change impacts mount, aridity and drought risks will increase;

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Revitalizing growth in agriculture productivity

The structural transformation in Asia’s economic development has entailed a rapidly declining share of agriculture in gross domestic product. If the problems of agricultural productivity are not addressed, food security could well become a recurrent world and regional concern in the coming decade, jeopardizing Asia’s efforts to sustain strong growth and eradicate poverty.

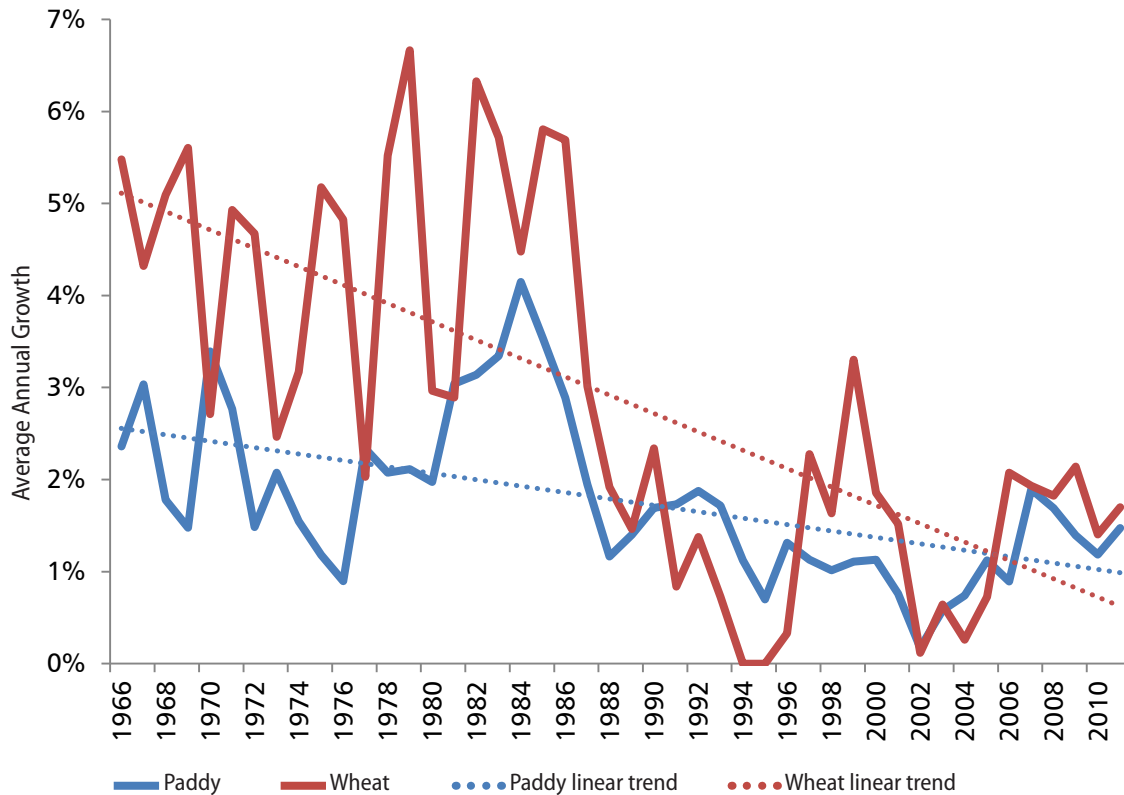
For all the major food crops, existing technology could raise productivity

again, South and Central Asia are most vulnerable.

Evaluation shows that investment in agricultural research has enormous economic payoffs, but this requires sustained commitment from international and national research centers and the private sector. The scientific challenges of adapting agriculture to climate change alone will be formidable. After declining for more than two decades, official development assistance to agriculture and food security rose by almost 50% from 2005 to 2010. More recently, however, financing appears to be

¹ World Bank. 2013. Global Economic Prospects: Commodity Market Outlook. Washington, DC.

Figure 1. Rate of Yield Growth (5-year moving average)



Source: FAOSTAT

falling back toward pre-crisis levels (see figures 2 and 3). With the notable exception of the People's Republic of China and India, public spending on agricultural research and extension systems has stagnated in Asia. Yet both are vital for food security.

The Consultative Group on International Agricultural Research (CGIAR) estimates that funding for research and technology development in emerging economies globally must rise to at least \$16.4 billion by 2025, more than three times its 2009 level. Ramping up agricultural research both in CGIAR and in national extension systems were among the recommendations to the Group of Twenty prepared by several concerned institutions in 2011. It is by no means clear whether the financial commitment will be adequate. The CGIAR Fund has grown, but it is well

short of the \$1 billion annual funding target, and aid agencies have been slow in delivering on commitments. Whether governments and donors will mount an adequate and sustained response to revitalize agricultural productivity at this critical juncture is a big question.

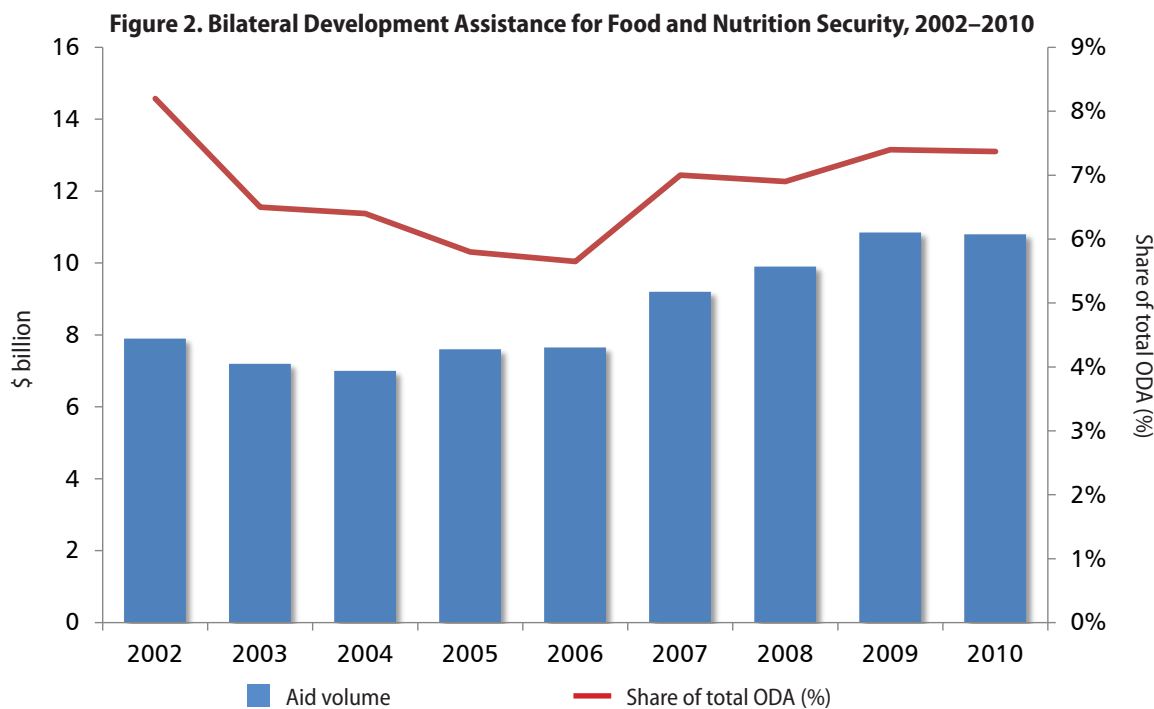
Addressing climate change

Increasing productivity is complicated and limited by climate change. And its impact on Asia's food security is not a distant threat. A growing body of evidence, from research over large geographical areas to studies at the household level, show that climate change is already having measureable impact on agriculture in a wide range of economies, crops, and farming systems. Other anthropogenic impacts on the natural resource base are amplifying these, including population

growth, urbanization, growing water scarcity, and the degradation of forests and watersheds.

South and Southeast Asia's low-lying, rice-growing deltas are already feeling climate change as rising sea levels cause saltwater intrusions, including on the Ganges-Brahmaputra and the lower Mekong deltas. In a disturbing side effect, people in these regions face increased risk of disease, as higher sea surface temperatures and levels are correlated with cholera epidemics. Existing crop technology in less intensively cultivated areas could produce higher yields, particularly in eastern India and, above all, Myanmar. But realizing this will require sizable investment in irrigation and roads, price incentives, and stable international trade.

The major food crops—wheat, corn,



ODA = official development assistance.
In constant 2010 United States dollars.

Source: Organisation for Economic Co-operation and Development. 2010. *Aid and Food Nutrition Security*. Paris.

rice—grow best within fairly narrow temperature ranges. Optimal mean growing-season temperatures, allowing for a range of daytime highs and nighttime lows, are about 15 degrees Celsius (°C) for wheat, 20°C for corn, and 25°C for rice. Scientific evidence is revealing the sensitivity of crop yields to temperature spikes that greatly exceed these ranges, even for short periods.

Although rice is a high-temperature crop, it is not immune to temperature extremes. The International Rice Research Institute reports that rice is most susceptible to heat stress during the reproductive and ripening stages. Extremely high temperatures for even a few hours during flowering can cause sterility, while high temperatures during ripening reduce grain filling and milling quality. If other constraints are binding, such as a lack of irrigation

water, temperature impacts are even more pronounced.

Empirical evidence and climate models suggest that temperature rather than rainfall changes will pose a greater risk to crop productivity in Asia during the coming decades. Regions that are presently arid or semiarid are expected to become drier. Averaged over continents, rainfall changes will likely be <10% over the next 50 years. Research using country data to estimate the effects of temperature and precipitation on wheat and corn from 1980 to 2008 found yields were reduced 5.5% and 3.8%, respectively, compared with a scenario without climate impacts. But it found no significant patterns in rice and soybeans. The research concluded that temperature effects were more important than changes in rainfall, and that overall climate impacts have

contributed to rising global food prices through an estimated 10% loss of the yields that would otherwise have been achieved by technological improvements.

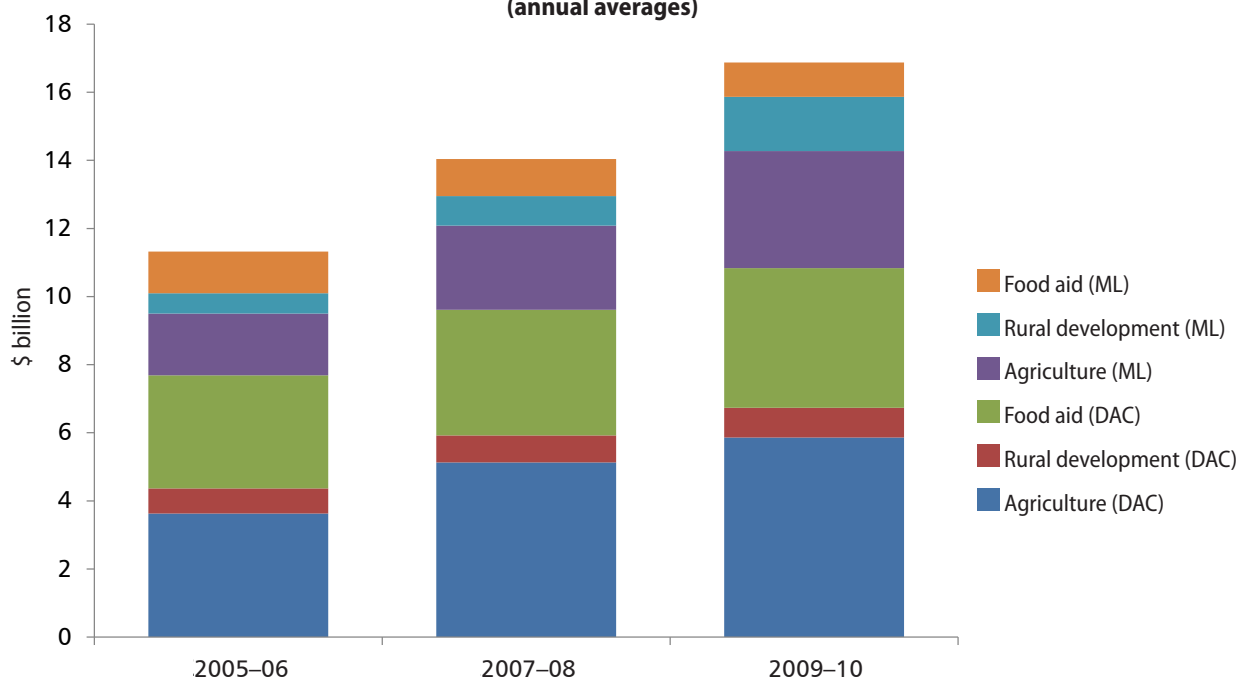
Increasing levels of ground level ozone caused by fossil fuel and industrial emissions—highest in East Asia, but expected to rise in South Asia—are now a significant source of crop yield loss.

Climate variability—drought, intense rainfall, and floods—was one of many factors behind surging food prices. Extreme weather is becoming more frequent and severe. Of a fourfold rise in natural disasters globally from 1971–2010 (figure 4), almost half occurred in Asia and the Pacific; of these, 72% were hydro-meteorological events. Measures to prepare for climate change—above all the adaptation

² It should be noted that while climate models have tended to converge in projections of change at the regional or continental scale, much less is confirmed about the changes at a local level.

³ D. Lobell, W. Schlenker, and J. Costa-Roberts. 2011. Climate Trends and Global Crop Production since 1980. *Science*.

Figure 3. Total International Pre- and Post-Crisis Financing of Agriculture and Food Security (annual averages)



DAC = Development Assistance Committee (bilateral donors), ML = multilateral organizations.

In constant 2010 US dollars.

Source: Organization for Economic Co-operation and Development. 2012. *Development Co-operation Report 2012: Lessons in Linking Sustainability and Development*. Paris.

of farming systems and rural communities—will be fundamental to long-run efforts to ensure food security at the national and household levels. Farming practices will need to be modified and new technologies and stress tolerant varieties developed and introduced.

At an anecdotal level in villages in Asia, Africa, and Latin America, perceptions about climate change are remarkably consistent with observed patterns and global models of climate change, according to a 2009 Oxfam report. For example, seasons are more unpredictable, including rainy seasons, and winter temperatures have increased most.

A large body of knowledge reveals water and soil conservation practices that could lessen climate change

impacts, but these may involve trade-offs between sustainability and productivity. Agronomic practices like mulching, direct seeding, and minimum tillage conserve soil moisture and hence offer some resistance to high temperatures. Likewise, better meteorological data and faster weather forecasts to farmers can play important roles.

Involving small farmers in modern agricultural value chains

To prosper, farmers must diversify and commercialize in response to market and consumer demands. A successful structural transformation would see the region's small-scale agriculture evolve from subsistence-oriented production to commercially oriented farming driven by the market forces of dynamic, urbanizing economies.

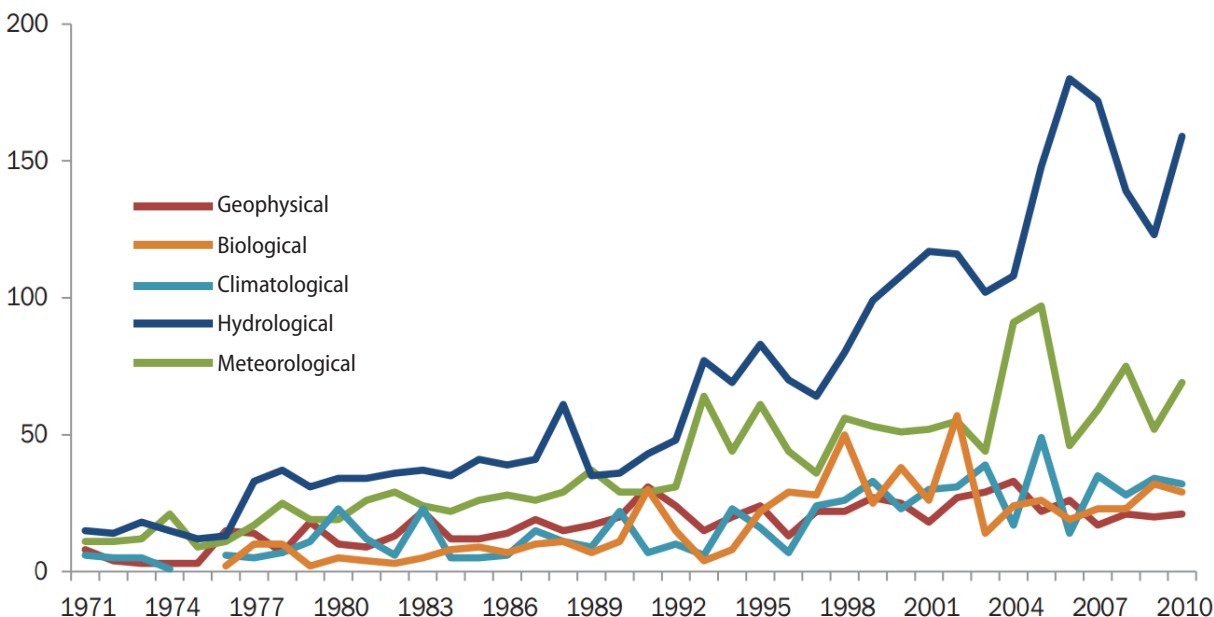
Without this process, small farmers, those typically working less than two hectares, will continue to do little more than make ends meet producing staple crops. With the transformation, the impact on rural poverty and inclusivity could be enormous given that about 45% of Asia's people depend on small farms for all or part of their livelihoods. Enabling them to participate in modern agricultural value chains could become a significant intervention to achieve this goal.

Rising demand for safe, high-value and differentiated products, and the rapid expansion of supermarkets and procurement systems, are creating unprecedented opportunities for farmers to participate in agricultural value chains. This allows them to reduce costs, increase revenue and bargaining power, and improve access

⁴ V. Thomas, J. R. G. Albert, R. T. Perez. 2013. Climate-related Disasters in Asia and the Pacific. *ADB Economics Working Paper Series No. 358*. Manila: ADB.

⁵ S. Jennings and J. Magrath. 2009. What Happened to the Seasons? *Oxfam Research Report*. Oxfam Great Britain.

Figure 4. Global Frequency of Intense Natural Disasters by Type (1971–2010)



Note: Intense natural disasters are those that caused 100 or more deaths or affected 1,000 or more people.

Source: Frequencies are authors' estimates based on data from the Emergency Event Database of the Centre for Research on the Epidemiology of Disasters. <http://www.emdat.be> (accessed 6 December 2011).

to capital and technology.

Clearly, not all agricultural value chains can be pro-poor; their aim anyway is profit, and the poor generally lack the skills to produce for high-value markets. All the same, these value chains hold great potential for development institutions and client governments if small farmers can be given access to credit and training and if high-value crop production areas are linked to commercial markets. Numerous approaches are being tried—extension, marketing cooperatives, contract farming, and public–private partnerships. The public sector can facilitate this transformation, but, amid rapid commercialization of agriculture in Asia, the private sector will lead it.

Tackling persistent malnutrition

The economic costs of undernutrition in lost national productivity are estimated at 2% to 3% of gross

domestic product in some countries in Asia. Despite rising incomes and rapid poverty reduction, reducing malnutrition remains an elusive Millennium Development Goal, particularly in much of South Asia. The causes are complex, with factors as varied as gender, age bias, feeding practices, water supply and sanitation, and parental knowledge.

Malnutrition in preschool children is a persistent problem with long-run impact on human capital. Globally, too many preschool children in the developing countries are underweight or have low height for their ages, with the food crisis contributing to a higher malnutrition risk. The United Nations Children's Fund estimates 30% of children under five in Asia and the Pacific are underweight, topping sub-Saharan Africa's 28%. Most of these children are concentrated in South Asia, where prevalence rates in India and Pakistan have changed little over the last decade. On the other

hand, significant progress has been made in reducing child malnutrition in the People's Republic of China and in Southeast Asia.

Evaluation suggests that the multidimensional nature of malnutrition may not readily lend itself to large-scale development projects that attempt to address many aspects of malnutrition at once. But simple, cost-effective interventions can address some of the underlying causes of malnutrition, including through community-managed water supply and sanitation, micronutrient supplementation (iodized salt, vitamin A, and iron are cheap supplements), and biofortification of staple crops such as Golden Rice high in beta-carotene. Low-cost interventions based on simple technologies are often inexpensive to add in rural investment projects, such as irrigation and roads, without overly complicating project design.

⁶ IED. *Evaluation Knowledge Study: Support for Agricultural Value Chain Development*. Manila: ADB.

Safety nets, if well designed and targeted, can be an effective subsidy during a food crisis, although they also present challenges. And subsidies are not always the best way to dampen price transmission to the poor, particularly in geographically dispersed rural areas where the poor are hard to reach. Subsidies also demand scarce institutional capacity, and even the best are prone to leakage, and can be politically difficult to unwind.⁷

The Political Dimensions of Food Security

The food price crisis underscored the need for development institutions and banks to pay greater attention to the political dimensions of food security when providing policy advice to governments in Asia. The challenge for policymakers in food importing and exporting countries is to find an efficient and politically acceptable balance between food supply, price

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management, and programs to protect the poor, such as subsidies and safety nets, without suppressing price incentives to farmers on the supply side.

Since the 1980s, the “Washington consensus” has stood for orthodox economic policy; that is, efficient growth is best achieved by liberalizing trade, deregulating markets, reducing untargeted subsidies, shutting down inefficient state-owned enterprises, and encouraging an efficient, dynamic private sector. In agriculture, this approach made a lot of sense in an era of growing food supplies, falling real prices, and confidence that the trends would continue.

The policy advice of the Group of Twenty countries and the World Bank—which dominated the multilateral response to the food crisis—followed the orthodoxy. It encouraged developing countries to allow full transmission of world prices to domestic markets, and to use consumption-oriented safety nets to protect the poor pending an improvement in the agricultural supply response. On a global basis, this prescription has merit, but policy advice needs to be nuanced at the local level, reflecting local political and institutional contexts. For longer-run efficiency, it would be better to buffer rural incomes by creating employment, for example, through public worker



⁷ Independent Evaluation Department (IED). 2012. *Asian Development Bank: Social Protection Strategy 2001*. Manila: ADB. <http://www.adb.org/sites/default/files/ses-socialprotection.pdf>

projects and addressing the underlying issues of agricultural productivity rather than subsidies. Indeed, a productive rural economy is the best safety net for Asia's rural poor.

A Heavyweight Challenge for Development Institutions

As world food prices stabilize, international attention may well turn to other issues, leaving many unresolved and emerging food security problems. From the 1990s until the start of the food crisis in 2007, most multilateral development banks had anyway scaled down their agriculture operations in Asia, reflecting optimism that food supply and security were essentially solved.

and investment in rural roads and irrigation. For practitioners, the strong interdependence and backward–forward links between agriculture and other sectors show the need for cross-sector approaches for meeting all these challenges.⁸

Recent evaluation shows that multilateral development banks have done many things well in supporting agriculture and food security and, importantly, learned how to do things better over time. An Independent Evaluation study on the design and performance of ADB operations in agriculture and natural resources shows they improved steadily and, from 2001, equaled the average of all other sectors.⁹ The World Bank reached a similar conclusion on its

Addressing Asia's food security challenges will require long-term commitment and financing from governments and their development partners.

The current and anticipated environmental and economic stresses on agriculture suggest that if the sources of stagnating productivity are not addressed, soaring and volatile food prices could return. Addressing Asia's food security challenges will therefore require long-term commitment and financing from governments and their development partners. The priorities are research, technology diffusion,

agriculture operations.¹⁰ Evaluation of ADB's work in value chain development was positive about the relevance and effectiveness of operations in commercial agriculture and agribusiness.¹¹

These outcomes suggest that more intensive engagement in agriculture by development banks could play a meaningful role in helping meet Asia's food security challenges.

⁸ For a recent case study on the importance of complementarity and linking with other sectors in the context of agriculture in Asia, see IED. 2012. *Shallow Tubewell Irrigation in Nepal: Impacts of the Community Groundwater Irrigation Sector Project*. Manila: ADB. <http://www.adb.org/sites/default/files/IES-NEP-FINAL.pdf>. For a broader discussion on this the theme of links, see IED. 2012. *Connecting the Dots for Greater Development Impact*. <http://www.adb.org/sites/default/files/LL-Connect-the-dots.pdf>.

⁹ IED. 2012. *2012 Annual Evaluation Review*. Manila: ADB

¹⁰ Independent Evaluation Group. 2011. *Growth and Productivity in Agriculture and Agribusiness: Evaluative Lessons from World Bank Group Experience*. Washington, DC: World Bank.

¹¹ IED. *Evaluation Knowledge Study: Support for Agricultural Value Chain Development*. Manila: ADB.

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