

## Module 11: Managing Agricultural Risk, Vulnerability, and Disaster

Public intervention can facilitate better risk management through risk-reducing sectoral development strategies and programs with due emphasis on community-based disaster reduction, improved hydrometeorological alert and information systems, pre-event emergency preparedness and recovery planning, development of financial markets, promotion of market-based price and yield insurance schemes, and ensuring that the poor are able to benefit from these interventions and from participation in emerging systems.

### Rationale for Risk Reduction and for Investment

Risk is a function of the vulnerability and capacity of communities and economies in relation to the hazards they confront. The increased vulnerability and inadequate coping capacity within communities have most definitely increased the impact of hazards on their lives and livelihoods. This trend can be attributed to flawed development practices and continued emphasis on reactive approaches to handling disasters. It is possible to reduce risks by improving pre-event preparedness, designing and implementing risk mitigating strategies, developing reliable and timely early warning and response systems, and spreading residual risks through innovative risk financing instruments. Therefore risk reduction must be mainstreamed in policies and programs for sustainable development.

Risk in agriculture is pervasive (box 11.1). Several assessments of risk and vulnerability by the Bank have shown that commodity price, yield (mainly due to weather), and health risks are the most important risks that rural households face. Households are vulnerable to those risks when a significant loss threatens the sustainability of their livelihood base—a common situation for many small-farm households in developing and transition economies.

#### Box 11.1 Some risks affecting agricultural production systems

- *Climatic risks* include risk of crop or herd loss (total or partial) from drought (micro or large-scale disaster, short or long term), flooding, hard rains, hail, frost, snow, hard freeze, or wind.
- *Environmental risks* result in damage to land from soil erosion and to flora and fauna and from pest and disease attacks.
- *Social and economic risks* include problems such as theft of crops or stock, damage by careless neighbors (fire, cattle), price fluctuations of commodities and key inputs (fertilizer), family illness and loss of labor (HIV/AIDS, death), loss of access to land because of badly designed titling schemes, and infrastructure failure (degraded roads, transport breakdowns).
- *Political risks* include more remotely generated (and thus significantly less manageable) events such as community resettlement (for example, dam resettlement schemes), conflict and war, and political alienation/redistribution of land.
- *Market risks* include adverse fluctuations in price or input costs, logistics and supply chain difficulties, and risk associated with access to finance to support trading activities.

Source: Authors

Profit is the reward for taking risks, and therefore any profit seekers in the business of farming, as in any other business, must be able to bear some risk. Many farmers, however, are highly vulnerable and cannot readily bear additional risk in their farm/herd management or its potential shocks to their households. Just what farmers do to moderate the effects of risk is remarkably similar at all economic levels and throughout the world (box 11.2). The specific components of these mechanisms—and the degree and formality with which farmers employ them—vary. The more informal mechanisms for coping with risk may reduce the farmers’ incomes (for example, diversification may come at the cost of specialization and higher incomes). Any government intervention targeting risk must take into account how farmers’ risk management mechanisms are applied as well as farmers’ resource base.

Risk management approaches can be distinguished according to whether they are undertaken before (mitigating) or after (coping) an event. They may also vary depending on whether risk is viewed primarily as an individually experienced phenomenon (idiosyncratic) or a more widely experienced event (systemic).

#### **Box 11.2 Risk management approaches of farmers and other rural producers**

Rural producers and communities employ several mechanisms to deal with the risky business of farming, and any interventions must account for the likely effect on these mechanisms and the resources available to farmers. Mechanisms include:

##### *Information gathering:*

- *Using and improving information available* in decision making, such as market prices, regional rainfall probabilities, new crop varieties, and emerging markets.

##### *Avoiding risks:*

- *Adopting a precautionary stance*, with the costs balanced against the possible reduction in serious negative consequences.
- *Using less risky technologies*, such as growing lower but reliably yielding drought-resistant crops or producing crops with more stable markets over crops with potentially higher but less certain returns.

##### *Diversification:*

- *Diversifying production systems* through planting a variety of crops for separate markets to mitigate climatic, disease, pest, and market vulnerability.
- *Acting with flexibility* to adjust to changed circumstances, reflecting physical assets and markets.
- *Financing farm activities* with credit, and borrowing in cash or in kind based on social capital.

##### *Sharing of risk:*

- *Using informal and formal insurance* through making small investments expected to provide returns only in the event of difficulty or catastrophe, such as cash or gifts, or “banking” through social capital.
- *Pooling risk* in formal or informal arrangements to share outputs and cost of production.
- *Using contract marketing and futures trading mechanisms* (such as forward contracting to

sell all of a crop at an agreed price, futures contracts, and hedging) to reduce price risks for commodities not yet produced, or for future inputs.

Source: Authors

The incidence of risk in agriculture is important to policy makers at national and international levels. Fluctuations in producer incomes, and particularly the threat of catastrophic loss, may present difficult welfare problems for these same producers, their governments, and the international community. Trading losses at the level of market intermediaries, such as traders and processors, negatively impact the development of sustainable trading and finance activities in the commodity sectors. In more extreme cases, international humanitarian assistance may be necessary, but that assistance may destabilize markets, create dependencies, or bias management via expectations of future disaster relief.

Mechanisms to deal with catastrophic, spatially covariate risks for large populations must be created in ways that do not undermine the coping mechanisms that individual households use to deal with chronic day-to-day and year-to-year independent risks. Since the types and severity of the risks confronting farmers vary greatly with farming systems and physical, socioeconomic, and political environments, generic guidance for good and relevant investment activity in risk management interventions is scarce. Past failures by governments and donors illustrate both the many pitfalls to avoid and some opportunities to explore in efforts to help resource-poor farmers deal better with risk and become less vulnerable to shocks.

## **Past Investment Activity**

Although remarkably little Bank assistance has targeted agricultural risk explicitly, there has been indirect assistance through rural finance operations, assistance for provision of various public goods, and more recently assistance through disaster relief operations (box 11.3). Quantifying the levels of World Bank assistance addressing agricultural risk is problematic, especially given that investments often target specific types of risk (for example, research on drought-tolerant crops) or risky environments (for example, arid and semiarid rangeland management) without specifically classifying the funding as relevant to risk.

### **Box 11.3 Investment in public goods**

Public investments that address risk reduction in farming have been considerable, but they are seldom designed explicitly to target this risk. Irrigation investments are one such case: the explicit intention has been to boost the productivity of land and water resources and increase rural employment and food self-sufficiency. Indeed, such investment together with the development of improved crop varieties formed the core of the green revolution in South Asia and elsewhere in the 1960s. But this investment also considerably reduced the inherent variability resulting from dependence on rainfall. Investments in plant breeding have targeted vulnerability to pests, diseases, droughts, and floods, and as such targeted some of the more risky conditions facing farmers. These risk-reduction features (along with the corresponding productivity gains) are largely public goods produced by investment in public research agencies. Public investments with collateral benefits affecting risk reduction include range management, veterinary and human

vaccine development, HIV/AIDS, rural banking, and early warning systems for conflict and weather.

Source: Authors

## Key Issues for Investment

With mixed results, governments worldwide have implemented various forms of public risk management policies and programs. Broad quantitative assessments of the costs and benefits of these programs are lacking, and results of these programs often raise questions about their *sustainability* (particularly financial) and *distribution of benefits* to the vulnerable groups most in need of assistance (for example, women). Another problem is that subsidized public interventions undermine risk markets and traditional risk management and coping systems. Key themes associated with sustainability and distributional issues are discussed below.

*Understanding risk and production systems.* Addressing problems of risk and vulnerability within an agricultural production and marketing system requires an understanding of the cross-cutting issues and of the multiple approaches to managing risk. These include market development and access, crop diversification, irrigation and intensification of farming, and development of financial and social capital. Changes in the agricultural system, including changes in risk management strategy, can have both beneficial and detrimental effects. Consolidating scattered plots of land may increase efficiencies, but it might make households more prone to loss if all their land is in one parcel. Thus, as is always the case, it is critical that interventions have clear goals, based on reliable information and sound analysis.

*Balancing productivity gains and risk reduction.* Farmers' efforts to avoid risks through on-farm management practices, such as plot diversification and use of traditional varieties and crops, help maintain stable but lower production and income levels. Production instability tends to increase domestic food price variability, cause food insecurity for the landless poor, and increase uncertainty for rural producers. Instability in export crop production and economic returns leads to more volatile foreign exchange earnings, which can destabilize a national economy.

*Recognizing the strengths and limitations of traditional institutions.* Formal risk-sharing institutions such as private insurance and commodity exchanges (spot markets, futures trading, and options markets) are widely available in industrial countries to help farmers cope with production and marketing risks. In developing countries, risk-sharing institutions are usually much more rudimentary, and formal or commercial institutions may not be available for most small-scale producers. Nevertheless, a wide range of informal risk-sharing arrangements has evolved, including share tenancy contracts, traditional money lending, and risk sharing within extended family and other community networks. These informal systems work well in most years in locations where risk events are independent and vary widely in incidence across households over time and between microlocations. While these approaches do not pool risks as efficiently as they would if they spanned broader regions or sectors of a national economy (like nationwide crop-insurance or credit schemes), they normally are available to most poor farmers. Such

informal arrangements can help farmers effectively manage the risk they routinely face on a household level. They can also be relatively effective arrangements for coping with independent risks (illness, death), but they are less effective do for systemic risks (where most of the community suffers at the same time).

*Dealing with systemic risk.* Most traditional/informal risk management strategies will fail during years of widespread disaster, such as drought, pest infestation, or flooding, which affect large numbers of people in the same village, district, or region. Furthermore, if nonfarm income depends on employment generated through sectors affected by the catastrophe, the success of nonfarm income in contributing to risk management can disappear along with surpluses. Rural banks can be severely affected by poor loan collection if many farmers default at the same time because of a shared catastrophe such as a major drought. Governments have too often responded to farmers' difficulties by "forgiving" their loans, thereby undermining the operation of the credit system and sending the wrong signal to farmers about the need for them to manage their own risks effectively. Governments do have responsibility for some direct involvement to manage severe systemic risk (for example, an extreme drought that may occur only once in, say, 50 years), as the private sector will not generally provide services to manage such risks. Effective government intervention to mitigate severe systemic risks (often couched as social protection measures such as the "food for work" schemes of India), along with an enabling policy and regulatory environment, will encourage private sector provision of services for more frequent and less severe risks.

*Past price stabilization initiatives.* Various mechanisms, such as price supports, buffer stocks, and variable tariffs, have been used to pursue traditional price stabilization objectives, with varying degrees of success and many failures.<sup>1</sup> Though perhaps theoretically sound, a frequent finding is that the welfare gains from price stabilization are relatively small. Buffer fund schemes supported by variable levies and tariffs have suffered from design and management problems that often have compromised their performance. As a result, a cautious approach to the use of stabilization schemes is advised to avoid bankruptcy or an unsustainable drain on public resources (such as experienced with the Indian food grain reserves in recent years). In general, such schemes should be developed only where specific criteria are satisfied (for example, temporary protection of an internationally competitive infant industry, or significant limitations to development of market-based price risk management schemes), and they should be implemented with clear sunset clauses. Future efforts should turn from traditional price stabilization toward mechanisms for market-based price risk management.<sup>2</sup>

*Rethinking agricultural insurance programs.* Agricultural insurance is provided or supported by the public sector in many countries. With few exceptions these interventions have failed, most being financially unviable. Many of the larger all-risks crop insurance programs pay out two dollars or more for every dollar of premium they collect, the difference being paid as government subsidy. Many farmers, despite high insurance subsidies by the government, are still reluctant or unable to purchase insurance.

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<sup>1</sup> See Module 1, "Building Agricultural Policy and Institutional Capacity."

<sup>2</sup> See the AIN, "Commodity Price Risk Management."

As a result, many of these public insurance programs are made compulsory, either for all farmers growing specific crops (for example, Japanese rice farmers) or for those who borrow from agricultural banks (for example, subsidized crop insurance in Mexico). This further distorts production decisions, reduces incentives for the private sector to provide market-based approaches, and results in little improvement in farm-level risk management capacity.

The high cost of public insurance schemes results from attempts to insure risks difficult to quantify and assess (for example, climate, diseases, and pests) or simply too costly and time consuming to quantify. Loss assessments are prone to severe moral hazard problems, and damage reported can be caused or worsened by inappropriate management practices. The common practice of insuring “target” yields rather than compensating for actual losses is problematic in situations where averages do not accurately reflect yearly, or site-specific, fluctuations in yield. Public crop insurers also tend to have high administration costs, since they insure mostly small-scale farmers and do not have a well-diversified portfolio of clients. Although private insurance is growing in some countries, it generally covers specific weather and pest problems faced by large-scale commercial farms growing high-value crops, and it is frequently heavily subsidized. In the near future, private schemes are not likely to be adequate for addressing the vulnerability of the larger population of resource-poor farmers. Other approaches (such as index-based insurance) are required, along with efforts to build an environment that enables improved availability of private-sector insurance services tailored to the needs of resource-poor producers.<sup>3</sup> These new insurance products will likely require considerable time to develop and test.

*Social safety nets.* Since all agricultural production systems are subject to risk, and many small farm households are quite vulnerable to shocks of different types, governments must be prepared to provide direct assistance to farmers under various circumstances, such as those noted above for systemic risk. Disaster response programs are frequently required in post-conflict situations and after natural disasters, to ensure survival and to help restart agricultural and off-farm production. Poverty relief programs may be appropriate where chronic poverty threatens survival and can be effectively addressed only through long-term development and support to education, health, and nutrition programs. Support might be needed to help farmers adjust to the transition from central planning (as in Eastern Europe), changing market environments arising from trade liberalization, changes in consumer tastes, and bans on producing traditional crops (such as opium poppy). Support programs may feature cash transfers or transfers of in-kind resources.

## **Future Directions for Lending**

The range of interventions being discussed by the development community includes attention to both chronic independent risk and large-scale covariate risk. Future interventions must be designed specifically to avoid reducing incentives for farmers to adopt effective preventive measures. Dependency on relief efforts must be avoided, and

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<sup>3</sup> See the AIN, “Agricultural Insurance.”

relief initiatives must not undermine broader development efforts or incentives for private-sector involvement.

*Improving information systems.* A critical component of most agricultural risk management strategies is access to information, which requires investments to improve the generation and dissemination of agricultural information. Market price information systems have positive effects on the marketing cycles for crops and livestock, helping producers to optimize prices obtained and better regulate the timing of sales throughout the year. Weather information systems help farmers make critical production and marketing decisions relating to input and output combinations given their resource constraints. Farmers facing a high likelihood of drought may plant more stress-tolerant varieties of crops. Herders facing drought may sell early to improve sale prices and reduce pressure on drought-stressed rangelands. Donors have a critical role to play in convincing governments that market and weather information systems are appropriate policy interventions and in supporting the establishment of efficient and sustainable information systems and education and training programs to accompany them.

*Strengthening rural financial services.* In principle, having a financial system serving rural areas in a flexible manner is the best and single most important approach for enabling effective risk management. Access to reliable local savings institutions may allow producers to sell when the price is highest and buy when it is lowest. For example, pastoralists sell animals regularly, at periods when prices are better, only when they have access to secure savings institutions and no longer have to store their wealth “on the hoof.” Farmers able to bank small excess profits are less likely to “bank” this excess in informal insurance or gift-giving.

*Testing new approaches to agricultural insurance.* With traditional all-risk crop insurance schemes largely discredited as unsustainable and costly, there are no easy answers to the problem of providing insurance for smallholder agriculture. While any approach must distinguish between the government’s role of addressing systemic catastrophic risks and the private sector’s role in provision of insurance tools for more frequent events, some new products being developed warrant close monitoring and further testing. Area-based index insurance is one new approach.<sup>4</sup> Instead of insuring a farmer’s crop and its performance, insurance is issued for some more readily measured, objectively verifiable index (for example, area rainfall), which substantially reduces problems of moral hazard and adverse selection. However, implementation issues (such as the availability and reliability of long-term rainfall and yield data for specific regions) need to be resolved. Further, if data are available, strong correlations between typical on-farm yields and rainfall levels are required for this mechanism to be effective. The potential to provide effective insurance for rural producers is promising, however, and despite hurdles it seems likely that new insurance products may eventually become widely available and handled routinely by the private insurance industry. In the meantime, further field testing should be continued to assist the industry to develop and market insurance products valuable to poor farmers.

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<sup>4</sup> See the IAP, “India: Innovative Rainfall-Indexed Insurance.”

*Promoting market-based price risk management.* Various mechanisms, such as buffer stocks and price bands, used to pursue price stabilization objectives have met with varying degrees of success and many failures. Recent initiatives such as trading in futures and options contracts are not intended to stabilize market prices but rather to insulate producers and market actors from short-term price volatility.<sup>5</sup> While the government's role in the functioning of these markets is regulatory, governments may need to adopt an active role in facilitating initial development of derivative markets, overcoming technical complexities, and ensuring that the concerns of the poor are adequately addressed. As for agricultural insurance, a key policy issue is if and to what extent poorer countries should (or can afford to) subsidize privately provided, market-based, risk management mechanisms.

*Targeting use of cash transfers and safety net programs.* The recognition that the poorest farmers might not be able to repay loans but do require external assistance has led to increased interest in cash (or other resource) transfer programs. Such programs fall into two categories—*poverty safety nets* to ensure survival or reduce poverty, and *transitional support programs* that help producers adjust to new market realities or production constraints (for example, the Direct Income Support Program in Turkey). Safety nets have an important role in helping rural households cope with risk and chronic poverty, providing assistance to households to meet short-run basic needs, and possibly also to increase future income. These safety net programs target especially the temporarily poor (households that experience sudden and unexpected drops in household income causing them to fall temporarily into poverty). Transitional support programs target both poor and nonpoor households that are vulnerable to short-term fluctuations in income, and poverty due to structural changes in the agricultural economy. Cash transfer programs can yield significant development benefits through income multipliers, stemming from increased household investment. Safety nets are especially useful for reducing the risk associated with increased food prices.

*Emphasizing disaster planning rather than relief.* The policies, or sometimes lack of them, governing disaster relief and planning at both national and international levels are critical areas in need of analysis and reform. Disaster is usually treated separately as a “humanitarian problem” and not the development and political problem that it usually is. Often as a result of public pressure, governments and donors intervene in ways that in the long run actually work to increase the likelihood of a subsequent disaster by discouraging private risk mitigation measures paid for by local populations. The public interventions, in hindsight, are often demonstrably ineffective and distort individual incentives to plan more carefully for what are often normal and recurrent events. Current debate within the area of rural finance centers on this critical and difficult issue. If governments bail farmers out of the effects of otherwise-insurable or manageable natural disaster risks whenever there is political pressure to do so, development of commercial insurance markets will be compromised and the workings of various indigenous (noncommercial) forms of risk-management practice will be affected. Innovative interventions to address specific disaster needs without compromising disaster risk-management practices either have not been developed or have been designed poorly. These interventions need to be

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<sup>5</sup> See the IAP, “Tanzania: Accessing Market-Based Price Risk Management Instruments.”

informed by sound technical analysis of how they can be better targeted, implemented, and evaluated as to their impact and sustainability (box 11.4).

**Box 11.4 The World Bank's Disaster Management Facility**

The Disaster Management Facility was established in July 1998 to provide proactive leadership in introducing disaster prevention and mitigation practices into the World Bank's development efforts. A recent recommendation of the Facility is that disaster risk management be formally included in all Bank planning for countries with high natural catastrophe exposure. The Facility also recommends that attention to risk by donors include the three steps of risk identification, risk mitigation, and financing. Other donors, such as the U.S. Agency for International Development (USAID), recently mandated that all country development strategies include conflict vulnerability assessments, thus directly including one type of “man-made” disaster into their development planning. The development and humanitarian assistance communities are working to improve links between relief and development planning. While moving slowly toward positive change, there is recognition of the need to prevent dependency on relief and to prevent relief efforts from undermining development efforts.

Source: <http://www.worldbank.org/dmf/>

*Responding to disasters.* When planning and mitigation measures fail, there is frequently a need to “jump-start” agriculture to get farms back into production after a disaster has occurred. Agricultural “starter pack” programs that fund free distribution of agricultural inputs have been used to assist resource-poor farmers after a catastrophe. They have also been used to introduce new technologies (seed, fertilizer) in nonemergency situations. Unfortunately, these programs may create higher levels of risk in the long run by undermining local markets, thus reducing the availability in good years of commercial input suppliers and inputs. Distributing farm inputs using vouchers and organized fairs as a forum of exchange between market participants has shown potential to strengthen both formal and informal marketing systems.<sup>6</sup> This also improves the ability of the agricultural system to cope in times of hardship and reduces dependency on external aid.

## Scaling Up Investments

For analysts trying to help decision makers at government and enterprise levels, the main message is that governments should not contribute to the complexity of the environment in which farm decisions are made or contribute to the vulnerability of rural households through ill-conceived or inappropriate interventions. Given the poor record of most interventions specifically targeting risk, future efforts must stress rigorous evaluation. Those proven endeavors that target the resource needs of poorer and more vulnerable producers (for example, microcredit, infrastructure, market and weather information systems) should be increased where sustainable. This will require that outcomes and impacts of risk-related initiatives be better documented so that a knowledge base can be built to guide future activities. Although there are still many persistent problems relating to agricultural risks faced by the poor, there are policy, institutional, resource, and market opportunities for risk management that can benefit vulnerable rural populations.

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<sup>6</sup> See the AIN, “Responding to Disaster with Seed Distribution.”

## Selected Readings

Asterisk (\*) at the end of a reference indicates that it is available on the Web. See Appendix 1 for a full list of Websites.

- Anderson, J. R. 2003. "Risk in Rural Development: Challenges for Managers and Policy Makers." *Agricultural Systems* 75(2-3): 161-197.
- Barry, P. J. 1984. *Risk Management in Agriculture*. Ames: Iowa State University Press.
- Duncan, R. 1997. "World Food Markets into the 21st Century: Commodity Risk Management Policies." *Australian Journal of Agricultural and Resource Economics* 41(3): 429-443.\*
- Freeman, P. K., L. A. Martin, R. Mechler, K. Warner, and P. Hausmann. 2002. "Catastrophes and Development: Integrating Natural Catastrophes into Development Planning." Disaster Risk Management Working Paper Series 4. World Bank, Washington, DC.\*
- Just, R. E. 2003. "Risk Research in Agricultural Economics: Opportunities and Challenges for the Next Twenty-Five Years." *Agricultural Systems* 75(2-3): 123-159.
- Skees, J.R. 2003. "Risk Management Challenges in Rural Financial Markets: Blending Risk Management Innovations with Rural Finance." Paper presented at Paving the Way Forward for Rural Finance: An International Conference on Best Practices, sponsored by USAID and hosted by BASIS CRSP partner, World Council of Credit Unions, June 2-4, Washington, DC.\*
- Manuamorn, O. P. 2006. "Scaling-Up Micro Insurance: The Case of Weather Insurance for Smallholders in India." Commodity Risk Management Group, World Bank, Washington, DC.
- World Bank. 2005. *Managing Agricultural Production Risk: Innovations in Developing Countries*. Agriculture and Rural Development. Washington, DC: World Bank.

## References Cited

World Bank Disaster Management Facility. <http://www.worldbank.org/dmf/>.

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# Commodity Price Risk Management

Commodity price instability has a negative impact on economic growth, income distribution, and the poor. Early attempts to deal with commodity price volatility relying on direct government intervention (for example, price stabilization schemes, floor prices, and guaranteed prices) were generally unsuccessful. Although there may be a case for limited direct intervention in some circumstances, liberalization of markets has resulted in the need for market-based instruments to help manage commodity price volatility. Large commodity exchanges typically offer such products (for example, futures and options), but there are substantial barriers to developing these markets for all commodities and for helping farmers to access existing markets. Key investments needed to expand access to these services include: public goods (price information systems, data management systems); strengthening supply chain relationships; strengthening technical capacity in private service providers; and educating potential users.<sup>7</sup>

Although the old paradigm of domestic price protection and price stabilization increased instability in world markets, trade liberalization has increased the transmission of international price movements to domestic producers and consumers. Inability to manage this volatility destabilizes exchange rates and affects governments' ability to maintain a stable economic environment. Low prices limit farmers' incomes, and price volatility makes it difficult for farmers to plan production activities, allocate resources efficiently, and obtain credit. Inability to manage intra-seasonal price volatility threatens the profitability of market intermediaries such as traders, cooperatives, and processors, and the banks who lend to them.

## Managing Commodity Price Risk

Governments in many countries have intervened in markets, often through state economic enterprises, to insulate producers and consumers from world prices. Most interventions have taken a nonmarket approach in the form of quota or buffer stock programs organized through state marketing boards. However, government interventions have been costly and have crowded out private sector initiatives.

Price risk management that relies on market-based products rather than government guarantees and subsidies will involve a substantially reduced overall role for government in administration. The long-term objective must be for government to assume a regulatory role, overseeing markets for risk management tools. However, the public sector can facilitate initial development of these markets and/or improve access to established foreign or international markets for these tools, thus ensuring that needs of the poor are adequately addressed. Market-based systems are most relevant for standardized commodities traded internationally in large volumes, mainly coffee, cocoa, rubber, cotton, grains, sugar, and oilseeds (and some livestock products) (box 11.5). They are less applicable to high-value, highly differentiated, or perishable products for which price risk is managed through forward contracts, often in the context of integrated supply chains.

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<sup>7</sup> This section refers mainly to cash crops for export markets and is less relevant for food crops.

### Box 11.5 Definitions of market-based instruments

The rationale and theoretical underpinnings of formal mechanisms for managing price risk are reasonably simple. There are two basic types of price risk management tools, physical instruments and financial instruments:

- *Physical instruments* involve strategic pricing and timing of physical purchases and sales (such as “back-to-back” trading), forward contracts, minimum price forward contracts, price-to-be fixed contracts, and long-term contracts with fixed or floating prices.
- *Financial instruments* are exchange-traded futures and options, over the counter (OTC) options and swaps, commodity-linked bonds and other commodity derivatives.
- *Futures contracts* involve the buyer (or seller) of a futures contract agreeing to purchase (or sell) a specified amount of a commodity at a specified price on a specified date. Contract terms (for example, amounts, grades, delivery dates) are standardized, and transactions are handled only by organized exchanges. Profits and losses in trades are settled daily through margin funds deposited in the exchange as collateral. Futures contracts are usually settled before or at maturity, and they do not generally involve physical delivery of the product.
- *Options contracts* offer the *right*—but not the *obligation*—to purchase or sell a specified quantity of an underlying futures contract at a predetermined price on or before a given date. Like futures contracts, exchange-traded options are standardized, over-the-counter options offered by banks and commodity brokers. Purchase of an option is equivalent to price insurance and therefore requires that a price (premium) be paid. Options include: *calls* (which give the buyer the right to buy the underlying futures contract during a given period and are purchased as insurance against price increases) and *puts* (which give the buyer the right to sell the underlying futures contract during a given period and are purchased as an insurance against price declines).

Source: Varangis and Larson 1996

## Benefits

Market-based price risk management instruments have the potential to provide producers with more certainty about the minimum price they will receive for their crop (at the cost of higher revenues forgone), and they may help producers make more efficient farm management decisions regarding output mix and input use. The elimination of worst-price scenarios can provide incentives for investment in promising sectors (that are often high risk/high return). Reducing market distortions fosters diversification to new and more profitable agricultural enterprises. Further, eliminating the primary reason for nonrepayment of loans - an adverse move in commodity prices - can reduce the risk exposure of producers or market intermediaries in the eyes of lenders and is likely to result in improved access to (and terms of) credit for the sector as a whole.

## Policy and Implementation Issues

*Targeting use of nonmarket mechanisms.* Reforming existing nonmarket interventions (such as price bands and floors) so that they are minimally distorting will enable the development of market-based mechanisms that “price stabilization” has tended to impede. Key to success of such nonmarket schemes is the ability to accurately define the

threshold price, maintain discipline in implementation, and include specific sunset clauses. Such schemes are appropriate *only* when major barriers to market-based alternatives will persist into the medium-term, *and* where there is a true underlying competitive advantage for the commodity selected for the price floor scheme.

*Commodity exchanges.* Well-functioning commodity exchanges—systems of price discovery—improve marketing efficiency for agricultural products, and open up new production and marketing opportunities to producers. They reduce price risk (faced by both producers and buyers) by improving overall market liquidity, enhancing stability of local trading networks, and providing farmers with more certainty (through better information) of expected future prices (upon which they can make better managerial decisions). Commodity exchanges require effective regulatory oversight to ensure market surveillance, supervision, and compliance with quality standards. These exchanges can provide a platform for future development of a wider range of services for market participants—both buyers and sellers. The key to development of successful commodity exchanges is commercial interest from all market participants: buyers, sellers, and banks involved in lending to the sector.

Simple cash forward markets, such as warehouse receipt systems, offer some advantages of a commodity exchange and can offer performance guarantees, improve credit accessibility, and reduce price risks. Warehouse receipt systems enable farmers to store their products in a reliable warehouse until prices increase, using the product as loan collateral and accessing funds before the product is sold. Such systems improve access to credit and may help farmers avoid the problem of having to sell immediately at harvest when market prices are lowest. They depend on effective systems for grades and standards and on contract enforcement mechanisms that can guarantee performance by the seller.

*Price risk management tools.* Commodity derivatives markets present opportunities to hedge commodity-related risks through products like futures and options, or specialized physical contracts such as minimum price guarantee contracts, price to be fixed contracts, or long-term contracts with fixed or floating prices. Market-based tools can effectively insulate producers from short-term price volatility, but they are not yet available in most developing countries, and producers and traders (especially small-scale and resource-poor farmers and traders) typically lack access. A key development challenge will be to address constraints to access and the technical complexities of using the products appropriately.

*Barriers to participation.* Sellers of futures and options (for example, international banks and brokerage houses) often resist trading with unfamiliar customers, particularly small-scale producers, since performance risk and transaction costs are greater. The fact that the minimum size of contracts traded on organized exchanges far exceeds the annual quantity of production of most individual producers in developing countries is another constraint to their use of these products. Many market intermediaries, traders, processors, and exporters, who are in the business of aggregating volumes and could perform a role in intermediating price protection, lack knowledge of market-based price insurance instruments and their use. Technical and logistical limitations and other policy and regulatory controls can limit the development and use of derivatives markets (box 11.6).

### **Box 11.6 Colombia: policy barriers to the use of derivatives markets**

The Colombian government changed the legal framework so that the private sector was allowed to hedge price risks using external risk management instruments (including commodity derivative markets). However, the institution supervising coffee exports does not allow contracts for longer than three months. As a consequence, the fees to be paid for exports three months in the future remained uncertain and represented a larger risk than international coffee price risks. Exporters did not use the international hedging market and small-scale producers ended up absorbing the price risk.

Source: Varangis and Larson 1996

## **Lessons Learned**

*It is possible to bridge the market gap between developed world markets for risk management and developing country organizations that need the products and services.* Commodity risks are severe in developing countries, and they are felt by not only farmers but all the way up through the commodity trading chain. Demand for education about risk management solutions is high. Within the existing supply and financing chain, where there are organizations in the “business” of commodity trade (companies, farmer associations, and banks), it is possible to develop commercially based risk management solutions that strengthen the sector overall.

*Companies that provide risk management instruments, such as international banks, commodity brokers, trading companies, and insurance companies, are interested in expansion to developing country markets, but they recognize significant barriers.*

- The rigorous nature of know-your-client requirements and increasingly stringent initiatives against money laundering require a process of due diligence, particularly for unknown clients in developing countries.
- Providers are interested in commercial sustainability and support a strategy of pursuing larger aggregators such as local banks.

*Attempts to market risk management products directly at smallholder farmers have not proven to be easy, because (1) price-setting policies of cooperatives in many cases shield smallholder farmers from intra-seasonal price volatility and in effect transfer the hedgeable exposure from the smallholder to the market intermediary itself, (2) small production volumes do not equate to minimum lot sizes, (3) high levels of training are needed to achieve even a basic understanding of the instruments, and (4) providers are not willing to do business with very small groups of farmers (box 11.7).*

### **Box 11.7 Mexico: price risk management**

After the liberalization of agricultural trade in Mexico increased price uncertainty for farmers, ASERCA, a government organization providing support services for agricultural commercialization, assisted cotton growers to hedge their price risk using international markets. During the planting season, for a fixed fee or premium, farmers can voluntarily participate in a program guaranteeing a minimum cotton price that is fixed using the New York Cotton Futures Exchange. ASERCA offers a guaranteed price (in US dollars) and hedges its own risk by purchasing a “put” option on the Exchange for future delivery at harvest. Should the prices fall, ASERCA pays farmers the difference between the New York Exchange price at harvest and the minimum price. (This difference is equal to the payoff value of the put option.) If prices rise, ASERCA makes no payment to farmers. By participating in the program, a farmer purchases insurance against a drop in prices below a certain level.

Source: Varangis and Larson 1996

*Capacity building needs are high.* For intermediaries lacking basic business skills, the benefit of education about price risk management instruments will be marginal. Additionally, attempts to build risk management capacity in organizations that have more critical problems—such as poor communications infrastructure, institutional instability, underdeveloped marketing/financial skills, and weak managerial authority—are likely to be ineffective and inefficient. Of the prerequisites for successful change, the most fundamental is that the institution involved must have a strong commercial incentive to improve risk management practices.

*There is a strong link between price risk management and lending.* Local financial institutions have a very strong incentive to improve risk management, because lending to the sector is not profitable or sustainable when there is a pattern of repeated financial loss. High capacity building requirements at the level of the market intermediaries demonstrate the need for a permanent, local partner who can assist with the implementation of risk management, and local banks are well-positioned to play that role (box 11.8 has an example from Tanzania). Hedging with overseas providers requires ongoing communication with partners in London/New York, and local banks have the levels of commercial sophistication and communications infrastructure to support this business. They also know borrowers’ business problems and have a solid understanding of the impact of price volatility on profitability. As a larger aggregator, the involvement of local banks strengthens the potential for the development of sustainable business. From a lending perspective, the use of price risk management instruments can potentially help banks extend lending in the sector and/or reduce the cost, since hedged customers are more creditworthy than unhedged customers. Finally, since local banks have to compete to find clients, expanding the range of financial services that can be offered is an advantage for market competitiveness.

*Limited commodities.* The use of derivatives in international commodity exchanges to hedge price risks seems to be more appropriate for internationally traded export/cash crops such as coffee, cotton, sugar, rubber, palm oil, cocoa, and maize. But even in these cases, the issue of the basis risk—low correlation between local and international prices—could reduce the effectiveness of hedging.

*Short-term versus long-term protection.* Market-based risk management instruments can provide price protection against a short-term move in prices, but they are not a solution for a longer-term increase or decline in commodity prices.

*Requests for local commodity derivatives markets.* Several countries have set up their own futures and options exchanges (for example, Argentina, Brazil, China, Hungary, India, Malaysia, South Africa, and most recently India), and others have expressed interest in doing so. Local derivatives markets can provide local users with better access to contract exchanges, ensure that contract specifications are appropriate for locally traded commodities, introduce new contracts of local interest, and remove the exchange rate risk of using foreign exchanges. These benefits, however, must be weighed against the benefits of using existing exchanges that have well-established rules and regulations, confidence of their customers, and a high volume of transactions (liquidity), enabling users to easily find a buyer or seller. Preconditions for establishing new futures and options exchanges include a well-established cash (spot) market; a developed financial sector and regulatory framework; sufficient capital to form a viable clearinghouse; and interest of the local business community (box 11.9). In most cases, it makes more sense to support local cash markets and assist the emergence of simple cash-forward markets before considering development of a full-fledged commodity futures market.

#### **Box 11.8 Tanzania: managing price risks for borrowers**

In Tanzania, the agricultural sector generates nearly half of the country's GDP. CRDB is the largest local bank lending to agriculture, with a portfolio of over US\$60 million. It is heavily involved in the cotton and coffee sectors, with lending in 2004/05 at approximately US\$16 million for coffee and close to US\$20 million for cotton. CRDB faces high levels of exposure to price volatility because its borrowers, particularly those that are cooperative unions, are exposed to price risk. Most other banks and multinationals operating locally have withdrawn from agricultural lending because of the high levels of risk. Most of CRDB's clients in the coffee and cotton sectors are exposed to price risk, since they buy and sell at different times in the season. In some cases, the exposure is a "long" position, which is created by the agreement to purchase the product at a fixed price from producers before it is sold to exporters or traders. A different exposure, a "short" position, occurs when a cooperative union or ginner sells forward before having purchased the coffee or cotton from the producers. In either case, if the price moves adversely between the time of purchase and sale, these organizations run the risk of trading losses. CRDB has recognized that market-based price risk management can help clients hedge the risk of these trading exposures and has recently offered clients the ability to purchase option contracts based on New York Board of Trade coffee and cotton contracts, or the London International Financial Futures Exchange coffee contract.

Source: Julie Dana, Commodity Risk Management Group, the World Bank

#### **Box 11.9 Preconditions for a local commodity exchange**

- Supply and demand for the commodity concerned has to be large, with numerous market participants who consider the commodity to be an important component of their operations.
- The commodity traded must be well standardized, with grades widely accepted by commercial parties, and with independent entities able to evaluate grades. Exchange trade is easier if a commodity is storable.
- Pricing must be left to market forces. This means that there should be little likelihood of manipulation by private interests or government entities.

- The exchange should be supported by major commercial interests. This does not just mean that many companies should use the market for hedging but also that they are willing to use the exchange price as reference for their physical trading.
- Well-functioning and accessible services and infrastructure are necessary, such as good access roads, availability of transport companies, weight bridges, quality control services, an efficient administration, warehousing, and telecommunications (if the warehouses or the transport companies are controlled by only a few companies and not available for public usage, they are of little use from the exchange's point of view).
- Judicious government support is required, including a willingness to adopt suitable new regulation/legislation and appropriate oversight over trade on the exchange.
- Free market prices must be volatile enough to create large price risks.
- Producers should feel the exchange is good for them. This requires an educational effort by the exchange, and good public relations.
- There should be enough potential interest from the speculative community.

Source: Rod Gravelet-Blondin, General Manager of Agricultural Products, SAFEX (a division of Johannesburg Stock Exchange)

*Managing commodity risks is critical at the macro level to minimize costly ex post responses to price and weather shocks.* The overall attempt to help developing countries improve budgetary management and financial stability in the agricultural sector needs to include an examination of ways that market-based responses can affect macro-level commodity risk management (box 11.10). An enabling country framework should include both public roles and incentives for the evolution of private sector solutions to commodity risks. The on-going public role is as catalyst and facilitator, but there are also times when certain large and catastrophic risks with social implications require stronger public sector intervention. Insurance, hedging, and external financial assistance can present improved methods for managing such risks.

**Box 11.10 Malawi: the government's price risk management and food security**

The food shortage in Southern Africa in 2005 was severe. Affected countries included Malawi, Zambia, Mozambique, and Zimbabwe, and the volume of imports needed to supply these countries was estimated at 1.5 to 2 million tons. During a food shortage, local maize prices typically increase and exacerbate the risk of hunger, because higher prices mean that food becomes unaffordable to a larger proportion of the population.

In the past, governments attempted to manage this kind of problem by subsidizing the price of maize or using other market interventions, but such responses have a large cost, both financially and in terms of their negative impact on local and regional trade.

In 2005, the Government of Malawi took an innovative approach to the risks associated with import operations. First, the Malawi Vulnerability and Assessment Committee created two scenarios for humanitarian need, based on two different scenarios for local price ranges. Highlighting this connection between local prices and the size of the vulnerable population led the Government to take a strong interest in price volatility, and in September the Ministry of Finance purchased a SAFEX-based call option to help cap the cost of imports.

The option contract was originally designed to be a contingent import strategy used in the following way: if local prices were rising to an unaffordable level in commercial markets, and maize imports were not moving in quickly enough to meet the needs, the government could

quickly trigger an additional response. When the option was exercised (called), the maize that was imported could then be resold directly to local traders or through commercial markets. Alternatively, maize purchased through this mechanism could also be used to meet humanitarian needs.

In practice, the government exercised the contract as prices were increasing and allocated the majority of the maize to the humanitarian pipeline, where there were severe shortages. Within the region, traders and banks support this strategy and believe it has a number of advantages in addition to the value of hedging prices for imports. Contingent import strategies based on call option structures help in planning, because they can be put in place well ahead of the hungry season and then triggered or called on an as-needed basis. Call options can be used as a “back-up” strategy for the government and to replace non-market based attempts to stabilize prices. Strategic grain reserves can be restructured so that management of physical stocks and storage is done by private banks and traders, who then write call option contracts for sale to the government if needed in the future. Finally, donors and the World Food Programme are also interested in this type of approach from the perspective of reducing costs and maximizing the value of every food aid dollar.

Source: Julie Dana, Commodity Risk Management Group, the World Bank

*Scaling up risk management initiatives.* Recent initiatives have confirmed demand for risk management tools by small-scale farmers. Expanding the size and scope of market development activities will require incorporating price risk management into existing supply chain or financing arrangements.

## Recommendations for Practitioners

Direct government intervention in price risk management should be encouraged only where there are substantial barriers to the emergence of private providers. General recommendations for government investments related to price risk management include (box 11.11):

- Focus reforms on regulatory liberalization, reform of the legal system, clarification of collateral law and property rights, central bank regulations for using foreign exchange and offshore accounts, contract enforcement law, and creation of secure collateral in the form of appropriately backed warehouse receipts.
- Promote establishment of physical trading centers and spot markets that allow commodity buyers and sellers to efficiently find each other and do business together.
- Build awareness of the need to manage price risk effectively and develop the technical knowledge and capacity of *government* to provide an enabling environment,

### Box 11.11 Potential investments

- Technical assistance for customers (farmers, traders, banks) on use of derivatives, with support provided through producer groups, trade associations, or business development services providers.
- Cofinancing of critical infrastructure for market development, information and communication systems, logistical infrastructure, data management systems, and testing laboratories.
- Ex ante risk management solutions incorporated into food security strategies.

Source: Authors

- providers* (local banks) to develop and market appropriate services and tools, and *customers* (farmers, traders, processors) to understand and use the tools effectively.
- Develop relevant technical and logistical infrastructure (for example, information systems) so that market participants have access to real-time commodity price information.
  - Target the poor by identifying commodity sectors where exposure to price is severe and producers are not diversified.
  - Work within the existing supply and finance chain to develop delivery mechanisms that ensure benefits of improved risk management will accrue to producers.
  - Evaluate how risk management strategies could help avoid costly ex post response to price shocks, particularly for food and oil.

## Selected Readings

Asterisk (\*) at the end of a reference indicates that it is available on the Web. See Appendix 1 for a full list of Websites.

Akiyama, T., J. Baffes, D. F. Larson, and P. Varangis. 2003. "Commodity Market Reform in Africa: Some Recent Experience." Policy Research Working Paper 2995. World Bank, Washington, DC.\*

Byerlee, D., T. S. Jayne, and R. J. Myers. 2006. "Managing Food Price Risks and Instability in a Liberalizing Market Environment: Overview and Policy Options." Report No. 34499-GLB. World Bank, Washington, DC.

Dana, J., Gilbert, C., Shim, E. 2006. "Hedging Grain Price Risk in the SADC: Case Studies in Malawi and Zambia." Food Policy 31 (2006) 357-371.

Dana, J., Mahul, O. 2005. "Maize Production and Price Risk Financing in Uganda and Tanzania: The Feasibility of Market-Based Instruments." Working Paper for AFT Private Sector, World Bank. EW-P071154-ESW.

International Task Force on Commodity Risk Management. <http://www.itf-commrisk.org>.

Larson, D. F., P. Varangis, and N. Yabuki. 1998. "Commodity Risk Management and Development." Policy Research Working Paper 1963. Paper prepared for the Roundtable Discussion on New Approaches to Commodity Price Risk Management in Developing Countries, April 28, Washington, DC.\*

Varangis, P., and D. F. Larson. 1996. "Dealing with Commodity Price Uncertainty." Policy Research Working Paper 1667. World Bank, Washington, DC.\*

Varangis, P., U. Hess, and E. Bryla. 2003. "Innovative Approaches for Managing Agricultural Risks." In N. Scott (ed.), *Agribusiness and Commodity Risk Strategies and Management*. London: Incisive RWG Ltd.

## References Cited

Varangis, P., and D. F. Larson. 1996. "Dealing with Commodity Price Uncertainty." Policy Research Working Paper 1667. World Bank, Washington, DC.

This investment note was prepared by Julie Dana, Erin Bryla, Panayotis Varangis, and Sam Kane.
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## Agricultural Insurance

Concern for risks that stifle investment and contribute to vulnerability of the rural poor is a driving force behind various types of agricultural insurance (typically “crop insurance”). Insuring small-scale farmers against crop losses to adverse weather or other hazards has attracted public sector involvement in the provision of agricultural insurance in many countries. With few exceptions, such interventions have encountered severe problems owing to high administrative costs, moral hazard, and adverse selection. Government interventions should be aimed at improving the accessibility and quality of private sector insurance. This will require the establishment of a framework for responding to severe systemic events affecting agricultural production, and establishing an appropriate regulatory environment to foster private sector innovation and investment in services for less catastrophic events.

Agricultural insurance is a financial tool to transfer production risk associated with farming to a third party via payment of a premium that reflects the true long-term cost of the insurer assuming those risks.<sup>8</sup> Past public sector interventions to provide insurance and enable the poor to cope in times of hardship typically have failed. Government response in times of severe calamity has been ad hoc and has lacked precise criteria for what “triggers” an insurance payment, thus leading to high potential for political interference and reduced opportunity to obtain reinsurance. As a result, comprehensive publicly supported crop insurance programs have been disastrous, being both ineffective and fiscally burdensome. They have involved heavy subsidization of premiums, large delivery and service costs, and high aggregate losses. To be profitable, the ratio of average administrative costs plus average insurance payouts to the average premiums paid must be less than one. However, for most countries the ratio has far exceeded one, indicating that the programs have been unsustainable without heavy subsidization.

Traditional publicly supported crop insurance is *all-risk* or *multi-peril*, covering either all the supposed production risks or a very broad spectrum of those risks.<sup>9</sup> All-risk insurance usually involves payments to the grower as compensation for any shortfall when yield declines below a level set in the policy (Gudger 1991). In some instances, this has encouraged inappropriate use of insurance and has led to excessive risk taking or moral hazard, such as growing crops in high-risk regions, thus increasing farmers’ exposure to future losses. Assumption by the public sector of massive insurance losses in turn reduces opportunities to participate in broader reinsurance markets. The ad hoc nature of government policy has frequently been coupled with an ineffective and uncertain regulatory framework that increases uncertainty for private sector providers.

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<sup>8</sup> This note specifically excludes the area of price insurance; see the AIN, “Commodity Price Risk Management.”

<sup>9</sup> Worldwide experience has shown that in most cases traditional crop insurance requires public support. Support is provided directly where government insurance companies offer crop insurance or indirectly where the public sector provides subsidies, reinsurance capacity, and design/pricing of insurance products, but the private sector ultimately delivers the crop insurance to producers.

## Benefits

Where affordable insurance is not available, poor households typically survive less severe situations through informal coping strategies (such as drawing down savings, selling assets, making reciprocal exchanges, diversifying crops, and seeking nonfarm income). However, informal mechanisms often result in inefficient outcomes and unexploited market opportunities, because the fear of risk leads farmers to forgo potentially profitable production choices. As well, these systems tend to break down in the face of catastrophes because of the correlated nature of such disasters (box 11.12).

### Box 11.12 Types of risk

- *Correlated/systemic risk* occurs when many farmers experience a negative impact at the same time (drought, for example). This kind of risk cannot be insured in the traditional sense.
- *Idiosyncratic risk* is unique to a household and unrelated to neighbors; it can be due to management factor. Households can be insured against specific risks.
- *Covariate risk* is linked to second-round effects (example: drought leads to a fall in the price of assets as assets flood the market).
- *Basis risk in insurance* is the risk that an insured recipient will receive a payment that is higher or lower than the insured losses (when the risk management tool does not correlate to farm-yield losses).

Source: Authors

Insurance acts as a guarantee for investment and can serve as a form of collateral, allowing farmers access to credit services, investment opportunities, and protection from mild and severe shocks. Compensating for catastrophic income losses protects the consumption and debt repayment capacity and helps mobilize rural credit at reduced costs. Furthermore, improved ability to manage risk disproportionately benefits the poor.

## Policy and Implementation Issues

*Classifying risks and roles.* Agricultural risks vary in terms of severity and frequency. For the more severe and less frequent events (for example, intense and widespread flooding, prolonged drought), markets typically fail to provide adequate insurance services because of limited credible long-term statistical information, an inability to reinsure on international markets, and the possibility of having to make large payments in years of catastrophic loss (especially in the early years of the program). Because of this market failure (undersupplied risk management services for catastrophic events), the private sector is also likely to fail to provide services for the less severe, more frequent disruptive events (such as localized drought, pest outbreak) that services would otherwise be provided for. When it does, services often bypass the poor or smaller farmers. Thus there is a role for the public sector to intervene (at least initially) in the area of catastrophic risk management, as well as facilitating private sector service provision for more frequent, statistically documented disasters that they are better able to insure against. The following characteristics distinguish these various kinds of risks, and potential problems are discussed in box 11.13:

- *Major catastrophes (unprecedented anomalies)* have a severe impact but occur rarely (say once in 50 to 100 years). Since frequency of occurrence is undocumented, insurers cannot establish statistical likelihoods and assign value for premiums. And

since frequency is uncommon, farmers have little interest in purchasing such insurance.

- *Systemic crop losses* have a severe impact but occur with documented frequency (for instance, a drought or flood every 7 to 15 years). Statistical analysis can be derived allowing premiums to be established. With insurance often tied to access for credit, commercial farmers often have become more willing to pay for protection and the private sector increasingly has demonstrated its capacity to respond. Some public intervention may be needed, at least in the early stages of developing agricultural insurance for this type of risk.
- *Higher frequency but lower impact independent crop losses* have a less severe impact but occur with increased frequency, and they stem from a variety of mainly independent causes. Independent yield losses that are not systemic can be insured by the private sector and direct public intervention is inappropriate in this area. For very frequent deviations of crop revenues, appropriate savings and credit schemes should enable smoothing of farmers' revenues and the public sector role is more related to promoting rural savings and credit schemes. For high-frequency events (more frequent than 1 in 5 or 7 years) that cause systemic and high crop losses, agricultural insurance is not likely to be the appropriate instrument, and a different approach is required based on diversification and changes in crops or production technologies, for example.

#### **Box 11.13 Typical insurance problems**

*Distorted incentives.* When insurers know that government will automatically cover most losses, the incentive to pursue sound insurance practices when assessing losses is reduced. Insurers may even collude with farmers in filing exaggerated or falsified claims.

*Asymmetry of information.* Successful insurance programs require that the insurer has adequate information about the nature of risks being insured. However, this is very difficult for farm-level yield insurance where farmers will always know more about their potential crop yields than any insurer.

*Adverse selection.* Only those who are more prone to risk will purchase public crop insurance, posing a challenge to the viability of an insurer and initiating a cycle of losses. Conversely, the private sector could leave the “bad” risks to the government.

*Administrative costs.* Providing services to small-scale farmers can raise costs, as data for individual farm-yield based insurance are deficient, and monitoring and inspection costs are high.

*Moral hazard.* Insurance payout based on individual low crop yields as opposed to the *causes* of reduced crop yields leads to moral hazard—when a farmer's own behavior or management negatively influences crop yield.

Source: Authors

## **Lessons Learned and Recommendations for Practitioners**

The overall objective for agricultural insurance should be a private sector-led and demand-oriented system in which farmers (including smallholders and the landless) can access (1) services supplied by the private sector and (2) insurance products for mainly

less systemic and more independent risks, at a premium that reflects the true long-term cost of assuming those risks. Given this, and given the market failure associated with private sector supply, public sector involvement is important but should be limited to establishing a favorable environment for private sector initiative, establishing mechanisms for management of catastrophic risk that the private sector is unable to offer insurance against, and building the capacity of the private sector. Good practice for establishing private sector-led insurance is still evolving, but important implementation issues include:

*Public sector initiation of agriculture risk management services.* A critical public sector priority is to address large systemic risks that affect agricultural production and allow the private sector to develop insurance products for less severe events and for individual, independent farm risks. Large systemic risks must then be identified, and appropriate insurance mechanisms to manage these risks where markets fail to do so must be developed. Essential to public intervention in this area is making the government's role explicit and transparent (box 11.14). An unambiguous threshold to trigger government payout (identifying what will and will not be covered and to what degree) must be specified. This trigger must be quantifiable, and ideally it can be measured by an independent, competent, and credible third party. Farmers' participation in publicly supported schemes should be voluntary, the service provider should purchase reinsurance on international markets where possible, and administrative costs must be controlled.

#### **Box 11.14 Subsidies for crop insurance**

Individual crop insurance often requires heavy government subsidization: one important form is through subsidized premiums. This strategy creates several problems, because it encourages farmers to assume more risks on the margin, it benefits large-scale commercial farmers disproportionately, and it may cause rent-seeking by the private sector and so require more subsidies to expand coverage, thus becoming a fiscal drain. If governments wish to support agricultural insurance with some form of subsidization, they should focus on the catastrophic layer of risks (Skees and Barnett 1999). This support can be justified in terms of cognitive failure by farmers (that is, reluctance to pay for risks that occur with remote probability), and the fact that governments already "own" large systemic risks affecting rural people in that losses from large systemic risks are socialized across all taxpayers.

Source: Authors

*Data collection and actuarial modeling.* In designing insurance products for any type of risk, insurers (both public and private) must understand the relevant statistical properties. This requires both credible long-term statistical information and actuarial models to define the relevant risk probabilities and to predict the likelihood of various events. Various indices (for example, area rainfall or soil moisture indexes) may be particularly attractive for their practicality and cost effectiveness (box 11.15).<sup>10</sup> An important area of public sector support can be the development of information sources such as risk maps that improve the institutional capacity of both public and private sector providers to

<sup>10</sup> See the IAP, "India: Innovative Rainfall-Indexed Insurance."

identify and analyze risk. This information can form a common foundation upon which the transparent identification and pricing of risk (premium rates) can be based. Donors can support both the development of information systems and of the capacity of institutions (such as the ministry of agriculture) to build databases that can overcome information-related constraints to private sector participation.

#### **Box 11.15 Index-based insurance**

Using weather-based index and area-based yield contracts to insure against natural disasters offers increased affordability and accessibility of insurance services for the rural poor. Because triggers can be verified independently, vulnerability to political interference and manipulation of farm losses is reduced. It is practical to implement and has low administrative and transaction costs, so the private sector can provide it with little or no government subsidies.

*Weather-based index insurance* makes payments proportional to the difference of a measurable weather event (rainfall, temperature) from a certain trigger, as measured at regional weather stations. *Area-based index insurance* makes payments proportional to the decline of area yields below a certain trigger at the county or district level. For each of these, contracts are written against specific perils/events (area-yield loss, drought, or flood) defined and recorded at a regional level (local weather station). Insurance is sold in standard units (for example, US\$10 or 100 payouts), with a standard contract or certificate for each unit purchased. The premium rate is the same for all buyers, who all receive the same indemnity if the insured event occurs. Buyers are free to purchase as many units of the insurance as they wish. The insurance is written against the average yield for a region (county/district), and a payment is made when the measured regional yield falls below a defined limit (say 80 percent of normal).

Source: Skees, Hazell, and Miranda 1999

*Creating a favorable regulatory environment.* To encourage private sector initiative, the policy and regulatory environment must be deemed by all stakeholders as fair, credible, stable, and enforceable. Toward this end, donors can contribute useful policy advice and capacity building support (box 11.16).

*Educating stakeholders.* Education of stakeholders is important if farmers are to understand the benefits of insuring against certain events. Workshops, information packages, media, and other mechanisms are needed to explain the characteristics of insurance schemes and the different opportunities available. Further, technical assistance should be provided to both public and private sector suppliers to ensure that the needs of producers (particularly the most vulnerable) are met. Such assistance might be best provided through cofinancing for business service providers.

*Develop effective financial systems.* Generally, when the poor do not have access to credit, there is less incentive and capacity to secure insurance and pay up-front premiums. Development of financial

#### **Box 11.16 Potential investments**

- Technical assistance to analyze options for restructuring or phasing out traditional, unsustainable public sector agricultural insurance programs.
- Development of appropriate regulatory frameworks to encourage private sector provision of insurance products.
- Technical support for the private sector in design and testing index-based insurance schemes.
- Data collection/information systems to better understand risk characteristics.
- Education and training for farmers to understand risks and insurance options.

Source: Authors

markets should be promoted where possible to facilitate saving and borrowing and complement the insurance schemes that are established. The ability of resource-poor farmers to access these services should be at the forefront of public sector involvement. This will also contribute to improving access to funds required for making up-front margin deposits on futures and options contracts for managing price risk. Linking finance to index-based insurance is an innovative approach that has emerged from recent work (Hess 2003).

## Selected Readings

Asterisk (\*) at the end of a reference indicates that it is available on the Web. See Appendix 1 for a full list of Websites.

Gudger, M. 1991. "Crop Insurance: Failure of the Public Sector and the Rise of the Private Sector Alternative." In D. Holden, P. B. R. Hazell, and A. J. Pritchard (eds.), *Risk in Agriculture: Proceedings of the Tenth Agriculture Sector Symposium*. Washington, DC: World Bank.\*

Skees, J., P. Hazell, and M. Miranda. 1999. "New Approaches to Crop Yield Insurance in Developing Countries." EPTD Discussion Paper 55. International Food Policy Research Institute (IFPRI), Washington, DC.\*

## References Cited

Gudger, M. 1991. "Crop Insurance: Failure of the Public Sector and the Rise of the Private Sector Alternative." In D. Holden, P. B. R. Hazell, and A. J. Pritchard (eds.), *Risk in Agriculture: Proceedings of the Tenth Agriculture Sector Symposium*. Washington, DC: World Bank.

Hess, U. 2003. "Innovative Financial Services for Rural India: Monsoon-Indexed Lending and Insurance for Smallholders." Agriculture and Rural Development Working Paper 9. World Bank, Washington, DC.\*

Skees, J. R., and B. J. Barnett. 1999. "Conceptual and Practical Considerations for Sharing Catastrophic/Systemic Risks." *Review of Agricultural Economics* 21(2): 424-441.

Skees, J., P. Hazell, and M. Miranda. 1999. "New Approaches to Crop Yield Insurance in Developing Countries." EPTD Discussion Paper 55. International Food Policy Research Institute (IFPRI), Washington, DC.

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## Responding to Disaster with Seed Distribution

Seed is frequently distributed to farmers in post-conflict and post-disaster (for example, after drought) situations as a way of “restarting” agricultural production and improving food security. Programs must be appropriately targeted, locally adapted, and timely. They should strengthen local institutions and coping mechanisms and avoid distorting markets and undermining local seed systems. To maximize development impact and program efficiency, programs may need to be accompanied by fertilizer, tools, training, and technical support.<sup>11</sup>

The apparent increase in international emergency situations has led to massive displacement of people due to civil strife, drought, and other emergencies. Drought and other disasters, both natural and artificial, have led to widespread destitution and a need for emergency food programs. Restarting agricultural production disrupted by an emergency is often hampered by lack of adequate seed supplies, which may have been lost or consumed. The distribution of seed and associated inputs has become a common intervention for addressing the problems of emergency situations and promoting long-term food security among agricultural communities affected by disaster. By providing the inputs necessary for crop production, such interventions increase agricultural productivity and reduce dependence on food aid.

Seed interventions merit consideration where displaced peoples are returning to agriculture or where pests, floods, or drought have depleted normal seed supplies. Even in refugee settings, gardens may help people increase food security and exercise a small measure of self-sufficiency. The most commonly distributed seeds are for cereal crops such as maize, wheat, rice, and sorghum. Roots and tubers, other planting materials, and vegetable seeds may also be distributed to be grown close to homes, taking advantage of water recycling. Cassava is especially useful in conflict situations, because the plants can be left in the ground and harvested over a long period, allowing farmers to harvest depending on the security situation (USAID 2002). In some situations, distribution of fertilizer and hand tools may also be appropriate.

### Benefits

Effective seed system interventions can prevent food shortages by enabling a population to grow food and can decrease emergency costs incurred through the provision of food aid. Compared to subsidies, the targeted supply of seed and other production inputs can benefit smallholders most in need rather than the richer or more influential members of the community. This also can be an opportunity for the introduction of innovations (new varieties, crops, or management practices) with longer-term positive effects on agricultural productivity. Food security at the household and national levels can be increased and local markets strengthened.

However, inappropriate, uncoordinated interventions can decrease seed system stability and varietal diversity, while bringing a set of unintended negative impacts on the social

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<sup>11</sup> This investment note draws largely from USAID (2002).

and political economy of recipient communities. Some interventions can distort production incentives, destroy local seed markets, and prolong the transition to sustainable farming systems. There is now a keen awareness that interventions need to be designed more carefully to alleviate the root causes of specific problems, rather than being viewed as a generic default response to emergencies. Interventions must build on the strengths of existing seed systems and alleviate their weaknesses, rather than impose new systems from outside.

## **Policy and Implementation Issues**

*Availability, access, and utilization.* Practitioners of seed interventions are now starting to understand the roles that seed availability, access, and utilization play in agricultural recovery following a crisis, and they are using this understanding to target interventions better.

- *Seed availability* refers to the seed supply within the affected district, region, or community. It is described according to the desired type, quantity and quality of seed or planting material available, as well as where and when it can be obtained. Availability may refer to both informal farmer-to-farmer networks and the commercial seed system. Seed availability is often a factor following a long-term drought or a sudden-onset disaster, when both stored and planted seeds may be destroyed or lost, leaving farmers without seed to plant and without the ability to obtain new seed through traditional farmer seed systems.
- *Seed access* refers to the ability of farmers to acquire the seed or planting material that is available. In some cases, seed may be readily available on local markets, but farmers are unable to purchase the needed seed (due to lack of purchasing power or physical access). Poorly planned distribution disrupts markets and eliminates local sources of income and incentives to produce seed for future years.
- *Seed utilization* refers to the ability of farmers to make use of seed, once it is accessed. This implies that farmers have tools, land, knowledge, and physical ability to plant seed.

*Formal and farmer seed systems.* Most smallholder farmers use their own saved seed for planting. Depending on the crop and situation, farmer-saved seed can be of a comparatively high physiological quality (in terms of germination percentage, physical purity, and varietal integrity). Seed quality does not necessarily deteriorate when seed is saved from season to season. Seed is also available from commercial seed companies—the formal seed sector. In most emergency situations, relief agencies obtain seed from the formal sector in relatively large quantities, often because procurement from small-scale farmers is deemed too difficult and seed is needed on short notice. Such seed is not necessarily better than farmer-saved seed, and it is often easy to overestimate the ability of the commercial seed sector to effectively satisfy the seed needs and demands of local producers (Jones et al. 2002).

*Dependencies and distortions.* Inappropriate seed distribution can cause a general dependency on these programs. Many communities come to expect emergency seed aid as a right, thus undermining the advance of local seed systems toward independent and sustainable enterprises. Seed insecurity may increase if spontaneous aid/relief in the form

of free distribution of improved varieties undermines the capacity of local seed systems, and limits adoption of locally suitable plant varieties and farming practices.

*Seed quality and health.* It is critical that the seed being distributed be labeled accurately (such as seed type, quality characteristics), and that it is appropriate for local conditions. Tests should confirm that seed is viable before it is purchased and distributed. Also, when importing seed, attention must be given to the phytosanitary inspection of seed, even when official requirements are waived because of a crisis. Introducing new diseases or insect pests to a region may cause long-term problems. In other situations, strict phytosanitary controls make no sense (for example, moving seed across a land border over which seed and grain normally flow freely in both directions). Sound technical advice is required in managing such seed imports.

## Lessons Learned

*Situation analysis.* Before making decisions about seed system interventions it is important to distinguish between problems of *availability* and problems of *access*. In some instances, the costs of intervention (in terms of potential for creating dependency, distorting impacts, and opportunity cost of donor funding) outweigh the benefits. Food aid alone may suffice to overcome the emergency through reducing the pressure to consume seed for planting.

*Sourcing the seed.* Seed distribution programs should be based on an understanding of the farming systems and what kinds of seed are needed, what varieties are most appropriate and accepted by the community, and what technologies are familiar to local farmers. When distributing new varieties, there should be evidence that these have been tested and have performed well in a similar agroecological area and that cooking and processing quality are compatible with local taste preferences. Ideally, relief seed distribution should be of locally produced seed of locally adapted crops. A program that purchases local seed can support indigenous marketing of both traditional and commercial seed. Past seed interventions, in both disaster and nondisaster situations, have often failed because of a tendency to assume that modern technology and formal systems are best, and that there is little value in strengthening what already works (Jones et al. 2002).

*Treated seed.* There may be reasons to treat seed with pesticide or other seed treatments to safeguard seed quality and crop productivity, and seed purchased from the formal seed sector may come with seed treatment irrespective of the relief agency preference. Adequate farmer training/orientation and adequate food distribution should ensure that treated seed is not used for food. Training of women in this regard is a priority.

*Fertilizer, tools, and technical support.* For seed distribution to be effective, it will often need to be linked with the provision of fertilizer, tools, and technical support. Even limited quantities of fertilizer (as little as 10 kilograms of nitrogen per hectare) may significantly increase yields. Complementary inputs are best supplied through local markets (traders, local stores), if farmers have the resources to make purchases. New inputs will generally need to be complemented by well-informed crop management advice, including advice to women. Targeting training to scientists and technicians is also important (box 11.17).

**Box 11.17 Rwanda: scientist and technician training**

Most scientists working for the national research institute and the Ministry of Agriculture before the war of 1994 were killed or fled to neighboring countries. Newly recruited scientists and technicians were generally inexperienced and lacked institutional memory relating to agricultural research and development programs. In this situation, regional research networks helped rejuvenate the national research and extension system. Training of scientists and technicians involved research methods, seed production, technology dissemination strategies, selection criteria, and evaluation techniques. The training enabled scientists to restart field research to address needs of farming communities.

Source: Buruchara et al. 2002

*Timing.* In most countries, the agricultural season presents a short window for planting, so seed must be provided and in farmers' hands at the start of the planting season. If an agricultural crisis is on-going, seed distribution may need to be coupled with food distribution so that all seed is used for planting rather than consumption.

*Targeting interventions.* The distribution of seeds, tools, or the means to access them (vouchers) must be targeted to the poorest farmers with the greatest need for assistance. A thorough assessment can determine not only what kinds of interventions are best, but also how to target those interventions. Where community organizations are strong, it is preferable for them to define eligibility criteria and take responsibility for allocating seed and inputs among needy families.

**Box 11.18 Uganda: emergency seed vouchers and farm tools**

After unrest in 2000 had forced Ugandans from their farms, a program was initiated to enable families to reestablish farming systems. The program provided families with farm tools and vouchers for the purchase of seed. The intervention was based on an assessment that showed lack of access to seed (not lack of availability) to be the main problem. Beneficiaries redeemed their vouchers for seed at seed fairs or special market days, with about 12,000 families accessing over 200 tons of seed of 10 crops and 30 varieties.

Vouchers enabled farmers to buy commercial or traditional seed of their choice in the crops and varieties they preferred. They were able to examine the seed themselves and select seed of acceptable quality. Since they were unable to return to their farms until the middle of the rainy season, they were able to choose seed of crops and varieties that are traditionally planted late. Seed fairs facilitated interaction between seed sellers and farmers, enabling both traditional and commercial seed sellers to market their seeds. Almost 50 percent of the participating grain traders were women. Overall, the assistance was flexible, timely, and cost effective.

Source: USAID 2002

*Vouchers and seed fairs.* Seed vouchers redeemable from certified retailers and seed fairs serve to strengthen farmers' seed procurement systems, improve cost efficiency, and allow commercial sector participation and farmer experimentation with new varieties (boxes 11.18 and 11.19). This provides a level playing field for the commercial seed sector and the farmer seed systems to compete and complement one another. Beneficiaries have a greater choice of crops, varieties, and seed quality, compared with traditional seed-and-tool distribution programs. This voucher and fair system is most appropriate where there is a problem with seed accessibility rather than availability, but upward pressure on seed prices must be considered.

#### **Box 11.19 Tanzania: seed fairs**

After four years of drought in Tanzania, farming households were ill prepared to cope with the drought of 2000. The U.S. Agency for International Development (USAID) sought to empower communities to access what they needed from within their communities. The scheme provided vouchers to vulnerable households to enable them to buy seed at special seed fairs organized locally. Prior to the project, seed surveys confirmed that, even after four years of drought, large amounts of seed were available locally. Meetings were held to inform all stakeholders about the voucher system. The most needy households were selected using democratic and transparent guidelines. Each household received six vouchers valued at about US\$1.80 each. Some 14,000 voucher recipients bought seed from more than 400 seed vendors in 30 seed fairs.

Source: USAID 2002

## **Recommendations for Practitioners**

Important recommendations for practitioners involved in investments related to the response to disasters with seed distribution include (box 11.20):

- Carry out a situation analysis to identify the true cause and nature of the problem (access versus availability, chronic versus acute) and to understand both the farmer seed system and the commercial seed system and plan the intervention to strengthen existing capabilities.
- If farmers have the resources to purchase seeds, use local markets (traders, local stores) for distribution.
- Target specific groups with limited purchasing power, using NGOs, local women's groups, or farmer associations to develop eligibility criteria for selecting beneficiaries and to handle seed distribution.
- Identify the complementary inputs and training needed to increase productivity and build local capacity.

### Box 11.20 Potential investments

- Technical assistance for analysis of needs and alternative ways of addressing seed supply problems.
- Financing alternatives to seed interventions (for example, food aid) where such alternatives will have a more positive impact on poverty and sustainable livelihoods.
- Procurement and distribution of seed where it is the best alternative.
- Vouchers systems for target farmers to purchase seed and other inputs.
- Seed fairs where vendors (both commercial and local farmers) and buyers can trade seed.
- Information campaigns to inform farmers of seed programs or alternative sources of seed.
- Training for farmers and for scientists and technicians providing support services.

Source: Authors

## Selected Readings

Asterisk (\*) at the end of a reference indicates that it is available on the Web. See Appendix 1 for a full list of Websites.

Buruchara, R. A., L. Sperling, P. Ewell, and R. Kirkby. 2002. "The Role of Research Institutions in Seed-Related Disaster Relief: Seeds of Hope Experiences in Rwanda." *Disasters* 26(4): 288-301.\*

USAID (U.S. Agency for International Development). 1998. [\*The Field Operations Guide for Disaster Assessments and Response\*](#). Washington, DC: USAID, Office of U.S. Foreign Disaster Assistance.\*

USAID (U.S. Agency for International Development). 2002. [\*Disaster Reduction: A Practitioners Guide\*](#). Washington, DC: USAID, Office of U.S. Foreign Disaster Assistance.\*

## References Cited

Buruchara, R. A., L. Sperling, P. Ewell, and R. Kirkby. 2002. "The Role of Research Institutions in Seed-related Disaster Relief: Seeds of Hope Experiences in Rwanda." *Disasters* 26(4): 288-301.

Jones R. B., P. Bramel, C. Longley, and T. Remington. 2002. "The Need to Look Beyond the Production and Provision of Relief Seed: Experiences from Southern Sudan." *Disasters* 26(4): 302-315.

USAID (U.S. Agency for International Development). 2002. *Disaster Reduction: A Practitioners Guide*. Washington, DC: USAID, Office of U.S. Foreign Disaster Assistance.\*

This investment note was prepared by Sam Kane.

## **Strengthening Agricultural Markets in Areas Affected by Conflict**

Promoting stability in states affected by conflict is an important challenge for the world today. Conflicts, especially long-term conflicts, devastate rural areas, where livelihoods are based on agriculture. By stimulating agricultural production, local consumption needs are met while market linkages—which are key to the development of a sustainable economy and provision of a stake in continued peace—are reestablished and strengthened. Investment needs in such situations are many and varied, often including infrastructure, marketing systems, extension, health, and education.

Conflicts are widespread at present. Most are internal, rooted in ethnic or religious grievances. Others stem from political motivations or competition for economic resources. Whatever the reason, longstanding conflicts persist in countries such as Sudan, Sri Lanka, Colombia, and elsewhere. Prolonged conflict erodes state legitimacy and effectiveness, giving rise to “fragile” and “failed” states.

By undermining livelihoods and preventing normal trade patterns, conflicts are an important cause of extreme poverty. As formal and informal economies weaken or even collapse during conflict, rural people often rely on—or revert to—agriculture as their economic mainstay. At the same time, markets often fail in their vital function as a source of supply to meet rural needs and an outlet for the sale of rural goods and services.

Post-conflict environments present multiple constraints to revitalizing agriculture, such as destruction of infrastructure; flight of scientists, technicians, and managers; and breakdown of social trust. Roving armed groups and deadly landmines may continue to threaten security. People may disengage, fearful to attend meetings or band together with former adversaries in common economic purpose. Under such conditions, private sector and donor investment confidence is typically low.

### **Benefits of Strengthening Markets**

The often large land area in regions affected by conflict is a major productive resource. Agriculture warrants investment where viable opportunities exist for employment and value-added processing. Investments in the entire agricultural value chain in post-conflict situations are priorities where:

- Providing economic opportunities offers an alternative to continued conflict and can jump-start the rural economy.
- Investments can connect communities previously in conflict and can reduce tensions between resident and returnee communities.
- Improvements in economic and social conditions promote stability and thereby avoid further destruction of productive assets.
- Reconstruction reduces needs for costly food aid and other humanitarian assistance.
- Agricultural investments can mitigate the mismanagement and overexploitation of natural resources that often occurs in conflict-affected areas.

- Security has been restored to a sufficient degree, allowing safe mobility and protection of people and property, on which markets depend.

## Policy and Implementation Issues

*Avoiding dependency.* The tendency in disaster recovery (whether from natural disaster or conflict) is to assume that systems have totally collapsed and all livelihood assets have been lost. This assumption results in lengthy reliance on relief and food aid, leading to a dependency syndrome characterized by missed opportunities to strengthen markets and by a lack of initiative for conflict-affected groups to take charge of their own destinies. While the extent and prevalence of such relief dependency can easily be exaggerated, there are often perverse incentives for local leaders, aid recipients, and relief agencies. Promoting sustainable livelihoods requires judicious phasing of the reduction of relief aid with assistance for expanding agricultural production, processing, marketing, and other livelihood options.

*State will and capacity.* Investment strategies in post-conflict agriculture depend to a great extent on the state's willingness and commitment to deliver services and its capability to do so. These are two hallmarks of a stable state—its legitimacy (the perception that it acts in the best interests of all of its citizens) and its effectiveness (the perception that it provides needed public goods and services to all). Market-facilitating programs should seek as appropriate to strengthen these aspects of the state to contribute to stability.

*Laying the groundwork for peace.* Investment decisions in post-conflict areas involve important trade-offs between delivery of short-term services by outsiders, which may promote stability, and longer term capacity building of insiders, which may get at the root causes of the conflict (Meagher 2005). It is also vital to identify local capacities to both exploit and nurture in market recovery, concurrent with vigilance in avoiding exacerbating tensions (Anderson 1999).

*Working with unsavory regimes.* Developmental assistance frequently legitimizes the administration in power in an area, whether national government or rebel movement. Even though assistance may directly benefit the poor, it can help to perpetuate oppressive and unstable regimes and lead to longer term suffering. The challenge for donors and NGOs is finding a way to manage opposing imperatives: the need to avoid legitimizing undesirable, corrupt, or rebel regimes and the need to meet the genuine needs of the poor and war-torn groups. Donors and NGOs will need to evaluate the options carefully before embarking on a new agricultural marketing program in such areas, seeking to work through locally based civil society groups while avoiding association with odious regimes.

*Local participation.* Local participation is invaluable for understanding the impact of the conflict, identifying needs as well as opportunities, and assigning local responsibilities. However, participating in public meetings, voicing opinions, and serving on committees and representative bodies may expose individuals to suspicion and political threats. A further question is, "Who benefits?" Local elites, who may naturally, and even in a spirit

of public service, step in as leaders, are likely (intentionally or not) to influence the sharing of program benefits. Women often have little voice in decision making and priority setting. Caution is essential in such environments. It is advisable to work through conflict resolution NGOs (Anderson, 1999). Decentralized implementation approaches are often important to tap local capacity and to promote a stronger role for local people in marketing program planning and implementation.

*Reconstruction versus new construction.* Ironically, a prolonged and destructive conflict offers opportunities for a fresh start with new models and pragmatic choices. However, after lengthy periods of conflict, participants in the conflict may look back to development models they know from the past rather than forward to new options. A tendency towards statist approaches (such as parastatal commercial activities, state provision of services) rather than public-private partnerships and market mechanisms is a particular concern. Because there may be little or no private sector capacity in conflict-affected regions, however, the state or entities such as NGOs or cooperatives may have to play transitional roles in agricultural input supply, service delivery, and marketing.

*Corruption and rent-seeking.* Opportunities for corruption arise with new institutions, investments, and income streams. Those who endured hardships at home and the dangers of combat often seek rewards for their perceived or real wartime sacrifices and think little of using public resources for personal profit. Forestry resources, cash crops, wildlife, and other income sources present prime targets. Illicit crops (drugs) may also flourish. New institutions and investments in agriculture and agricultural markets, like those in other sectors, require oversight and accountability mechanisms to guard against corruption.

*Competing priorities.* In situations where conflicts have been longstanding and/or where areas had been previously neglected, recovery efforts face multiple conflicting demands for assistance—infrastructure, capacity building, institutional development, agricultural services, policies and regulatory frameworks, and so on—with needs everywhere one looks (box 11.21). There is no blueprint for prioritizing interventions, but it is advisable to: (1) provide some quick, visible evidence of the benefits of peace, such as infrastructure or community grants, during a time of high expectations; (2) make incremental investments on the multiple fronts that need to be addressed; and (3) handle land and asset claims of returnees through a special legal review system that is prompt, fair, and transparent.

*Demobilization, disarmament, and reintegration (DDR).* It will be necessary to provide a resettlement allowance and vocational/technical skills in agriculture and related rural enterprises to ex-combatants and others who return “home.” A smaller peacetime army and police force will not be able to absorb every ex-combatant. While some former fighters will resume their prewar activities, others may have no interest in farming or a rural life. Meeting the needs of permanently disabled veterans poses special challenges. Reintegration of ex-combatants through viable market-oriented job programs into an expanding peacetime economy is critically important.

### **Box 11.21 Checklist of entry points for post-conflict agricultural investments**

The effectiveness of agricultural investments will vary country by country and case by case. Much depends on the underlying conditions, the depth of fragility, or nature of the current or previous crisis or conflict:

- The length of crisis or conflict (*Was it long or short?*)
- End of crisis or conflict (*Did it end in decisive victory or in stalemate and negotiated settlement, which might leave unresolved issues to fester?*)
- Existence of physical infrastructure (*Was it largely intact or destroyed?*)
- Availability of skilled workers and trained professionals (*Are these people in country or scattered abroad?*)
- The performance of existing public institutions (*Are they effective or ineffective?*)
- Tradition of market-based economy (*Is it strong or weak?*)
- Presence of demobilized soldiers who need to be reintegrated and retrained in nonconflict occupations (*Do they remain a threat? Can they be absorbed quickly?*)

Answers to these questions can determine how to sequence and prioritize investments in agriculture to guide economic stabilization, recovery, and capacity-building. Investments also need to consider how they can build off of—and make a smooth transition from—humanitarian response programs.

Source: Authors

## **Lessons Learned**

*Be aware of the impact of changing contexts of the post-conflict environment on agriculture.* As an area transitions out of conflict, security needs will be paramount. The initial post-conflict phase often centers on physical rehabilitation and reconstruction of basic infrastructure. Markets are typically weak or even missing at this moment. Market interventions are often supply-driven, as outsiders provide emergency relief food and other supplies. Economic rehabilitation follows, with a greater focus on supporting livelihoods and strengthening local institutions. Later on, systems rehabilitation aims to further develop infrastructure, technical capacity, and formal institutions. Development of economic institutions and regulations improves market performance, leading to a demand-driven system (box 11.22). During this transition, the focus of donor and NGO assistance will have to shift accordingly.

*Strengthening markets.* Markets are resilient. A fundamental lesson is that prolonged conflict changes markets but does not destroy them. Counter to conventional wisdom, markets continued to function in Afghanistan and in northern Uganda in spite of 20 years of conflict. A key to return to stability is first to understand how markets function and then to work to strengthen them so that people can access food and other needs and develop a stake in peace and stability by finding employment and earning incomes.

Local purchase of food for relief activities may stimulate local production. The establishment of parastatal marketing organizations and intervention on the supply side are generally not good ideas. However, in some cases, subsidies that support demand can increase access and food security, strengthen markets, and provide incentives to both

producers and traders. Demand subsidies in the form of vouchers have been used most widely for seed, but also more recently for fertilizer and small livestock. Such interventions must be approached with caution: subsidies should be time bound with a clear “sunset clause” to cease operations.

#### **Box 11.22 Post-conflict transition and agricultural markets**

Agricultural support in conflict and post-conflict situations should facilitate the transition from supply-led programming to the establishment of sustainable systems for service delivery, developed within a framework of broad-based efforts to protect and promote rural livelihoods. This transition can be broken down into a number of measures:

- To ensure that vulnerable farmers have access to agricultural inputs and services (food for agriculture, seed, irrigation, pest control, animal health, microfinance, extension), either through direct distribution or interventions designed to stimulate choice, such as vouchers.
- To increase agricultural production through access to appropriate technology options.
- To increase rural incomes through the promotion of agricultural product and labor markets.
- To establish the capacity, structures and institutions necessary for the sustainable delivery of inputs and services.
- To address vulnerability and social inequality through social protection and livelihood promotion.
- To promote the reforms necessary to address the structural causes of vulnerability.

Source: Longley et al. 2006:51

Infrastructure needs, especially roads, communication, and information networks, are often great following conflict. Honest law enforcement is another pressing need to counter the threat to commercial activity of informal “taxation” by local security forces or armed criminal groups. Newly formed post-conflict governments may need substantial assistance to formulate policies and regulatory frameworks that facilitate free markets for production inputs and agricultural outputs.

*Building capacity.* Long-term capacity development should not be neglected, even in the face of apparently overwhelming short-term needs in the post-conflict period. Training and institutional development provide an invaluable long-term payoff. Training needs assessments are an important start. They should assess needs at all levels and should also address needs for establishing or strengthening local training institutions.

*Tapping the diaspora.* Post-conflict reconstruction and development efforts can often benefit from services of diaspora populations of emigrants and those displaced during the conflict. Such populations often include highly trained individuals with the ability to access investment capital and commitment to serve their country. Innovative programs to assist in bringing such people back—on a temporary or permanent basis—can help meet many needed skills in agriculture and agricultural marketing.

*Agricultural service delivery.* In post-conflict situations, the state frequently lacks capacity in extension, adaptive research, market information, veterinary support, and other services. International NGOs (INGOs) are often the dominant service providers in the early post-conflict period, but community-based organizations may also be effective.

Increasingly, the international agricultural research centers are engaging in and supporting agricultural recovery.<sup>12</sup> In such situations, it is important to:

- Engage government early to build capacity where willingness exists, to establish a policy framework for service delivery, and to plan complementary interventions.
- Prioritize, sequence, and bundle services (in other words, provide multiple services through a single implementing mechanism) where appropriate.
- Emphasize security, public safety, peace building, and low-tech service packages for remote or rebel-held areas (Meagher 2005).

Options for providing services include direct state delivery, NGO provision, contracting out, community action, or a mix of these (Table 11.1).

**Table 11.1 Parallel versus state-linked service delivery aid models**

	<b>Independent INGO projects</b>	<b>Hybrid INGO/state model</b>
<b>Advantages</b>	<ul style="list-style-type: none"> <li>• Strong quality control and resource monitoring</li> <li>• Scale/speed not limited by local capacity or systems</li> <li>• Access to services by vulnerable people where state has broken down</li> <li>• Independent and nonpartisan, may influence state from outside</li> </ul>	<ul style="list-style-type: none"> <li>• Possible to access dispersed clients through existing state networks</li> <li>• May “leave something behind”—long-term capacity</li> <li>• Better access to relevant data and knowledge</li> <li>• Less likely to distort or subvert state systems</li> <li>• Positive influence through collaboration</li> <li>• Relatively cheap</li> </ul>
<b>Disadvantages</b>	<ul style="list-style-type: none"> <li>• Costly (expatriates)</li> <li>• Hard to reintegrate services with public sector</li> <li>• May undermine state, draw away civil servants</li> <li>• Do not address causes of long-term vulnerability</li> <li>• May be hard to scale up</li> </ul>	<ul style="list-style-type: none"> <li>• May be restricted by existing systems and capacity</li> <li>• May have to work with flawed protocols</li> <li>• Limited access to rebel-held areas</li> <li>• May fragment state systems, fail too coordinate with other agencies</li> <li>• Unrealistic expectations for government?</li> </ul>

Source: Meagher 2005, adapted from Laurence and Poole 2005.

Where state institutions and structures are new and deserving of support, development activities can help legitimize the new government by working with it and boosting its visibility. Government capacity is typically low, but NGO and donor programs can operate within a government framework and attribute services to local institutions.

*Support farmer organizations.* Support of business-oriented farmer organizations—both small, informal “self-help” groups and large, formal apex organizations or rural cooperatives—can strengthen social cohesiveness and market linkages during the post-conflict period. By organizing around an economic motive, groups and cooperatives have the potential to reach across the conflict divide. By acting in economic self-interest and building trust among members, groups and cooperatives have a stake in peace. At the outset, cooperatives may require sponsorship and considerable hands-on support by

<sup>12</sup> See the IAP, “Afghanistan: Supporting Food Security by Establishing Village-Based Seed Enterprises.”

qualified NGOs, but successful cooperatives eventually develop a culture of self-help, avoiding aid dependency.

*Importance of urban areas.* Market towns are important to agriculture in post-conflict situations and warrant investment in infrastructure that enables economic growth—markets, transport, telecommunications, and electricity. Larger towns often attract returning refugees that have grown used to better services that are not available in rural areas. The presence of these returnees may provide opportunities for investment in periurban agriculture and related value added.

*Seed security and seed system strengthening.* Seeds and tool distribution programs are the quintessential post-conflict assistance instrument, visible evidence of “assistance” to restart agricultural production.<sup>13</sup> Where seed security assessments confirm the need for seed, it is preferable to use locally produced seed procured through seed or livelihood fairs. This is because these seeds are adapted to local growing conditions and known by farmers (Sperling and Longley 2002). Responding to a problem of access via vouchers has the added advantages of connecting resident communities with seed to sell and returnees equipped with vouchers to exchange. Seed sales increase the income of the sellers, who are usually farmers themselves; this income can be reinvested in nascent agroenterprises (box 11.23). Programs introducing new crop varieties need to ensure adequate testing.

**Box 11.23. Northern Burundi: Role of small-scale traders in the local seed system**

Since 1993, conflict has caused the death of over 200,000 and the displacement of over 700,000 persons in Burundi, contributing to extreme poverty. To assist in recovery, seed aid initially consisted of: (1) determining the number of households needing seed, based on food security information, (2) issuing tenders and awarding contracts for the local procurement of seed, and (3) subsequent distribution by NGOs. When it was clear that there was sufficient seed in the system to meet the needs of the seed insecure, Catholic Relief Services began using an approach that combined the issuance of vouchers for seed combined with seed fairs that brought prospective seed sellers and voucher recipients together. Seed vouchers and fairs are cost efficient and have reached considerable scale and scope across Burundi. Seed exchanged for vouchers has been competitively priced and of good quality. This approach has been especially important for women traders and has captured an opportunity to exploit and strengthen social capital.

Source: Bramel et al. 2004

*Taking labor availabilities and requirements into account.* Loss of able-bodied labor (due to conflict death or injury) limits rural households’ economic options. For example, the loss of household labor (particularly the main breadwinner) usually means less land is cultivated and/or less labor-intensive crops are cultivated. It often will be necessary to invest in research into and extension of less labor-intensive crop varieties and techniques. Drip irrigation techniques for higher-value fruits and vegetables, for instance, might offer a viable solution to loss of household labor, provided there is financing for the purchase

<sup>13</sup> For a comprehensive discussion of seed distribution issues, see the AIN, “Responding to Disaster with Seed Distribution.”

of equipment and identified market demand for the produce. Training disabled people in less physically demanding marketing activities is another option for helping households cope with loss of labor.

## **Recommendations for Practitioners**

Assume that markets, though altered, are resilient and still function. Invest in describing and diagnosing constraints to market performance. Identify opportunities to enlist markets in recovery. Focus on ensuring that farmers have access to seed, fertilizer, and other complementary inputs and that initial assistance is delivered in a manner that helps build market-based input distribution networks.

Avoid prolonged aid dependency by linking producers to markets. By producing for the market, the producer decides to provide a good or service on the basis of market demand in terms of quality, quantity, and timing. Producing for the market differs from producing for subsistence or speculative sales. As a further benefit, market-oriented production drives the development of input markets and service delivery as well as value-added processing, storing and transporting.

Although this investment note deals with agricultural markets, development practitioners need to focus on the whole range of rural livelihoods, of which agriculture is often just one part (see box 11.24 on the range of potential investments). Don't think in terms of project fixes that focus on one aspect of agriculture alone, such as production technology transfers, without attention to other aspects, such as input requirements, credit needs, and marketing channels. Looking at the entire value chain (or commodity subsector) and interactions among all levels will help to identify and address constraints and reduce transaction costs.

Use “assessment frameworks” to (1) identify the drivers of conflict or patterns of fragility and (2) guide the choice and sequence of investments that reduce the drivers of conflict to build a secure and lasting post-conflict economic environment. An understanding of the impact of the conflict on the pre-conflict situation can help identify strengths and resiliencies in the affected people and their systems that can be harnessed in recovery.

Build local capacity. Support local institutions. Make markets reliable and efficient. Consider carefully the impact of outside assistance on local market structure, conduct, and performance. Strengthen markets as a neutral venue where conflict-affected people can buy, sell, and reconnect.

### **Box 11.24. Potential Investments—sometimes nearly everything**

- Capacity building, including policy studies, extensive refresher training courses for “old” staff and scientists, degree training for “new” staff, and investment in local training infrastructure.
- Seed and tool distribution (provided through fairs where possible).
- Cash grants to producers may be an alternative to distribution of inputs, where input markets are already operational.
- Infrastructure, especially to facilitate marketing of agricultural inputs and products.

- Community grants to develop local infrastructure, social capital, and income opportunities.
- Public works projects to generate employment.
- Urban development investments.
- Extension services and adaptive research, drawing especially on technology spill-ins from neighboring countries.
- Market development, including market information studies, business development services, market infrastructure (including elements of the infrastructure that facilitate women's participation), cooperatives, and regulatory systems.
- Microfinancing programs.

Source: Authors

## Selected Readings

- Addison, T. 2005. *Agricultural Development for Peace*. United Nations University, World Institute for Development Economics Research. Research Paper no. 2005/07. Helsinki: United Nations University-Wider.
- Anderson, M. B. 1999. *Do No Harm: How Aid Can Support Peace—or War*. Boulder: Lynne Rienner Publisher.
- Bramel, P., T. Remington, and M. McNeil (eds.) 2004. *CRS Seed Vouchers and Fairs: Using Markets in Disaster Response*. Nairobi: Catholic Relief Services.
- Collier, P., and A. Hoeffler. 2004. “Greed and Grievance in Civil War.” *Oxford Economic Papers* 56. Oxford: Oxford University Press.
- Longley, C., I. Cristopolos, and T. Slaymaker. 2006. *Agricultural Rehabilitation—Mapping the Linkages between Humanitarian Relief, Social Protection and Development*. HPG Research Report 21. London: Overseas Development Institute (ODI).
- Meagher, P. 2005. *Service Delivery in Fragile States: Framing the Issues*. College Park: IRIS Center, University of Maryland.
- Sperling, L., and C. Longley (eds.). 2002. *Special Issue: Beyond Seeds and Tools*. *Disasters* 26(4).
- USAID (U.S. Agency for International Development)/Conflict Management and Mitigation. *Conducting a Conflict Assessment: A Framework for Strategy and Program Development*. April 2005. [http://inside.usaid.gov/DCHA/CMM/documents/CMM\\_ConflAssessFrmwrk\\_May\\_05.pdf](http://inside.usaid.gov/DCHA/CMM/documents/CMM_ConflAssessFrmwrk_May_05.pdf)
- USAID (U.S. Agency for International Development)/Conflict Management and Mitigation. [No date, but October 2005.] *Livelihoods and Conflict: A Toolkit for Intervention*. Washington, DC: USAID. [http://inside.usaid.gov/DCHA/CMM/documents/CMM\\_Livelihoods\\_and\\_Conflict\\_Dec\\_2005.pdf](http://inside.usaid.gov/DCHA/CMM/documents/CMM_Livelihoods_and_Conflict_Dec_2005.pdf)
- Walsh S., J.-M. Bihizi, C. Droeven B. Ngendahayo, B. Ndaboroheye, and L. Sperling L. 2004. “Drought, Civil Strife, and Seed Vouchers and Fairs: The Role of the Local Trader in the Local Seed System.” In L. Sperling, T. Remington, J. Haugen, and S. Nagoda (eds), *Addressing Seed Security in Disaster Response: Linking Relief with Development*. Cali: International Center for Tropical Agriculture (CIAT).

## References Cited

- Anderson, M. B. (1999). *Do No Harm: How Aid Can Support Peace- or War*. Boulder: Lynne Rienner Publisher.
- Bramel, P., T. Remington, and M. McNeil (eds.) 2004. *CRS Seed Vouchers and Fairs: Using Markets in Disaster Response*. Nairobi: Catholic Relief Services.

Longley, C., I. Cristopolos, and T. Slaymaker. 2006. *Agricultural Rehabilitation—Mapping the Linkages between Humanitarian Relief, Social Protection and Development*. HPG Research Report 21. London: Overseas Development Institute (ODI).

Meagher, P. 2005. *Service Delivery in Fragile States: Framing the Issues*. College Park: IRIS Center, University of Maryland.

Sperling, L., and C. Longley (eds.). 2002. *Special Issue: Beyond Seeds and Tools*. *Disasters* 26(4).

Views expressed in this investment note are those of the authors and do not necessarily represent policy or views of the World Bank. This note was prepared by Gary Alex (USAID), Tom Remington (Catholic Relief Services), and Philip Steffen (USAID).
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## Reducing Agricultural Vulnerability to Natural Hazards

The effective integration of risk reduction in strategies for agriculture and allied sectors depends on recognizing that strengthening the resilience of agricultural systems is a strategy for reducing livelihood risks. Resilient agricultural systems reduce the vulnerability of the poor to natural hazards, and there is an emerging need to mainstream risk management in agricultural systems, policies, and plans. There also is an acute need to develop a long-term risk mitigation strategy that includes the early detection of hydro-meteorological hazards and information delivery mechanisms to communities at all levels.

### The Global Hazard Risk Scenario

According to a “natural disaster hotspots” study by the World Bank and Columbia University, nearly one-fourth of total land area with more than three-fourths of the world’s population is subject to a relatively high risk of mortality from one or more natural hazards. This vulnerability reflects the higher population densities of areas that have experienced relatively high mortality during the past two decades according to the Emergency Events Database (EMDAT).<sup>14</sup> More than four-fifths of GDP is located in areas of relatively high risk of economic loss, subject to one or more hazards. This fact poses a quite considerable risk for the global development community. Data from recent major disasters reaffirm the accumulation of mortality and economic loss risks in developing economies, particularly the low and lower-middle income group of countries. During the last decade, disasters caused damage of an estimated US\$69 billion per year on average. There is also substantive evidence that the impact of disasters has been exacerbated by such trends as climate change, rapid urbanization, and environmental degradation.

### Vulnerability of Economic Growth to Natural Hazards

Hazard risks make economic growth projections vulnerable, and the occurrence of a disaster during the planning cycle can seriously retard development in general and negatively impact poverty outcomes in particular. A ProVention Consortium/IIASA study in modeling expected catastrophic losses in macroeconomic projections has demonstrated that natural disasters can make a difference in the economic development of poor countries (Freeman et al. 2002). While data on wage losses and increased unemployment in the organized sector due to disasters are known for such projections, this is not the case in developing countries, where the organized sector accounts for only a small fraction of the workforce, and the informal economy expands with a redundant workforce and causes sharp declines in wages. The diversion of development resources to meet post-disaster relief and recovery needs may also slow poverty alleviation programs. This dimension of disasters often is not captured in gross estimates, and thus the economic impact of disasters is always underestimated. By incorporating hazard risks in countries’ macroeconomic projections, effective policy options at the country level can

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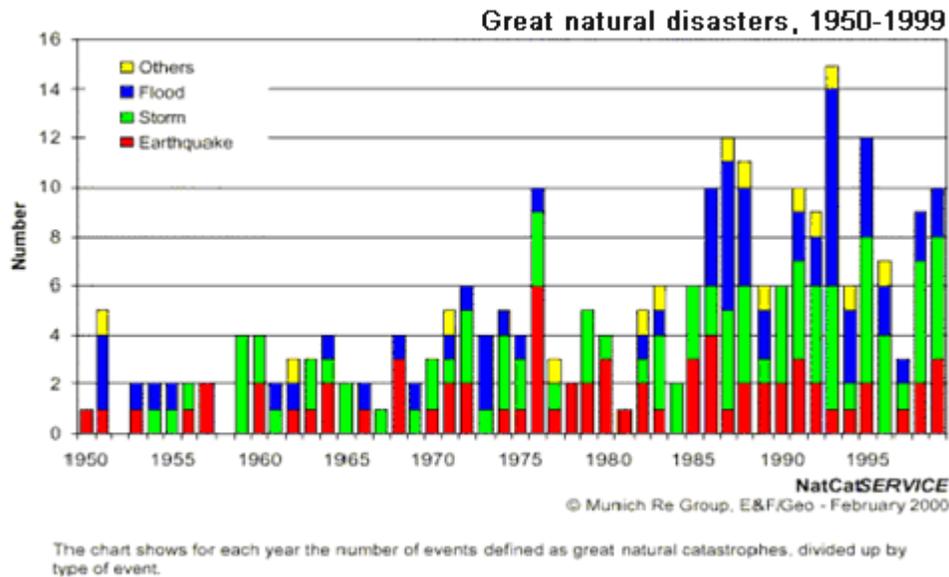
<sup>14</sup> International Disasters Database (CRED/OFDA) [www.cred.be/emdat](http://www.cred.be/emdat).

be explored, and preventive and mitigation measures can be taken to make the economy more resilient.

**Box 11.25 Natural disasters and trends: Some hard facts**

The world is facing emergencies on an unprecedented scale. Between 1992 and 2001, 200 million people were affected by natural disasters globally each year, on average, and disaster claimed 62,000 lives per year. In 2000, 1 in 30 people worldwide were affected by natural hazards. The economic costs associated with natural disasters have increased 14-fold since the 1950s. During the last decade, disasters caused damage estimated at US\$69 billion per year on average.

Poor nations are a soft target for disasters: 24 of the 49 less developed countries face high levels of disaster risk, and of these at least 6 countries have been hit by 2-8 major disasters every year in the last 15 years. Aside from these major events, enumerable minor events have had lasting effects on local populations. Natural disasters also cause heavy losses to capital assets and services. Disruptions in production and the flows of goods and services severely strain the fragile economies of such countries. Research indicates that low-income countries that are based on simple economies and are more prone to disasters have experienced a much slower pace of economic development over the past three decades than their less disaster-prone counterparts.



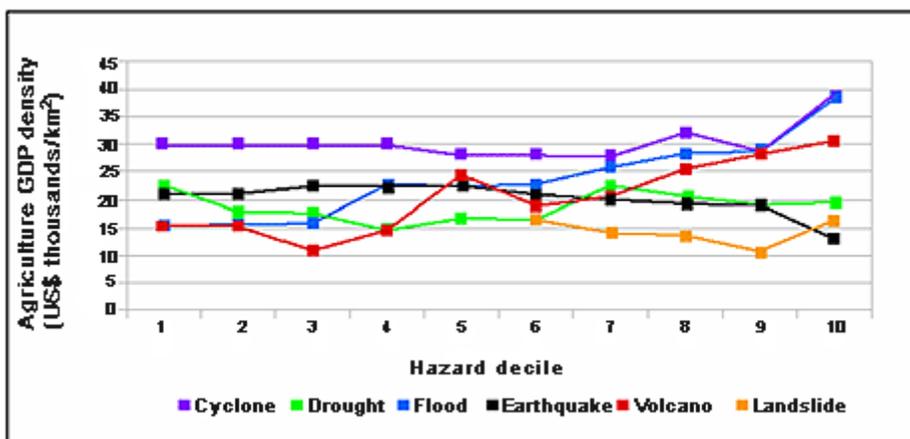
Source: IFRC 2001; UNDP 2001

**Vulnerability of Agriculture to Natural Hazards**

Global trends clearly show that windstorms and flood-related disasters account for 60 percent of total economic losses to natural hazards. Agriculture is one of the sectors hit hardest by disasters triggered by hydro-metrological hazards (box 11.25) Crops are damaged by wind, drowned by floods, or scorched by heat or drought. Livestock perish from thirst and starvation. Land is stripped of fertile topsoil by floods and windstorms and salinized by seawater incursion. Seed and food stores rot under floodwater or are consumed during droughts. The poor are the biggest losers, because they are the most dependent on agriculture for a living and have few buffer systems to cushion against

these losses. The most hazard-prone areas have higher-than-average agricultural GDP density, population density, GDP, and infrastructure (Dilley et al. 2005). This explains the exposure of the agricultural sector to multiple hazards and the need for mainstreaming risk management in agricultural policies and plans (figure 11.1).

**Figure 11.1 Exposure measures by hazard decile – agricultural GDP density**



Source: Dilley et al. 2005

## Lessons from Recent Disasters

Agriculture and allied sectors have been badly hit in recent major disasters. To reduce the vulnerability of agriculture to multiple natural hazards, important lessons can be learned from past disaster assessments and recovery programs. Some of the major lessons are:

- Access to accurate, reliable, and timely early warning on drought, floods, hurricanes, and surges is critical.
- It is difficult to predict smaller hazards (such as tornadoes or thunderstorms) that cause extensive crop loss.
- Loss of locally adapted seed makes rehabilitation of indigenous agriculture difficult.
- Absence of crop contingency planning for various disaster scenarios makes post-disaster recovery difficult and ineffective.
- Irrigation and farming infrastructure are severely damaged because of faulty design and construction practices.
- Risk mapping and mitigation strategies have yet to be included in agricultural extension, training, education, and research agendas.
- Farmers and fishers have limited awareness and preparedness, including a lack of agricultural diversification in vulnerable areas.
- An integrated coastal area management approach has not been adopted to reduce the vulnerability of coastal communities.
- Mitigation and recovery programs often overlook the needs of animal resources.
- Degraded mangroves and coastal belts have exposed coastal areas to suffering from recurring disasters despite structural measures.
- Damaged flora and fauna cannot be replanted, as types are not well documented.

*Resilient agricultural systems reduce the vulnerability of the poor to natural hazards.* Most poverty is rural, and most of the rural poor are engaged in agriculture (Lipton 2002; UN 2001). Because the poor typically spend more than half of their income on food, stimulus to agriculture can provide them with a double benefit as producers (through employment and higher incomes) and as consumers (through more affordable food). Single-crop communities are often forced to farm in high-risk areas and tend to minimize risks rather than maximize income decisions. Disaster-resilient agriculture and rural development will have a maximum impact on the vulnerability of the poor and therefore should be central to poverty reduction strategies in all countries at high risk from disasters (table 11.2 lists those countries). This can be achieved by using some or all of the following measures to promote integrated risk management approaches in agricultural and rural sector development programs:

- Protecting livelihood systems through awareness and preparedness measures.
- Maximizing climate constraints and potential for better yield.
- Developing cropping systems that are resilient in the face of multiple hazards.
- Establishing a technical and legal regime for hazard-resistant agriculture and farming infrastructure.
- Promoting weather- and market-based risk-sharing instruments for farmers and producers.
- Mainstreaming agricultural risk management approaches in all related government policies and strategies.
- Undertaking research and development on hazard risks to agriculture and developing cost-effective risk mitigation technologies.

**Table 11.2 Countries with >30 percent population and/or GDP in areas at risk from two or more hazards**

Sl no	Country	Percentage of total area at risk	Percentage of population in areas at risk	Percentage of GDP in areas at risk	GDP (billion US\$)
1	El Salvador	88.7	95.4	96.4	16
2	Jamaica	94.9	96.3	96.3	8
3	Dominican Rep.	87.2	94.7	95.6	19
4	Guatemala	52.7	92.1	92.2	27
5	Korea, Rep. of	82.8	92.2	91.5	680
6	Vietnam	33.2	75.7	89.4	45
7	Albania	86.4	88.6	88.5	8
8	Costa Rica	51.9	84.8	86.6	18
9	Colombia	21.2	84.7	86.6	97
10	Bangladesh	71.4	83.6	86.5	57
11	Philippines	50.3	81.3	85.2	86
12	Turkey	73.0	80.9	83.3	302
13	Trinidad and Tobago	66.7	82.4	83.1	13
14	Guam	83.6	84.5	82.6	
15	Antigua and Barbuda	53.4	80.4	80.4	1
16	Barbados	79.9	79.9	79.9	
17	San Marino	66.7	55.3	73.1	

18	Ecuador	24.4	73.6	72.2	30
19	Mexico	15.9	68.2	71.1	676
20	Dominica	68.3	67.0	68.3	
21	Nicaragua	21.6	68.7	67.9	4
22	Chile	5.2	64.9	67.7	94
23	Iran, I. R. of	31.7	69.8	66.5	163
24	Venezuela	4.9	61.2	65.9	109
25	Uzbekistan	9.3	65.6	65.5	12
26	St. Kitts and Nevis	0.01	52.8	64.9	
27	Jordan	13.7	64.9	64.7	11
28	Argentina	1.8	57.4	63.2	152
29	South Africa	8.6	56.4	62.4	213
30	Tunisia	30.4	64.1	62.4	28
31	Indonesia	11.5	67.4	62.3	258
32	China	13.1	49.8	56.6	1649
33	Honduras	19.0	56.0	56.5	7
34	Haiti	44.4	47.9	56.0	4
35	Uruguay	3.0	55.0	55.0	13
36	Peru	4.0	41.5	53.7	68
37	Liechtenstein	53.9	45.9	53.6	
38	Kyrgyz Rep.	8.3	51.3	53.4	2
39	Montserrat	50.3	50.3	50.3	
40	Romania	37.4	45.8	50.3	73
41	India	22.1	47.7	49.6	692
42	Algeria	3.1	49.3	48.3	85
43	Niue	48.1	48.1	48.1	
44	Cyprus	50.4	60.5	47.4	15
45	Korea, DPR	27.6	44.5	46.3	
46	Andorra	43.5	19.4	45.0	
47	Paraguay	2.0	45.6	42.9	7
48	Azerbaijan	15.6	42.3	42.4	9
49	Pakistan	9.0	40.1	41.6	96
50	St. Vincent	41.6	41.6	41.6	
51	Georgia	4.4	40.5	41.0	5
52	Macedonia, FYR	38.8	29.6	38.7	5
53	Tajikistan	4.1	38.2	38.3	2
54	Bolivia	1.0	36.6	37.7	9
55	Mozambique	0.01	1.9	37.3	6
56	Djibouti	1.9	31.7	35.3	1
57	Cambodia	9.1	31.3	34.5	5
58	Morocco	3.4	30.4	33.4	50
59	Bulgaria	29.3	31.6	30.0	24
60	Nepal	80.2	97.4	<30	7
61	Burundi	96.3	96.6	<30	1
62	Malawi	70.8	95.3	<30	2
63	Niger	14.4	76.4	<30	3
64	Ethiopia	29.9	69.3	<30	8
65	Kenya	29.0	63.4	<30	16
66	Burkina Faso	35.1	61.7	<30	5
67	Bhutan	31.2	60.8	<30	1

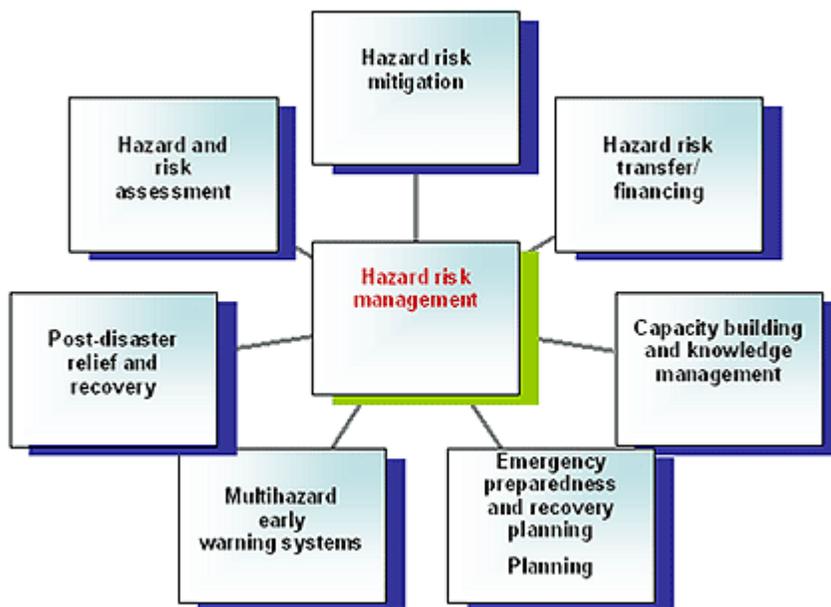
68	Madagascar	15.7	56.0	<30	4
69	Comoros	59.0	54.2	<30	
70	Tanzania	27.7	53.7	<30	11
71	Somalia	15.4	53.3	<30	
72	Senegal	10.1	52.9	<30	8
73	Grenada	52.1	52.1	<30	
74	Lesotho	52.4	50.5	<30	1
75	Afghanistan	7.2	46.0	<30	6
76	Cameroon	9.2	42.0	<30	15
77	Fiji	20.0	42.0	<30	3
78	Togo	61.2	39.3	<30	2
79	Zimbabwe	10.1	39.0	<30	
80	Congo, Rep. of	1.9	38.8	<30	4
81	Benin	37.2	38.6	<30	4
82	Belize	19.8	38.2	<30	1
83	Sierra Leone	13.0	35.7	<30	1
84	Mali	2.9	29.6	<30	5
85	Lebanon	19.2	29.2	<30	22
86	Uganda	27.5	26.6	<30	7

Source: Dilley et al. 2005

*Develop an integrated risk management model for the agricultural sector.* To make the agricultural sector more disaster-resilient, a set of measures have to be taken ex ante as integral to the agricultural sector development strategy. These measures—often referred to as the “Integrated Risk Management Model” (figure 11.2)—include the following:

- *Hazard and risk assessment.* This assessment involves identifying hazards and associated risks for different agroclimatic zones based on soil type, land use planning, cropping, and farming practices. It requires GIS-based data systems on different hazards, land use and agricultural practices, and data on losses from past disasters, which are often lacking in developing countries. Agricultural investments should include building GIS-based decision support tools for a comprehensive risk information management system, which is integral to guide community and government interventions in agriculture and allied sectors. Risk assessment at the macro level must be complemented by community-based risk and vulnerability analysis prior to annual water use and crop planning.
- *Hazard risk mitigation.* Mitigating risks will require a set of interventions for appropriate land use planning, balancing: conservation and production (for example, the use of land for agriculture, fisheries, forestry, and other uses); soil conservation and watershed management (using conservation practices to mitigation the impact of hazards, for example by stabilizing soil and land slopes); resilient cropping and farming practices (for example, diversification of cropping, varieties and duration, tillage and pasture practices, agroforestry techniques); and preventive actions (such as developing bioshields through shelter-belt plantations or mangrove afforestation and regeneration). Mitigation interventions could be prioritized for areas prone to greater disaster risks. Advanced research and extension for improved agricultural techniques related to crop diversification, irrigation, and biological control should be integral to an integrated risk management strategy for the agricultural sector.

Figure 11.2 Integrated Risk Management Model



Source: Author

- *Hazard risk transfer and financing.* It is possible to mitigate risk to an acceptable degree, and residual risk should be covered through various informal and formal insurance and other innovative means of hedging the risks. Weather- and market-based risk-sharing instruments for farmers and producers can play an important role in risk management for agriculture (see the comprehensive treatment of this issue in the overview and other investment notes in this module.)
- *Capacity building and knowledge management.* Enhancing farmers' and producers' awareness through sound risk communication strategies, and providing appropriate training to increase their coping capacity, should form the basis of a community-based risk management approach. Capacity building for the extension system must include techniques of risk mitigation and risk financing and should receive greater attention in all agricultural investments in hazard-prone areas. Dissemination of knowledge and good practices in risk management through informal and formal mechanisms can have the greatest impact on changing risky behavior and encouraging farmers to adopt cost-effective mitigation interventions. Access to knowledge resources for risk management through decentralized means is vital.
- *Emergency preparedness and recovery planning.* Contingency planning is essential for an effective response to extreme events. This planning can be achieved through provisions for enhanced preparedness in providing inputs (for example, anticipate alternate cropping practices after a disaster and establish a genetic resources bank to facilitate seed multiplication) to agriculture and allied sectors. Post-disaster recovery should be integral to pre-event planning: the development of standard operating procedures for damage and needs assessment, availability of inputs, marketing support, and other forms of support should be included in annual planning for the agricultural sector at all levels. This foresight can help speed recovery and reconstruction in the aftermath of a disaster.

- *Multihazard early warning systems.* Early detection of hydro-meteorological hazards and reliable and timely delivery of information is the single most important element in improving the preparedness and response capabilities of communities and governments. The decision support system for agriculture in particular and the economy in general will benefit from investments to improve the quality of hazard forecasting and modeling and to develop capabilities for clearly identifying areas at risks (for example, inundation maps for windstorms and surges; maps of areas under severe moisture stress), along with a fail-safe and redundant communication system for delivering information to people at risk.
- *Post-disaster relief and recovery.* Though pre-event recovery planning helps in organizing effective relief and recovery operations, existing contingency planning ought to be reviewed as well. Several efforts will need to be organized quickly, including rapid damage and needs assessment, delivery of alternative inputs in accordance with the contingency plan, and coordination with disaster management authorities to effectively channel domestic and international assistance to the affected producers. Often the absence of codes of ethics for seed and other inputs results in the importation and distribution of inappropriate varieties. The distribution of seed contaminated by diseases and pests can have long-term impacts. The need for animal disease surveillance in the post-disaster period has often been overlooked. Aside from building capabilities for launching a quick recovery operation, there is a need to document the experiences and lessons from each disaster to improve the understanding of the vulnerability in the sector and include this information in the policy process.

## Guiding Principles and Recommendation for Practitioners

Agricultural vulnerability to disasters can be reduced by mainstreaming risk management approaches in agriculture and allied sectors. Guiding principles for mainstreaming include:

- Agriculture and rural livelihoods depend to a large extent on the natural resource base, which is directly impacted by multiple natural hazards. The impact may be exacerbated in future by long-term climate change and variability.
- Disasters impact biological input systems, processing and marketing infrastructure, and management practices.
- Some agricultural practices may exacerbate the impact of hazards.
- Catastrophic risks must be included in macroeconomic projections for countries that are prone to multiple hazards and where agriculture is the dominant economic sector (see box 11.26 for a checklist for investment decision in agriculture and allied sectors)..
- Risk communication strategies, supported by the transfer of knowledge and technology to farmers and producers to mitigate risks, may have the most tangible impact in loss reduction.

### Box 11.26 Checklist for investment decisions in agriculture and allied sectors

1.	Which natural hazards affect agriculture and allied sectors, and how?
2.	What are the impacts of land degradation on productivity in agriculture and

	related sectors?
3	Do any studies document the impact of climate change on agriculture and related sectors?
4.	What factors in rural areas determine vulnerability to hazards? Has there been any analytical work on linking household survey/living standards measurement study (LSMS) with disaster vulnerability? What are the key findings?
5.	Which existing agricultural practices exacerbate the vulnerability and the risk for farmers and the producers?
6.	What factors contribute to loss of adaptive capacity in the agricultural sector?
7	Which cropping and farming practices are employed in the agricultural sector to reduce the risk of disasters?
8	How do national and local development policies reduce vulnerability to natural hazards in agriculture?
9	How do economic policies affect the value and use of resources in the agricultural sector?
10	What incentives and disincentives encourage unsustainable exploitation of natural resources, including water, in agriculture?
11	Do policies for agriculture and related sectors contain specific measures to combat drought, land degradation, desertification, and climate change?
12	What conservation practices (indigenous practices as well as those developed by the research system) are promoted to permit sustained higher productivity and incomes from agriculture and allied sectors?
13.	What are the on-going initiatives to strengthen the capacities of producers, entrepreneurs, and service providers?
14	How resilient is agricultural infrastructure to multiple natural hazards? Are there appropriate building standards and practices to be followed for the design and construction of such infrastructure?
15	Has there been any assessment of the existing early warning and response system? What are the gaps in forecasting, modeling, and the early warning system? How effective is the information delivery mechanism? Are there any on-going initiative to address these gaps?
16	Are there any physical development and land use planning regulations? Are they enforced in rural and urban areas?
17	How do policies promote effective and viable risk-financing mechanism as a means to mitigate residual risks in agriculture?
18	How do education and extension programs foster the adoption of risk-sensitive agricultural practices?
19	Does on-going research promote practices that develop the sustainable use of resources in agriculture for hazard-prone areas?
20	What institutional arrangements are in place at different levels to link vulnerability reduction in agriculture with other sectors and with the government's overall risk management strategy?

Source: Author

## References Cited

Dilley, M., R. S. Chen, U. Deichmann, A. L. Lerner-Lam, and M. Arnold. 2005. *Natural Disaster Hotspots: A Global Risk Analysis*. World Bank, Washington, DC.

Freeman, P., L. Martin, R. Mechler, and K. Warner. 2002. "Catastrophes and Development: Integrating Natural Catastrophes into Development Planning." Disaster Risk Management Working Paper 4. Disaster Management Facility. World Bank, Washington, DC.

IFRC (International Federation of the Red Cross and Red Crescent Societies). 2001. *World Disasters Report: Focus on Recovery*. Geneva: IFRC.

UNDP (United Nations Development Program). 2001. *Disaster Profile of Least Developed Countries*. New York: UNDP.

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## Kenya: Community-Based Drought Management

The pastoralist population in arid districts of Kenya is counted amongst the poorest and most disadvantaged sections of society. The arid lands are well endowed with livestock resources but lack reliable marketing outlets to provide the full benefit of this resource for either pastoralists or consumers in the region. Environmental constraints in these districts are extreme: fragile, easily degraded physical environments and poor and variable water resources. Drought is a normal and recurring phenomenon that can kill 50 percent or more of the livestock in severe cases. Experience with typical top-down development projects for traditional nomadic pastoralist communities has been so bad that many donors still shy away from financing further development interventions. Unless constraints imposed by drought risks are addressed, however, neither effective conservation of natural resources nor development of the potential of these areas will be realized.

**What's innovative?** Working with communities in drought-prone areas on an early warning system, contingency planning, integration into the mainstream economy, and improved district and national drought and risk management.

### Project Objectives and Description

The overall objective of the first Arid Lands Resource Management Project is to build the capacity of communities in the arid districts of Kenya to cope better with drought. To achieve this objective, the project focuses on three components:

- *Drought management* institutionalizes at national and district levels a structure to effectively manage all the phases of drought. This includes preparedness (drought monitoring), mitigation (drought contingency planning and rapid reaction), and recovery (continued drought relief activities).
- *Marketing and infrastructure* addresses the bottlenecks that impede livestock market linkages between the arid lands and the rest of the national economy.
- *Community development* is designed to achieve the fundamental objective of increasing communities' capacities to protect and develop their livelihoods by dealing with drought cycles in an effective way. Delivery systems related to services demanded by communities include animal health and livestock production, crop production, water supply and human health, and education.

### Benefits and Impacts

A key achievement of the project has been its role in the coordination of assistance to the arid lands and the overall national coordination of donors, in particular through the establishment of the Kenya Food Security Meeting. Adequate and timely information provided by the project has enabled proper scheduling of drought mitigation assistance. The project has also been highly successful in developing a devolved system of implementation with full participation, involvement, and ownership by district

governments, institutions, and communities. At the district level, the primary achievements have been the establishment of functional local entities such as the District Steering Groups, the enhanced capacity of line ministries' human resources involved in project implementation (Mobile Extension Teams), the start of effective decentralized planning and implementation, and improved links between communities and their local institutions.

As part of the drought management component, the project has helped to finance an Early Warning System which is of vital importance for Kenya, as 75 percent of the country has a fragile arid or semiarid environment. During the severe 1999-2001 drought, the improved drought management and coordination system allowed vulnerable groups improved access to food, enabling US\$300 million of food aid to be made available to about 3.3 million people.

Livestock production is the mainstay of Kenya's pastoral areas. Fifty-three livestock marketing and infrastructure investments have been implemented by the project. Stock routes have been improved through the rehabilitation or creation of watering points. Holding grounds have been created close to livestock primary and secondary market centers to improve the contractual power of the animal holders. Moreover, new markets and sale yards have been promoted at the divisional level, enabling decongestion of the district markets. Slaughterhouse standards have been raised with consequent improved hygiene, ante- and post-mortem health control, meat quality, and overall environmental conditions.

Over 1,200 microprojects have been implemented on a fully participatory basis benefiting some 180,000 people and addressing several sectoral needs identified by the communities. Animal health interventions contributed to an 11 percent increase in vaccination coverage in 2002 and a 15 percent decrease in contagious bovine pleuropneumonia and contagious caprine pleuropneumonia. Average maize and bean yields have reportedly increased by 30 percent. Project-improved access to water has reached an estimated 40 percent or 800,000 of the arid lands population and an equivalent or higher percentage of the livestock population.

Principal shortcomings are the limited progress on establishing a framework for natural resource management and on developing a better understanding of how to monitor, protect, and sustainably develop the arid lands resource base. Further, the exclusively grant-based community development funding may increase dependency. These shortcomings are addressed in the design of the second Arid Lands Resource Management Project. This follow-on project will support three complementary channels of intervention, which together address vulnerability:

- Strengthening and institutionalizing natural resources and drought management.
- Empowering communities to identify, implement, and sustain development priorities.
- Policy support, advocacy, and improvement in the delivery of essential services.

## **Lessons Learned and Issues for Wider Applicability**

- Strengthening of district-level multisectoral institutions can significantly improve the effectiveness of project interventions on the ground.

- Community participation and contribution are central to project impact and sustainability, increasing ownership, and the community's ability to replicate activities.
- Continuous capacity building is needed at all levels, as is strengthening of technical support services for quality interventions and technical follow-up.
- Broader access to main services in arid lands can be achieved only by strengthening communities and support service actors to provide cost-effective and, where possible, profitable facilities that continue beyond credit closure.
- Development is closely linked to education, which provides an important exit or diversification strategy for pastoralists.
- Support for diversification must be targeted so as to not displace existing household activities. The more wealthy and less vulnerable are more able to diversify into higher income activities while maintaining herds. Exit from pastoral activities is not risk-reducing "diversification" but usually reflects loss of assets.
- An improved understanding of the arid lands resource base is essential for successful and sustainable project interventions.

<b>Country</b>	Kenya
<b>Project Name</b>	Arid Lands Resource Management I and II
<b>Project ID</b>	ALRMP I: P001331, and ALRMP II: P078058
<b>Project Cost</b>	ALRMP I (org.): US\$25.1 million, and ALRMP II (org.): US\$77..9 million
<b>Dates</b>	ALRMP I: FY1996-2003, and ALRMP II: FY 2003-2009
<b>Contact Point</b>	Christine Cornelius The World Bank, 1818 H Street NW, Washington, D.C. 20433 Telephone: (202) 458-1882; Email: <a href="mailto:CCornelius@worldbank.org">CCornelius@worldbank.org</a>

# Mongolia: Sustaining Livelihoods in Areas with High Natural Disaster Risk

Rural poverty in Mongolia has been increasing in depth and severity. Although the number of people living below the poverty line has been relatively stable (around 36 percent of the population from 1995 to 1998), those who are living below the poverty line have become even poorer. Previous projects targeting poverty reduction have fallen short, partly owing to a lack of commitment by the government. In July 2000, however, the government declared that poverty reduction was to be one of its highest priorities. This declaration paved the way for projects to address one of the root causes of poverty in Mongolia—vulnerability to risk. In particular, a Participatory Living Standard Assessment demonstrated that loss of employment, high costs of health and education, and natural disasters are the most common factors associated with poverty.

## What's innovative?

Managing risk and overgrazing pressures on degraded pasture lands through community-based land-use management systems, providing exit strategies for pastoralists, risk forecasting, and an index-based livestock insurance mechanism.

## Project Objectives and Description

The Mongolia Sustainable Livelihoods Project was financed to reduce vulnerability and promote the security and sustainability of rural livelihoods in a manner that can be scaled up. In particular, the Mongolia project targets risk from natural disasters, including drought and *dzud* (winter disaster), through an integrated approach that includes:

- A Local Initiatives Fund, to be managed in a socially inclusive, community-driven way to diversify incomes and improve local infrastructure.
- Community-based pastureland management based on improved grazing discipline and alternative conflict resolution mechanisms.
- Risk forecasting and contingency planning, including an index-based livestock insurance scheme, meteorological monitoring, and an early warning system.

Pastureland throughout Mongolia is classified as “common land,” although tenure rights can be granted. As a result of this land tenure system, pasture must be managed on a community rather than an individual basis. Currently five to nine percent of pastureland in Mongolia is considered degraded. This degradation threatens sustainable livelihoods and may be worsened by poor management associated with overuse, especially during natural disasters such as drought and *dzud*. Within this project, communal land management is strengthened through the development of community-based grazing management systems that include conflict resolution mechanisms and sanctions for noncompliance. Reducing instances of poor land management is expected to allow herders to sustain productive livelihoods, thereby contributing to poverty reduction.

The number of herder families in Mongolia increased from 75,000 in 1990 to over 190,000 in 2000. This increase can be explained by the fact that many families began herding because of a lack of alternative income-generating opportunities. Exit strategies in the project are targeted at presenting these new herders with other income-generating opportunities. Provision of access to microfinance credit is used for alternate employment. Developing exit strategies serves two functions: first, addressing the poverty of new herders by providing alternate income opportunities; second, addressing the poverty of established herders by reducing pressure on grazing land and making their livelihoods sustainable.

Another key to achieving the project objectives has been identified as institutional capacity building, which is critical for the return of decision-making power to a decentralized and local level. Capacity building is especially necessary for the local management of rural investment funds and for community-based management of common pasture lands.

The pastoral risk management component will improve risk forecasting and contingency planning by improving coverage of weather forecasting data, broadening the range of data used in semiannual early warning system bulletins and increasing their dissemination to local authorities and herders, and developing contingency plans at the *sum* (rural district) level.

A livestock insurance scheme based on a risk index is being developed, on the basis of which eligible participating private insurance companies would offer livestock insurance to individual herders, herding households, or other juridical persons owning livestock to cover covariant risk arising from dzud, drought, or other weather-related events. The index, based on objective, third-party verifiable indicators such as weather data, livestock mortality rates, and/or indices of range vegetation condition, would differentiate relative risk at an appropriate level (most likely at the rural district level) based on historical data. Indemnities under the scheme would be triggered once the index exceeded a given threshold specific to that rural district. Insurance cover would be for productive activities including: the replacement value of livestock; the value of goods or services to support risk preparedness and/or enhance livestock productivity, such as hay and fodder production or purchase, acquisition of veterinary drugs and services, construction of livestock shelters, and breeding services; and/or the value of goods and services to allow policyholders to engage in alternative or supplementary livelihood strategies. Liability of insurance companies has an upper limit, and the government covers claims beyond that amount. The project would also finance training workshops for participating insurance companies and public officials involved and finance a nationwide information campaign to publicize the scheme and attract policyholders. The scheme will be launched during the second year of the project, and it is expected to become profitable by the end of the project.

## Benefits and Impacts

The Mongolia Sustainable Livelihoods project began in 2003, so outcomes have not yet been measured. Experiences during planning, design, and initial implementation have, however, indicated a number of expected benefits, including poverty reduction through pasture land management. Reducing poverty by addressing livestock and grazing land management presents an opportunity to shift from simply managing poverty (by providing welfare services) to reducing poverty (by fostering the emergence of secure and sustainable livelihoods).

## Lessons Learned and Issues for Wider Applicability

The Mongolia project is designed as a pilot for scaling up in other areas; its flexible policy framework has wider application in the context of an adaptable program loan. The numerous advantages of managing sustainable livelihoods via community-driven development can be applied broadly, as its tools allow for better targeting of poverty reduction programs, and the community-driven approach is especially useful where welfare approaches have not worked. Decentralization is critical, and there is a growing need to support institutional frameworks through which this can take place.

<b>Country</b>	Mongolia
<b>Project Name</b>	Sustainable Livelihoods Project (Pastoral Risk Management Component)
<b>Project ID</b>	P067770
<b>Project Component Cost</b>	US\$5.4 million (estimated)
<b>Dates</b>	FY 2003 – FY2007
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## Tanzania: Accessing Price Risk Management Solutions Through Local Bank

The fall of coffee prices to 40-year lows in 2001 and 2002 affected over 400,000 low-income coffee-producing households in Tanzania. The 1993 liberalization of the coffee sector exposed farmers and their marketing organizations to intra-seasonal price fluctuations. These fluctuations have made it difficult for farmers to optimize production technology, timing of sales, and use of assets that could eventually result in higher household incomes. Exposure to price volatility greatly diminished the overall welfare of coffee and cotton farmers and market intermediaries.

**What's innovative?** Local bank offers market-based price risk management solutions to help borrowers manage price risk, giving organizations more price stability and the ability to stay financially solvent even if global prices move in an adverse direction.

### Project Objectives and Description

To confront the negative effects of short-term price volatility, one of the largest coffee cooperative unions in Tanzania, averaging 20-100 kilograms production of coffee per farmer, utilizes market-based price risk management instruments to hedge price risk and make multiple payments to farmers throughout the year. Cooperative members receive a uniform minimum first payment price for their coffee when they deliver it, and later in the season, depending on sales and market performance overall, may receive subsequent payments for their product. The guaranteed first payment provides farmers a form of price stability but can have disastrous financial impacts for the cooperative. If the cooperative guarantees a low first payment at the beginning of the season and the market price rises, farmers, instead of selling to the cooperative, will sell to traders who pay full market price in cash at the time of delivery. If the cooperative guarantees a high first payment at the beginning of the season, and market price falls, it will take losses on the negative margin between first payment price to farmers and actual market prices.

In past years, the cooperative union received loans for its operations from a local commercial bank. However, the loan agreements and the union's access to financing were in serious jeopardy due to a history of poor financial performance, which related in large part to the pricing problems previously described. The government had supported many of the cooperative unions through difficult times but was indicating impatience about continuing to do so indefinitely.

To assist the cooperative's attempts to strengthen its operations, the World Bank began working with the union in the summer of 2001 to help it protect its prices with market-based hedging instruments. The World Bank's Commodity Risk Management Group (CRMG) aimed to provide services consisting of training and education about price risk management markets, principles, and products for the cooperative, the local bank, and others in the Tanzanian coffee sector. The cooperative union used put options to design a hedging strategy that matched its risk profile, using the options in the international market to provide a floor price to protect against declining prices. The objectives of the

strategy were to protect the union's break-even position and guarantee a first payment to farmers. Providers of financial products and services had intense due diligence requirements, which included detailed information about the ownership, structure, financial status, and trading history of the cooperative union. After completing this due diligence process, the cooperative was approved as a new client and was able enter the market to hedge its price risk.

The union took its first hedge position by buying a put option in October 2002. It continued with market activity (reselling the option when it no longer had exposure in a given month, and purchasing new option contracts to cover upcoming months) through the end of the selling season in March. In total, during the 2002-03 crop year, the cooperative hedged about two-thirds of the total volume of coffee it handled.

## **Benefits and Impacts**

Thus far a number of positive effects have resulted:

- The union improved its relationship with its local bank and received a loan to cover the cost of the premiums for the hedging instruments as part of its total loan package.
- Union management had a clearer view of overall financial status through the season.
- Improved financial transparency helped the union make better selling decisions.
- The union paid farmers second and third payments. The price floor allowed the union to disperse revenue when it was earned.

Monitoring of the relationship between local Tanzanian coffee prices to the global market is being continued. When the two markets are highly correlated (prices moving in similar ways directionally), hedge quality is high. If, however, the markets become disconnected, hedge quality is low, and this negatively affects the cost-benefit analysis of the overall risk management strategy. However, in a short period, the union in Tanzania has moved from being a very high-risk enterprise to a much more stable entity. Price risk management contributed to that growing stability, and the union's managers have improved their knowledge about price risk management and access to such tools.

## **Lessons Learned and Issues for Wider Applicability**

This project provides technical assistance and training, which are necessary to bridge the gap between developing country commodity producers and providers of risk management products and services. From the provider's perspective, technical assistance from the CRMG was critical. Without it, private sector participants have indicated that they would not have been willing and able to transact with such new clients in developing countries. From the cooperatives' perspective, the technical assistance and training gave management the confidence and knowledge to utilize risk management methods previously unknown to them. This work is beginning to stimulate demand from developing country organizations and has the potential for wide applicability.

<b>Country</b>	Tanzania
<b>Project Name</b>	Market-Based Commodity Risk Management Instruments for Developing Countries
<b>Dates</b>	2002- 2003
<b>Contact Point</b>	Commodity Risk Management Group The World Bank, 1818 H Street NW, Washington, D.C. 20433 202-473-1718; crmg@worldbank.org

## India: Innovative Rainfall-Indexed Insurance

In much of India, weather volatility is the single most important risk faced by farmers who cannot irrigate their crops. Drought risk especially affects the poor, who typically have smaller landholdings and less access to irrigation. Due to an absence of formal mechanisms such as insurance, farmers have developed a variety of informal strategies to deal with these risks, including accumulation of buffer stocks, diversification of income-generating activities, and variation of cropping practices. These strategies are often ineffective, however, particularly with regard to catastrophic events such as widespread drought, and they result in risk-averse decision making and suboptimal resource allocation.

**What's innovative?** Using rainfall-indexed insurance (combined with other financial services) to reduce systemic risk and improve the supply of financial services to smallholders.

A pilot program in India initiated by KBS Bank (Krishna Bhima Samruddi Local Area Bank) and ICICI Lombard, supported by the World Bank, shows how farmers in such areas can protect their livelihoods.<sup>15</sup> Weather-indexed insurance does not suffer from the usual problems of traditional crop insurance, including moral hazard, adverse selection, and high administrative costs, and it is therefore better suited to small-scale farmers who depend on rainfall.

### Proposed Objectives and Description

Having worked on crop insurance pilot programs for the previous four years, BASIX—one of India's largest microfinance institutions, with approximately 150,000 active borrowers in nine states—launched India's first rainfall insurance program in July 2003 through its KBS Bank in Mahabubnagar in Andhra Pradesh, bordering Karnataka. The district has experienced three consecutive droughts during the last years. One of the main incentives for KBS Bank to offer rainfall insurance was that local banks are limited to operations in three adjacent districts and therefore face limited portfolio diversification. Rainfall insurance for its borrowers would mitigate the natural default risk inherent in lending in such drought-prone areas.

*The 2003 pilot.* During the 2003 pilot, the insurance contracts were designed to protect farmers from drought during the groundnut and castor growing season. ICICI Lombard underwrote a bulk insurance policy for KBS Bank, which then sold individual policies to farmers in four villages in Mahabubnagar through workshops and meetings. Farmers were classified into three categories: small-scale farmers (defined as households farming less than 0.8 hectares); medium-scale farmers (farming between 0.8 and 2 hectares); and large-scale farmers (farming more than 2 hectares). Premium rates are Rs456 per year for

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<sup>15</sup> This IAP draws largely from U. Hess, "Innovative Financial Services for Rural India: Monsoon-Indexed Lending and Insurance for Smallholders," Agriculture and Rural Development Working Paper 9 (World Bank, Washington, DC, 2003) and O. P. Manuamorn, "Scaling-Up Micro Insurance: The Case of Weather Insurance for Smallholders in India," Commodity Risk Management Group (World Bank, Washington DC, 2006).

small-scale farmers, with a liability of Rs14,250, medium-scale farmers pay Rs600 with a maximum liability of Rs20,000, and large-scale farmers pay Rs900 for a liability of Rs20,000. KBS decided to initially limit liability per farmer rather than impose per hectare limits in order to manage overall liability.

During this first-year pilot, KBS Bank decided that only borrowing farmers could buy rainfall insurance policies, and it hopes to lower the interest rate for these farmers due to the reduced risk of default. In total, 230 farmers bought the insurance for the 2003 *khariff* (monsoon) season from June to September: 154 groundnut farmers and 76 castor farmers. One of the top five reinsurers in the world has agreed to reinsure this entire rainfall insurance portfolio.

*The 2004 pilot.* With a good customer response in 2003, a second pilot was launched in the 2004 *khariff* season and introduced significant changes to the 2003 design based on farmers' feedback. The 2004 program was significantly modified in geography, product design, and scope. Geographically, the pilot was expanded to four new weather stations in two additional Andhra Pradesh districts: Khammam and Anantapur. To minimize basis risk (the mismatch between insurance payouts and crop losses), the product contained a three-phase payout structure which reflects the weighted importance of rainfall to crops during different crop stages (sowing, growth, harvest). The phase-based payout also allows farmers to reinvest in working capital for a fresh crop if the first crop fails in the sowing stage.

In terms of scope, the 2004 pilot offered contracts to both BASIX borrowers and nonborrowers. Feedback sessions were added in the month leading up to the groundnut and castor growing season. New contracts were also offered for cotton farmers in Khammam District, and an excess rainfall product for harvest was offered to all castor and groundnut farmers. In total, over 640 farmers bought insurance from BASIX in 2004. Several farmers were repeat customers from 2003. During 2004, BASIX itself also bought a crop lending portfolio insurance policy based on rainfall indexes.

*The 2005 scaled-up program.* In the 2005 scaling-up phase, BASIX and ICICI Lombard further improved the product by adding new features recommended by farmers: the dynamic starting date and the exclusion of daily rainfall below 2 millimeters and above 60 millimeters from the cumulative level which determines payout.<sup>16</sup> Another important change is the crop parameter. Instead of crop-specific policies, BASIX sells area-specific generic weather insurance products which suit all principal rainfed crops within the same agroclimatic region. The products were sold to farmers in 36 locations in 6 states. In total, BASIX sold 7,685 policies to 6,703 customers in 2005. In addition to ICICI Lombard, the government's Agriculture Insurance Company (AIC) also underwrote the policies for BASIX in one of the states.

## **Benefits and Impacts**

Farmer uptake was immediate, with around 100 farmers signing up the first day. Informal interviews with about 15 farmers who bought the policies revealed that they are very well aware that contracts are based on a rainfall index and are aware of the associated basis risk. The farmers value the quick payout of the weather policy, which distinguishes it from the federal crop insurance policy in India. Interviewed farmers also understand and appreciate the weighted and capped structure of the contract, as it directly reflects their experience that the distribution of rainfall throughout the season significantly affects yield.

Overall, a win-win outcome of the scheme can be expected: not only do farmers benefit (from insurance against catastrophic events, improved income stability, and greater access to credit and lower interest rates), but banks also stand to benefit from secured lending and reduced default rates, improved collateral, and increased lending amounts and savings in rural areas. Further, the public sector can benefit from reduced need to provide emergency assistance.

## **Lessons Learned and Issues for Wider Applicability**

Now that weather insurance has been initiated, the immediate challenge is to scale up the distribution and ensure fast claims settlement. It is important to manage expectations of the farming community for the insurance product. Other important lessons emerging from this pilot and past index-based insurance initiatives include:

- The index must be based on long-term statistical information and credible actuarial models. To this end, the public sector can develop information sources such as risk maps.
- Triggers must be verified independently (this will reduce vulnerability to political interference and manipulated farm losses).
- The payment schedule (what will and will not be covered and the extent of coverage) must be clear, quantifiable, and measured by an independent and credible third party.
- Education programs and technical assistance for stakeholders (both farmers and service providers) should be provided.

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<sup>16</sup> According to farmers, rainfall below and above the mentioned levels does not help crop growth.

- Private sector involvement must be encouraged from the outset, and any government subsidies must be kept to a minimum with a clear directive for complete phasing out.
- Combining index-based programs with other types of insurance and financial services can improve the effectiveness of the trigger.

<b>Country</b>	India
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## Afghanistan: Supporting Food Security by Establishing Village-Based Seed Enterprises

More than two decades of war and a prolonged drought resulted in serious economic decline and had brought agricultural production to a standstill in Afghanistan by 2002. Formal institutions had collapsed, infrastructure was devastated, and skilled human resources were virtually nil. There was thus an urgent need to improve food security and rural livelihoods by raising agricultural production and productivity.

Most farmers were using seed they had saved themselves, but their varieties were obsolete and had limited productivity. To boost production, quality seed of improved, locally adapted varieties was required immediately. The formal seed sector did not function, however. The private sector had no interest in entering the seed market. The challenge was to devise a quick approach to meeting small-scale farmers' need for seed.

**What's innovative?** Village-based, economically viable seed production and marketing units supply improved, locally adapted seed at affordable prices in less favorable, remote areas, or areas where the formal seed sector is weak.

### Project Objectives and Description

In 2002, ICARDA led the rehabilitation of agriculture in Afghanistan as part of the Future Harvest Consortium to Rebuild Agriculture in Afghanistan (FHCRAA), a USAID-supported initiative. A needs assessment of seed systems and crop improvement was carried out to ensure proper targeting of interventions and develop a vision for agriculture in Afghanistan. A total of 8,500 tons of improved wheat seed (imported and locally multiplied) was distributed to farmers for grain production, and 53 tons of breeding lines and foundation seed of different crops were provided for testing and evaluation. Five research stations were rehabilitated, farm equipment provided, and a weather station established. Today, regular research continues, and research stations are evaluating a suite of varieties and crops for release in Afghanistan.

To strengthen the national seed system in Afghanistan, ICARDA has assisted in the preparation of an up-to-date seed policy, and it has rehabilitated two principal and three satellite seed testing stations. Regular seed testing is done to ensure the quality of seed marketed to farmers. Because the human resource base was seriously depleted during the war, the FHCRAA carried out a major capacity building effort, training staff in areas as diverse as seed production and radio broadcasting.

Based on the work of the FHCRAA, in November 2003, ICARDA and its partners, with financial support from USAID, initiated the Village-Based Seed Enterprise (VBSE) program. Over the course of three years, 21 VBSEs were established in Ghazni, Helmand, Kunduz, Nangarhar and Parwan Provinces. The enterprises currently produce and market more than 2,000 tons of wheat seed, 650 tons of rice seed, 425 tons of mung bean seed, and 350 tons of potato seed to farmers, NGOs, and other. Each VBSE, on average, produces more than 100 tons of wheat seed, thus attaining the project's performance target.

## Benefits and Impacts

The VBSE program has proved to be the cornerstone for providing seed of improved and adapted varieties to a large number of farming communities at a reasonable cost, boosting production and food security. This participatory approach is technically feasible and economically sustainable because it builds on farmers' participation, partnership, and empowerment.

A recent assessment indicated that seed production at the community level was profitable in 2004/05. VBSE members received prices ranging from US\$285 to US\$420 per ton, generating profit margins of US\$111-246 per ton, depending on the crop. The most progressive VBSEs are diversifying into other crops: one-third of the VBSEs are also producing onions and tomatoes.

Scaling up the VBSE program has laid the foundation for a number of sustainable seed businesses that provide farmers in Afghanistan with quality seed of a wide range of improved varieties. Annually more than 40,000 farmers benefit directly from higher productivity and production in their fields. The introduction of improved seed has a multiplying effect as well, because other farmers benefit through farmer-to-farmer diffusion and wider adoption of the technology.

## Lessons Learned and Issues of Wider Applicability

- In many developing countries, the majority of farmers still depend on informal seed supply mechanisms. They have no access to the fruits of national and international crop improvement programs.
- A village- or community-based seed supply system can fill this gap by assisting in the provision of new technologies (varieties) to a large number of communities in a relatively short period.
- The VBSE approach is technically feasible and economically viable; it provides high quality seed at a reasonable cost to farmers. Overhead costs are relatively low and transport costs are minimal.
- The VBSEs are client-oriented and demand-driven. They focus on the immediate needs of farming communities.
- The VBSEs empower farming communities to play a leading role in addressing local constraints, in institutionalizing local seed production, and in ensuring long-term sustainability without external support.
- The approach serves as a model that can be mainstreamed, scaled up, and scaled out to address seed provision problems of poor farmers in situations where both the public and the private sectors fail to deliver agricultural research products to rural communities.

<b>Country</b>	Afghanistan
<b>Project Name</b>	Village Based Seed Enterprise (VBSE)
<b>Project ID</b>	USAID-funded RAMP (Rebuilding Agricultural Markets Program) Project, Job Order No. 7
<b>Project Cost</b>	US\$1.5 million
<b>Dates</b>	November 2003-June 2006
<b>Contact Point</b>	Seed Unit, International Center for Agricultural Research in the Dry Areas (ICARDA)