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# Working Paper

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## **Agriculture and Rural Development: Lessons for Christian Groups Combating Persistent Poverty**

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## **Introduction**

Persistent poverty is one of the core challenges faced by Christians and by development scholars and practitioners alike. There is no question that Jesus was concerned about the poor – both materially and spiritually. From his first public address in the Synagogue in Nazareth, His home town, where He concluded by saying that He had come to “preach good news to the poor” (Luke 4:18), Jesus lived the gospel in word and deed. We, as Christian men and women, whether researchers or practitioners, are called to do no less. When Jesus made His parting remarks to His disciples, He said (John 20:21) “As the Father has sent me, I am sending you.” emphasizing that we are to do likewise. This concern permeates the Old and New Testament, another example being the words of the prophet Micah (6:8):

“He has showed you, O man, what is good. And what does the LORD require of you? To act justly and to love mercy and to walk humbly with your God.”

We are here to think through together some of the implications of this mandate for ourselves as researchers and practitioners. More specifically, to consider how the work we do as researchers can inform our work in the field as practitioners in such a way as to more effectively help those who are materially poor.

In most wealthy countries, poverty is generally a short-lived phenomenon. This is not the case throughout the developing world. In the United States, for example, less than one quarter of those living below the poverty line remain below the poverty line 12 months later and only 13 percent are still poor 24 months later. Although our cross-sectional poverty of 11.7 percent is relatively high – although it must also be borne in mind that our poverty line is relatively high, too – in the United States, the long-term, structurally poor are a very small minority, roughly one percent of the population.

Elsewhere, long-term, structural poverty is the norm. World Bank figures show that, as of 1999, 2.78 billion people lived on less than \$2/day, most of them in Asia, but with sub-Saharan Africa evincing the largest – and growing – share of its population in severe poverty (World Bank, 2002). Unlike in the United States, we do not yet know a great deal about the expected duration of poverty for people in the developing world. While the median time in poverty in the United States is 4.5 months (Naifeh, 1998), the median time in poverty in rural Bangladesh, Congo, Ethiopia, Kenya or Madagascar is roughly a lifetime. Of particular concern to Christians, the expectation of lifetime impoverishment tends to foster hopelessness. Without hope, people find it hard to contemplate or effect change. With hope, many things become possible. The Gospel message and the practical challenges of reducing persistent poverty thus go hand-in-hand with helping the downtrodden to find hope.

We also know that most of the world’s poor – by most estimates, 70 percent or so – live in rural areas and most work, at least part-time, in agriculture. For this reason, agricultural and rural development is an essential component of any reasonable strategy to combat persistent poverty. In the words of T. W. Schultz’s 1979 Nobel address, “Most of the people in the world are poor, so if we knew the economics of being poor we would know much of the economics that really matters. Most of the world’s poor people earn their living from agriculture, so if we knew the economics of agriculture we would know much of the economics of being poor.” But the challenge is daunting. To increase incomes by just one dollar a day for the world’s rural poor will require an increase of more than \$700 billion in annual rural earnings. In this paper, we

strive to highlight key issues that Christian development organizations must face as they set priorities and make design choices about how to make progress toward that goal.

### **Persistent rural poverty: sources and responses**

Perhaps the most fundamental point development practitioners and scholars must internalize is that, outside of a few members of religious orders who freely undertake vows of poverty, no one willfully chooses to be poor. Poverty reflects the constraints and incentives people face. This underscores the importance of taking time to really understand the goals, priorities and constraints (social, economic, ecological, political/institutional) of rural peoples. When behavior appears irrational or illogical to us outsiders, it is often because we don't really understand the circumstances or context in which local agents make choices. Seemingly irrational behaviors that actually prove second-best have been extensively documented in the literature, including things such as non-participation in markets or cash crop production due to transactions costs or risk considerations (Fafchamps, 1992; Omamo, 1998a; 1998b), the persistence of shifting cultivation when other "more profitable" options exist (Holden, 1993), and production within apparent cost or profit frontiers (Barrett, 1997).

It is also important to keep in mind that the macro-environment or context (whether political, economic or social) within which rural poor make livelihood decisions or choices has a major impact on the constraints faced by rural peoples and any attempts we might make to help at the local level. Whether problems arise due to changes in the macro-economic climate (Krueger et al., 1988) or due to persistent, institutionalized injustice or continual insecurity arising from civil strife, the result is to severely constrain the options rural people have for change. Bad macroeconomic policy is responsible for a great deal of the persistent poverty in the world. This is not only poor policy within low-income countries, but also policies within OECD economies that have significant spillover effects through global markets. In addition to a general failure to reform international trade in agricultural commodities and textiles, the main exports of the poor, *de jure* trade liberalization has been accompanied by *de facto* protectionism in the form of rapid expansion of regulatory trade barriers associated with environmental standards, food safety, etc. and via increased restrictions on immigration. Massive and growing subsidies to wealthy country farmers in the OECD states, in particular the United States, Japan and the European Union, further injure the rural poor in developing nations (McCalla, 2001). Despite its indisputable importance, this macro- dimension is nonetheless outside of the scope of this paper. Rather, we will focus on the micro-level issues and applications that have immediate relevance to Christian development groups working at the grassroots level.

In order to improve productivity and incomes, we must understand the goals and constraints that condition livelihood strategies and management choices. For example, research into the use of *Stylosanthes* as a fodder crop for improving pastures or as supplemental feed in the dry season in the Sahel region of West Africa (Tarawali et al., 1999), motivated out of a desire to improve forage quality and cattle nutrition as well as to improve soil fertility, had disappointing results. One of the main reasons cited for failure was differences in goals of livestock production. Whereas researchers were looking for ways to improve productivity (milk, meat output), livestock owners were more interested in herd size and therefore ways to maintain an acceptable level of survival at minimum cost. Similarly, the nonuse of long range weather forecasts in Kenya and Ethiopia (Luseno et al., 2002) may be due to the fact that livelihood

strategies are already adapted as best as they can to the inherent environmental risks. Long range weather forecasts appropriate to decision-takers in industrial countries or in commercial crop production may not help pastoralists in their climate-related greatest need – to locate where rain fell last week so that they can move their livestock accordingly.

Once one accepts that few, if any, of the world's 2.8 billion are poor because of systematic errors they make and that effective intervention requires paying close attention to the objectives of and the constraints and incentives faced by poor people, one needs to search for structural causes in order to map out an effective strategy of rural poverty reduction. There are four basic explanations for persistent poverty: (1) meager endowments of productive assets, (2) relatively unproductive technologies to generate sustainable streams of income or consumption goods from those assets, (3) poor access to markets offering remunerative returns for productive assets or one's surplus output, and (4) vulnerability to asset, yield or price shocks. We organize the remainder of this paper around these four subthemes. Wherever they work, Christian development organizations need to assess the proximate causes of persistent poverty and the strategies that might prove most effective in addressing the constraints that limit human development. The classification that follows can help in this endeavor.

### **Asset endowments**

Basic physical laws of conservation of matter imply that one cannot produce something from nothing. In economic terms, people must control stocks of productive assets if they are to generate flows of food, services and income. In rural areas, the primary productive assets are human and natural capital. We do not discount the place of financial or manmade, physical capital in agricultural and rural development. But given limited space here, we focus merely on these two primary asset classes. An emphasis on human and natural capital is especially appropriate for Christian development organizations for this explicitly honors the Creator by caring for His creation.

*Human capital:* Others in this conference are focusing on health and education issues, so we do not dwell on questions of human capital formation. Yet we would be seriously remiss to ignore the issue entirely because, even among farming populations, the principal asset of the poor is their labor power. So we briefly address human capital questions as they relate to agricultural and rural development strategies.

The capacity to access remunerative nonfarm employment is often essential to generating investible capital in rural environments that lack functioning financial systems capable of providing interseasonal or interannual credit. Econometric and case study evidence from rural Africa finds that there exists a positive relationship between nonfarm income and household welfare indicators, and, in particular, that greater nonfarm income diversification causes more rapid growth in earnings and consumption (Barrett et al., 2001). But substantial entry or mobility barriers to high return niches within the rural nonfarm economy limit access to a subpopulation of relatively well-endowed households, especially those with above-average educational attainment and good health. The result is a positive feedback loop, wherein those with good education and health participate more actively in the rural nonfarm economy and enjoy faster income growth, thereby providing the resources to plow back into further investment in human or natural capital, and expanded nonfarm activity.

Initial endowments of education and health therefore matter. Christian development organizations have a long and distinguished history of establishing and maintaining mission schools, clinics and hospitals where children who could not otherwise afford to attend school receive a valuable and marketable education and those who could not otherwise receive quality preventive and curative health care are able to avoid or overcome potentially debilitating disease. This is a serious challenge in the era of HIV/AIDS, but is, if anything, becoming a more acute need as government health care budgets become wholly absorbed by the HIV/AIDS crisis in much of Sub-Saharan Africa.

A different form of human capital that is perhaps especially important in agriculture is local knowledge. Christian development NGOs can help facilitate the preservation and extension (to new generations and to “scientific” researchers) of valuable local knowledge, although it is important not to idealize it either (Peters, 2002). In the past, development NGOs and government agents have often attempted to introduce “western” or “modern” agricultural practices which, unfortunately, were frequently not well-adapted to the local context. When farmers failed to adopt them wholeheartedly, they were often deemed to be “backward” when, given their reality, to fail to adopt was perfectly rational. Given that rural households had been farming for centuries, their system was likely well adapted to the ecological context and it was a bit presumptuous to think that outsiders needed to “teach them how to farm”. On the other hand, circumstances may be changing and the ecological balance upset. In this case then there is a very real need for working alongside local farmers to find ways to adapt to such changes in an environmentally sound and economically viable way. For example, while the subsistence “agri-cultural” system of food production in north-central Democratic Republic of Congo (DRC) is well adapted to the ecological context, as the population grows the labor and social cost of having to travel further and further afield in an effort to maintain the desired length of forest fallow may exceed the capacity of the population to do so. It is at this point that we are in a position to effectively help farmers find and evaluate alternative means of maintaining the natural resource base.

Human capital is not purely that which is internalized within a single individual, it also encompasses the broader community, the social fabric or context within which people make decisions, or what some scholars and practitioners term “social capital”, a term we dislike and try to avoid.<sup>1</sup> Social networks matter for multiple reasons. Economists have focused especially on the role of social networks in resolving coordination failures associated with information deficiencies (e.g., social learning, contract enforcement and monitoring, reduced transactions costs) and in providing social insurance in the absence of formal insurance or credit to cushion against adverse shocks. Social networks also help establish and maintain individual preferences and the social norms that condition choice (Akerlof and Kranton, 2000; Platteau, 2000). One of the unintended consequences of serious-minded efforts to rapidly improve public services delivery and market access in many rural areas has been the unraveling of the preexisting social fabric on which so much implicitly depended.

This is of particular concern in areas where increasing commercialization and increasing population pressure lead to increased competition for common pool resources. The result can be

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<sup>1</sup> The Nobel Laureate Ken Arrow summarized our concern well, noting that “The concept of measuring social interaction may be a snare and a delusion. Instead of thinking of more and less, it may be more fruitful to think of the existing social relations as a preexisting network into which new parts of the economy ... have to be fitted.” (in P. Dasgupta and I. Stiglitz, eds., *Social Capital*, Washington: World Bank, 2000).



a breakdown of essential pre-existing social networks, institutions and values that may not be adapted to the changed circumstances. This is of particular concern where, for example, the commercialization of non-timber forest products (NTFPs) is being actively encouraged as a source of income that could improve the livelihood of the rural poor. Commercialization may help improve households' incomes in the short term, but at a severe long run cost due to its effect in undermining effective communal systems of sustainable resource management that evolved over long periods of time.

Development practitioners need to pay attention to the social networks in the communities in which they work, taking care not to disrupt important functionings of those systems and, where possible, to add to them through the community of faith. The church functions as an important social network and source of social capital in many parts of the world (although we recognize that it is much more than this and this is not its primary role). In the DR Congo, for example, there are few functioning institutions apart from the Christian church. Were it not for the church, there would not be an educational or health care system in that country today.

*Natural capital:* After labor, natural resources are the principal asset of the rural poor. They provide not only wealth, but power, as much local level governance in rural areas is based around management of forest, soils, water and wildlife. In most of Africa and parts of Latin America and Asia, where the industrial and service sectors are only beginning to emerge, natural resources will remain the engine of economic growth for decades to come. Land reform is therefore an ever present issue, perhaps especially in Latin America and southern Africa where severe inequality in access to land impedes rural poverty reduction among the mass of landless and smallholder farming households. It is equally important to push reform in tenurial arrangements to ensure security of control over land, forest and water resources in order that people have incentive to invest in their maintenance or improvement. This does not imply a need for western-style individualized property rights, but it does require secure, individual or household level use rights so that the fruits of current investment in natural capital can be harvested by those who sacrifice current consumption in order to care for Creation.

Land quality is as important an issue as land quantity, although it attracts considerably less attention among scholars and practitioners. Within traditional smallholder farming populations, variation in environmental production conditions may well explain most variation in yields not attributable to variation in input quantities (Sherlund et al., 2002), with water and soil nutrients commonly the limiting factors. There have been tremendous advances in recent years in practices and technologies to facilitate soil fertility improvement on small farms – improved fallows, green manure cover crops, new soil and water conservation techniques, etc. – and greater efforts need to be made to stimulate uptake of these practices (Barrett et al., 2002).

It has often been assumed that the smallholder farming population is relatively uniform in terms of its endowment of natural capital. However, work in Kenya stratified farmers according to their resource endowments (Shepherd and Soule, 1998) in an attempt to determine if farm management practices were uniformly unsustainable across all classes. In so doing, they found that the farmers with a large resource endowment were able to make the necessary investments to maintain soil quality. On the other hand, they found that farmers with low and medium resource endowments were not able to do so. The poor are generally less able to invest in long fallows (Coomes et al., 2000), soil nutrient amendments (Freeman and Coe, 2002; Omamo and Mose, 2001), and other improved natural resources management practices necessary to maintain

the natural capital base on which agricultural production fundamentally depends (Barrett et al., 2002). The implication of this research is that, to address the issues of productivity, sustainability and rural poverty, appropriate interventions must be targeted to the needs of this group of farmers – interventions which they have the potential to employ given their resource constraints (available land, labor and capital).

### **Technologies:**

People cannot eat labor power, social networks, soil, or money. They must have the technological means to convert asset stocks into flows of income or consumption goods. The more productive the technologies at their disposal, the less assets they need to deplete or exploit, the more they can consume, or both. Given basic biophysical limits posed by physical laws of conservation of energy and matter, there is no route to an extra \$700 billion/year for the rural poor absent sharp increases in agricultural productivity.

The Green Revolution was, in some ways, the most effective anti-poverty strategy in recorded human history, increasing per capita food availability nearly twenty percent and igniting unprecedented rapid rural income growth in Asia over a forty year period (Barrett, 2002). But the Green Revolution largely missed Africa, yield growth has stalled in much of Asia and Latin America, and the environmental and human health consequences of chemical-intensive agricultural production practices have been belatedly recognized as considerable. There's a pressing need for what Gordon Conway terms a "doubly green revolution" in which agricultural productivity per hectare and per worker increases without requiring significantly increased rates of chemical application and making more efficient use of scarce water resources (Conway, 1997). Agricultural intensification is a necessary condition for poverty reduction and economic growth in the rural South (Lee and Barrett, 2000).

A key principle to keep in mind is that there are no magic bullets – no one technological solution or practice that will fit in all or even many circumstances. Given the labor and capital constraints that people face and the necessity to gain practical experience with new technologies or practices, incremental adoption is easier than adoption of lumpy new technologies. It is also important to consider the cost of adjustment when a new technology is adopted and whether or not the additional income will offset any additional costs (Kuyvenhoven et al., 1998). The transition costs (how to get from A to B) and associated uncertainty may be as important in adoption decisions as the actual viability of the particular practice itself and any ex ante assessment of economic viability of a new practice should consider the transition process (Grist et al., 1999).

The labor costs associated with improved natural resource management practices can be significantly higher than for those they replace. It is important to consider how a practice fits into the household labor constraint and the timing of other activities. Households may not be financially able to hire additional labor even if it is available when required. Small changes in the way in which a technology is implemented can have a major impact on labor costs and therefore on its viability from a household perspective. This proved to be the case for the use of *sesbania sesban* in improved fallows in Eastern Zambia for example (Kwesiga et al., 1999). Similarly, a shortage of household labor during the critical planting period, due to a necessity to engage in off-farm wage labor to meet basic needs, was one of the reasons that the System of Rice Intensification (SRI) has not been widely adopted by poorer households in Madagascar even

though it is in many ways an “ideal” natural resource management (NRM) practice (Moser and Barrett, 2001).

Incentives (essentially, these are bribes) can be given to encourage adoption of new management practices, however, this is inadvisable in most circumstances. While the process may go slower in the short run, there are many examples of practices that have been employed only so long as the incentive continued. Adoption of improved NRM practices has a better chance of succeeding in the long run if they are adopted on the basis of their own merits. Practices that are truly viable and beneficial, as assessed by the potential adopters themselves, get adopted.

Finally, many improved natural resource management technologies involve more than might appear on the surface to the casual observer. It is important that the key factors for success over the long term are understood by those who adopt a practice. This is especially a concern where spontaneous adoption occurs – a situation we desire – because a poorly implemented mimic may not succeed and be disadopted as was the case for some farmers using mucuna as a cover crop in northern Honduras (Neill and Lee, 2001).

A doubly green revolution will not emerge purely from agroecological approaches based on improved natural resources management, however. There remains a pressing need for improved cultivars and for judicious use of chemicals as supplements to biological methods of fertilization and pest control, as in integrated pest management and integrated soil fertility management (Place et al., forthcoming). While they remain highly controversial, we believe emergent biotechnology offers some real promise for increasing crop productivity in the face of difficult and variable agroecological conditions – e.g., high salinity, aluminum or iron toxicity, drought – albeit with some real ecological risk. The high yielding new rice varieties for Africa (NERICA), developed by the West Africa Rice Development Association (WARDA) in cooperation with various national agricultural research systems using tissue culture methods, also underscore how advances associated with biotechnology need not derive from genetic engineering (see the WARDA (2002) web site for more details on NERICA).

### **Market Access:**

Markets are merely a technology that converts inputs (the things one sells) into outputs (the things one buys). Just as one needs efficient production technologies to make good use of asset endowments, so are efficient markets critical. Markets are now nearly universally regarded as indispensable to economic development; although we still have only a rudimentary knowledge of how markets actually function in rural areas of poor countries and how analysts might reliably evaluate whether markets allocate goods and services efficiently or not and, when inefficiencies exist, where and how to target policies so as to ameliorate them. Most empirical studies find that markets work reasonably efficiently, meaning competitive spatial equilibrium typically holds, but that the costs of market intermediation are considerably greater and more volatile in rural areas of developing countries than they are elsewhere in the world.

High and volatile marketing margins drive down the price sellers receive for their produce and driving up the price buyers pay for inputs or – for the considerable share of small farmers who are net food buyers – for the food on which they depend. High and volatile marketing costs also impede market participation, thereby limiting the options faced by

smallholders who need to maintain flexibility in the face of imperfectly covariate yield risk in livelihood portfolios. Market access depends in part on low sunk (unrecoverable) costs, although rural people spend tremendous amounts of time in transit to/from market as well as going to/from their fields (Stryker, 1976). Recent research by the International Food Policy Research Institute (IFPRI) found that investment in basic infrastructure such as roads provides some of the highest returns in terms of poverty alleviation, particularly in less favored lands (Hazell and Fan, 2000). Transactions costs significantly influence behavior and livelihood strategies – for example diversification can be shown to result from high transactions costs alone (Omamo, 1998a; Omamo, 1998b), although there other factors that influence it as well.

Not all inputs are obtained through markets. While in some areas access to land can be obtained through the market, this is often not the case. However, even with traditional land tenure arrangements the same principles apply. Smallholder farmers need reliable or secure access to the land they use to encourage investment in sustainable and productive natural resource management strategies. However, it should be kept in mind that secure access is not necessarily equivalent to having formal title to the land – nor does possession of the right of alienation. A title deed may not mean security of access depending on the laws of the land and the nature of the political system. Conversely, traditional systems of land tenure may be very secure and stable, rewarding those who actively manage their land with strong and secure individualized land rights under customary tenure rules (Otsuka and Place, 2001).

Some technology options may be more or less adoptable depending on the particular bundle of rights that goes with land tenure or access. For example, where access rights do not include rights to the trees standing on the plot, there may be little incentive to protect or plant trees even when tenure is otherwise secure. Without the right to alienation, land cannot serve as collateral for loans to invest in improvements. When right of access comes to a woman through her spouse and his family, if she becomes a widow she may no longer have access to productive resources. In the case of managed fallows, the choice of species may depend on whether the impression is given that one is claiming the right of ownership or not. Finally, the location of a plot of land also influences the cost of cultivation and hence production decisions. Fields that are located further from the home are more costly to access due to travel costs.

Although agricultural economists tend to emphasize rural markets for agricultural inputs (e.g., land, fertilizer, and seed) and products, the most important rural markets are arguably those for finance and labor. There are two fundamental reasons for this. First, the rural nonfarm economy is too often underappreciated as an engine of rural development and sustainable agricultural intensification (Haggblade et al., forthcoming). Where poverty results from meager endowments of non-human capital, the poor need remunerative employment opportunities in order to enjoy income growth. Growth in labor demand and, especially, in wage rates, tends to come primarily from downstream processing and distribution of agri-food products and from other non-farm activities. Investment in creating the viable nonfarm businesses necessary to a dynamic, diversified rural economy requires financial capital that is typically in very short supply in rural areas of the low-income world. The microfinance movement – including nascent micro-equity ventures (Pretes, 2002) – offers some promise in this regard, although deficient basic institutional and physical infrastructure remains a severe limiting factor in many places. Second, finance and labor markets are terribly important as mechanisms to respond to shocks, our next major subtopic.

## **Shocks**

People are not only born into poverty. Sometimes they fall into poverty as a result of adverse shocks associated with disease, crime, drought, floods, or other natural or human emergencies that cost them productive assets, whether directly (e.g., homes washed away or blindness) or indirectly through distress sales. Safety nets – most commonly associated with food aid and public employment schemes – thus play a crucial role in helping people defend current consumption without having to sacrifice future opportunities through the liquidation of productive assets. The timely provision of safety nets is probably as important as their availability. By the time people leave their farms and arrive at a feeding centre, for example, they may have already used up most, if not all, of their productive assets and their labor resources may be severely depleted.

Shocks are problematic not just in their realization, but also in their mere prospect because people go to great lengths to avoid potentially calamitous downside risk. The key points to take away from the literature on risk preferences are (i) households that are risk averse in any fashion are willing to pay a premium (in the form of foregone average income) to reduce risk, and (ii) not all households will be equally willing to pay to avoid identical risks. In particular, poorer households will likely be willing to pay more than richer households to avoid a risk of identical magnitude and when faced with the same production technology. They may even be willing to pay more to avoid a risk of a given proportion of income (i.e., pay more to avoid lower absolute risk).

To put it another way, the security of their livelihood is commonly of as much importance to resource-poor farmers as the level of household (cash or in kind) income. The question of stability and resilience in the face of stresses and shocks is of primary importance since outside of the extended family there are few, if any, sources of insurance when things go poorly. In many cases, it is the unknown factors surrounding the performance of a new technology, both from the biological and economic perspective, that limit or delay adoption. From the perspective of the subsistence householder, it is far better to stick with what one knows than risk one's family's well-being on a potentially better, but very uncertain alternative – even if the system one knows is only just adequate. For this reason, it is important to clarify the particular characteristics of natural resource management and agricultural production practices in terms of their relative risk and stability.

Missing rural financial markets induce poor people to smooth income *ex ante* through potentially costly diversification measures rather than *ex post* through financial instruments. They may use more labor or they may reduce output relative to choice under certainty (Antle, 1987; Barrett, 1996; Finkelshtain and Chalfant, 1991; Sandmo, 1971; Townsend, 1995), in the former case reducing leisure consumption and in the latter expected profits. Such precautionary savings is also a common reason offered for the apparent severe underutilization of inorganic fertilizers in African agriculture – which must be purchased in the planting period before returning income during the subsequent harvest period – where the ratio of the marginal revenue product of fertilizer to its price is typically on the order of 3 or 4 (recall that profit maximization implies the ratio should equal one). Rosenzweig and Binswanger (1993) and Rosenzweig and Wolpin (1993) uncover significant underinvestment by the poor in India, who eschew higher risk-higher return strategies far more than their *ex ante* wealthier neighbors.

So what can be done? Improving the capacity of the poor to anticipate – and thereby manage – changes in the environment around them is often seen as central to the strategy. This is one reason for the rapid spread of, and widespread enthusiasm for, new climate forecasting technologies and similar information systems. The evidence of impact from such technologies is scant, however, most likely because the limiting factor for the poor is less the information at their disposal than their capacity to act on that information (Luseno et al., 2002). Early warning systems are useful primarily for cueing central governments and international donors whose bureaucracies are typically otherwise detached from emerging problems in rural areas and slow to respond. Pastoralists' livelihood strategies are typically adapted to sporadic and dispersed rainfall patterns. Better than a forecast of above or below average rainfall would be information about the location of recent rainfall and, hence, good grazing.

The more promising avenues revolve around improved rural financial systems and better-targeted safety nets. Microfinance has been wildly fashionable for the past 15 years, yet the economic conditions and institutional modalities under which one can achieve lasting, positive effects are still not well understood (Morduch, 1999; 2000). Care also needs to be taken since credit can also increase exposure to risk and break down long-established social networks. In addition to potentially higher risk due to the increased yield variability in extreme climate conditions that often accompanies technologies that rely on more purchased inputs, there is greater financial risk as a result of the potential to default on the loan. For this reason, credit for purchase of inputs may not be an attractive alternative in the absence of some form of accompanying crop or rainfall insurance to cover the possibility of catastrophic crop failure. Similarly, credit is not an attractive option for subsistence food crops – crops which are not typically sold and therefore do not generate cash revenues to facilitate loan repayment.

Some improvement in targeting of assistance can be achieved by using new financial products such as weather insurance contracts. They can, for example, help NGOs turn reasonably stable flows of contributions – subsequently paid out as premia – into large payouts on claims when the need is greatest, in times of drought or flood (Skees, forthcoming; Skees et al., 2001). This can help overcome the delays and resource insufficiency that causes many safety nets to be activated too slowly or to miss many of the poor.

Perhaps the greatest challenge to improving the targeting of assistance involves rethinking the role of food aid and public employment schemes used to absorb surplus labor. There's a great deal of pressure to hit both safety net and investment objectives with current transfer programs. But this is exceedingly difficult to do and typically leads to considerable targeting errors (Barrett et al., forthcoming). The two sets of circumstances and the requirements of programs designed to address them in an appropriate manner are very different. The investment value of the roads, reforestation, etc. undertaken through food-for-work programs and similar safety net schemes is almost surely less than that in human capital, although we have a terribly difficult time measuring these latter gains (in terms of net nutrient and health gains versus an appropriate counterfactual). The primary goal of safety net programs ought to unapologetically be conservation of human capital, the most important asset of the poor.

## **Conclusions**

The goal of this paper has been to outline some of the key insights from recent research that may be of benefit to agricultural and rural development practitioners as they design and evaluate programs to aid the rural poor, in particular smallholder agricultural households. We are careful to emphasize that there are no “magic bullets” or “one-size fits all” solutions or recommendations. Rather, we have sought to outline some priorities and design “best bets” in four key areas: assets, technologies, markets and shocks. No one organization can do everything. Some have particular expertise and experience in emergency relief and the provision of safety nets while others have more experience in agricultural and rural development. Each organization should identify its comparative advantage, focus on that and, where needed, work in partnership with other organizations with different comparative advantage.

Finally, in addition to the above observations about what one does, we should note that how one works or how one does development is in many cases of equal importance in the design and implementation of effective sustainable development strategies and interventions. Firstly, it is important to work with local resources and technology wherever possible. A similar observation applies to local institutions and partners since this is the best way to develop local capacity and ensure compatibility with local cultural norms and priorities. Thinking of the long run rather than the short run can mean more lasting results as well. Although quicker results may come from drilling or digging wells “for” people or with only token local involvement, the results are unlikely to endure. While the alternative of going at the pace of, for example, a local village group is slower, there is a better probability of long term success. In the area of food aid that is given as a safety net in response to severe production shocks, we need to consider the impact on local markets and the risk of negative incentives to producers when we consider how to make such aid available to those who need it. Similarly, the mechanics of how we go about facilitating the marketing of produce (i.e. provision of transport or assistance to remove the barriers to those who could provide) can determine the potential for long term success. The reality is that real development work that lasts is painfully slow and a lot of hard work – one needs to be in it for the long haul. Two-year appointments and short term missionaries are really not appropriate in this context. This time frame is only really sufficient to get one’s feet wet. Christian organizations that have a long term commitment to partner with a national organization are well placed to make the kind of contribution that is needed. And the research community can help by providing rigorous assessment of what’s working and what’s not so that together we can make progress in the Gospel directive to serve God by serving the poor.

## **References**

- Akerlof, G., and R. Kranton. 2000. Economics and Identity. *Quarterly Journal of Economics* 115:715-753.
- Antle, J.M. 1987. Econometric estimation of producers' risk attitudes. *American Journal of Agricultural Economics* 69:509-22.
- Barrett, C.B. 1996. On price risk and the inverse farm size-productivity relationship. *Journal of Development Economics* 51:193-215.
- Barrett, C.B. 1997. How credible are estimates of peasant allocative, scale or scope efficiency? A commentary. *Journal of International Development* 9:221-229.
- Barrett, C.B. 2002. Food security and food assistance programs, *In* B. L. Gardner and G. S. Rausser, eds. *Handbook of Agricultural Economics*. Elsevier Science, Amsterdam.
- Barrett, C.B., T. Reardon, and P. Webb. 2001. Nonfarm income diversification and household livelihood strategies in rural Africa: Concepts, dynamics and policy implications. *Food Policy* 26:315-331.
- Barrett, C.B., F. Place, and A.A. Aboud, (eds.) 2002. *Natural Resources Management in African Agriculture: Understanding and Improving Current Practices*, pp. 1-368. CAB International, Wallingford, UK.
- Barrett, C.B., S.T. Holden, and D.C. Clay. forthcoming. Can food-for-work programs reduce vulnerability?, *In* S. Dercon, ed. *Insurance Against Poverty*. Oxford University Press, Oxford.
- Conway, G. 1997. *The Doubly Green Revolution: Food for All in the Twenty-first Century*. Penguin Books, London.
- Coomes, O.T., F. Grimard, and G.J. Burt. 2000. Tropical forests and shifting cultivation: Secondary forest fallow dynamics among traditional farmers of the Peruvian Amazon. *Ecological Economics* 32:109-124.
- Fafchamps, F. 1992. Cash crop production, food price volatility, and rural market integration in the Third World. *American Journal of Agricultural Economics* 74:90-99.
- Finkelshstein, I., and J. Chalfant. 1991. Marketed surplus under risk: Do peasants agree with Sandmo? *American Journal of Agricultural Economics* 73:557-567.
- Freeman, H.A., and R. Coe. 2002. Smallholder farmers' use of integrated nutrient-management strategies: Patterns and possibilities in Machakos District of Eastern Kenya, p. 143-154, *In* C. B. Barrett, et al., eds. *Natural Resources Management in African Agriculture: Understanding and Improving Current Practices*. CAB International, Wallingford, UK.
- Grist, P., K. Menz, and R. Nelson. 1999. Multipurpose trees as improved fallow: An economic assessment. *International Tree Crops Journal* 10:19-36.
- Haggblade, S., P. Hazell, and T. Reardon, (eds.) forthcoming. *The Rural Nonfarm Economy*. Johns Hopkins University Press, Baltimore.
- Hazell, P., and S. Fan. 2000. Balancing regional development priorities to achieve sustainable and equitable agricultural growth, p. 151-170, *In* D. R. Lee and C. B. Barrett, eds. *Tradeoffs or Synergies? Agricultural Intensification, Economic Development and the Environment*. CABI Publishing, Wallingford, U.K.
- Holden, S.T. 1993. Peasant household modelling: Farming systems evolution and sustainability in northern Zambia. *Agricultural Economics* 9:241-267.
- Krueger, A.O., M. Schiff, and A. Valdés. 1988. Agricultural incentives in developing countries: Measuring the effect of sectoral and economywide policies. *The World Bank Economic Review* 2:255-271.



- Kuyvenhoven, A., R. Ruben, and G. Kruseman. 1998. Technology, market policies and institutional reform for sustainable land use in southern Mali. *Agricultural Economics* 19:53-62.
- Kwesiga, F.R., S. Franzel, F. Place, D. Phiri, and C.P. Simwanza. 1999. *Sesbania sesban* improved fallows in eastern Zambia: Their inception, development and farmer enthusiasm. *Agroforestry Systems* 47:49-66.
- Lee, D.R., and C.B. Barrett, (eds.) 2000. Tradeoffs or Synergies? *Agricultural Intensification, Economic Development and the Environment*, pp. 1-538. CABI Publishing, Wallingford, U.K.
- Luseno, W.K., J.G. McPeak, C.B. Barrett, G. Gebru, and P.D. Little. 2002. The value of climate forecast information for pastoralists: Evidence from Southern Ethiopia and Northern Kenya.
- McCalla, A.F. 2001. The devastating impacts of rich-country agricultural policies on poverty reduction and food security in developing countries. Summary Paper from the International Conference on Sustainable Food Security For All By 2020. (Conference Paper). International Food Policy Research Institute, Washington, D.C.
- Morduch, J. 1999. The microfinance promise. *Journal of Economic Literature* 37:1569-1614.
- Morduch, J. 2000. The microfinance schism. *World Development* 28:617-29.
- Moser, C.M., and C.B. Barrett. 2001. The disappointing adoption dynamics of a yield-increasing, low external input technology: The case of SRI in Madagascar. unpublished manuscript.
- Naifeh, M. 1998. Dynamics of Well-Being, Poverty 1993-94: Trap Door? Revolving Door? Or Both? Current Population Reports, Household Economic Studies. U.S. Census Bureau, Washington, D.C.
- Neill, S.P., and D.R. Lee. 2001. Explaining the adoption and disadoption of sustainable agriculture: the case of cover crops in northern Honduras. *Economic Development and Cultural Change* 49:793-820.
- Omamo, S.W. 1998a. Transport costs and smallholder cropping choices: an application to Siaya District, Kenya. *American Journal of Agricultural Economics* 80:116-123.
- Omamo, S.W. 1998b. Farm-to-market transaction costs and specialisation in small-scale agriculture: explorations with a non-separable household model. *The Journal of Development Studies* 35:152-163.
- Omamo, S.W., and L.O. Mose. 2001. Fertilizer trade under market liberalization: Preliminary evidence from Kenya. *Food Policy* 26:1-10.
- Otsuka, K., and F. Place, (eds.) 2001. *Land Tenure and Natural Resource Management: A Comparative Study of Agrarian Communities in Asia and Africa*, pp. 1-389. The Johns Hopkins University Press, Baltimore and London.
- Peters, P.J. 2002. The limits of knowledge: securing rural livelihoods in a situation of resource scarcity, p. 35-50, *In* C. B. Barrett, et al., eds. *Natural Resources Management in African Agriculture: Understanding and Improving Current Practices*. CAB International, Wallingford, UK.
- Place, F., C.B. Barrett, H.A. Freeman, J.J. Ramish, and B. Vanlauwe. forthcoming. Integrated soil fertility management: Evidence on adoption and impact in African smallholder agriculture. *Food Policy*.
- Platteau, J.-P. 2000. *Institutions, Social Norms, and Economic Development*. Harwood Academic Publishers, Amsterdam.
- Pretes, M. 2002. Microequity and microfinance. *World Development* 30:1341-1353.

- Rosenzweig, M., and H. Binswanger. 1993. Wealth, weather risk and the composition and profitability of agricultural investments. *Economic Journal* 103:56-78.
- Rosenzweig, M.R., and K.I. Wolpin. 1993. Credit market constraints, consumption smoothing and the accumulation of durable production assets in low-income countries: Investments in bullocks in India. *Journal of Political Economy* 101:223-244.
- Sandmo, A. 1971. On the theory of the competitive firm under price uncertainty. *American Economic Review* 61:65-73.
- Shepherd, K.D., and M.J. Soule. 1998. Soil fertility management in west Kenya: dynamic simulation of productivity, profitability and sustainability at different resource endowment levels. *Agriculture, Ecosystems and Environment* 71:131-145.
- Sherlund, S.M., C.B. Barrett, and A.A. Adesina. 2002. Smallholder technical efficiency controlling for environmental production conditions. *Journal of Development Economics* 69:85-101.
- Skees, J.R. forthcoming. A role for capital markets in natural disasters: A piece of the food security puzzle. *Food Policy*.
- Skees, J.R., P. Hazell, and M. Miranda. 2001. New Approaches to Public/Private Crop Yield Insurance. unpublished manuscript. World Bank.
- Stryker, J.D. 1976. Population density, agricultural technique, and land utilization in a village economy. *American Economic Review* 66:347-358.
- Tarawali, G., V.M. Manyong, R.J. Carsky, P.V. Vissoh, P. Osei-Bonsu, and M. Galiba. 1999. Adoption of improved fallows in West Africa: Lessons from mucuna and stylo case studies. *Agroforestry Systems* 47:93-122.
- Townsend, R.M. 1995. Financial systems in Northern Thai villages. *Quarterly Journal of Economics* 110:1011-46.
- WARDA. 2002. New Rice for Africa (NERICA) Offers Hope to Women Farmers and Millions More [Online]. Available by West Africa Rice Development Association <http://www.warda.org/warda/main/Achievements/nerica.htm> (posted 26/11/2002; verified 26/Nov/2002).
- World Bank. 2002. Millennium Development Goals: Malnutrition and Hunger [Online] <http://www.developmentgoals.org/Poverty.htm> (posted 25/11/2002; verified 25/November/2002).