Managing Sustainable Agricultural Development

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Working Paper 95-WP 135
May 1995

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This paper was presented at the Regional Senior Policy Seminar on Sustainable Agricultural Development for Central Asia, Economic Development Institute, sponsored by the World Bank, Almaty, Kazakhstan, February 14-15, 1995.

MANAGING SUSTAINABLE AGRICULTURAL DEVELOPMENT

Introduction

Agricultural leaders in economies making transitions from planned to market systems have a double responsibility. First there is the complex task of restructuring the economic system to permit an increased role for markets in the allocation of resources and in the distribution of the benefits of economic activity. Second, they must respond to the increasing scientific information on the relationship of agriculture to the environment and to concerns about the capacity of agriculture to meet societal demands for food and other raw materials (and contribute to a landscape consistent with a high-quality life for rural and urban citizens) on a sustainable basis (see for example, Serageldin and Steer 1994). In both of these areas, much can be learned from the more mature market economies and the experience to date of the nations of the Former Soviet Union (FSU)(Brooks et al. 1991; Csaki 1990, 1991; Csaki and Johnson 1993; Johnson and Brooks 1983; and McKinnon 1994). At the same time, the development of a market-based sustainable agriculture must reflect the unique historic and cultural features of these nations in transition as well as the specific capacities of the human and natural resources used by the agricultural production, processing and distribution system.

Market systems have intrinsic features that are consistent with the sustainable development of agriculture. Goods and services are produced to meet consumer demand. The sovereignty of consumer decisions is more fully reflected in market demand, in contrast to the situation in planned systems where consumers may have free choice, but only indirectly influence the mix of goods produced by agriculture. From a societal viewpoint, the expression of consumers' preferences through markets implies that the agricultural system will produce from its scarce and perhaps frail resources a mix of goods and services with a higher value (in theory consistent with maximum welfare). In production, processing and distribution, market incentives lead to resource allocation efficiency through price incentives for both inputs and outputs, and more subtly, the consolidation of the productive agricultural resources or assets in the hands of the most able managers. The managers that are efficient make higher profits and, in turn, can use these profits to acquire land and other resources or other assets from the less efficient managers (Csaki and Johnson 1993).

Markets also work to achieve production and consumption efficiencies through allocations of goods and services in time and space. This feature of markets is of particular importance to agriculture, where the production cycle is annual or relatively long and distance from input suppliers and consumers is often a factor.

Of course, markets are not perfect in their capacities to organize production and consumption. The inability of market prices to accurately reflect the full current and future value of today's resources provides a rationale for a small but important role for the government in agriculture and other industries. This role is different from the directing of production, processing, distribution, and, to an extent, consumption, that the government assumes in planned economic systems. Instead, successful government provides a regulatory and institutional framework that minimizes the problems of market failure. Market failures occur in situations where there are externalities, information asymmetries, strategic collusion, and skewed income distributions.

The hypothesis of this paper is that, for transition economies, sustainable development of agriculture can be most effectively achieved by aggressive steps to increase the role of markets in resource allocation and distribution. Using resources efficiently and producing the goods and services most highly valued by consumers can take agriculture a long way toward the goal of sustainable development. In the transition, there are also opportunities not to repeat the mistakes in the development of agriculture of the more mature market economies. By careful consideration of property rights, systems of taxation and redistribution, and initiatives for choices of production, processing and distribution technologies, a more informed path to a sustainable agriculture can be identified (Lerman et al. 1994). Leaders in transition economies have the difficult task of orchestrating the change of an economic system, but an unusual and perhaps one-time opportunity for achieving reforms in which economic growth, environmental protection, and sustainability of agriculture are mutually achieved.

Elements of a Sustainable Development Strategy

The specific strategies pursued by nations for achieving the sustainable development of agriculture will reflect the many complexities and the specific circumstances in which these initiatives are undertaken. It is not possible to lay-out a detailed prescription for change without the benefit of much more complete information on the political and economic climate, the initial conditions for agriculture, and the priorities that will emerge in efforts to define and implement sustainable development strategies. Still, for nations in transition, there are a few principles that will prove

useful in guiding these sustainable development strategies. These principles relate to sequencing, the nature of policy and institutional changes, and the pace implementation. Figure 1 provides an overview of these principles and their sequencing, nature, and timing or pace.

The first priority for achieving sustainable development is the implementation of the reforms leading to a market-based agriculture. It is only after these reforms are consolidated that the structure of agriculture (broadly defined) that will emerge under the market system begins to become apparent. Legislative and political energies heavily devoted to legislation and regulation for environmental performance may be misplaced at this point in the transition. Clearly, the legal, regulatory and administrative structure, and the public sector activity necessary for achieving sustainability, depend the structure of agriculture; for example, production patterns, production technologies, concentration in processing and distribution, and institutions governing activities of special interest groups. Setting directive policies for environmental aspects of sustainability before the transition is well under way may result in improper incentive structures and unnecessary costs. The positioning of the regulatory, administrative, and legal structures is additionally complicated by the fact that market systems go hand-in-hand with more open economies. Thus, the resulting agriculture will reflect not only interregional competition, but the comparative advantage among nations.

Income will be highest when the most efficient market allocation of resources is achieved. With these higher real incomes, it will become more feasible to consider the trade-offs between profits today and profits tomorrow that are implied by the production techniques that do not degrade nature and the natural resource base; that is, production technologies that foreclose future options for equal productive capacity. Among the mature market countries, we have observed that higher incomes correlate with added willingness to take care of nature and the resource base.

Strategic Instruments	Timing		
	Short Term	Medium Term	Long Term
Economic Reform	High Priority	Continuing Priority	Tuning and Consolidation
Indirect Sustainable Initiatives	Organize Available Information	High Priority	Continuing Priority
Legal, Regulatory and Administrative Framework	Tuning and Evaluation	Increased Priority	High Priority

Figure 1. Market reform, sustainable development, and transition strategy

The high initial priority on economic reform does not mean, however, that there are not important and specific activities that can be undertaken to support the sustainable development of agriculture from an environmental perspective. In this area, a number of public sector activities can contribute to the sustainable development of agriculture, and lay the groundwork for more specific and directive initiatives, once there is better information about the structure of agriculture that will evolve under the new market system. These activities include:

- Information needs to be developed on the attitudes of the practitioners in agriculture, and in the general population, about environment and sustainability; what they know about issues of sustainability, and where they obtain the information that influences their attitudes and behaviors. In more mature market economies, surveys providing this information have been particularly revealing. In most cases, these surveys have found, for example, those involved in agriculture tend to be much more interested and sensitive to sustainability and the maintenance of the resource base for continued growth and productivity than was imagined by the environmental interest groups. The implication is that a less stringent regulatory and administrative framework may be most appropriate. Without knowledge of the producer's preferences in favor of preserving the environment, the government may overreact and overrestrict. The resulting lower output and income can undermine the incentives that would otherwise be there among high-income producers to demand high levels of environmental protection and sustainability.

- The assembly of information about impacts of agricultural production, processing, and distribution practices on indicators of environmental performance and sustainability is necessary. Sound information on relationships of cultivation practices, rates, fertilizer and pesticide application, and other cropping practices for ground and surface water, soil tilth, erosion, and related indicators of the capacity to develop a productive agriculture must be available to support education and intervention initiatives. The same is true for the livestock and other subsectors. Added monitoring, data acquisition, and management activities can begin in conjunction with an acceleration of market reform in agriculture.

- Public education will be critical to sustainable development of agriculture, both during and after full implementation of market reforms. Perhaps in transition economies, due to the new and inexperienced private farmers and other agents in agriculture, these programs are even more essential than in established market economies. Education programs can provide information to improve productivity and reduce the negative impacts of current agriculture on the environment. In many cases, more sustainable agriculture practices are consistent with increased profits, such as, inputs used more efficiently. Well-informed economic agents will produce a more environmentally sound and sustainable agriculture.

- Pilot and demonstration activities, featuring new technologies, farming systems, and multi-farm environmental management approaches can be introduced. These can include, for example, limited tillage cultivation, improved management of livestock waste, landscape and watershed management, crop rotations, and many others. The scientific basis for many such demonstrations is available in the respective nations and can be supplemented by experiences in nations that are currently more aggressively pursuing the sustainable development of agriculture.

- Research and formal educational systems can be reoriented. New ideas, techniques, and management methods are critical to the sustainable agricultural development. Research and educational programs that deal with sustainable development and improved management in the agriculture require longer term investment and attention. Recently, for example, the technology curve for sustainable agriculture has been rapidly pushedout by more environmentally oriented programs in the developed mature market economies. Future agricultural technologies and management methods and, in fact, the human capital for agriculture ultimately depend on solid and up-to-date research and formal education systems.

- Tuning of taxation, subsidy, and other forms of current government intervention in agriculture can, of course, support sustainability. Many of the existing government interventions and public sector activities in agriculture are likely to be at cross-purposes with sustainable development. Inventorying and evaluating these interventions and activities for their implications during the evolution to a market system can yield information to support the sustainable development of agriculture. In many cases, minor changes in taxation and subsidy schemes or current regulations and administrative practices can result in significant improvements in the productivity of agriculture and reduce the negative impacts of agriculture for the human and natural resource base.

This evaluation of the regulatory, administrative and legal structures, as well as other public sector activities in agriculture, should be ongoing during the process of economic reform. Activity in this area can help prepare policymakers for the formulation and implementation of a more coherent policy for sustainable development that is geared to the emerging structure of agriculture. A feature of the new approaches to sustainable development is the idea of integration. Systems approaches are increasingly being recognized for their importance to the design of the regulatory, administrative, and legal structure for sustainable agriculture (Great Plains 1994). These same systems ideas extend as well to public sector activity in agriculture. It is with an integrated package of market incentives, institutions, policies, education, and other public sector activity that the opportunities for sustainable agriculture development are best realized.

The institutions and public policies that "surround" the private sector activity in agriculture can be drawn more tightly after the market reforms. Of course, neither the economic reforms nor the public sector and legal and regulatory framework can be expected to be a perfect "once-and-for-all policy." There will always be opportunity for change, reflecting new information, new technologies, and changing priorities of nations for environmental and agricultural performance. As the experience in implementing sustainable agricultural development deepens, it will likely become apparent that economic growth for agriculture and improved environmental performance are more consistent than may at first have been imagined.

Transition to a Market System

Essential to the development of a sustainable agriculture is an economic system that provides incentives for efficient use of resources, and the reduction of what might be called "policy uncertainty" for participants in the sector (Csaki and Johnson 1993). Each of these aspects of sustainable agriculture development is of particular importance for the transition economies. First, closing the gap between the economic systems of the past and the new market systems to which the nations are politically committed should be accomplished at a rapid pace. The experience of the transition economies of the FSU suggests that the introduction of liberalized prices and other features of market economies without carrying through on the institutional and/or basic aspects of the structure that lead to successful functioning of markets can result in almost a "paralyzing" of agriculture (Lerman et al. 1994; Csaki and Johnson 1993). This is due to the inconsistency of incentives and the uncertainty about the course of the transition. If the participants in agriculture are not sure of the commitment to the market system and/or the pace of the reform, strategic behavior inconsistent with sustainability may occur (McKinnon 1994). Clear communication on the course of the reform can result in improved agricultural productivity, more efficient resource use, and the establishment of the foundations for sustainable development.

A number of lessons have been learned from the agricultural reform experience of the FSU nations and other nations in transition from planned to market economies (Csaki and Johnson 1993; Lerman 1994; McKinnon 1994). These lessons involve issues of pace, the order of liberalization, and the essential features of well functioning market systems. Selected lessons are reviewed in an order that reflects experience on the proper sequencing of market reforms. Actually, this order is not as important as it might at first appear. Successful transition requires concerted action in each of the

areas reviewed. References to synthesis pieces are included at various points, elaborating more fully on the experience to date with the transition efforts.

Macroeconomic Stabilization and Price Liberalization

A stable macroeconomic environment for producers and consumers is essential for success in the reform process (McKinnon 1991a, 1991b, 1994). Stabilization and financial balance with liberalized prices will require phasing-out producer and consumer subsidies. Generally, the macroeconomic balances of FSU countries in transition cannot be maintained without sharply reducing the producer and consumer subsidies associated with agriculture. Freer trade can help to establish prices and to guide resources toward uses more consistent with an open, free market economy. Opening borders and letting world prices signal transactions can help to "make markets" in transition economies. These nations also need capital investment and new technologies. Private capital will flow if prices are liberalized, trade is relatively free, and the monetary sphere is stable. With the foreign capital will come the new technologies necessary to make agriculture competitive in international markets.

The reduction and restructuring of producer and consumer subsidies is, of course, difficult. But unless these subsidies are significantly reduced and restructured, there is little hope for macroeconomic stabilization, saving and domestic and foreign investment, and an orderly transition to a market system. Restructuring of the portion of the producer and consumer subsidies that remain in place is also an issue. In the formerly planned economies, subsidies were often implemented using artificial prices of goods and services, including credit. As a result, the subsidies were not well targeted to those most in "need." In market economies, there are often many subsidy programs, such as for the old and indigent or for those temporarily economically disadvantaged and in need of assistance. The economic issue is not whether societies should subsidize the at-risk groups. It concerns how the subsidies are delivered. In general, subsidies that distort prices and resource allocation are flawed in two ways: they are poorly targeted and they lead to inefficient resource use. Subsidies based on "means tests" and delivered to recipients using instruments that do not interfere in a major way with the market system are the least obstructive to successful economic reform.

Demonopolization and Privatization

Under planned systems, much of the processing and distribution, and even basic agriculture production, occurred under monopolistic conditions. Creating private monopolies by privatizing the

publicly owned ones is, of course, not the answer to efficient market reform. Privatization, or the transfer of property rights, will increase the opportunity of the private monopolists to benefit themselves at the expense of others. An accompanying anti-monopoly policy is also necessary. There are established approaches to controlling monopoly: opening borders to allow for competition by foreign firms, breaking up the large enterprises, or regulation. Most market economies have a monopoly policy that incorporates a combination of these approaches (Csaki and Johnson 1993; Williamson 1975).

Often in privatization there is much concern about equitable initial asset distributions. While an equal sharing of state assets among new private owners is a good way to avoid concentration of market power, which can lead to some kinds of market failures, not to distribute assets at all because of the difficulties of achieving perfect equity means *no markets at all*. It is better to divide assets as equitably as can reasonably be determined in a very short time. The markets will be able to function only when private agents have clear property rights under conditions that permit efficient transfers (sales/purchase/lease) of these rights between people.

Furthermore, the temptation to control potential monopolies by maintaining partial state ownership should be avoided. Partial state ownership is the least efficient way to curb the exploitation of private market power. The efficient way to avoid monopoly is to widen the opportunities for there to be many private owners and competitors. In contrast, state ownership narrows opportunities for new private firms by reducing incentives for foreign investment and new entry. Partial state ownership can even be a pro-monopoly policy because it increases the opportunities for corruption.

Infrastructure and Efficient Markets

Public acceptance of the market system will depend on efficiently functioning markets. Markets must function efficiently for both goods and services, for variable agricultural inputs, and for property or assets. For input and output markets, publicly supported information systems are a key for broad participation. Security of contracts is also critical to efficient exchange in markets. Various forms of arbitrage, buying and selling across regions and time, will improve the efficiency of the production and distribution system. This is not in nature a so-called "mafia activity," and is made such only if governments fail to recognize it as productive, or fail to expand it through an enabling regulatory and policy structure (Johnson 1993). A legal, administrative, and regulatory framework to insure enforceable contracts is the key responsibility of the government in market economies. Markets must

be opened to broad participation, be secure, and be perceived as fair. The fairness can be best accomplished through measures promoting symmetric information among participants.

Government has a role in assuring that there is not unscrupulous behavior in markets. At the same time, the services provided by "middlemen" arbitrating between buyers and sellers should not be curtailed. These traders are providing productive services in the market system. The more valued the services of middlemen and the more scarce those willing to provide these services, the higher the "profit" to these middlemen. Thus, the most effective way to reduce the share of the middlemen's profits is through the opportunity to become middlemen. The larger the supply of these services, the lower the price any one middleman can require for his services. In market economies, warehousing, transport, handling, insuring, and retailing are important productive activities. In fact, the largest share of mature market economy GDP is generated in these so-called "service sectors." The most important role of the government in these markets is to assure conditions for broad participation.

Markets must function as well for assets. Land markets, in particular, are critical to market reform. Again, the land resources must be easily transferable to the most productive users. The transfer costs, taxes and fees should be low, and registration and other government sanctions should ensure the validity of the contracts. Finally, much can be gained in establishing stable markets by linking (even if through tariffs and border taxes) to international prices, and designing institutions to not discriminate against international participation in the production, processing, and distribution of agricultural commodities. This is especially the case for smaller FSU nations. If the intent is to integrate the domestic economy into the international markets, "marking" relative prices at international levels and phasing them in with transparent tariffs and trading systems can help to establish markets and improve resource allocation.

Financial Markets and Credit

Credit is the "lubricant" that supports agricultural production and the efficient functioning of market systems. In many FSU economies, credits are allocated from agricultural banks at concessionary rates. The continuation of this practice in market systems means that forms of "nonprice credit rationing" will emerge. That is, if credit is not allocated on the basis of interest rates, it must be rationed on another basis. This "other basis" can involve favoritism, cronyism, and in general allocation of scarce financial resources not consistent with their best use in agriculture. Privatization of land and other property or assets and bankruptcy law facilitate the use of equity, along with interest rates, in rationing the financing of agriculture production, processing, and

distribution. Creditors must have the option of legally forcing payment of loans that are in default if the private banking system is to succeed.

The credit system and the banks must also be encouraged to secure savings as a source of capital and be transparent to their loan and savings customers. The latter is essential to insure that the suppliers of financial services are themselves financially solvent, and to limit market failure due to asymmetric information. There is an extensive literature on alternatives for regulating financial institutions that addresses this situation in transition economies. One important conclusion from this analysis is that the approach to regulation of private banks should be initially conservative, with great attention to savings protection and the limiting of bank failure (McKinnon 1991a).

Extension, Education, and Information

The participants in transition economies must adapt rapidly to a new economic system. This suggests an important role for government in education, extension, and the supply of information services. In many of the mature market economies, extension has been a key to the development of agriculture. Extension services supply tested research results and new information on technologies and management methods to participants in agriculture. Extension services also include information on improved business practices (Csaki and Johnson 1993). For example, good financial records are essential for firms to succeed in market systems.

Public information on prices, new technologies, actions of the government, conditions in international markets, and many other aspects of the economy can assist firms in making better decisions. Since the benefits of supplying information and education are not fully appropriable, the private sector, left to its own, will underinvest in these services relative to the optimum for society. This is a clear example of "market failure," which can be effectively addressed by the newly configured public sector in transition economies. In short, active support of the participants in agriculture (the new private agents) and of agriculture markets is essential to consolidating benefits associated with a rapid economic transition.

Protecting Living Standards

It is politically, and, from a humanitarian viewpoint, not possible to conduct market reform on the backs of the most economically disadvantaged citizens. The living standard protection in the old system was the guarantee of a job. In market systems, there will be unemployment, as resource use adjusts to the new incentive system and new business institutions. Two aspects of living standards protection merit specific comment. First, the households that are at risk must be assisted through the transition. Often, these households have become vulnerable due both to unemployment or underemployment and increasing food prices. Thus, agriculture is involved.
The tendency of governments has been in many cases to hold staples prices artificially low as a way of providing a safety net. This is very costly because it does not target the at-risk populations. Also, it distorts the incentives that are often the most important subsectors in agriculture: those for staple foods. Targeted, means-tested, assistance programs are the answer. Principles for designing living standards protection policies follow directly from the modern theory of consumer demand (Deaton and Muellbauer 1984).

Second, there is the issue of retraining or "restarting" individuals who are unemployed during the transition. Available idle human capital, if retooled and reintroduced into productive activity, can add to output and economic growth. Thus, retraining programs, jobs programs, and other initiatives that support the reentry of the unemployed or those who have become unproductive are part of a well-balanced safety net program. This portion of the safety net is not an income transfer but an investment to yield more productive participants in the economic system. Rural sector population and the amount of labor in agriculture suggest that these policies will be particularly important to the transition and the sustainable development of agriculture (Stuart 1984).

Rationalizing and Restructuring Government

Particularly for agriculture and the rural sector in the FSU, public services were provided by enterprises and/or collective and state farms (Lerman et al. 1994; Stuart 1984). Under the planned system, these enterprises were generally responsible for schooling, hospitals, roads, housing, pensions, and other services for rural populations. As these enterprises are privatized and restructured, there will be a natural tendency to shed their responsibility for supplying these public services. The enterprises will become more purely economic entities. Yet these public services are necessary if the quality of life in rural and urban areas is to be consistent. In general, supply of

public services requires local government. Local government in rural and urban communities must have taxation and other rights necessary to raise the funds to provide these public services. These same government authorities must also learn to administer the public service programs efficiently. In some transition economies, the reluctance of the members of state and collective farms about restructuring has been related to uncertainties about the supply of traditional public services (Brooks and Lerman 1994).

There are other new roles for government and the public sector in restructuring economies. But typically, in the economic sphere of activity, these involve adopting a different orientation. Government does not make things happen—markets and associated incentives do. Government must position itself to ensure the efficient functioning of markets. This requires new policies and institutions and a new attitude or policy culture for government sector leaders. Educational and other policies to actively change the policy culture of the bureaucracy can help to accelerate and consolidate the reform. Government bureaucrats often are the most resistant to change.

Environmental Protection

Environmental protection is a necessary element for sustainable agricultural development. As market prices for previously subsidized chemical and fertilizer inputs rise relative to output prices, the market sends incentives to use less of these chemicals and to use them more efficiently. Thus, market reforms have clear environmental benefits in terms of efficient use of chemicals and other variable inputs in agriculture production, processing, and distribution. But an additional comprehensive legal, administrative, and regulatory framework will be necessary to ensure that agriculture is not unduly harmful to the environment, and is sustainable. Generally, in more mature market economies, agricultural environmental policies are designed primarily to mitigate off-site damage. For example, erosion, contaminants in water and air, and noise and odor not only have an impact on production units, but also on the surrounding areas and property. Policies aimed at reducing the off-site impacts of agriculture for the environment typically involve combinations of regulation, education, and market incentives. The associated policy measures are rationalized on the basis of protecting human health and the general condition of the environment in the short run, and in the long run on the basis of a continued capacity to use resources in agriculture production and sustainability. In agriculture, unlike other sectors, the environment contaminants often come from nonpoint sources. Thus, pollutants do not simply come from the smokestack of a factory, but instead from applications of materials, tillage, or other practices on the overall landscape. This makes it difficult to monitor contamination and

environmental damage, and to enforce regulations designed to reduce this damage. For this reason, much of the environmental regulation of agriculture is educational and based on market incentive (Johnson and Martin 1993).

A second feature of environmental regulation for agriculture in more mature market economies has been the development and use of "best practices" concepts. One way to be sure that the environment is not damaged is to eliminate hazardous practices from production activity. However, as production occurs in different biological and geophysical circumstances, these standards or practices can be more restrictive than necessary. These concerns about the cost of environmental regulation are leading to different concepts of intervention. Instead of regulating by media using best practices, the idea is to regulate the integrated system; for example, the ecosystem. Indicators of performance of the ecosystem (perhaps a watershed for agriculture) in terms of environmental quality are identified. Then, through permit trading, siting, and other incentive-based systems, the agents in the system can organize themselves to meet the environmental performance standards. Regional environmental incentives in the United States, first organized around large bodies of water (lakes, rivers, and along coasts) were among the first to use this integrated-systems approach to environmental intervention on a large scale.

Consistency in Reform

As already mentioned, uncertainty about the course and pace of the policy reform is particularly debilitating for agriculture in transition economies. Agricultural production, processing, and distribution activities, by their very nature, have relatively long production periods and planning horizons. Annual cycles for crop production and investments in storage, livestock inventories, and processing facilities are examples. Because of the length of the production period and the necessity for agents in agriculture to anticipate the future in order to make effective current decisions, uncertainty about policy only adds yet another difficulty of transition. Of course, financial instability introduces uncertainty and adds complexity. But unpredictable reform packages are especially difficult for producers that organize their activities on a longer term basis.

Partial regulation of output and input markets, threats of regulation of margins for processing and distribution, indicative prices, and other only partially visible instruments of the planned system and/or the reform package are among the policy factors that complicate decisions for agricultural agents. More consistent reform packages that are implemented on a predictable timetable and that are transparent in their mechanisms and objectives are essential to sustainable agricultural development.

Partially enforced policies, stop-and-go actions, reversals of government reform initiatives, and lack of clarity about the intent of the policies or institutional measures and the nature of the instruments to be used for their implementation are major obstacles to sustainable agriculture development. Perhaps as important, the uneven course of the reform is particularly troublesome to foreign investors and other agents that are not in position to anticipate erratic policy change.

Sustainability and the Environment

Agricultural production simply cannot be sustained if the resource base is degenerating because of it. Thus, environmental protection and sustainable agricultural development are intertwined. Environmental protection is typically achieved through a package of legal, regulatory, and administrative measures, and more indirect governmental activities supporting education, monitoring, and the development of new technologies, market-based incentives, and public sector activity. We differentiate the other public sector activity from legal, regulatory, and administrative activities by noting that it can also provide goods and services: forest rangers, wildlife specialists, soil testing services, landscape design services, and managers of irrigation systems. These informational, indirect, environmental measures have already been discussed. The point was made that these activities contribute to protecting the environment and the resource base for agriculture, and can be introduced and proceed concurrently with economic reform. The reason is that these initiatives, albeit to differing extents, do not depend on the structure of agriculture that will emerge after the economic reform.

Many of these indirect interventions that are designed to educate, monitor, and produce the new technology require skilled labor. This may be particularly fortunate as a way to deal with the necessary reductions in the public sector as a consequence of the reform. Much monitoring, education, surveying, and even demonstration activity can be accomplished at relatively low cost during the transition. Government workers, for example, the members of the agriculture administrations at regional levels, can reorient their activities and contribute positively to the sustainable development of agriculture and protection of the environment as educators and evaluators.

The section "Transition to a Market Economy" included comment on the special features of the legal, regulatory, and administrative framework required for environmental protection and sustainable development of agriculture. These measures must deal with particular aspects of agriculture and the environment, off-site damage, nonpoint source contamination, extra-farm cooperation in managing ecosystems (e.g., watersheds) and the problems of enforcement (many private farmers distributed

over a large geographic area). In general, these features mean that environmental protection for agriculture will rely more heavily on education, incentives in the structure of subsidies (for example, partial payment for structures that provide both on- and off-farm benefit), and market incentives. Ideas of "integrated environmental management" are rapidly emerging in Western Europe and in the United States. The emphasis is on the "place" or the specifics of the particular location in designing packages of interventions to ensure environmental protection and at the same time permit growth and development of the local economy (Johnson and Martin 1993).

One-time opportunities for environmental protection and the sustainable development of agriculture are mostly associated with property rights. Agriculture scientists in the formerly planned economies are well acquainted with frail environmental areas. These frail areas can be kept as public land and used on a fee basis (grazing rights, for example), targeted as areas where agricultural activity cannot be conducted, or titled with covenants or use restrictions.

The term *easement* has become increasingly popular in environmental regulation of land use. If there are agricultural practices or activities that are particularly damaging to the environment, they can be restricted by covenants in land titles. Alternatively, easements can be purchased from the new land owners. These easements can limit use of selected production practices. If easements are purchased, markets can be organized to support the efficient supply of environmental benefits. Easements are consistent with sustainable development of agriculture, since they are not unduly costly and specific targeting is possible.

Finally, in the transition there are unique opportunities to influence the development of the rural landscape. Landscape design is receiving increased attention as a way to better link agriculture to improved environmental performance. In most regions, the landscape and land use patterns have developed historically. Thus, they reflect different technologies for production, transportation, processing, and distribution; and a different distribution of the population from what existed when agriculture developed. Also, more is now known about how agriculture affects the environment. This new information can be used to design improved landscapes for rural areas. These landscapes can, for example, incorporate patterns of forests, crop agriculture, and pastureland that are more consistent with the new technology and economic activity. Much of the land in the FSU nations has not yet been privatized. Opportunities exist for privatizing this land in a way that yields landscapes more consistent with modern agricultural technologies, modern transportation, current population densities and other factors important to agriculture, and up-to-date information on relationships between agriculture and the environment. These landscapes, whether consciously shaped by policy or

not in the future will provide the framework within which the sustainable development of agriculture will occur.

Conclusions

The policy and institutional framework that will guide agriculture after reform should be viewed, as much as possible, as an integrated package. This package must include not only private property and measures to ensure the efficient functioning of goods and asset markets, but also measures that will protect the agricultural resource base and the environment. These are the pillars on which sustainable agricultural development will rest. It is convenient in considering this policy package to reflect on the available results on "industrial policy" (Johnson et al. 1989; Johnson and Martin 1993; Adams and Klein 1983; Grossman 1990, for example). Industrial policies have been pursued for different sectors and by many nations. The lessons learned from industrial policy can be particularly valuable for agriculture. In general terms, the various industrial policies that have been tried can be placed into three categories:

- Preservationist policies concerned with limiting change and/or restoring the sector to an earlier structure;
- "Picking the winners" or government directing the course of economic development, technical change, or the structure of the industry; and
- Transitional policies facilitating the movement of resources to productive uses in response to external drivers of change.

What can be learned from the experience of many nations with differing industrial policies whether for agriculture or other sectors? First, preservationist policies almost never work. In the case of the transition economies, this means that attention to maintaining existing structures, production patterns, industry organization, and so on will require policies that are very unlikely to be maintained or to achieve the intended results. Once the political decision has been made to provide a different fundamental basis for organizing economic resources and production (a market system), it is highly unlikely that the old structure of agriculture will prevail. Accordingly, policies aimed at preserving past structure will be very costly in lost opportunities for sustainable development and growth, and will be short lived.

On the "picking winners" strategy, the evidence is equally unimpressive. Generally, in market systems, governments cannot outperform the private sector in selecting directions of industry change and growth. Industry policies that involve heavy-handed government intervention in selecting, for

example, which subsectors of agriculture to develop and the ones not to develop, are likely to fail. The point to remember is this: if the industry is to provide the goods and services people want, the market will signal all the right incentives. There is no need for a government to try to force it to happen. Instead of selecting the areas for agricultural development, the government should organize itself to facilitate these kinds of private sector decisions.

Transitional industrial policies have been the most successful. In essence, these policies accelerate adjustments to new circumstances, new technologies, or new market opportunities. They are very "light-handed" policies that often involve education, training, enabling institutions (for example, the German Standards Policy), and infrastructure. They also do not restrict the economic and civil rights of the population (Buchanan 1989; McMillan et al. 1994; Scully 1992). This last policy category seems most appropriate for sustainable agriculture in the transition economies, and on the basis of its record in other sectors and nations is most likely to succeed.

The tie between environment and sustainable development of agriculture is the maintenance of the resource base (often defined as not foreclosing future opportunity for at least current production levels). Clearly, new technologies can compensate for degradation of the resource base, maintaining or improving productivity. But this is a gamble that responsible leaders are not likely to make. And there is evidence that this gamble has not worked in the planned systems (e.g., Johnson et al. 1994; Skold and Popov 1990). Instead, investment in maintaining the quality of the resources used for agriculture as a form of saving is the wiser strategy. Investments can be viewed as present opportunity costs of limitations on the use of overly exploitive agriculture technologies. As sustainable development has become better understood, the research community in agriculture has directed added effort to new technologies that are more in harmony with maintaining and improving environmental quality. It is these new technologies to which informed leaders should give emphasis as keys to sustainable development in the longer run. In the shorter run, policies that place high priority on consolidating the market reform and nonintrusive environmental intervention are the ones destined to lead most expeditiously to the sustainable development of agriculture.

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