

III MEETING THE CHALLENGES OF THE FUTURE

While some Asian countries struggle to catch up, the rest will need to continue to increase incomes and the quality of life in rural areas. This will have to be done even as rural populations continue to grow. Failure to do so will lead to accelerated migration to the cities, a process that will have its own social and environmental costs, and a growing risk of social conflict and violence over the use of natural resources. Rapid economic growth must continue in order to provide the means to solve these problems. But at the same time that growth must be equitable and environmentally sustainable. As already seen in Chapter II, past experience suggests some key elements for these strategies. These need to be more widely adopted.

The recent financial and economic crisis in Asia has provided some important lessons and undeniably altered the way in which governments and policymakers need to tackle the problems facing their economies. Rural Asia, in particular, will be challenged by the legacy of the economic crisis for some time to come. The East and Southeast Asian countries that have been most affected by the crisis will need time to recover from the loss in real income and the necessarily drastic cuts in government investment in rural areas. Many investments have long lead times (e.g., agricultural research) and the consequences of the cuts will take many years to work themselves out; they will also impede agriculture's ability to respond to improved incentives for growth as a result of the currency devaluations. In addition, there has been reverse migration back to rural areas in some of the hardest-hit countries; reassimilating these people will take some time to complete. It

will also take time to reconstruct domestic financial markets and hence to restore the flow of credit to businesses and consumers. Governments and donors need to give high priority to restoring these investment fundamentals in the crisis economies.

Another legacy of the crisis that must be confronted is that the severe immediate negative welfare effects may be intensified and prolonged. The negative social effects of the crisis have been compounded by a lack of social safety nets for the newly unemployed and the newly poor. Traditional social systems that have supported the poor in the past, including close family ties, community support, and the ability to return to subsistence agriculture, have been weakened by the development of a dynamic urban economy. New safety-net systems have not been put in the place of traditional systems. Social unrest in Indonesia indicates how fragile and growth-dependent the social equilibrium has become in many of the rapidly developing Asian economies. None of the crisis economies except the Republic of Korea has an unemployment benefit scheme or other social-welfare programs.

The economic distress has also generated a crisis of confidence that may reverberate more widely in Asia. Since institutional failures were at the heart of the crisis, the key lesson is not that market-led growth is bad, but that more appropriate governance structures for key institutions are needed for managing it. Effective safety-net programs need to be in place to protect vulnerable people in times of crisis: public investment in key public goods must be sustained.

Evidence indicates that women are disproportionately affected by all social dimensions of the crisis and are in the greatest need of safety nets. The traditional gender difficulties faced by women have been exacerbated by the crisis. In addition, women tend to be the first laid off when companies feel the pressure of labor costs (on the other hand, they tend to find work in the informal sector more easily, they tend to work in the less affected export-oriented sectors, and they are sometimes substituted for more expensive male labor); girls are pulled out of school before boys; and women face

increasing difficulties in providing social services for their families.

Along with recovering from the economic crisis, and learning from it, Asian countries must also adapt to a changing world, one that will be increasingly impacted by

- globalization;
- demographic transition;
- an unfolding biotechnology revolution in agriculture;
- increasing water scarcity and land degradation; and
- the need to reinvent governance structures and public institutions.

This chapter will lay out options for meeting the new challenges of the future in ways that exploit their growth opportunities, but which are also pro-poor and environmentally sustainable.

MANAGING GLOBALIZATION

Globalization offers opportunities for further economic growth in Asia. Market-oriented policies that have favored economic liberalization, open markets, and integration with the global economy have been very successful for both rural and general economic development in Asia. The process of globalization, including increased interlinkages across countries and expanded trade, financial, and information flows, provides new technologies and markets and new sources of finance. But globalization and economic liberalization carry with them risks that have been driven home by the Asian economic crisis. These risks include

- the inability of many domestic industries to compete in the short term;
- the potential destabilizing effects of uncontrolled short-term capital flows;

- increased exposure to price risk; and
- worsening inequality as many poor people and backward regions get left behind.

To avoid the pitfalls of globalization and economic liberalization, each of these risks needs to be addressed and policies and strategies adopted that negate or minimize them.

Competition

World markets are ruthlessly competitive and offer little succor to the weak and inefficient. Some sectors in many Asian economies are not well positioned to compete in world markets and in some cases (e.g., Central Asia) whole countries are not yet ready. The pace of economic liberalization must therefore take into account the institutional capacities and political realities in each economy. Some of the less developed economies of Central Asia and South Asia may need a managed transition period in which agriculture and domestic industries can gear up to compete and during which a technological dynamism can be established that will help ensure that they can continue to compete over time. The emerging evidence from economic reform in Central Asia and Eastern Europe suggests that more rapid and comprehensive reform can be conducive to a quicker economic turnaround and faster growth (although, maybe, at a higher short-term social cost).

The PRC, on the other hand, has had great success with a gradual approach, yet success was arguably best in the agricultural sector, where reform was fastest, and much less so in the state-enterprise sector, where reform was slowest. Viet Nam undertook highly successful and relatively rapid economic liberalization and stabilization reforms in 1989, but has encountered difficulties in the slow-reforming state-enterprise sector. Gradual reform typically allows for a more comprehensive reform process, but a lack of urgency for thorough reform can bring about inappropriate and incomplete

reforms or lead to stop-and-go periods, as the PRC has experienced during its protracted reform process. Nevertheless, political and social stability during the transition process may be as important to success as economic stability and may dictate a more gradual approach to reform than is optimal from the point of view of efficiency.

The newly industrialized economies of East Asia offer some important lessons about industrialization policies for managing the transition. Many of them used directed interventions to promote specific industries, such as targeted credit, export promotion, tax benefits, and import protection. It was expected that these policies would also create spillover benefits to other industries, help enhance the overall competitiveness of the economy, and raise the future technological level of the economy. But the results of these policies have been quite mixed, especially in the long run. Many industrial policies were implemented without a sound analysis of the market failures they were intended to correct; they ignored market signals in attempting to achieve efficiencies; they underestimated the informational requirements necessary for effective intervention; they overlooked the limited capacities and capabilities of government; and they overestimated the human and other resources available to build efficient industries. Moreover, attempts to transfer the “lessons” of this kind of industrial policy to the rest of developing Asia have been largely unsuccessful.

Protection of some industries by definition penalizes other industries. A clear example of this is the rural nonfarm sector. Recent macroeconomic policy reforms that have benefited the agricultural sector should have led to positive growth multiplier benefits for the rural nonfarm economy. The policy reforms have also favored tradable goods production in general, and this should have been directly beneficial to much rural industry. But policies to assist the rural nonfarm economy have still generally favored manufacturing rather than service activities and large- rather than small-scale units of production. In many cases, small firms have effectively been placed at a competitive disadvantage against their larger-scaled

rivals (for example, they do not receive the same subsidies and tax benefits), and this has encouraged more capital-intensive patterns of development than is optimal.

A better approach to dealing with the uncertainties of globalization can be described as market-friendly policies. They can be considered as an intermediate approach, more proactive than laissez-faire policies and more cautious than active industrial policy. Market-friendly policies focus on the liberalization of trade, accompanied by decreased government regulation and intervention, and thus less rent-seeking—all conducive to the functioning of a market economy. Under market-friendly policies, exporters face fairly uniform incentives for exporting commodities across industries; both imports and capital flow should be gradually liberalized as institutional capacity improves; and the fiscal deficit and share of government expenditures in GDP are maintained at comparatively low levels. Rather than favoring specific industries, governments should focus primarily on prudential regulation and provision of public goods, particularly through heavy investment in infrastructure and human capital. The market-friendly approach encompasses macroeconomic stability, human capital formation, openness to international trade, and an environment conducive to private investment and competition.

Destabilizing Capital Flows

Flows of private capital from abroad are fickle and can be destabilizing if not properly managed. Most concretely, the economic crisis raised serious questions about the convertibility of short-term foreign capital inflows. Foreign direct investment and other long-term, relatively stable investments make significant contributions to economic growth, but the benefits of short-term international capital are small and uncertain because, unlike foreign direct investment, short-term capital does not bring along technology and management innovations. Moreover, when savings rates are already high and marginal

investment is misallocated, short-term capital greatly increases the vulnerability of the economy. Management of international capital flows should therefore focus on the creation of an environment conducive to long-term investments and discouraging to short-term capital inflows. Tax incentives and other distortions that favor short-term inflows over long-term investments should be eliminated. Moreover, the importance of sequencing of reforms was shown by the high costs of moving to free convertibility of short-term capital before effective financial intermediation and prudential regulation were in place. Both prudential regulation of currency positions of banks and strengthened supervision of these regulations and other risk-management procedures are required. In those Asian developing economies that are plagued by weak institutional capacity and financial systems, selective controls on short-term capital may well be appropriate. Temporary, market-oriented controls on short-term capital inflows combined with domestic reforms and greater disclosure may help reduce the frequency and magnitude of shocks.

Price Risks

There is also the possibility of increased price and economic risks as domestic markets become less insulated from global forces, although the evidence of this is highly mixed. While there should be an immediate increase in price risk for domestic producers when a country's price stabilization policies are dismantled, this may eventually be more than offset by greater stability in world markets as more countries liberalize and pool their market risks.

Some evidence for this is to be found in a recent FAO study of changes in interyear price variability of cereals from 1972 to 1996. The study concluded that there had not been any increase in interyear variability in world cereal markets. Recent price changes do not appear to manifest anything unusual and are not outside the range of normal annual variations. Furthermore, analysis of the intrayear cereal price

variability showed that, if anything, the tendency is towards a decline in variability.

But even if domestic producers are confronted by increases in price risk, there are better ways of managing such risks than returning to trade protectionism and costly price-stabilization policies. Futures and options markets now exist for key agricultural commodities in many industrialized countries and are also beginning to emerge in developing Asia. These markets can offer an efficient and cost-effective way of managing price risks.

In order to reach the mass of small Asian farmers, however, new forms of financial instruments need to be created within Asian countries. Appropriate intermediaries (e.g., banks or farm cooperatives) could offer forward price contracts to farmers and then use national and international futures and options markets to hedge the associated price risks.

Worsening Inequality

Globalization leads to growth that often favors the middle classes over the poor and urban over rural areas. This is not to say that the disadvantaged do not gain; globalization can bring new employment and tighter labor markets and it can open up new opportunities for commercial agriculture even in more remote areas. But there is risk that the gains may be highly skewed and that the distribution of income may worsen. Moreover, economic downturns associated with the higher risks of greater exposure to world commodity and capital markets inevitably impact more severely on the poor.

Avoiding worsening inequalities will require adequate investments in rural infrastructure (especially roads, transport, and communications), in human capital (education, specialized training, and health), and in social safety-net programs (see also the first part of this chapter).

MANAGING DEMOGRAPHIC TRANSITION

Demographic factors have played a major role in Asia's growth in recent decades, and will continue to do so well into the next century. More importantly, demographic changes will continue to influence the quality of life in the coming years. For example, because of population aging and cultural shifts, traditional forms of caring for the elderly in rural Asia may be inadequate in the future. Policies that rely on family welfare systems are therefore unlikely to address future needs adequately, and policymakers must develop ways to create and fund rural pension systems before they are actually needed.

Rural Asia accounts for more than a third of the world's total population and almost two thirds of Asia's population. Even though rapid rates of urbanization are bringing down the rural-to-urban population ratio in Asia, rural populations will continue to grow in absolute terms. While Asia's population is still increasing, the rate of growth is declining as fertility rates steadily fall. As fertility rates fall, the number of young children declines and the ratio of dependents to working-age people gradually decreases. Declining fertility also creates a bulge in the age pyramid, since the cohort just before the decline in fertility rates becomes the largest cohort, with each succeeding cohort having fewer numbers. When this large cohort reaches working age, dependency ratios will fall even further. As a result, per capita incomes will increase even without productivity increases, as long as the ratio of workers to dependents increases.

The economies of East Asia and, more recently, Southeast Asia have already reaped or are reaping the benefits of this "demographic gift". The changing demography has contributed to the rapid rates of economic growth in East Asia, which had the earliest and most rapid demographic transition in Asia. Southeast Asia is now beginning to experience the economic growth impacts of its changing demography. South

Asia, where fertility declines have been the slowest, will gradually begin to experience the effects of the transition as well, although its impact will be weaker because of the more gradual demographic transition.

While Asia as a whole has experienced and will continue to experience this boost from the changing age structure, rural areas within Asia have been less successful at accomplishing the necessary demographic transition. Accelerating the transition in rural areas provides a way for countries to create a rural demographic gift, thereby enhancing both growth and quality of life in rural Asia.

In any country, a whole host of factors linked to the community's social and economic environment influence the fertility rate. The importance of providing family planning services as part of a package of reproductive health services catering to clients' needs has become increasingly apparent. More than just efficient family planning programs are necessary to lower fertility rates, however. Raising women's education status and increasing their job opportunities have been most effective in bringing down fertility rates. Poor access to education and the lack of efficient labor markets for women in rural areas thus help explain higher rural fertility. Increasing educational opportunities for girls in rural areas can have long-term demographic benefits; creating job opportunities for woman in rural areas will help raise the value of women's time and thereby increase the costs of bearing more children. Since an important motivation for having children is to provide economic security for parents in their old age, providing a viable and efficient alternative in the form of pension plans and safety nets would reduce the dependence on children.

Initially, the impact of the demographic transition on both growth and the quality of life will be beneficial. The benefits, however, will be temporary. As the population ages, the bulge cohort will reach retirement age and old-age dependency will rise. This will start to have a negative impact on growth unless families and governments begin to prepare for it now. In Asia the family has been the main source of support for the elderly; this is particularly true in rural societies.

With smaller families and competing economic needs looming in the near future, investing in a better education for children is called for now so that they will be able to bear the financial burden of the future more easily. Demographic changes also mean that the elderly in rural Asia will require additional services, particularly medical services and the financial wherewithal to gain access to these services. Rural social welfare programs will be needed and rural societies will have to gear up to caring for the elderly.

Overall, demographic factors currently at work in rural Asia will have a powerful influence on several dimensions of future quality of life. Changes in fertility and migration patterns will be coupled with cultural changes associated with modernization, urbanization, and globalization. Demographic changes are predictable and thus provide decision makers with the opportunity to take them into account while designing policies that can responsibly address the far-reaching changes that the demographic transition is sure to bring. The challenge is to address these concerns now so that future problems are minimized.

MANAGING THE BIOTECHNOLOGY REVOLUTION IN AGRICULTURE

The unfolding biotechnology revolution in agriculture has the potential to dramatically transform agricultural production and processing in the future. Early benefits will be seen in modest yield increases, reduced dependence on agricultural chemicals for pest and weed control, increased drought resistance in crops, and better-quality and more nutritious food. This could be followed by much more significant breakthroughs in crop and livestock yields, new types of crops, control of major diseases in livestock, nitrogen fixation in cereals, and new types of processed foods. As with the microcomputer revolution of the 1980s, developments may accelerate much faster than the experts think.

If successfully tapped, the biotechnology revolution could make an extremely important contribution to future agricultural growth and food security in Asia. In fact, it may offer the only viable way of restoring adequate levels of growth in crop yields in the decades ahead. The green revolution has already run its course in much of Asia; yield growth for major food grains has become sluggish. It is seldom profitable for farmers to aim for more than 50 percent of yield potential as expressed in experimental-station yields; this level has already been reached in many irrigated areas. Conventional plant breeding is running out of options for providing the needed breakthroughs in yield potentials, but biotechnology is beginning to open up new sets of possibilities. Like many revolutionary developments, however, biotechnology also brings new risks and problems.

Most current agricultural biotechnology research is being undertaken by a handful of multinational companies and caters to the problems of rich farmers and developed-country consumers. Few outputs from this research will be appropriate for most Asian countries. For example, crop varieties with built-in herbicide resistance would require much greater reliance on herbicides than is common in Asia, where most weeding is still done by hand. Moreover, crop varieties that incorporate Bt genes for insect pest resistance need to be surrounded by buffer zones of non-Bt varieties if insects are not to become resistant. This may be hard to enforce in many Asian countries.

But the biggest limitation is that hardly any biotechnology research is being undertaken on many of Asia's basic food crops or on the problems of small farmers. Even in Asian countries with the strength to develop biotechnology programs, such as India, research emphasis is often placed on export crops. The private sector is unlikely to change its focus because it perceives limited potential to reap profits from working on many of these problems. If Asian countries are to tap more fully into the biotechnology revolution, they will need to expand their own national and regional capacity to undertake some of this research.

Greater local capacity will also be essential for forming effective partnerships with relevant multinational companies and biotechnology research centers in developed countries. Several international initiatives are already attempting to improve Asia's access to biotechnology research. For example, the Rockefeller Foundation launched its Rice Biotechnology Network in 1985 with the aim of improving national capacity. After a slow start, some of the International Agricultural Research Centers (e.g., The International Rice Research Institute and The International Crops Research Institute for the Semi-Arid Tropics) are also beginning to become more active players in biotechnology research. They may soon be able to serve an important intermediary role between multinational companies, developed-country research centers, and the needs and capacities of national agricultural research systems in Asia. These developments are at an early stage, however, and Asian countries need to make a much more concerted effort to tap into the biotechnology revolution. This will require allocation of additional public funds for agricultural research, as well as staffing up for biotechnology research.

The public sector will need to play a particularly important role in ensuring that small and disadvantaged farmers and resource-poor areas are not left further behind by the biotechnology revolution. Private companies have little incentive to work on the problems of these groups, since the latter are the least likely to be able to afford new and improved seeds or to use additional inputs like herbicides. Publicly funded (though not necessarily publicly conducted) research will be crucial for these groups.

Another worry for Asia is that biotechnology is being used in developed countries to genetically engineer substitutes for some of the region's traditional export crops. This could eventually prove costly in terms of lost export earnings. For example, rapeseed plants with more than 35 percent laurate in their oil have now been produced in the US and are expected to provide a cheaper alternative to coconut and palm kernel oil. Such losses in competitive advantage will take place not only between developed and developing countries, but also

between smaller developing countries without biotechnology capacity and those developing countries that have it.

Biotechnology also brings new risks associated with the release of genetically modified material into the environment (e.g., gene jumping, new pests) and from the consumption of genetically modified foods (e.g., allergic reactions, toxins). These risks are not well understood and they provoke a great deal of anxiety among some segments of the public. National institutions must have the capacity to evaluate these risks and to implement and rigorously enforce appropriate regulatory systems.

Biotechnology is also associated with a thorny set of intellectual property rights issues. Property rights over genetic resources are needed to reward private companies for their efforts in developing improved varieties. But if these rights are inappropriately defined, they could lead some countries to lose ownership rights over their own indigenous genetic resources. These concerns have been reinforced in recent years by patents issued in the US for frivolous claims to turmeric, neem and basmati rice that essentially gave private companies ownership rights over underlying indigenous genetic material from Asia. Such patents are often overturned when challenged in US courts, but require costly litigation by Asian countries.

Another problem is that as more countries try to assert claims over their indigenous genetic resources (as agreed at the International Convention on Biodiversity), the free flow of agricultural genetic material between countries may be impeded. The high-yield varieties of cereal crops associated with the green revolution incorporated genes from a number of countries; these were freely exchanged through public research institutions to the benefit of all countries that could grow the crops. There is a growing danger that it will become increasingly difficult to share genetic material in this way and this could slow or impede future genetic improvements.

The development of an international system of intellectual property rights in agriculture is still in a state of flux, with the US taking an aggressive lead. Asian countries need to take a position that balances the interests of private-sector companies (both foreign and domestic) whose products

they would like to use with protection of their own rights of public access to indigenous genetic materials at home and abroad. This probably means they will need to implement patent laws to protect rights to novel and significantly improved genetic material. As far as possible, however, they should try to uphold the FAO's 1984 International Undertaking on Plant Genetic Resources that states that these are a "common heritage of mankind". There is enough commonality of interest so that Asian countries should work together and develop a common negotiating position on these issues.

MANAGING LAND AND WATER SCARCITY AND DEGRADATION

Finite quantities of land and water in Asia suitable for agriculture limit the scope for bringing new natural resources on line for food production. In addition, some contraction in land and water resources for agriculture, due to rising pressure to divert resources already in agriculture to nonagricultural uses, may partially offset any expansion. Moreover, environmental degradation of areas already in production can dampen growth in food supplies by eroding the productive capacity of the natural resource base; any new areas brought under production may be even more susceptible to degradation than are current areas.

Land degradation is a serious problem in both favorable and less favorable environments in Asia. On the one hand, intensification of agricultural production in irrigated and favorable rainfed environments, combined with sometimes flawed incentives due to inappropriate policies and weak enforcement of laws and regulations, has caused substantial environmental degradation. Meanwhile, in resource-poor areas, continuing population growth and a scarcity of good land have forced the expansion of cropped area into forested and woodland areas and onto steeper slopes, with increasing soil erosion. A third type of environmental degradation that

could expand dramatically is waste disposal and water quality problems caused by intensified livestock production.

Agricultural intensification *per se* is not the root cause of lowland resource-base degradation, but rather intensification combined with an inappropriate policy environment that has encouraged monoculture systems and excessive or unbalanced input use. Trade policies, output price policies, and input subsidies have all contributed to the unsustainable use of Asian lowlands. The dual goals of food self-sufficiency and sustainable resource management have often been mutually incompatible. Policies designed for achieving food self-sufficiency have undervalued goods not traded internationally, especially land and water resources, leading to salinity build-up, waterlogging, and nutrient mining. Subsidies have encouraged environmentally damaging misuse of inputs.

In the less favorable areas, mining of soil fertility, soil erosion, deforestation, and loss of biodiversity impose high costs on those who depend on these areas for a living. Soil erosion contributes not only to lower yields on site, but also to siltation problems downstream, reducing the capacity and productivity of reservoir and irrigation schemes and thereby affecting an even broader area. Likewise, deforestation in upper watershed regions can also have broader effects, for example by contributing to flooding problems in lowland areas. These problems are already serious in many “hot spot” areas in Asia such as the foothills of the Himalayas, sloping areas in the southern PRC and Southeast Asia, and the forest margins of Indonesia, Malaysia, Viet Nam, Cambodia, and the Lao People’s Democratic Republic (PDR).

With rapidly increasing demand for meat and livestock products in much of Asia, pressure on livestock production could cause similar or more severe environmental degradation in this sector. Fisheries production has also increased dramatically in response to increasing demand and this has led to severe strains on Asia’s aquatic resources (See Box 7). Modernization of the traditional livestock production systems in many Asian countries will require huge investments to

improve feeding potential, ensure a suitable animal environment, and provide other modern production and processing technology. As with intensive crop agriculture, however, the intensification of livestock production poses potentially severe environmental challenges. Production of livestock generates waste by-products that under some conditions can be recycled but, when animal concentrations are high, can become a serious pollution problem. Livestock and feed production use large quantities of water, not only as a direct input, but also for waste disposal. The high concentration of industrial livestock production has the potential to produce substantial organic discharges that are in excess of the carrying capacity of the surrounding environment.

Policies that mitigate or even reverse negative environmental effects in the crop sector and help preempt larger problems in the livestock sector include the removal of trade, macroeconomic, and price distortions in input and output markets and the establishment of price incentives or regulations to reduce the production of environmental externalities in both sectors. Establishment or improvement of secure property rights to land and water is also essential for improvement in the incentives for resource conservation. These environmental policy reforms in higher-potential areas for crop and livestock production must continue to receive attention, since Asia will continue to rely on these areas for its food production and degradation there poses a relatively greater threat to the food supply.

In the less favorable environments, it is the pressure to expand area under production, rather than intensification, that frequently causes degradation. In the short to medium term, intensification for these areas may be the best strategy, but because these areas are more fragile environmentally, intensification must be undertaken in a manner that preserves the environment. This will mean greater investment in technologies and policies suited to the diverse conditions that characterize low-potential areas, as well as efforts to link those areas to the broader economy so that the benefits of market reform reach them as well. As in high-potential areas, land

Box 7 – Increasing Pressure on Aquatic Resources

Fisheries production in Asia, both the capture and culture subsectors, grew remarkably in the two decades to 1996, at a faster pace (4–5 percent per year) than did Asian food crops (3.5–4 percent per year), and much faster than fisheries production in the rest of the world, which declined from 2.6 percent in 1977–1986 to only 0.3 percent in 1987–1996. Asia now accounts for more than half of the world's total fisheries production. China has emerged as the dominant producer in both subsectors, with more than half of its total production coming from aquaculture.

At the global level, marine production exhibits a picture of general ill health. About 35 percent of the world's major fisheries were showing declines by 1994; only about 40 percent could increase their production levels. The main causes are the open-access nature of most fisheries and subsidy-driven overcapitalization that have led to overfishing and excess fishing capacity, resulting in a global crisis in fisheries. Even increased production may hide deeper problems: increased squid production, for example, is attributable to declines in population of demersal fish, which are their predators. This trend of fishing down the food chain may have a long-term and perhaps irreversible impact on the ecological balance of marine ecosystems. Freshwater fisheries production worldwide is unlikely to increase significantly and faces increasing constraints from population pressure, mainly through pollution and inadequate access and user rights.

In Asia, overfishing has worsened during the last two decades. Catch rates in Thailand are down to only 6–10 percent of peak levels; catches of a number of large and small pelagic stocks (such as tuna and herrings, respectively) have declined,

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degradation in low-potential areas can be reduced through improved property rights to land.

Although land degradation is of overriding importance in some geographic regions within Asia, probably the most severe environmental challenges facing Asian developing countries are water scarcity and quality. Water scarcity is

Box 7 (continued)

while the proportion of juveniles of commercial species and of “trash” fish has been increasing.

In Asia, as elsewhere, there is a need to re-orient capture fisheries toward conservation and sustainability. Fisheries policies need to include not only production goals but also socioeconomic and ecosystem aspects and to take into account other users of coastal and inland aquatic resources. The dilemma policymakers face, between increasing production to meet growing demand and self-restraint and conservation, remains a difficult one to resolve, however.

Asia accounts for 90 percent of world aquaculture production, about two thirds of which is in fresh water and brackish water. The phenomenal growth of the culture subsector, nearly 12 percent per year in the decade 1987–1996, is likely to continue for some time, because there are still untapped potential areas, while new technology, such as genetic improvement and hatchery techniques, holds the promise of further gains. Some forms of aquaculture have had a severe negative environmental and socioeconomic impact, however: shrimp farming has entailed destruction of mangroves, water pollution, land dereliction, saltwater intrusion onto adjacent lands, and the introduction of exotic species and diseases in coastal waters. Inevitably, growth of both the freshwater and brackishwater culture subsector will be constrained by availability of and competition for suitable unpolluted water and by the environmental impact of culture operations themselves.

Source: Mingsarn Kaosa-ard and Benjavan Rerkasem. 1999. *The Growth and Sustainability of Agriculture in Asia*. Hong Kong: Oxford University Press.

increasing, and within the next decade or two will approach crisis levels in many Asian countries, where there will simply not be enough water to meet everyone’s needs for all or part of the year. Growing water scarcity is resulting largely from rapidly growing demands for agricultural, industrial, and

household purposes, while the potential for expanding supplies is diminishing. There is much greater competition between urban and rural uses of water. Water-shortage problems are also aggravated by worsening environmental conditions related to deteriorating water quality, degradation of irrigated land, insufficient levels of river flow for environmental and navigation purposes, upstream land degradation, and seasonal flooding. Pollution of water from industrial waste, poorly treated sewage, and runoff of agricultural chemicals, combined with poor household and community sanitary conditions, is a major contributor to disease and malnutrition.

These problems are important throughout Asia: water scarcity is more of a seasonal constraint in the monsoon countries of East and Southeast Asia but a year-round problem elsewhere. Water-scarcity and -quality issues are especially severe in Central Asia (e.g., the Aral Sea) and parts of South Asia. In order to deal with these problems and to avert water scarcities that could depress agricultural production, cause rationing of water to household and industrial sectors, damage the environment, and escalate water-related health problems, new strategies for water development and management are urgently needed.

A large share of the water that is needed to meet new demand must come from water saved from existing uses through comprehensive changes in policies related to water and institutional reforms. Such changes will not be easy, because both long-standing practice and cultural and religious beliefs have treated water as a free good and because entrenched interests benefit from the existing system of subsidies and administered allocations of water. But it should be pointed out that the types of policies needed to improve water management are broadly applicable to other environmental problems as well. In the broadest sense, these are policies to improve the flexibility of resource allocation in agriculture:

- Removal of subsidies and taxes that distort incentives and encourage misuse of resources.
- Establishment of secure property rights and invest-

ments in research, education and training, and public infrastructure.

- Better integration of international commodity markets.
- A greater inclusion of populations in developing countries into these markets.

The most significant reforms will involve changing the institutional and legal environment in which water is supplied and used, to one that empowers water users to make their own decisions regarding use of the resource, while providing correct signals regarding the real scarcity value of water, including environmental externalities. The precise combination of new investments and water management reforms will vary depending on the location, level of institutional and economic development, and degree of water scarcity. But the key elements of the reform include

- holistic water management at the river basin level;
- user-managed irrigation;
- water use rights, pricing, and markets; and
- groundwater management.

Each of these is discussed further below.

River Basin Management

The watershed, or river basin, is the hydrologic unit that includes the key interrelationships and interdependencies of concern for water management, as represented, for example, in the linkages between upstream and downstream water users. Competition for limited water resources occurs between different stakeholders/sectors and at different levels: among farmers within an irrigation system; between irrigation systems in the same river basin; between the agricultural sector and other rural uses, such as fisheries or domestic water supply; and more and more often between agricultural and urban and

industrial users and uses. Environmental uses also enter the competition. Upland watersheds are source areas for surface and groundwater recharge, while downstream agriculture and urban development are directly dependent on water supplies from the upper watershed.

In many regions, poor management of watersheds through deforestation, the eradication of perennials, and other human interventions in upland areas can lead to soil erosion and decreases in agricultural productivity; siltation of reservoirs and irrigation systems; adverse impacts on fisheries, wildlife, river habitat, and recreational water uses; water pollution; flooding of lowland areas; and reductions in water supply for irrigated agriculture, hydropower, industrial, and urban uses. The factors shaping the competition for water use at the river basin scale include economic and population growth; changes in technologies and the environment (including climate change); changes in the social, legal, institutional, and political environment; and changes in the physical, technical, and economic environment.

Because of these complex interrelationships, integrated water management at the river basin level is the foundation for the sustainable management of water resources. The main roles of the public sector in water management are

- to define and implement a strategy for managing water resources that includes stakeholder participation;
- to provide an appropriate legal, regulatory, and administrative framework;
- to guide intersectoral allocations; and
- to develop water resources in the public domain.

It is at the river basin level that water allocation decisions must be made across the major competing demands of agricultural, municipal, and industrial users. Investments and allocation decisions in one part of the basin affect activities in other parts of the basin. As a result, policy instruments designed to make more rational economic use of water resources need to be applied at this level. Improved water management at

the river basin level will require considerable strengthening of relevant public institutions and improved tools for planning and monitoring purposes.

User-Managed Irrigation

In many countries, poor performance of agency-managed systems, together with fiscal pressures from mounting operations and maintenance costs, has provided a major stimulus for transferring management responsibility for both irrigation and domestic water-supply systems from agencies to user groups. In the Philippines, inadequate local funding, exacerbated by shrinking donor-agency contributions and declining revenues due to farmers' failure to pay irrigation fees, prompted the national government to transfer system management to the farmers. This management transfer program initially focused on small-scale systems with traditions of strong farmer involvement and later expanded to larger-scale public systems.

A major advantage of the user allocation strategy is its potential flexibility to adapt water delivery patterns to meet local needs. Having more information on local conditions than agency staff, those directly involved in a sector's water use do not have to rely on rigid allocation formulas. For example, based on the soils' water-retention capacity, certain fields may be given more water than others. User organizations may also consider local needs for watering animals, bathing, washing clothes, or various small enterprises, needs that a sectoral agency has no mandate to meet. The result can be improvements in either output per unit of water or in equity or both.

User-based institutions can be constituted as irrigation districts, groundwater districts, cooperatives, irrigator associations, village-based organizations, or more informally constituted user groups. Studies of such farmer-managed irrigation systems have shown a wide diversity of rules for within-system allocation: by timed rotation, water depth, land

area, or shares of the flow. In the domestic water-supply sector, user-based allocation is seen in community wells and hand-pump systems, as well as in a growing number of more sophisticated systems controlled by water and sanitation associations.

Among a wide range of factors affecting the viability of organizations for water management, property rights are a critical factor. In the past, system turnover of infrastructure and management of systems has often failed because of flaws in internal structural features or external factors that affect the viability and sustainability of water-user associations in managing irrigation systems. The cohesive force of property is important in many aspects of water management, but is especially critical for allocation. User groups cannot make decisions regarding water if they have no *de jure* or *de facto* rights over the resource. Property rights, which can be ownership of the actual irrigation facilities and/or water rights, form the basis for relationships among irrigators, which become the social basis for collective action by irrigators in performing various irrigation tasks.

Water user groups also tend to be stronger if they build upon existing social capital or patterns of cooperation. Groups are likely to be stronger if they are homogeneous in background and assets (though heterogeneity can be managed). User groups must have a demonstrable effect in improving water control and farm profitability to ensure that the benefits to farmers outweigh the costs of participation. Particularly crucial to success is a supportive policy and legal environment that includes establishment and adjudication of secure water rights, the monitoring and regulating of externalities and third-party effects of irrigation, and the provision of technical and organizational training and support.

Water-Use Rights, Pricing and Markets

Irrigation water in nearly all of Asia has been subsidized and in many cases provided free. Farmers therefore have little

incentive to economize on its use. Two major environmental problems in intensified areas—land degradation due to salinity buildup and waterlogging and the buildup of increasingly resistant pests due to excessive reliance on monoculture rice—are directly related to the virtually free provision of water to farmers. Increasing water-use efficiency through opportunity-cost pricing or market valuation of water would have substantial environmental benefits and would not adversely affect yields; yet this leverage for improving the sustainability of the resource base has rarely been utilized in Asia.

In principle, markets in tradable water rights may have considerable efficiency and other advantages over other allocation mechanisms. These include

- empowerment of water users by requiring their consent to any water reallocation and compensation for any water transferred;
- security of water rights tenure to users, which can encourage investment in water-saving technology;
- provision of incentives for users to consider the full opportunity cost of water when making allocation decisions, including its value in alternative uses; and
- provision of incentives for water users to account for external costs imposed by their use, reducing the pressure to degrade resources.

Water markets could, therefore, play a key role in reducing environmental degradation by providing incentives for water conservation.

Despite these potential benefits, constraints to broad-based water market approaches are significant in most of Asia. The unique physical, technological, and economic characteristics of water resources pose special problems for establishing tradable water rights and developing markets for such rights. Because of both environmental concerns and larger public interests, regulatory mechanisms for large-scale water use would have to be carefully designed. The fundamental importance of water to farm production and income raises

serious equity concerns when major shifts in water allocation are considered. Multiple reuse of water creates the likelihood of significant third-party externalities, that is, spillover effects on other people's welfare from water trades, creating further difficulties in enforcing and regulating trade in water. Moreover, surface irrigation in much of Asia consists of very large systems serving many small farmers. Development of water markets at the farm level under these conditions would be difficult, because measurement of deliveries to large numbers of end users, in order to charge by volume of water use, requires a combination of technology and monitoring effort that is not cost-effective under these conditions.

Because of these complexities, establishment of markets in tradable water rights is likely to be a longer-term solution in much of Asia, will be more extensive for groundwater irrigation, and for surface-water irrigation systems will be concentrated (at least initially) around major urban areas. But market-type incentives in water allocation could be strengthened through innovative approaches that would combine the benefits of water markets and user management. Although appropriate institutions would need to be designed for specific countries and regions, the wholesaling of relatively large blocks of water to user groups or privately run irrigation subunits could establish appropriate incentives for water allocation. The user group would then be responsible for internal allocation of the water, and could resell water that was saved through efficient use. The price charged for water under this allocation method would have to be high enough to improve cost recovery for irrigation and to encourage conservation of water. Water prices can also include pollution or effluent charges in order to reduce the incentive to pollute.

Groundwater Management

Sustainable development of groundwater resources also offers significant opportunities for many countries. The massive expansion of private-sector tubewell irrigation in India,

Pakistan, and Bangladesh is the most successful example of private-sector irrigation development in the developing world. Private tubewells have grown most rapidly in areas where there are reasonably good roads, where research and extension systems operate, and where credit and electric or diesel energy are accessible. Private tubewells have largely developed in and around the command areas of large surface-irrigation systems, because deep percolation losses from the surface systems recharge the aquifers for tubewells.

Principles for groundwater management reform are similar to those for surface water, including the introduction of economic incentives and user involvement in the allocation process. Successful approaches in the western United States appear surprisingly appropriate for conditions in much of Asia. The approaches have employed a variety of instruments to influence water demand, including pumping quotas (usually based on historical use), pumping charges, and transferable rights to groundwater. The governance structure in the water basin (shared aquifer) establishes water rights, monitoring processes, means for sanctioning violations, representative associations of water users, financing mechanisms for administration and management, and procedures for adapting to changing conditions. Key elements for the success of this governance structure are that it is agreed upon and managed by the water users; that it is responsive to local conditions; that it operates with available information and databases, rather than requiring theoretically better but unavailable information; and that it adapts to the evolving environment.

Effective and sustainable management of groundwater will also require that policy distortions in other sectors that impinge on groundwater use are corrected. Subsidies to diesel fuel and electricity used for pumping and subsidized credit for purchasing pumps and engines, which have been prevalent in parts of South Asia, can encourage the wasteful use of groundwater and aggravate problems with declining water tables.

BUILDING GOOD GOVERNANCE AND SOCIAL CAPITAL

Asian societies are changing. With rising incomes and globalization, there is increasing demand for more competitive politics and greater popular participation in government. There is increasing demand for more democratic forms of governance and for greater devolution of the management of public resources to local governments and organizations. Greater participation is an important contributing factor to the quality of life (See Figure 3, p. 41).

The demand for improved governance is also driven by some of the failures of the past. The Asian financial crisis, for instance, has exposed serious weaknesses in financial and corporate oversight and pervasive corruption in high places. People not only want a greater say in public decisions, but also more accountability in the way funds are spent. These changing expectations about governance have led to an increase in political activity, an increasing visibility for organized civil society, and an increasing importance for NGOs.

At the same time, the nature of many public goods is changing, as are the options for supplying them. As biotechnology becomes more important, for example, more aspects of agricultural research are being privatized and this requires some rethinking about the role of publicly provided agricultural research. The removal of parastatals and the privatization of agricultural marketing and service provision have also reconfigured the role of the public sector to one of regulation rather than supply. In the case of education and health care, both directly related to the quality of life, household demand for services increases rapidly with income and the private-sector response in provision is already very apparent in Asia's urban areas. There is need to reconfigure the roles of the public and private sectors and of civil society in providing many public goods and services so as to make them more cost-effective and efficient and to better meet the changing needs of rural people. In the case of merit goods

such as education, basic health care, and water supply, a public-sector role in provision will have to be maintained for bypassed regions and the rural poor, whose limited consumer wherewithal prevents a satisfactory private-sector response.

Good Governance

Good governance embraces the concepts that authority is based on the rule of law, that its policies are transparent, that it is accountable to society, and that it is based on institutions and not on individuals. Institutional reform to provide good governance is a complex and long-term process that requires both improvement in public administration and public-sector management and movement toward more diversified delivery of services that is responsive to stakeholders. Public-sector management should be improved to enhance transparency and accountability, improve efficiency and effectiveness, and reduce opportunities for corruption. Management information systems, audit functions, and procurement systems should be upgraded to strengthen the capacity of governments to monitor expenditures; ensure control over disbursements; and reduce costs, fraud, and abuse. Pay increases and improvement in employment conditions for civil servants could reduce the incentives for illicit behavior. Improved procedures for recruitment and promotion could help avoid the abuses of patronage, nepotism, and favoritism and help foster the creation of an independent, meritocratic civil service.

Fundamental reform of the relationship between the public sector and the recipients of public-sector services is also necessary. A diversified approach to delivery of services that would involve government, the private sector, civil society, and religious institutions can help reduce the risks of relying on only one delivery channel.

To diversify delivery successfully, it is important also to reform the “demand side” for services. Generation of effective demand for public services and monitoring of public-sector performance is enhanced by a pluralistic society with rights

to associate and to organize interest groups that have access to information about government services and programs.

Governments would reduce implementation problems and enhance public support for their programs by easing access to information and allowing affected communities the opportunity to voice their concerns. Decentralization of services to local or community-based institutions can be an important component of good governance, but should not be seen as a panacea: local elites may have weaker rather than stronger technical resources at their disposal and greater opportunities for corruption and lack of transparency.

NGOs can play an important role in good-governance reforms on both the supply and the demand side. Traditionally, NGO activity has concentrated on the supply side: delivering services or assisting the public sector in operating its programs. But NGOs are increasingly becoming involved in the demand side: helping communities articulate their concerns and preferences, negotiating with official bodies in order to amplify the community “voice,” and mixing technical operational skills with information-intensive communication, advocacy, and networking to enhance the influence of poor people.

Effective NGOs can improve governance in several ways:

- by encouraging government ministries to adopt successful approaches developed within the voluntary sector;
- by educating and sensitizing the public about their rights and entitlements under public programs;
- by acting as a conduit to the government for public opinion and local experience;
- by collaborating with official bodies;
- by influencing local development policies of national and international institutions; and
- by helping government and donors fashion a more effective development strategy through strengthening institutions, carrying out staff training, and improving management capacity.

NGO involvement may not always be a positive force for good governance, however. Some NGOs and governments have long histories of mutual mistrust. If an NGO operates according to predetermined principles coupled with preset plans of action, it could both overlook the real needs and desires of local communities and alienate local and national government agencies. In addition, if NGOs act in isolation, setting up their own fiefdoms, good governance can be hindered rather than encouraged.

Changing Roles

In the current enthusiasm for market liberalization, privatization, and the increased participation of civil society, it has become fashionable to think that the smaller the role of the public sector the better; as a result budgets for many key public-sector services have been cut to critical levels. Central planning is rightly dead, but countries still need organized and rational approaches to the provision of key public goods and services in rural areas. The private sector has insufficient incentive to provide many rural infrastructure and social services (e.g., roads, irrigation, electricity, communications, clean drinking water, schools, health centers and hospitals), or to undertake much of the needed agricultural research (particularly for poorer farmers and regions), because it cannot find ways to charge for, and hence capture, a sufficient amount of the benefits that these investments generate. Nor does the private sector have any incentive to regulate itself to ensure efficient and competitive markets, to ensure the safety of the public, or to correct environmental externality problems.

Government has a crucial role to play in providing these kinds of public goods and services. However, the role of government in financing public goods and services needs to be distinguished from its role in supplying them. There are increasing opportunities in Asian countries for governments to contract out the provision of many public goods and services to private firms and NGOs. This can often lead to greater

efficiencies, cost savings, and improved accountability to end-users.

The innovative institutional and policy reforms required for water management that were described in the previous section show the complex blending of public sector, market, and civil society that can lead to improved performance. Another example of such synergistic cooperation can be seen in the area of agricultural research. It is likely that the share of private investment in agriculture will increase in the future, but the public role remains essential; decentralization of research and dissemination of the technology generated by research would be highly beneficial. A number of developments could increase the role of the private sector in agricultural research in Asia. The private sector's ability to capture the benefits of research results has increased, now that hybrids are being increasingly used and policy barriers to private-sector involvement are being reduced. Biotechnology innovations are likely to further the scope for private-sector involvement. In several countries the private seed sector has emerged as the dominant supplier of finished varieties for a number of crops. Policies to further increase private-sector involvement require continued attention; while many research activities require the long-term continuity of a public or semipublic institution, the potential for contracting for research should be explored more vigorously.

Private-sector research, however, has generally shown little interest in solving the critical issues involved in increasing basic yield potentials in wheat or rice varieties adapted to Asian agroclimatic zones or in developing hybridization procedures for additional crops. Moreover, there are some "orphan" commodities, mostly tropical crops, fruits and vegetables, where the private sector makes no investments. Contracting entire long-term research agendas to the private sector is therefore probably impossible, and a significant and sustained public role in funding agricultural research will be necessary.

The growing complexity and agroclimatic specificity of agricultural technology suggests also that the division of responsibilities and working relationships among international,

national, and subnational research centers needs to be reexamined with a view to increased efficiency. Decentralization of research regionally and to the farm level, based on agroecological characterization, may be the most effective approach, because it provides better farmer input and feedback to upstream researchers and policymakers. Improvement in linkages between public agricultural research and small research firms and informal farmer research could have high payoffs. Farm-based research often specializes in choosing varieties that are specific to microenvironments and can be highly complementary with formal research systems.

Similar opportunities exist to out-source, privatize and decentralize parts of the supply of many other public goods and services, including agricultural extension, foodgrain and fertilizer distribution, education, and health. In all cases, governments need to proceed with a clear understanding of the comparative advantages and strengths of the different actors to be involved and with agreement on methods for financing their implementation, monitoring their performance, and ensuring their accountability.

Rural social services deserve specific mention because of their importance as quality-of-life indicators. There is a fundamental “urban bias” in the provision of these goods by both the public and private sectors. The per capita cost of provision is much lower among concentrated urban populations. With traditional public-sector-dominated provision, the rural areas have suffered through the inadequacy of accessibility, quality, financing, and management of social services. But while private provision of education and health care has often grown explosively in urban areas because of the rapid growth of household income and demand, this has not occurred in rural areas, where incomes are lower and delivery costs are higher. The result is that the natural substitution of private- and public-sector roles that is evident in urban areas has yet to emerge as strongly in the countryside. Governments therefore should consider the extent and likelihood of persistence of urban bias when decisions are made about the allocation of scarce public resources between urban and rural areas.

The role of government is changing. While it was seen in the 1960s as the main provider for society's needs, changing conditions, both domestically and internationally, have revealed its limitations and there is better understanding of what governments can and cannot do effectively. Government financing capacity is increasingly constrained. The private sector, local governments, communities, and NGOs have emerged as important partners in rural development. The challenge for Asian governments during the next century will be to manage their own transition from direct providers of goods and services to facilitators and regulators of private and civil-society activity. This will require responsible, flexible institutions and governance structures that encourage growth and at the same time ensure that private actors perform with public and social interest in mind.