





CHAPTER V

DECLINING AGRICULTURAL PRODUCTIVITY: THE ROLE OF BIOTECHNOLOGY, ORGANIC AND REGENERATIVE AGRICULTURE

The Green Revolution in the 1970s and 1980s increased the production of three cereal crops – rice, maize and wheat – in many countries of the region, mainly through productivity growth. The technology, based on high-yielding varieties of these crops, irrigation water and fertilizer, bypassed rainfed areas as well as crops like sorghum, millet and cassava – staple foods grown by the poor. The current revolution being promised by biotechnology is still the subject of much debate. What is clear is the need to promote alternative and sustainable approaches to increasing agricultural productivity. These approaches must combine indigenous technology with that derived from scientific institutions, paying adequate attention to the likely consequences of these technologies on poverty reduction.

Poverty in most developing countries of Asia and the Pacific Region remains a rural and agrarian phenomenon. Thus growth and distribution in agriculture holds the key to the sustained reduction of rural poverty, provided the benefits of this growth are broad-based. Growth in agriculture can also spur growth in the rural non-farm sector through various linkages. This chapter reviews the trends of production and yields of major crops and commodities in the region in general, and some of the countries in particular. The reasons for declining productivity growth in major crops are analysed so as to identify:

- The remaining potential with existing technologies.
- The constraints on harnessing this existing potential.
- The need for renewed efforts in areas where existing potentials are exhausted.

DECLINING TRENDS IN AGRICULTURAL PRODUCTIVITY

The Green Revolution is regarded as the true Asian miracle in the agriculture sector in the 1970s and 1980s. This high-input, high-output technology was based on the use of three major production inputs: high-yielding varieties of cereal crops, mainly rice, maize and wheat; irrigation water; and chemical fertilizers. This seed-fertilizer technology had a phenomenal impact on increasing food production and averting food shortages in Asia. The last two and a half decades saw an impressive growth in the production of cereals: cereal production in developing Asia more than doubled from about 313 million t in 1970 to approximately 650 million t in 1995 (Table 5.1). More important, these production gains were achieved mainly due to yield increases (by 99.5%), as cereal area increased only marginally (by 4.0%) during this period.

In China, cereal production increased by 119.3%, even though cereal area actually decreased by 3.2%. India also achieved a very high production increase (88%) as a result of

yield increases. (Again, cereal area did not increase during this period.) Other countries in South Asia also did very well in cereal production, as both cereal yield and area increased. As a result of these cereal production gains, per capita calorie consumption increased by 33.5% in China and Southeast Asia, and by 14.6% in India, despite high population growth over the last two decades. In the other countries of South Asia, however, calorie consumption per capita rose only marginally (4.1%), as population growth was very high.

The Green Revolution kept food prices down and employment up (IFAD 2001). When grain yields doubled in an area, employment per hectare normally increased by 40%. A further 30% rise in employment was due to extra farm demand for rural non-farm products (Hazell and Haggblade 1993). Higher employment-based incomes led to extra food entitlements and cheaper food staples. In addition, agriculture in the 1970s contributed between 25 to 40% of GDP in countries with a Green Revolution – a substantial contribution to their GDP and consumption growth. This typically accounts for 30-50% of international differences in speed of poverty reduction (Lipton 1998). In the absence of the Green Revolution, if the near-stagnant crop yield trends of 1955-65 had continued, it would have induced tremendous intensification of production and expansion into previously forested areas and other environmentally fragile lands (Avery 1997). This would also have led to an encroachment of land belonging to marginalized rural people – who are also, often, indigenous peoples.

The growth rates of production and yields of cereals and pulses have slowed down in recent years (Kaosa-ard et al. 1999). As Table 5.2 shows, the growth rate of productivity of the major cereals – rice, wheat and maize – declined in Asian countries from 3.35% in 1977-86 to 1.5% in 1987-97 for rice; from 6.21% to 2.96% for wheat and from 4.04% to 3.34% for maize. Cereal yields are stagnating or falling in many areas, mainly due to micronutrient exhaustion, low-level pest build-up, and falling water tables.

There has also been a shift towards diversification of agriculture, away from food grains to higher value crops (Table 5.3). The share of high value crops in total crop area increased from 26% in 1977 to 36% in 1997. Between 1987 and 1997, the area under high value crops increased by 2.8% per annum compared to 0.3% for cereals and pulses. While the proportion of area under foodgrains increased by a small proportion in Afghanistan, Cambodia, Japan, the Republic of Korea and Sri Lanka, it declined sharply in other Asian countries. The decline is most prominent in China (almost 17%) and India (8.3%), which have the largest acreage under foodgrains.

This analysis shows a growing shift from foodgrain crops to other crops. And the area and yield frontiers in the foodgrain crops are levelling off. What does this mean for the poor? Foodgrain prices will fall more slowly than otherwise. They may even rise, and unless there are corresponding increases in real wages and earnings, living costs will also increase. Higher food prices may not benefit small-scale producers because many of them are net purchasers of food. Estimates show that on average, the rural poor in Bangladesh and India derive 50% of their calorie intake from market purchases (Pele 1985). Very little of the production of the poor is marketed. In Bangladesh, 75% of the marketed surplus is produced by 15% of the farms.

CONVENTIONAL TECHNOLOGY DEVELOPMENTS

Green Revolution technology has been bitterly criticized since the 1970s on the grounds that it focuses on the more favourable areas. But there has been little progress in developing appropriate technologies for less favoured areas such as the drylands and the uplands and mountainous areas. Rice yields in rainfed areas are only half of those in irrigated areas, with even lower yields in the upland and deepwater areas (Rosegrant and Pingali 1991). Technological breakthroughs have not been made for crops like sorghum, millet and cassava – the staple foods grown by the poor, consumed by the poor and grown on less productive marginal lands. Only a quarter of international agricultural research resources has been devoted to marginal lands, and national research resources have also been used mostly on tradables such as rice, wheat and maize (UNDP 1997). Research input has been high on rice, maize and wheat and world average yields have more than doubled over the past 20 years, while the world average yield of millet and sorghum increased by only 15%. This, coupled with the decreasing arable land per capita, has raised serious food security concerns for the poor. Available data shows that the arable land per capita decreased between 1979 and 1996 in all Asian countries except Malaysia (World Bank 1998b).

The Green Revolution technology was usually able to reduce rural poverty where there had earlier been improved water control (IFAD 2001). However, there is an impending water squeeze on Asian agriculture with competing demands for water for industrial and domestic uses. The main single environmental problem for the poor, alongside water quality, is water depletion, particularly in the context of global warming with less stable rainfall and higher evapotranspiration (World Bank 1992b).

Water management techniques can improve water use efficiency, raise economic efficiency of water and help the poor, if prices, institutions or environment are not too unfavourable (IFAD 2001). Intermittent flooding in irrigated rice fields can reduce water requirements by about 40% with no significant decline in yields. In the North China Plain, piping irrigation water results in 90% conveyance efficiency, compared with 50-60% for earth canals (Xie et al. 1993). However, these techniques are capital-intensive and do not help promote employment of the poor. In the hills and mountains of Nepal, low-cost, gravity-fed technologies in sprinkler and drip irrigation for vegetable and fruit cultivation have been shown to enhance income and employment of rural poor (SAPPROS 2001). However, such systems have not spread to wider areas due to inadequate support by the government and by donors.

More research is needed in developing countries on sustainable water use and supplementary systems; and on the better integration of both with farmers' own techniques and preferences, and with bio-agricultural research. Rapid technical progress in farm water location, extraction, recycling and drainage is also needed to resolve the problems of water. The World Water Council has suggested priorities for expanded water research funding for international and national agencies (World Water Council 2000). The special needs of the rural poor must be integrated into such research.

The Green Revolution technology has bypassed farmers in the uplands and unreliably

Box 5.1: IFAD's pro-poor interventions

IFAD's agricultural development projects in several Asian countries attempt to introduce technological innovations that assist small and marginal farmers and other groups of rural poor. For example, the East Java Rainfed Agriculture Project has had good results with the introduction of hedgerow technology for soil conservation. The priority is for agricultural research to be pro-poor, whether it is by involving women, or by developing bio-pesticides from locally available *neem* (*Azadirachta indica*) seeds.

watered drylands, and has not covered minor crops like sorghum, millet and barley, on which the poor farmers depend heavily for their livelihood. As a consequence, IFAD-financed research in Asia has attempted to address some of the main agricultural production constraints of resource-poor farmers in the more fragile, low-potential areas. The focus has been on keeping the use of inputs low despite inherent low soil fertility and poor/erratic rainfall conditions of the production environment.

Some of the Fund's grant-supported research initiatives have generated widespread benefits to small-scale agriculture in the region. Research led by the International Center for Agricultural Research in the Dry Areas (ICARDA) on *faba* beans led to dramatic yield increases in West Asia. Research at ICRISAT led to the development of a new variety (ICPH8), the world's first hybrid pigeon pea to be bred successfully for resource-poor conditions. Research by the International Centre of Insect Physiology and Ecology (ICIPE) on semiochemicals (substances synthesized both by desert locusts and by host plants) has succeeded in influencing desert locust behaviour and communication in ways that prevent migratory swarm formation. This is an outstanding contribution that will lead to the development of a viable preventive control strategy within the next two years, for deployment in India and Pakistan as well as West Asia. The IFAD-supported Eastern India Rainfed Rice Project is making significant contributions by linking formal research to farmers' own methods and experiments in raising rice yields, in developing more robust rice varieties for rainfed conditions, and in augmenting crop incomes.

IFAD has also supported research on bamboo and rattan, two of the most prominent NTFP in the region. This research has strongly influenced the International Network for Bamboo and Rattan (INBAR), encouraging it to address the priority constraints and opportunities for the rural poor, including women; and promoting the use of bamboo and rattan-based products to improve incomes, nutrition and value-added. Similar success is being achieved by IFAD-supported research on coconut, 95% of which is produced by very poor smallholders: post-harvest technologies and market links are expected to benefit millions of rural poor in the coastal areas of Asia.

BIOTECHNOLOGY AND THE RURAL POOR*What does biotechnology mean?*

Biotechnology is often presented as promising a new phase of productivity growth, including new production systems less dependent on chemical inputs now known to have negative environmental consequences. Likewise, the claim is that biotechnology has the potential to develop crop varieties for rainfed, drought-prone and upland areas.

But biotechnology is controversial: many claims and counter-claims are made on its potential environmental, human health, economic and social risks. There are also many social and ethical issues involved, given the near total monopoly of multinational corporations in biotechnology research. As a result there are several questions that need answers. Can small farmers afford the research results? How big is the risk that crops grown by the poor will be neglected on grounds of profitability? And will it lead to the lack of technology choices for farmers?

When we speak of science facilitating development – whether through biotechnology, nuclear reactors or tractors – it is important to remember that we are in fact talking about techno-science. The tendency to view technology as merely applied science masks the fundamental differences in character between ‘academic’ and ‘industrial’ science (Morgan 1999). Whereas academic science is concerned with producing knowledge and not anything material, techno-science is conducted with a view to practical application – or the production of a material commodity or a process. Hence it is usually controlled and funded by industry. To view techno-science through the lens of positivist ideological assumptions is to run the risk of ignoring the social, cultural and economic dangers it can pose to developing countries.

Biotechnology was initially defined in a broad context and included the application of indigenous as well as scientific knowledge. Today, it has a much narrower meaning. The 1992 Convention on Biological Diversity (CBD) defined biotechnology as “any technological application that uses biological systems, living organisms or derivative thereof, to make or modify products or processes for specific uses”. In the field of agriculture, this definition includes tissue culture, immunological, molecular genetic and recombinant DNA techniques. The approaches are more scientific, but reductionist in character; such technology is developed by highly trained and skilled scientists working for the most part in laboratories. The application of technology is more uniform, and it is developed primarily by the private sector for profit. Thus there is greater control of ownership, which makes the technology more exclusive.

These attributes of modern biotechnology have raised a number of issues:

- The estimate is that, in the medium term, over USD 20 billion worth of developing countries’ exports could be replaced by products of the new biotechnologies developed in the North (Hobbelink 1991). This represents over a quarter of what these countries are now exporting in the form of agricultural commodities. Such a dramatic shift in world agricultural trade could harm food security.
- Large biotechnology companies such as Monsanto are buying out small start-up biotech companies and even large seed companies. This could eventually lead to a total monopoly over seeds, the first link in the food chain.
- New biotechnologies can threaten biodiversity and ecological stability. Prominent scientists have expressed their fears that the ecological risks of applying genetic engineering to agriculture might include a possibility that some transgenic crops could become noxious weeds, and others could become conduits through which new genes may move to wild plants which could themselves become weeds.

- Independent scientific evidence points to some health hazards of genetically modified food.

Genetic modification (GM) refers to approaches within the broad domain of biotechnology that are distinguished from other biotechnology techniques – by allowing the transfer of genes between different organisms (Kydd et al. 2000). So far, GM research has targeted innovations to increase yield and/or reduce costs in developed countries and some relatively better off food-exporting developing countries. The main crops involved include soybean, maize, cotton and rapeseed.

The proponents of genetically modified crops claim that the new varieties produce significantly higher yields than conventional high-yielding varieties (HYVs), and therefore hold the key to solving future food production problems. This is based on the presumption that existing conventional technologies would not be able to maintain a high growth rate of food production. Contrary to these claims, an emerging non-aligned literature suggests that genetically modified crops have yet to produce major stakeholder advantages (Kydd et al. 2000). This possibility is supported by a study conducted by the United States Department of Agriculture and quoted by the magazine *New Scientist* (quoted in *The Japan Times* of 9 July 1999). In 12 of the 18-crop/region combinations, into which the study had been divided to look at yields, there had been no improvement in yields over conventional crops. In 7 out of 12 combinations of crop and region, American farmers using genetically modified crops had to add the same quantities of pesticides to their fields as those growing non-genetically modified crops.

Differing views on biotechnology

Although growing public concern about genetically modified crops has been most vocal in Europe, the introduction of GM technology in selected developing countries has also generated intense controversy. Kydd et al. divide the argument among independent commentators into two camps – ‘deep sceptics’ and ‘cautious optimists’. The first group feels that the possible environmental effects, and concentration of commercial control, add up to a major threat to food security and sustainability of poor farmers’ livelihoods (ActionAid 1999; Christian Aid 2000). According to them, genetically modified crops are largely irrelevant to ending hunger and may even contribute to hunger and poverty.

The second camp – of cautious optimists – think that with appropriate policies and a large scaling-up of publicly funded agricultural research, genetically modified crop varieties can be developed to meet the needs of resource-poor farmers and help eradicate poverty (NCB 1999; Sachs 1999). They feel that while genetically modified crops could help small farmers who currently grow food under conditions of high risk of low yields, the current structure of GM research is designed to meet the needs of the rich rather than the poor farmers. Swaminathan (2000) identifies additional issues of concern to the public and professionals in developing countries. The first issue is related to biosafety. Another issue relates to the potential impact of genetically modified foods on biodiversity. A limited number of genetically modified strains can replace numerous local cultivars, thereby leading to genetic erosion. It can also lead to inequity in benefit sharing,

as the contributions of tribal and rural women and men to genetic resources conservation and enhancement may not be recognized and rewarded (Swaminathan 1996).

Both groups agree on the importance of smallholder agriculture to poverty reduction, as this sector provides food locally and simultaneously creates employment for the poor. However, there are several differences in their position with respect to GM technology. The deep sceptics focus on the promotion of alternative and sustainable approaches based on traditional knowledge and practices, but also involving new methods such as integrated pest management (IPM). They advocate putting anti-monopoly regulation of the world's food systems on the agenda of global trade talks. Their other recommendations include a five-year freeze on commercial applications of GM technology, and a global bio-safety protocol that defines public as opposed to private rights.

The cautious optimists question the dependence on 'alternative agricultural approaches' as the main strategy for poverty reduction. They argue that the few feasible strategic choices now available face a number of problems (NCB 1999). These include: limited potential for area expansion due to environmental problems, increasing irrigation water scarcity, environmental and health hazards associated with increasing use of fertilizer and pesticides, and increasingly defensive breeding work in the face of an evolving pest complex. The argument is that GM has the potential to address some of these constraints by developing crops that perform well in degraded irrigated environments, raise returns to fertilizer and help control pests with lower use of chemicals. The cautious optimists say that to tap this potential, huge increases in public spending are needed for research into the specific problems of poor countries. Also needed are public-private partnerships based on new institutional arrangements, including more funding for the Consultative Group on International Agricultural Research (CGIAR) systems, and incentives for private companies to develop GM technologies that address the problems of poor farmers.

There are others who emphasize the important role of new types of partnerships, alliances and market sharing, to enable the successful transfer of plant genetic materials to the poorest countries (Serageldin 2000). Possible mechanisms include licensing under varying cost and technology-sharing arrangements, market segmentation between rich and poor countries, technology grants, joint ventures and various kinds of direct research support (Wright 2000). Some important conclusions can be drawn from the early experience of the CGIAR centres (Falcon 2000):

- First, mutually beneficial public-private arrangements can be negotiated, even those involving several private companies in non-exclusive relationships.
- Second, it is possible to provide preferential access to research findings for particular national agricultural research programmes.
- Third, market sharing is an important part of these agreements. In a typical arrangement, the right to distribute, sell and license products in the developed countries is retained by the private sector partner, whereas the public sector partner retains similar rights for the developing countries. However, the partners have not reached agreement on market-segmentation agreements in the case of China and India, both of which are large economies with strong agricultural research systems.

This report argues for the need to promote alternative and sustainable approaches based on the combination of indigenous technology and that derived from scientific institutions, including GM technologies and conventional breeding technologies, with proper

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attention paid to all around consequences of these technologies. In this context, one should proceed – though with utter caution – with verifying claims regarding the potential of GM technologies to address the specific problems of poor farmers and marginal areas. If IFAD is to support GM technologies in any project area, it must first organize a broad public hearing where the pros and cons of the GM technologies are explained and discussed. The technical review of such a proposal must ensure that alternative options

have been thoroughly and independently assessed. The whole issue of freedom of choice and of entitlements must also be squarely addressed.

There is an urgent need to reverse the decline in the yields of staples. Open and democratically controlled science must ‘turn around’ the biotechnology research set-up, dominated by a few big corporations rather than national or international public institutions. The present commercially motivated emphasis on cosmetic features for the crops of rich people (and their animals) must be shifted. And it must be shifted towards seeking massive improvements in the yields, robustness, employment-intensity and suitability for different areas (the presently marginal uplands and drylands) of the main staples – that form 70% of the poor's income uses and a larger proportion of their inadequate calorie intakes. Otherwise, sustained rural poverty reduction, especially in drylands, is far less likely. Towards this end, IFAD should support directing international public money towards research that will improve the technological base of the uplands and drylands, combining adequate attention to indigenous technology, with conventional crop breeding methods and properly-guarded biotechnology advances.

SUSTAINABLE OR REGENERATIVE AGRICULTURAL TECHNOLOGIES

One possible method to increase income from upland agriculture is to export organically grown foods to the developed country markets such as North America, Europe, Japan and North America. Whether for health reasons or for ecological concerns, consumers in these countries have demonstrated a willingness to pay premium prices for organic foods. In 1999, the International Trade Centre (ITC) of UNCTAD (United Nations Conference on Trade and Development) and the World Trade Organization (WTO) published a survey on the European market for organic foods and beverages. A major conclusion of the study was that demand for these products is growing rapidly, and that insufficient supply rather than demand is the problem in these markets (Kortbech-Olsen 2001). There is also a growing demand for organic foods in the urban centres of many Asian countries.

The enhancement of organic agriculture does not need expensive investment in irrigation, energy, and external inputs. On the contrary, what is needed at the farmer's level is investment in capacity-building and related research. "This would entail a shift of capital investments from hard to soft technologies – that is from agricultural inputs (private goods) to knowledge-building (public goods)." (Scialabba 2000).

However, most organic products survive with consumer premiums, usually paid by urban consumers or those in developed countries. So these are likely to be niche markets, not available to all farmers. Many small farmers are 'organic' for home consumption and local markets, in the sense that they do not use chemical fertilizers. But buyers for organic products in developed country markets (and urban markets to some extent) insist on high, easily 'policed' products and labour standards that entail huge difficulties for small-farm suppliers, especially from uplands with their high transport costs.

Given the limitations of high-input agriculture and organic farming in the less favoured areas of Asia, sustainable or regenerative agriculture holds enormous promise for yield increases and environmental protection. It involves the identification, development and establishment of resource-conserving technologies that either conserve/improve existing on-farm resources (such as nutrients, pest predators, water, and soils); or introduce new elements (such as nitrogen-fixing crops, agroforestry, water harvesting structures, and new predators). Until recently, few realized the potential for a regenerative or sustainable agriculture situated somewhere between organic and very high input agriculture (Pretty 1995). As discussed earlier, the high standards required by niche markets for organic products entail difficulties for small-farm suppliers, particularly those from upland areas. But regenerative agriculture, if profitable, would be immediately available to all farmers, as it does not rely on consumer preference.

Pretty (1995) has shown that in the complex and diverse agricultural systems where external input use is low or non-existent, there is considerable evidence for the impact of sustainable agriculture. In such systems, two to three-fold increases in yields have been achieved with the community-wide adoption of resource-conserving technologies and practices (Table 5.4). Crop yields have increased, without the use of fertilizers and pesticides, in programmes focusing on soil and water conservation, land rehabilitation, nutrient conservation, raised field agriculture, green manuring and IPM. For upland and mountainous areas also, a number of regenerative technologies are now available for farmers' use (Table 5.5).

Based on a review of 45 projects in 17 countries of Africa, Pretty (1999) has recently shown that the enhancement of sustainable practices increased maize and banana yields by 50 to 100%; sorghum and millet yields by 30 to 100%, and potato yields by 200%. The lowest increases were from 5 to 10%. Further benefits were generated by diversifying production systems (such as year-round production in vegetable gardens and fish culture in ponds). Altogether, they covered a total of 730 000 farm households, cultivating 600 000 to 900 000 ha of land with ecologically friendly practices. Similarly, in Asia, the rice-fish farming systems developed in Bangladesh and Sri Lanka have boosted the net incomes of farmers and stabilized their outputs. Raising fish in rice paddies and growing vegetables on pond sides can raise incomes by up to USD 240/ha (CIIFAD 1999).

The critical objective is to exploit the synergies between different production systems. In Malawi, for example, fishponds are not taken in isolation as a separate production activity, but as a complement to growing vegetables. Unlike the conventional method of focusing on single commodities, this ecological approach does not seek to create optimal conditions for single species. Instead it views them as parts of a larger ecosystem, where nutrients and other agro-ecological services are provided/recycled in mutually supportive ways (CIIFAD 1999). Such an approach could boost yields, even with existing technologies, though perhaps not to the extent reported in the studies. As new and better technologies are researched and become available, they would also need to be situated within such an ecosystem approach.

Sustainable agriculture has also been introduced into Green Revolution areas in a limited way. The most successful example has been IPM for rice programmes in South and Southeast Asia. Examples from several countries show that the use of input – such as fertilizers and pesticides – can be reduced substantially if farmers bank more on the ‘input’ of their knowledge and experience, as well as their labour and management skills (Table 5.6). With these changes, yields can be maintained or even improved.

Table 5.1: Growth in population and cereal production in Asia, 1970 and 1995

Indicator	India	Other South Asia	China	Southeast Asia	Asia
Population (million)					
1970	554.9	156.2	834.6	204.4	1 750.2
1995	929.0	293.9	1 226.3	343.7	2 792.9
% change	67.4	88.2	46.9	68.2	59.6
Cereal production (million t)					
1970	92.8	25.4	161.1	33.8	313.2
1995	174.6	48.1	353.3	73.6	649.6
% change	88.1	89.3	119.3	117.8	107.4
Cereal area harvested (million ha)					
1970	100.4	21.3	91.1	25.0	237.7
1995	100.2	26.0	88.2	32.9	247.3
% change	-0.2	22.0	-3.2	31.6	4.0
Cereal yield (t/ha)					
1970	0.925	1.197	1.769	1.352	1.317
1995	1.743	1.846	4.007	2.237	2.627
% change	88.4	54.2	126.5	65.6	99.5
Calorie consumption (Kilocalories/person/day)					
1970	2 083	2 184	2 019	1 945	2 045
1995	2 388	2 274	2 697	2 596	2 537
% change	14.6	4.1	33.5	33.5	24.1
Per capita income (USD/year)					
1970	241	187	91	351	177
1995	439	299	473	1027	512
% change	82	60	420	193	189

Source: AsDB 2000

Table 5.2: Productivity growth rates of rice, wheat and maize in Asian countries, 1977-97 (% per annum)

Region/Country	Rice		Wheat		Maize	
	1977-86	1987-97	1977-86	1987-97	1977-86	1987-97
East Asia						
China	5.22	1.77	8.73	3.33	5.07	2.76
Japan	0.41	0.58	2.61	-0.35	-2.81	0.12
Republic of Korea	0.53	0.49	6.38	3.75	8.98	-1.64
Southeast Asia						
Cambodia	2.68	0.63			-1.97	3.19
Indonesia	5.00	1.05			5.11	2.45
Laos	7.18	2.40			-0.15	7.76
Malaysia	0.00	1.61			1.41	0.26
Myanmar	6.92	0.99	11.96	-2.55	11.99	-0.20
Philippines	4.45	0.91			2.87	4.46
Thailand	1.63	0.98			1.41	4.41
Viet Nam	4.18	3.39			3.48	7.20
South Asia						
Afghanistan	1.14	-0.99	0.15	-0.30	0.39	1.00
Bangladesh	1.91	1.61	4.97	1.35	-0.09	0.75
Bhutan	-0.27	-0.69	0.18	0.37	-0.25	0.44
India	2.41	2.44	4.26	3.10	2.09	2.76
Nepal	0.21	0.32	2.69	1.75	-0.69	0.98
Pakistan	0.75	2.05	2.60	2.37	0.41	0.72
Sri Lanka	5.44	1.33			6.29	-1.28
Asia	3.35	1.50	6.21	2.96	4.04	3.34

Source: Kaosa-ard et al. 1999

Table 5.3: Area under foodgrains and other crops in Asia, 1977 and 1997

Region/Country	Area (million ha)				% of Total Area			
	1977 Food- grains	Others	1997 Food- grains	Others	1977 Food- grains	Others	1997 Food- grains	Others
East Asia								
China	101.3	44.3	93.5	82.8	69.6	30.4	53.0	46.9
Japan	3.0	1.0	2.2	0.7	75.4	24.6	75.7	24.3
Republic of Korea	1.4	0.6	1.1	0.4	68.0	32.0	72.0	28.0
Southeast Asia								
Cambodia	1.0	0.1	2.0	0.2	91.3	8.7	91.5	8.5
Indonesia	11.1	6.4	15.6	13.3	63.2	36.8	53.9	46.1
Laos	0.6	0.1	0.6	0.1	92.6	7.4	83.0	17.0
Malaysia	0.7	2.9	0.7	5.9	20.6	79.4	10.5	89.5
Myanmar	5.8	1.8	8.1	2.5	76.3	23.7	76.2	23.8
Philippines	6.9	4.6	6.7	5.3	60.1	39.9	55.7	44.3
Thailand	9.5	2.9	11.0	4.7	76.6	23.4	70.0	30.0
Viet Nam	5.7	1.3	7.9	2.5	81.5	18.5	75.8	24.2
South Asia								
Afghanistan	3.1	0.4	2.1	0.3	88.3	11.7	88.7	11.3
Bangladesh	11.4	1.7	11.5	2.0	87.3	12.7	85.1	14.9
Bhutan	0.1	0.0	0.1	0.0	86.1	13.9	79.6	20.4
India	122.6	59.7	125.5	87.4	67.2	32.8	58.9	41.1
Nepal	2.4	0.3	3.5	0.5	89.5	10.5	87.4	12.6
Pakistan	11.4	3.2	13.9	7.6	78.1	21.9	64.6	35.4
Sri Lanka	0.8	1.2	0.8	1.0	38.9	61.1	45.4	54.6

Source: Kaosa-ard et al. 1999

Table 5.4: Impact of resource-conserving technologies and practices in complex and diverse agricultural systems in Asia

Country/Location	Technologies	Yields (t/ha)	Increase in Yield (%)	Scale
China, Jiangxi Province	Soil conservation and watershed management	No data	152%	3 200 families
India, Gujarat	Soil and water conservation, biogas	No data	Rice:253% Soybean:117% Pigeonpea:222% Cotton:153%	Programme in 100 communities
India, Tamil Nadu	Contour bunds, percolation tanks, gully checks, agroforestry	Rice: no data Gram: 0.4	Same yield, new second crop harvested	Programme in 45 villages
India, Maharashtra	Soil and water conservation	Soybean (dry): 0.7; soybean (irrigated): 2.2	350%; 176%	One community of 168 ha
India, Haryana	Soil and water conservation, social fencing	Grass: no data	400-600%	50 communities
India, Rajasthan	Grass strips, field and contour bunding	Soybean: 0.33-0.46; Millet: 0.72-0.93	210-292%; 120-154%	No data

Source: Pretty 1995 (Table 5.5)

Table 5.5: Examples of productive and conservation-effective upland farming/agroforestry/watershed management practices

Practices Related to:		Upland Farming Practice	Production Benefit	Conservation Effect
Crop management	Annual crops	Improved seed/ planting material Good fertilization (organic, inorganic)	Increased biomass, higher yields	Improved ground cover
		Intercropping	Crop diversity, reduced risk, higher returns to labour	Improved ground cover
		Crop rotation with legume grain crops	N from the legume will positively affect yield of subsequent cereal/root crops	Improved soil fertility
	Perennial tree/ crops	Mulching with grasses, crop residues and tree pruning	Improved soil moisture and reduced weeds results in higher yields	Improved ground cover, soil moisture and topsoil organic matter
		Cover cropping	Controls weeds, may contribute N to benefit of tree crop growth, provides feed for livestock	Improved ground cover and topsoil structure
		Circle weeding/ring cultivation	Reduced labour	Limited removal of the protective ground cover between the trees
	Mixed annual and perennial cropping	Multi-storey home gardens	Wide range of products from a relatively small area around the homestead	Canopy protection as well as good ground level cover, recycling of nutrients
		Multi-storey field cropping systems	High agro-biodiversity results in a range of crop, livestock and tree products from the same land area	Canopy protection as well as good ground level cover, recycling of nutrients
		Trees and shrubs on terrace risers/along field boundaries	Timber, poles, fodder, livestock bedding from within the farm holding	Increased organic matter from natural leaf fall, cross slope runoff control effects when stems close together

Table 5.5: Examples of productive and conservation-effective upland farming/agroforestry/watershed management practices (continued)

Practices Related to:		Upland Farming Practice	Production Benefit	Conservation Effect
Soil management	Soil organic matter	Incorporation of crop residues	Improved soil fertility raises yields and reduces inorganic fertilizer purchase	Increased topsoil erosion resistance, soil nutrient and moisture availability
		Application of compost/animal manure	Improved soil fertility raises yields and reduces inorganic fertilizer purchase	Increased topsoil erosion resistance, soil nutrient and moisture availability
		Hedgerow/tree crop prunings left to decompose in-situ	Improved soil fertility raises yields and reduces inorganic fertilizer purchase	Increased ground cover, topsoil erosion resistance, soil nutrient and moisture availability
	Soil chemical properties	N-fixing species inter-cropped or planted in rotation	Improved soil fertility raises yields and reduces inorganic fertilizer purchase	Replenishes nutrients lost by leaching or removed in harvested products
		Use of green manure crops/N-fixing multi-purpose trees and shrubs	Improved soil fertility raises yields and reduces inorganic fertilizer purchase	Replenishes nutrients lost by leaching or removed in harvested products
		Integrated plant nutrition (blending organic and inorganic fertilizer)	Raises yields and increases effectiveness of purchased fertilizer	Replenishes nutrients lost by leaching or removed in harvested products
	Soil physical properties	Minimum tillage	Reduced labour	Maintains and enhances topsoil structure
		Planted pasture/enriched fallow	Non cropping period reduced and/or used for livestock production	Restores topsoil (and with deep rooted species subsoil) structure
		Tree stumps/roots left to decay in situ	Reduced labour during land clearing	Reduced subsoil structural damage, root channels facilitate water and air exchange

Table 5.5: Examples of productive and conservation-effective upland farming/agroforestry/watershed management practices (continued)

Practices Related to:		Upland Farming Practice	Production Benefit	Conservation Effect
Rainwater management	Reduction of runoff volume and velocity	Contour ploughing/cultivation	Reduces moisture stress and risk of crop failure	Increases surface roughness across slope thereby checking the movement of surface runoff
		Bench terracing	Increased moisture retention reduces risk of crop failure	Reduces slope length and steepness thereby reducing runoff velocity
		Contour hedgerows/grass strips	Source of on-farm fodder/green manure/fuel	Permeable barriers slow down runoff velocity and reduce volume by allowing more time for infiltration
Infiltration		Tied crop ridges, pits and micro basins	Increases volume of rainfall directly available to the growing plant	In-situ entrapment of rainwater ensures no erosive runoff
		Contour hillside ditches, earth banks	Protects crops against damage from uncontrolled runoff	Entrapment of runoff at intervals on slope reduces risk of gully erosion
		Mulching, compost and appropriate tillage	Increases volume of rainfall directly available to the growing plant	Erosive runoff reduced as rainwater infiltrates at soil surface through maintaining an open topsoil structure

Source: IFAD 1999e

Table 5.6: Impact of resource-conserving technologies and practices in Green Revolution areas of Asia

Country	Technologies	Crops	Input Use (%)	Yields (%)	Spread
China	Waste recycling, composts, rice-fish culture	Rice	30% for N	110	1200 ecofarms
China	IPM farmer field schools	Rice	46-64%	110	14 counties
India, Andhra Pradesh	IPM	Groundnuts	-	100	1 community
India, Tamil Nadu	Agro-forestry, green manures	Rice Sorghum	25% for N	123 151	7 ecofarms
Indonesia	IPM	Rice	37-48%	107	110 000 farmers
Philippines	IPM	Rice	62%	110	No data
Philippines	Azolla network	Rice	50% N	100	No data
Philippines	Irrigation improvement	Rice	100%	116-119	Nation-wide
Sri Lanka	IPM	Rice	23%	135	No data

Source: Pretty 1995 (Table 7.4)





CHAPTER VI

THE RURAL NON-FARM SECTOR

With the rural non-farm sector absorbing the surplus labour released from agriculture, the sector's importance has grown as a source of employment and income – and as a means to alleviate poverty. As a result, IFAD's projects give high priority to the development of rural non-farm enterprises and rural public works.

The rural non-farm economy plays a significant role in providing employment and income for the poor in rural areas. As population pressure grows in the land-scarce Asian developing countries, the growth in agricultural production cannot absorb the increasing rural labour force in agricultural employment (IFPRI 2001). The urban industrial sector cannot grow fast enough to absorb the surplus labour released from agriculture. This leaves the rural non-farm sector to absorb those released from agriculture but not absorbed in the urban industries. Non-farm income and employment emerges as a very important source of income and employment and, as a result, for rural¹ poverty alleviation.

RURAL NON-FARM ENTERPRISES AND INDUSTRIES

Supporting rural non-farm enterprises and industries

Non-farm sources of income for the rural poor are important for two reasons:

- The direct agricultural income of the poor is not enough to sustain their livelihood, either because of landlessness or because of insufficient owned or tenanted land.
- Wage employment in agriculture is highly seasonal, so that the poor value non-farm sources as a source of income and as employment supplementation. As most rural non-farm activities require little capital and generate more employment per unit of capital, they are quite suited to a poor household's requirements.

The non-farm economy accounts for 40 to 60% of total national employment, and the rural non-farm economy accounts for 20 to 50% of total rural employment (AsDB 2000). Table 6.1 shows the details for seven Asian countries. Among these countries, the smallest share of non-farm economy in total and rural employment is in India, and the highest is in Thailand. Non-farm income shares are typically 5 to 10% larger than non-farm employment shares in rural areas. The importance of non-farm employment and earnings rises as the land available to the household for cultivation diminishes. The non-farm sector also has considerable scope to complement farming because of the strong linkages between the two sectors, and because the non-farm sector forges linkages between rural and urban areas.

Service activities dominate the non-farm economy in rural areas, followed by manufacturing and trade. Service activities are more important in the lower-income South

Asian countries, while trade and manufacturing are about as important as services in the East Asian countries. These activities are highly labour-intensive and dominated by small, part-time services, mostly family businesses.

The non-farm sector is also an important source of income for women, small farmers, landless workers, and the poor living in rural towns. Manufacturing, service, and trade activities are the most important sources of employment for both male and female workers in rural areas, though women are relatively more concentrated in these activities than men in most countries (Table 6.2). Trade is more important for women in East Asian countries than in South Asian ones, but transport and construction activities are much less important for women than men in all countries.

The rural non-farm sector is particularly important to the rural poor. Households with less than 0.5 ha earn between 30 and 90% of their income from non-farm sources. There is a strong negative relationship between non-farm shares and farm size. For example, in Thailand the average share of non-farm sector in total income was

■ *The rural non-farm sector is a more promising way out of poverty when it is based on growth linkages – with successful farmers and their employees who demand booming services, whether construction, trade, or transport.*

45% for those with more than 4.1 ha of land compared to 88% for those with less than 4.1 ha (Table 6.3). Likewise, in the Republic of Korea, the share varied from 19% for farmers owning more than 2 ha to 73% for those owning less than 0.5 ha. In rural India, non-farm sources accounted for 34% of household income compared to

55% from cultivation and 8% from agricultural wage labour (Lanjouw and Shariff 2000). The share of non-farm sources is fairly evenly spread across per capita income quintiles (31 to 39% of total income), while the share of agricultural wage income is heavily concentrated among the bottom two income quintiles (Table 6.4). In contrast, the income from cultivation increases with income quintiles. Within the non-farm sources, casual non-farm income shares fall monotonically across quintiles, whereas regular non-farm wage income shares rise with the income quintiles. Own enterprise income shares are the highest for the second and third income quintiles and the lowest for the top quintile.

Low-investment manufacturing and services (including weaving, pottery, gathering, food preparation and processing, domestic and personal services, and unskilled non-farm wage labour) typically account for the greater share of income for the rural poor than the wealthy (Hazell and Haggblade 1993). Non-farm income is also important to the poor as a means to help stabilize household income in drought years (Reardon et al. 1998).

Many studies indicate that the rural non-farm sector growth – based on growth linkages to successful farmers and their employees, who demand booming services (construction, trade, transport) – has a better chance to cut poverty (IFAD 2001). Most traditional rural non-farm sector participation, reflecting family skills, land shortage, or the need to diversify against seasonal employment or annual drought risk, is linked to poverty, and so should not be neglected. But the modern, linkage-based rural non-farm

sector is a more promising way out of poverty (Lin 1992; Mellor 1976; Hazell and Ramasamy 1991; Mecharla 2000; Fisher et al. 1997; Bhalla 1994).

With increasing urbanization and migration of rural workers, real rural wages rise. The opportunity cost of labour is thus raised, making low-return non-farm activities uneconomic. This leads to the demise of many traditional and low-paying craft and service activities, and to the growth of new types of employment in trade, commerce, and manufacturing. Hossain (1988) provides evidence from the Green Revolution experience in Bangladesh. In villages with a majority of rice cropped in high-yielding varieties (HYVs), he identifies higher agricultural incomes, higher agricultural wages, and higher non-farm income per capita compared to villages still dependent on traditional varieties. The higher non-farm income in prosperous villages reflects a greater concentration of high-return non-farm activity (transport and services) and less low-wage cottage industry, construction, and earth hauling.

Studies of the rural areas of Asia reveal strong linkages between agricultural growth and the rural non-farm economy, which tends to follow agricultural growth and depends mostly on local and regional demand (e.g. Mellor and Lele 1972; Mellor 1976). These linkages relate both to production and consumption. Backward production linkages relate to the demand of farmers for inputs, while forward linkages are with the processing of agricultural commodities. A rise in farm incomes stimulates the consumption of goods and services, many of which are produced by rural non-farm firms. In addition, there are linkages through the supply of labour and capital. With a rise in agricultural productivity, either labour is released or wages go up. Agricultural surpluses can finance the expansion of the rural non-farm sector, which in turn can stimulate agricultural production via lower input costs, technological change and ploughing back of profits into farming. It is estimated that for each dollar increase in agriculture's value-added, there is an additional USD 0.50 to USD 1.00 increase in the value-added of the non-farm sector; 67 to 80% of this increment is attributed due to household consumption linkages (Rosegrant and Hazell 2000). It is also reported that tightening rural labour markets through an expansion of non-farm activities on agricultural wage rates is significant. For example, using the ICRISAT panel data, Gaiha (1997) found that if non-farm wages rise by a rupee, agricultural wages would rise by about 16 paise (1 rupee =100 paise).

Many Asian countries have implemented policies to promote the growth of the rural non-farm economy, realizing the important role this sector plays in creating employment and reducing poverty. These included the creation of industrial estates in rural areas and smaller towns where industries receive privileged treatment in terms of infrastructure support and technical assistance (AsDB 2000). Such industries usually received subsidies, tax breaks, foreign exchange licenses, and subsidized credit that gave targeted industries a competitive edge in the market. In addition, these countries adopted macro and trade policies that promoted exports and protected domestic firms against cheap imports, particularly during the early stages of development.

China's successful experience in rural industrialization represents a rational response to the unique economic conditions created in rural areas by the absence of efficient factor

and product markets (Otsuka 1998). Since labour and capital were not able to move to larger cities, many small and medium-sized industries grew up in rural towns and villages that might otherwise have been expected to locate in larger towns and industrial regions. In India, the government adopted the policy of protecting certain industries as the unique domain of small-scale firms and cottage industry, prohibiting imports or the emergence of large-scale competitors. Although this policy helped in the creation of employment, it retarded technological progress and growth in factor productivity (Chadha 1993; Singh 1990). Since China's experience may have relevance for other Asian countries, particularly transforming economies, the following paragraphs make a detailed case study on China.

The Chinese example: developing rural non-farm enterprises and reducing poverty

China provides an excellent example of how a rural development strategy focusing on the non-farm sector can bring about a significant change in the structure of the national economy. This is in addition to boosting the rural economy, increasing farmers' incomes and contributing to poverty reduction (Huang and Rozelle 1999). The effects of developing rural enterprises reveal the importance of expanding non-agricultural sectors in the rural areas to generate employment for increasing surplus labour. Rural industrialization, which plays a vital role in shaping China's economic growth and economic structure, is regarded as one of the major successes of the country's reforming economy. The share of rural enterprises in GDP rose significantly, from 2 to 4% in the 1970s to 28% in 1997 and rural enterprises dominated the export sector by the mid-1990s (Table 6.5). They now employ nearly 30% of rural labour, and comprise major source of new rural employment.

With the rapid growth of rural enterprises in China, the diversification of the country's rural economy has been remarkable. The contribution of the non-farm sector to gross value of rural output rose sharply from 31% in 1978 to 55% in 1990 and to over 75% in the mid-1990s (Table 6.6). Among the non-farm sectors, industry accounted for more than half of rural output value in 1995-97. The shares of transportation and commerce sectors in the rural economy rose by three to four times between 1978 and 1997, despite starting from a very low base. Agriculture no longer plays its former dominant role in the rural economy in terms of output value.

Table 6.6 also shows the changes in the sources of farmers' net income from agriculture and non-agriculture in the last two decades. In the 1980s, farmers received 83% of their income from the agricultural sector alone. Though there was a substantial increase in agricultural output prices in the early 1980s, the share of agriculture in farmers' income fell by 8% (from 83% to 75%) in 1980-85, because of expanding employment in the non-farming sectors. Farmers' cash income increased from less than 50% in 1980, to 60% in 1985 and 67% in 1997.

Before the rural reforms, underemployment was a persistent problem in rural China. This became even more apparent as efficiency gains in agriculture during the reforms further reduced the labour input needed for crop production (Table 6.7). At the same time,

the rural labour force grew 2-2.5% annually, with over 10 million new entrants each year during the 1980s. The increase in rural labour resources, combined with land scarcity, limited the absorptive capacity of employment in agriculture. This would have caused an enormous labour surplus, slowed down farmers' income growth, and limited the extent of poverty reduction – if the non-farm sector had not developed appropriately.

Although the development of rural enterprises in China can be traced back to the early 1950s, the sector took off only after reforms were introduced in the late 1970s. During the early years of the reform period (1978-83), the output value of commune and brigade enterprises (CBEs), in real terms, grew by 12.3% annually – nearly 4% higher than GDP growth. Total CBE employment grew by 2.5% annually, 1% higher than the growth of the nation's labour force. Since 1984, China has implemented a series of policies to encourage and support rural enterprise development. The CBEs were renamed township and village enterprises (TVEs) to include farmers' individual and cooperative enterprises, and other forms of rural private enterprises. TVEs expanded at an even higher rate during the late reform period (1984-95). Their gross output value (in constant 1985 prices) increased by about 13 times, with an average annual growth rate of 24.1% from 1984 to 1995. Total employment in the TVE sector rose from 52.1 million in 1984, to 128.6 million in 1995, an increase of about seven million per year. Increases in the rural labour force were almost entirely absorbed by the TVE sector. By 1995, the gross output value of rural TVEs accounted for 75% of the rural total, and 50% of national industrial output. Farmers' per capita income from TVEs represented 30% of their total income. TVEs employed 28.6% of rural labour and contributed 25% to GDP as well as 34% to financial revenue.

China's experience demonstrates the importance of institutional reform, price and market reform, rural industrialization, and other policies that diversify the agriculture sector and rural economy, as ways to promote farmers' income growth. After 1978, the country shifted from a controlled economy to a more open, market-oriented socialist economy, with generally positive results. Agriculture and the rural economy grew sharply as reforms liberalized the production and consumption institutions and markets. The shift from collective to household responsibility systems also enhanced the price-responsiveness of farm households. As the right to private trading was extended,

Box 6.1: China's lesson for developing countries

Other developing countries – particularly those with abundant labour in the rural areas and in relatively capital-intensive industry in the urban areas – can learn from the Chinese experience of developing rural enterprise to maintain sustainable growth of the rural economy and of farmers' incomes. Rural enterprises can provide a major source of employment for workers who are transferred out of farming with the increase of agricultural productivity. The rural non-farm sector also prevents the urban congestion that inevitably accompanies industrialization. Government policies can play an important role in creating these new employment opportunities for surplus rural labour – they can promote the privatization of rural enterprises, credit market development, infrastructure investment, and the adoption of a balanced development strategy between the rural and urban economies, and education and training.

to include surplus output of all categories of agricultural products after contractual obligations to the state were fulfilled diversification of agriculture as well as the rural economy accelerated.

China's reform policies recognized that given limited natural resources (especially arable land), agricultural production growth was a necessary but not sufficient condition to create a booming rural economy and to raise rural incomes. Institutional reform and the related efficiency gains created rural labour surpluses, and new industries in rural areas generated employment. A number of policies and measures have contributed to this rural industrialization.

- Rural industrialization was closely linked to urban industry in terms of products, technology, staffing and facilities, especially in the early stages of development. Rural industries were subcontracted by the larger urban industries, directly or indirectly hired retired urban technicians, and purchased cheap and used equipment from the urban firms.
- Institutional changes in agricultural production, and a substantial increase in procurement prices, raised farmers' incomes and increased labour productivity in agriculture. This promoted rural industrialization by providing a financial foundation (from farmers' savings), cheap labour and land (because of the reduction of the local food production burden).
- The recognition of private (individual and cooperative) enterprises by the central government beginning in 1984 has provided a boost to TVE growth since the mid-1980s.
- State loans to TVEs rose more than six times in real terms during 1978-84 and more than seven times during 1984-95. Tax concessions have been widely applied to various TVEs at their initial development stages, normally ranging from two to five years.
- As they face a hard budget constraint imposed by higher level fiscal and credit authorities, they can go bankrupt and lay off workers.
- Rural industrialization also benefited from trade liberalization, foreign currency reform and strong improvements in human capital (through primary and secondary education and on-the-job training), as well as good rural transport/communication networks. The role of village leaders and a focus on developing labour-intensive industry in the early stages also contributed to its success.

Despite their remarkable success in rural economic development and poverty reduction through rural industrialization, TVEs are facing new challenges. The growth of output and profit has been decelerating since 1995; their capacity to create jobs has been declining since the early 1990s. In 1997, the growth rate of employment in TVEs became negative. A recent study shows that TVEs will find it difficult to maintain past growth rates because of fundamental changes in the economic environment (World Bank 1999c). Product competition has grown with the emergence of rural enterprises, and the larger profits of the past have disappeared. With the expanding size of rural industry, the extent of government support was limited, whether state financial aid, credits or tax concessions. The result is that financial markets cannot meet their current needs, leading to a serious constraint to sustaining rural industrialization.

Current property rights and operational and management systems are still inefficient in spite of significant changes in institutional and management forms in the TVE sector. Rural enterprises are often small and inefficient; increased competition and declining profits have forced the consolidation of rural industries. This process will accelerate for firms that rely heavily on exports, as the Asian financial crisis has reduced the demand in Asia, and devalued currencies make products from competing countries cheaper. Large-scale, capital-intensive TVEs may face increasing problems if China is unable to privatize or provide better incentives. A major challenge to the transformation of TVE property rights is to find ways to manage the risk of large firms. TVEs will face more challenges in the future as their technology needs to be updated to remain competitive. There is also a growing concern over their occupation of agricultural land. Their growth has been regionally unbalanced, and the result has been worsening equity of income distribution. Other challenges facing China's rural industrialization include growing concern over environmental pollution, and the increasing costs of transportation and communication due to the wider distribution of TVEs across rural areas.

Public policies to support the rural non-farm sector

Governments can adopt diverse sets of public policies to promote the non-farm sector. Broadly speaking, these policies can be divided into two categories. The first category relates to those economy-wide policies that affect the non-farm sector – such as trade, foreign exchange, fiscal, industrial, and labour policies. In general, the macro- or sectoral policy reforms that facilitate the growth of the non-farm sector, especially small-scale or microenterprises in industry and trade, include:

- Simplification and rationalization of entry and exit regulations and tax codes to lower new entrants' costs.
- Liberalization and streamlining of export and import regulations to lower barriers for small participants.
- Privatization and regulation of monopolies to create opportunities for new entrants.
- Reforms of banking regulations to encourage banks to compete and seek new markets.
- Reforms of property rights and collateral regulations that impair the ability of small firms to receive loans.
- Reforms of labour regulations that restrict or tax labour flows. These reforms tend to make the playing field equal for both small rural and large urban enterprises.

The second category of support policies relates to specific policies directed at non-farm sector enterprises. This category includes programmes and projects to provide financial assistance and credit facilities to the non-farm sector and technical services of various kinds. These policies help reduce the discrimination and disincentives suffered by small-scale rural enterprises through lack of access to credit, technology and markets. Given the urban bias in policies, these enterprises also suffer from underdevelopment of social, human and physical infrastructure in the rural areas. The provision of human capital is important to give the poor the capacity to enter the rural non-farm sector (IFAD 2001). This does not require formal education, as there is scope for basic literacy, numeracy and

bookkeeping classes. This can improve the position of the poor within the rural off-farm labour market, and even enable them to set up their own profitable enterprises.

Financial assistance to medium, small-scale, and microenterprises is usually channelled through government-owned commercial banks or specialized financial institutions, or by requiring private commercial banks to allocate a certain percentage of their loans to these enterprises – often backed by refinancing of such loans from central banks or specialized refinancing institutions. Small enterprises often receive loans at subsidized interest rates, resulting in credit rationing. The rate of repayment is very low, resulting in losses for financial institutions burdened with a large proportion of non-performing loans.

In the past, rural financial institutions failed to recognize that rural households needed access to deposit or savings accounts that gave reasonable returns. They also failed to provide needed financial services to many small-scale and part-time non-farm businesses, especially in the service sector. As financial services improve in rural areas, it is possible that larger shares of rural savings will be captured in rural areas (including local towns), and that this will facilitate the growth of the rural non-farm economy.

Increasingly, fiscal assistance to microenterprises has been channelled through non-governmental organizations (NGOs), a few of which are established for this express purpose. The way in which these groups are organized, how they identify those in their lending portfolio, and how they monitor the projects vary widely. Although many microfinance institutions target this sector – the integrated rural development programmes (IRDP) in India and the Grameen Bank in Bangladesh are examples – access for the poorest is very limited.

One popular way of providing services to these small microenterprises is to establish industrial estates fully endowed with infrastructure, roads, communications, electricity, and financial services, in small towns or semi-rural areas. The experience with such direct assistance programmes for non-farm enterprises has also been mixed and has led to generally disappointing results (Haggblade and Mead 1998). Industrial estates for rural areas are widely viewed as expensive failures. Technical assistance programmes have had mixed results, with the strongest performers being focused on high-leverage interventions in specific commodity subsectors.

Box 6.2: Microfinance to empower women

Microfinance is one of the main instruments used in IFAD-initiated projects to reduce rural poverty and empower the rural poor, particularly women. Many studies in Bangladesh have shown the positive impact of microfinance schemes on three important aspects of women's empowerment: involvement in income-generating activities, awareness on social and economic issues, and contraceptive use (Rahman 1999). Microfinance schemes have also helped reduce the relative isolation of women. They meet regularly not only to conduct savings and loans activities, but also to share information and discuss new ideas (Hulme and Mosley 1996). Such schemes have also been able to reach a significant proportion of particularly vulnerable women. In Bangladesh, 55% of the loans are issued to widowed, separated or divorced women who fully control their loans, while only 25% are fully appropriated by men (Goetz and Gupta 1994).

Local governments can help stimulate the growth of the rural non-farm sector by facilitating the development of physical, social, and human infrastructure at the local level (Islam 1997). Decentralization tends to shift the focus of expenditure toward small-scale infrastructure projects, encouraging the growth of small-scale private sector projects. It is also likely that there will be greater equity in the distribution of public expenditures within localities because there is greater transparency and accountability in a local setting. In China and Taiwan, local governments have played an important role in the development of infrastructure and industrialization.

Microfinance to alleviate poverty

Although banking services have expanded rapidly in rural areas in recent years, the majority of rural poor have not been able to benefit from these services. Studies have shown that community-based organizations have considerable potential in serving the poor better (Sinha 1998). Following the success of the Grameen Bank in Bangladesh and other similar experiences, microfinance institutions tend to rely more on peer group monitoring and joint liability to overcome the screening, monitoring and enforcement problems commonly encountered by formal lending institutions (Gaiha 2001a).² These programmes deliver small loans to poor borrowers, mostly women organized into small groups, combined with accessible deposit facilities and much greater attention to risk management. Thus they aim to increase their incomes and smooth the consumption. Many multilateral and other donors, as well as governments, now make wide use of microfinance programmes and projects as anti-poverty instruments in developing countries.

Box 6.3 Working Women's Forum: Commitment to the rights of poor women

Launched in 1978, the Working Women's Forum (WWF) is committed to the rights of poor women to credit, education, health care and all other basic services.

- WWF has unionized over 591 000 women in 15 geographic areas in the southern Indian states of Tamil Nadu, Karnataka and Andhra Pradesh, giving them visibility and status as 'workers'.
- WWF organizes and mobilizes women on trade lines, promoting the social and financial independence of poor Indian women through small enterprise development.
- WWF grassroots health cadres take up advocacy measures to inform and educate their communities. WWF also influences government service delivery systems to increase gender sensitivity and promote changes in health care policy, programmes and legislation.
- WWF has promoted an autonomous, legally registered, yet informal Indian Cooperative Network for Women, run and managed by poor women themselves. The network has, over two decades, a record recovery of 96% and a cumulative disbursement of over INR 436 million. The process of accumulation at the base of the economy is evident in the transformation of labour to capital, changing situations of invisibility to visibility, and upward mobility and growth of enterprises of poor women.

Source: Working Women's Forum. 2000. Social Platform through Social Innovations: A Coalition with Women in the Informal Sector.

Microfinance can reduce the vulnerability of the rural poor to shocks caused by natural or man-made calamities, sickness, or death in the family, by building up a household's assets (IFPRI 2001). This is an important form of self-insurance against crises:

- Some assets can be readily sold to meet immediate consumption needs.
- Asset building can improve creditworthiness, thereby improving a household's borrowing capacity during a crisis.
- A larger and more diverse asset base can reduce covariant risk. The potential reduction in vulnerability takes place through the creation or expansion of one or more income-earning assets; improvement in housing conditions; income and consumption-smoothing savings for the lean season; and the emergency assistance provided by microfinance organizations.

An IFAD assessment of the impact of the recent financial crisis on the rural poor in Indonesia has shown that voluntary savings by the self-help groups promoted by its microfinance programmes allowed them to maintain consumption levels. It also helped them carry on economic activities in the face of the credit squeeze in the formal sector. Microfinance programmes have also had a positive impact on the incomes of the poor in Asia, particularly women (Boxes 6.2 and 6.3). But growing evidence indicates that these programmes may not have reached the poorest of the poor. In Bangladesh, only 26% of hard-core poor households and 45% of absolute-poor households belonged to a credit NGO. Lack of access to land and a homestead was identified by a recent IFAD-sponsored study as the major factor in the exclusion of the hard-core poor (Rahman 1999). Illness-related crisis and dropout was another major constraint, and it is to overcome this constraint that the Indian NGO SEWA (Self-Employed Women's Association) introduced a health insurance scheme as part of a microfinance programme.

IFAD's traditional emphasis on financial sustainability can at times turn out to be a limiting factor, as targeting the poorest can increase the financial costs in three ways:

- Many NGOs prefer to issue uniform loan sizes, and most of them are not flexible enough to give the very small loans wanted by the poorest.
- That the hard-core poor need more time to gain sufficient confidence to participate in microfinance schemes raises the transaction cost of involving them.

Box 6.4 Towards second-generation credit schemes

Various IFAD-initiated projects illustrate a number of ways of going on to second-generation credit schemes:

- Credit and related training for women in non-traditional sectors (building irrigation check dams, bicycle repair, furniture making) as in the Andhra Pradesh Tribal Development Project.
- Enabling women to graduate from micro to larger scale credit schemes, by setting up banks or non-bank financial intermediaries. An example is the women's bank set up in Kurnool, Andhra Pradesh.
- Ownership of productive assets by groups, as of brick-kilns in the Tamil Nadu project, or pond aquaculture in Bangladesh.
- Tackling constraints in women's participation in marketing, local or long-distance.

- A recent review of the Maharashtra Rural Credit Project reveals that strong financial discipline or stringency (e.g. strict repayment and saving requirements, penalties for delays) may discourage some of the poorest. This is particularly important as the poorest are normally subject to seasonal variability of incomes (Gaiha 2000b).

IFAD views microfinance programmes as a **vehicle** with continued potential to build local institutions and empower the rural poor, especially women. Facilitating women's access to independent income and financial services, providing cohesive structures of support through solidarity groups, and promoting self-employment, all enhance women's status in the family and their control over family resources. Such schemes, in the final analysis, promote the family's well-being, thus proving to be an important strategy to reduce poverty.

Despite the proliferation of microfinance schemes in the last several years, their coverage remains limited. A study on the outreach of 39 microfinance institutions/programmes in 12 countries of the region found that they covered a total of 5.1 million households (UNDP/UNOPS/APDC 1996). Of this, about 4.5 million households were in Bangladesh, and only 0.6 million households in the rest of the region. The total coverage in the region represents only 2.5% of the total poor households. A number of steps are necessary to expand the coverage of microfinance schemes and to improve their targeting:

- The institutional capacity of microfinance institutions must be strengthened in a borrower-friendly way.
- Most countries in the region will have to clarify the supervisory and regulatory framework governing the function of financial intermediation in ways that will not stifle the 'informal' nature of microfinance.
- The policy environment will have to be modified to expand outreach to the poor. Despite the rapid growth of the microfinance sector and the mobilization of larger amounts of savings and credit, the poor still have little or no access to the resources mobilized by the formal sector. India and Indonesia have achieved some success in mainstreaming microfinance products through linkage banking, but the potential for expanding such programmes remains enormous. There is also an urgent need to look at new financial arrangements such as equity participation.
- Innovations in microfinance institutions have largely been in the area of loan products. There is a need for a second generation of innovative financial products, such as insurance schemes designed to reduce the risk of borrowers.
- Financial viability of many microfinance institutions continues to need constant monitoring and effective action. The financial viability of the borrowers should be a major concern for the institution itself. They have been able to reduce their overhead costs by reducing field staffing, increasing the intensity of lending and introducing larger loans (e.g. for housing). But average loan size, the main determinant of financial viability from the point of view of a financial intermediary, is slow to rise. Where groups have been treated as a borrowing entity, transaction costs have gone down significantly.
- The cornerstone of microfinance is savings and local capital accumulation. External credit lines should be introduced cautiously and at the appropriate time.

RURAL PUBLIC WORKS

The rationale of rural public works programmes

Self-employment schemes, such as those promoted under microfinance programmes, typically enable the poor to acquire income-generating assets by providing access to credit, marketing and other inputs. In contrast, wage employment schemes create wage labour opportunities for the poor, mainly on public works projects. Many developing countries have used such schemes to deal with situations (such as famine and drought) marked by widespread but transitory unemployment in rural areas. In recent years, some developing countries (India, Bangladesh) have included employment creation through rural public works (RPWs) at the core of their anti-poverty strategy.

The seasonality of agricultural production and the presence of significant surplus labour means that disguised employment or unemployment is a common phenomenon, especially during the slack farming season.³ Because of the imperfection of capital and insurance markets and the associated lack of borrowing and savings opportunities, many agricultural labourers cannot cope with intertemporal risk, one of the justifications for scheduling RPWs during the slack season. Other justifications refer to the ability of certain RPWs to reduce negative externalities (e.g. afforestation) and their self-targeting nature, which could effectively help to reduce inequality or poverty. If they can provide sufficient employment,

Box 6.5 IFAD's experience with rural public works (RPWs)

Most IFAD-funded projects, particularly those with a focus on microfinance, try to increase the incomes of the rural poor through microenterprise development based on self-employment. A few IFAD-funded projects promote wage employment. But RPWs could play a significant role in reducing the poverty of the landless who are forced to rely on agricultural employment with long seasonal spells of inactivity. The difficulties of targeting anti-poverty interventions also make a strong case for RPWs, which tend to exclude the non-poor since they usually involve hard physical labour. IFAD has not been directly involved in many RPW projects, though there are pertinent exceptions.

- The Northeast Sichuan and Qinghai/Handong Integrated Agricultural Development Project in China, jointly funded by IFAD and the World Food Programme (WFP), aims to increase the incomes of 212 000 poor households in eight counties of Nanchong and Wanxian prefectures in one of the poorest areas in China. The project's RPW component includes a food for work* sub-component to improve irrigation systems, protective forestry, or construction of rural roads; and food for training to improve literacy skills, especially of women, and to train women in income-generating activities. The Fund's contributions focus on disadvantaged groups or isolated areas, for example by increasing women's capacity to earn an independent income or by improving transport through road construction to open up isolated villages.
- The Income-Generating Project for Marginal Farmers and Landless in Indonesia, funded entirely by IFAD, tries to raise incomes by initiating a range of on- and off-farm income-generating activities. By providing start-up and working capital credit, the project has been successful in boosting incomes by an average of 41-54% in three years, thus enhancing self-confidence and self-reliance.

* WFP uses the principle of 'food for work' to prioritize poorer households, allowing non-poor households to participate only after all poor households willing to participate have been covered (IFAD 1999c). The argument that RPWs are 'self-targeting' does not apply to this scheme.

RPWs can guarantee one of the important human rights, the right to work. They could also improve the economic and social positions of the poor through participation (Dreze and Sen 1989). This aspect is particularly important for poverty reduction programmes that understand poverty in a broader sense, to include the violation of basic human rights.

The direct benefit of participating in RPW consists of wage earnings net of whatever the person would have earned elsewhere. There are also indirect benefits:

- Benefits from the assets created (such as easier access to markets through roads).
- Higher wage rates by strengthening bargaining power of agricultural and other labourers.
- Higher earnings, leading to higher spending, first by the workers themselves, then by others as an expansionary (Keynesian) process.

RPWs have become important in alleviating poverty in many Asian countries, though the size of their programmes is rarely as large as that of the major programmes in India (Table 6.8). The large employment generation schemes in Asia include food-for-work (FFW) programmes in Bangladesh, China, Nepal, The Philippines and Thailand, as well as India's Employment Guarantee Scheme (EGS) in Maharashtra State, and its somewhat diluted version at the national level, the Employment Assurance Scheme.⁴ In Bangladesh, the national FFW programme is designed to provide rural labourers with slack season employment and income (Osmani and Chowdhury 1983). The programme provided 105 million days of work (earthworks, roads, canals, etc.) in 1988-89. The fact that over half the workers were reportedly landless and only 2% had more than 2.8 ha of land, suggests good targeting, in part because of low wage rates (Chowdhary 1983). But due to considerable diversion from other work, less than 60% of the earnings comprised a net gain to workers, and the programmes provoked a rise in local wage rates. All the same, direct transfer benefits for the workers were substantial (7-8% of total annual income).⁵

Ravallion (1987) argues that that if there had been an effective RPW programme during the 1974 famine in Bangladesh, a great many people could have been saved from starvation and impoverishment; and that the FFW programme of 1988 helped Bangladesh avoid famine (Ravallion 1987, cited in Ravallion 1991 and Gaiha 1993). Risk benefits within a year from FFW programmes have also been substantial, and it is safe to conclude that food for work in Bangladesh has played a very important role in alleviating poverty.

India's Employment Guarantee Scheme (EGS) as a poverty reduction strategy

As part of this assessment, a study reviewed the experience of a relatively successful EGS in Maharashtra State (India), to draw lessons for other countries of the region (Imai 1999). Since its inception in 1979, the EGS has become a major public employment scheme in India. It generated 2 166 million person-days of employment in 1988-89. In 1977-1988, it was reportedly associated with a cut in the rural unemployment rate of one third compared to the all-India trend, although 20% of the work done drew workers away from other employment (de Haan and Lipton 1998). By 1987-89, EGS was reaching half the rural households, raising average incomes by 20%, and pulling up the lowest private sector wages. Major features of the scheme include guaranteed employment

within a radius of 8 km; self-targeting (induced by restrictions on the choice of work); wage payment on a piece-rate basis; selection of projects on the basis of labour intensity and productivity; and concentration of project activity in slack periods to avoid competition with agricultural demand for labour.

The study suggests that the scheme had a significant positive impact on the probability of escaping from chronic and severe poverty: when public employment is made available to households that have been poor for a long time, their chances of escaping from poverty are considerably improved. While leakage to the affluent can never be justified, this result could compensate for some degree of imperfection in targeting performance. But improving targeting is important, as the scheme is likely to reduce **chronic** poverty significantly if it reaches the hard-core poor. Although the analysis is based on a small sample of households, it is still worth noting that access to employment on RPWs could help the chronically poor households escape from a situation of continuous deprivation.

The analysis also suggests that RPWs were not necessarily efficient in targeting the poor or the more disadvantaged groups. In particular, the empirical study suggests, predictably, that those relatively older or with poor nutritional status have a low probability of participating in the RPWs. Thus the self-targeting nature of RPWs, which should in theory improve targeting performance, does not necessarily result in good targeting performance in practice. 'Mistargeting' is made worse by shortcomings in design and implementation. For example, there was no budget to address the rise in minimum wage rates and the elaborate registration procedure put off the poor. Measures to improve targeting performance are, thus, important when designing RPWs. Also, since RPWs cannot target the 'unemployable' (the old, the ill or the physically handicapped), they need to be associated with other interventions.

The above analysis implies that RPWs have substantial indirect transfer effects or long-run effects as well as risk benefits. The study of the EGS in Maharashtra suggests that:

- Agricultural wage rates tend to rise in the long run when people have opportunities to join the EGS.
- The multiplier effects of the scheme are large (as long as the productivity of the assets created by the scheme is kept high).

RPWs also mitigate seasonal stress or smooth income fluctuations over the years, providing a rationale for their use as a poverty alleviation tool. However, mistargeting, especially in the initial stages, is likely to bar the poor from access to these benefits. It is therefore important to:

- Improve targeting performance at the initial stage.
- Enable the poor to appropriate the benefits from the assets created by the RPWs.
- Maximize the productivity of the assets in the long run.

In contrast, the performance of nation-wide RPWs has been very unsatisfactory. A recent review of the Jawahar Rozgar Yojana (JRY) points to serious targeting failures, delays in payment of wages, unsatisfactory quality of assets created, and manipulation of master rolls (Gaiha 2001c; Imai 1999). Similar criticisms are made in the Mid-Term Appraisal of the Ninth Five Year Plan (1997-2002) (Government of India 2000). In

fact, the cost-effectiveness of RPWs diminished slightly over the period 1987-93⁶. Some remedial measures include lowering of the RPW wage rate relative to the agricultural wage rate; reduction of delays in payments of wages; flexibility in the wage/material cost ratio; monitoring of master rolls; and closer coordination between village *Panchayats* and line agencies in designing and implementing small infrastructure projects.⁷

OPPORTUNITIES IN THE RURAL NON-FARM SECTOR

The analyses in the earlier sections, especially the experiences in China and India, show the considerable potential of rural enterprise development and RPWs in reducing poverty in many of the developing countries of the region, particularly those with abundant rural labour. Asian countries with a large labour force in rural areas, and relatively capital-intensive industry in urban areas, could learn from China's experience in rural enterprise development as a tool to maintain sustainable growth of the rural economy and farmers' incomes. Similarly, India's experience with RPW programmes indicates that it would be a good strategy for IFAD to promote wage employment as part of its poverty reduction strategy, since some of the direct anti-poverty interventions, including micro-finance schemes, have failed to reach the poorest of the poor. But RPWs are not a panacea. It is very important for policy-makers to recognize both the strengths and the shortcomings of RPWs, and make the schemes as efficient as possible in the early stages.

The importance of a long-term perspective

RPWs can serve as a short-term relief measure, but it is essential to design the scheme so that long-term benefits are maximized and sustained for a long time.

- Maximizing long-term benefits: The aspects policy-makers must pay more attention to are:
 - The returns from the infrastructural assets have to be kept high.
 - The geographical allocation and the content of the scheme must ensure that disadvantaged areas obtain larger benefits.
 - The poor households or individuals benefit from the assets created.
- Sustainability of long-term benefits: Costs tend to be large at the start of such schemes, and there will be a lag before benefits of the assets created accrue (Narayana et al. 1991). So with a limited budget it is advisable to introduce RPWs at a modest level, then expand them gradually to make them financially sustainable. Given their importance, it may be necessary to incorporate long-term benefits and costs into the evaluation of RPWs. A realistic approach would be to carry out a first survey on a very small sample of workers, then visit them several times (or every two years) after the start of the project. The indirect transfer benefits or risk benefits are thus likely to be identified, even if the sample size is small.

Targeting the poor or the poorest under RPW programmes

The case studies in rural India show that mistargeting is likely to result from shortcomings of design and implementation. If the self-targeting method is applied, the wage

rates of the scheme and the work requirements must attract only the poor. Special attention must be paid to selecting relatively disadvantaged areas. Inflexibility of timing, delayed payment of wages and even the opportunity costs of participation are non-negligible for the poor. It is particularly important to simplify the procedure so as to make the scheme attractive to the poor.

RPWs vs. microfinance

Whether RPWs can substitute or complement microcredit schemes is of interest for policy-makers, particularly because microcredit schemes often fail to reach the poorest. If the poorest households are not willing to take loans (or cannot) for fear that unstable income flows may prevent them from repaying, a well-targeted RPW component could complement microcredit by securing income flows. If some of the poor who are excluded from any credit scheme are vulnerable to risk, RPWs could serve a complementary role, again by mitigating income fluctuation. This is the approach adopted in China through the partnership and collaboration between IFAD, WFP and the Government of China. When the poorest are more interested in earning opportunities than in loans, RPWs could be superior to microcredit schemes in alleviating poverty.

But if the RPW schemes also carry targeting flaws (say because of poor design or the presence of people who **cannot** work), they will never be able to substitute or complement microcredit schemes, and a combination of two mistargeted schemes could worsen the situation. Having said this, our econometric study shows that the importance of the role of RPWs and microcredit in helping the chronic poor escape from poverty cannot be underestimated.

The choice – whether poverty should be alleviated through RPWs or microcredit schemes or a combination of both – is not straightforward. But the determinants of poverty or chronic poverty provide us with some clues. If the main reason for chronic poverty is the

■ *RPWs can help poor households who are chronically poor because of the lack of income-earning opportunities or seasonal fluctuations of income. They can also help equalize geographical disparity by creating infrastructure in disadvantaged areas. But RPWs are unlikely to help chronic poverty linked with limited access to land or education.*

limited endowments of the poor, specifically land or education (as reported by Gaiha 1998 in the context of rural India), it is unlikely that a single RPW scheme will be sufficient to alleviate chronic poverty. Thus, redistributive land reform or a broad targeting policy focused on primary education may be necessary in the long run. However, if the poor households are chronically poor because of the lack of income-earning opportunities or seasonal fluctuations of income, then RPWs or a

combination of RPWs and microcredit will be effective. Another rationale for RPWs can be found in the fact that they may be effective in equalizing geographical disparity, by creating infrastructural assets in the particularly disadvantaged areas (if one of the reasons for poverty is lack of access to these). In situations where a high correlation between poverty and unemployment or underemployment is observed, a solution like the EGS will be quite

effective. Reflecting the determinants of poverty, the impacts of several alternative choices on the poor should be carefully compared.

RPWs have an attractive feature as direct anti-poverty interventions. But many of the past projects (such as those directed by the International Labour Organisation (ILO)) have quite naturally focused on the direct and indirect **employment** effects, rather than the impact on poverty or severe poverty (Gaude et al. 1984 and 1987). It seems that the advantage for IFAD in supporting RPWs lies in 'the IFAD experience' with many projects that target the poorest of the poor in relatively poor regions. Many of the reasons for 'mismatching' of RPWs reviewed in this analysis might be essentially due to lack of information as to the cause of poverty. In this regard, in any situation where RPWs are used as anti-poverty interventions, IFAD could very likely play a very important role thanks to its own experience.

In sum, RPWs, when well designed and implemented, are very effective instruments in alleviating poverty or chronic poverty. By directing more budget resources to RPWs, or by getting more involved in institutions that finance RPWs (WFP, ILO), IFAD could well improve the overall cost-effectiveness of its efforts to alleviate poverty **in the long run**. This is one of the approaches IFAD has followed up in China, India, Bangladesh, D.P.R. Korea and other countries.

Endnotes

- 1 We consider any locality that exists primarily to serve an agricultural hinterland rural. In contrast, urban economies are driven by manufacturing, government, or some other economic base independent of agriculture. Given this view, 'rural' areas include all rural settlements, central marketplaces and towns linked through economic transactions related to the agricultural economy. 'Non-farm' activities are defined as including all economic activities other than crop and livestock production. Thus they include agricultural processing and trade (conventionally classified as part of the manufacturing and commerce sectors, respectively), as well as construction, mining, transport, and financial and personal services.
- 2 Microcredit refers to small loans, whereas microfinance is appropriate when such loans are supplemented by other financial services such as mobilization of savings and provision of insurance.
- 3 In the ICRISAT villages in India, the probability of involuntary market unemployment was much higher in slack periods (0.39 for men, 0.50 for women) than in peak periods (0.12 for men, 0.11 for women) in 1975-76 (Ryan and Ghodake 1984).
- 4 In addition, an RPW with no element of assurance but with a larger outlay is the Jawahar Gram Smdrhi Yojana (JGSY) – a restructured version of Jawahar Rozgar Yojana (JRY).
- 5 On targeting performance, Ravallion (1991) also shows a very good targeting performance of FFW programmes. Although cut-off points in per capita income are relatively low, the share of the poor among the workers was higher than the headcount ratio in 1981-82. In Case 1, the poverty line was BDT 1 500 and 60% of the workers were poor against a headcount ratio of 25%. In Case 2, the poverty line was BDT 2 500 and 96% of the workers were poor against a headcount ratio of 70%.
- 6 Over this period, there was a sharp rise in unspent balances for RPW. As these are often a result of bunching of expenditure forwards, the close of a financial year, involving ad hoc disbursements, substantial wastage and diversion of funds cannot be avoided (Gaiha 2001c).
- 7 Two changes were introduced in JRY (recently renamed JGSY): (i) it is to be exclusively implemented by village Panchayats; and (ii) the main focus is to be infrastructure development, with employment generation becoming a secondary objective. As a result, the main burden of a rural safety net has shifted to the Employment Assurance Scheme (EAS).

Table 6.1: Employment shares by activity in rural and urban areas, selected countries (%)

Country	Rural Population (as % total)		Total Employment	
	1960	1994	Agriculture	Non-Farm
Bangladesh (1991)				
Rural			66.1	39.9
Urban			15.1	84.9
Total	95.0	82.0	54.6	45.4
Sri Lanka (1981)				
Rural			55.7	44.3
Urban			7.3	96.7
Total	82.0	78.0	45.2	54.8
Pakistan (1981)				
Rural			71.6	28.4
Urban			8.0	92.0
Total	78.0	66.0	55.5	44.5
India (1993/94)				
Rural			76.9	23.1
Urban			17.7	82.3
Total	82.0	73.0	61.5	38.5
Philippines (1980)				
Rural			74.0	26.0
Urban			18.3	81.7
Total	70.0	47.0	51.4	48.6
Indonesia (1995)				
Rural			63.1	36.9
Urban			9.4	90.6
Total	85.0	66.0	45.9	54.1
Thailand (1996)				
Non-municipal			49.9	50.1
Municipal			1.9	98.1
Total	87.0	80.0	39.7	60.3

Source: Rosegrant and Hazell 2000

Non-Farm Employment						
Manufacturing	Transport	Trade	Services	Finance	Construction	Other
6.8	4.0	.....	35.4.....		3.3	50.2
8.1	6.5	.....	31.8.....		3.4	50.1
7.3	5.1	.....	33.8.....		3.3	50.4
19.8	8.3	16.5	25.2	1.5	6.6	22.1
16.0	9.7	23.9	28.7	2.8	3.7	15.0
18.5	8.8	19.2	26.5	2.0	5.5	19.5
21.8	9.2	18.3	33.8	1.1	12.3	3.5
21.5	10.1	25.6	31.0	2.5	7.5	1.8
21.6	9.9	22.2	32.3	1.8	9.9	2.3
30.7	6.9	19.4	..... 26.8		11.6	4.6
22.2	12.7	25.9	..... 38.3		3.1	2.3
28.5	8.4	21.1	..... 29.8		9.4	2.8
20.9	11.9	13.2	32.1	3.0	11.5	7.4
19.4	11.3	14.9	35.9	7.1	8.1	3.3
19.9	11.5	14.3	34.7	5.8	9.2	4.6
23.8	8.2	31.7	24.2	0.5	9.4	2.2
20.0	8.0	30.1	31.1	2.4	6.8	1.6
21.8	8.1	30.9	27.9	1.5	8.0	1.8
30.3	5.1	22.1	..... 19.7		21.5	1.3
22.6	7.0	29.9	..... 28.8		9.7	2.0
27.6	5.8	24.8	..... 22.8		17.4	1.6

Table 6.2: Distribution of rural workers across non-farm sectors, male and female (%)

Country	Total Non-Farm	Manufacture	Transport
Bangladesh(1991)			
Male	100.0	6.5	4.6
Female	100.0	8.4	0.4
Sri Lanka (1981)			
Male	100.0	18.8	9.8
Female	100.0	24.9	1.6
India (1993/94)			
Male	100.0	26.8	8.4
Female	100.0	48.7	0.6
Philippines(1980)			
Male	100.0	16.5	19.0
Female	100.0	27.9	0.6
Indonesia (1995)			
Male	100.0	19.9	12.5
Female	100.0	30.9	0.3
Thailand (1996)			
Male	100.0	25.3	8.0
Female	100.0	37.5	1.0

Source: IFPRI 2001

Trade	Services	Finance	Construction	Other
.....	39.4		3.7	45.8
.....	12.2		0.8	78.2
18.1	20.6	1.6	7.7	23.4
8.9	46.1	1.4	1.2	15.9
21.1	..... 27.2		12.6	3.8
14.2	..... 25.9		7.1	3.2
9.6	22.9	3.1	18.6	10.4
19.0	46.8	2.8	0.4	2.5
23.7	26.0	0.7	14.5	2.8
46.2	21.0	0.2	0.3	1.0
17.8	..... 17.3		29.9	1.7
28.2	..... 23.1		9.7	0.5

Table 6.3: Share of non-farm income/employment in total household income/employment by farm size groups, selected countries

Farm Size (ha)	Non-Farm Share (%)	
	Employment	Income
India (1987/88)		
Landless	46.1	
0.01 - 0.4	29.3	
0.41 - 1.0	19.0	
1.01 - 2.0	14.0	
2.01 - 4.0	11.8	
4.01 +	9.0	
North Arcot, India (1982/83)		
0.0 - 0.1		35.0
0.1 - 1.0		23.0
1.0 +		20.0
Republic of Korea (1986)		
0.0 - 0.5		73.0
0.5 - 1.0		49.0
1.0 - 1.5		35.0
1.5 - 2.0		26.0
2.0 +		19.0
Taiwan (1979)		
0.0 - 0.5		67.0
0.5 - 1.0		58.0
1.0 - 1.5		48.0
1.5 - 2.0		40.0
2.0 +		33.0
Thailand (4 regions) (1980/81)		
0.0 - 4.1		88.0
4.2 - 10.2		72.0
10.3 - 41.0		56.0
41.0 +		45.0

Source: India: Chadha 1993; North Arcot: Hazell and Ramasamy 1991; Taiwan: Ho 1986; Thailand: Liedholm 1988

Table 6.4: Income shares by (real) per capita income quintile: All India quintiles defined at the national level

Quintile	Cultivation	Agriculture Wage Labour	Non-Farm Labour	Non-Farm Self Employment	Non-Farm Regular Employment	Total Non-Farm	Other Sources	Real Per Capita (Rupees)
Lowest	38.2	28.2	15.8	11.4	4.4	31.6	2.0	1 146
Q2	38.0	21.3	14.7	16.8	7.0	38.5	2.3	2 113
Q3	45.2	13.4	10.1	16.3	11.7	38.1	3.2	3 141
Q4	50.1	7.5	6.1	14.6	18.6	39.3	3.2	4 712
Highest	64.5	2.1	2.0	7.0	21.1	30.9	2.5	11 226
Total	54.9	8.0	5.9	11.5	17.1	34.4	2.7	4 468

Source: Lanjouw and Shariff 2000

Table 6.5: Changes in the structure of China's economy, 1970-98 (contribution in %)

	1970	1980	1985	1990	1995	1998
Share in GDP						
Agriculture	40.0	30.0	28.0	27.0	20.0	18.0
Industry	46.0	49.0	43.0	42.0	49.0	49.0
Services	13.0	21.0	29.0	31.0	31.0	33.0
Share in employment						
Agriculture	81.0	69.0	62.0	60.0	52.0	50.0
Industry	10.0	18.0	21.0	21.0	23.0	23.0
Services	9.0	13.0	17.0	19.0	25.0	27.0
Rural enterprise's share						
in:						
GDP	2.0	4.0	9.0	14.0	25.0	28.0 ^a
Export	-	-	15.0	43.0	48.0	46.0 ^a
Rural enterprise's share						
in rural employment						
	4.5	9.3	18.8	22.0	28.6	28.4 ^a
Share of rural						
population						
	83.0	81.0	76.0	72.0	71.0	70.0

^a the figure is for 1997

Source: State Statistical Bureau, China Statistical Yearbook, various issues; and China Rural Statistical Yearbook, various issues; Han 1996

Table 6.6: Structure of China's rural economy and sources of farmer's income (%), 1980-97

Sector	1980	1985	1990	1995	1997
Share in rural gross output value					
Agriculture	69.0	57.0	45.0	25.0	24.0
Industry	20.0	28.0	37.0	51.0	50.0
Construction	6.0	8.0	6.0	7.0	6.0
Transportation	2.0	3.0	4.0	5.0	5.0
Commerce and other	4.0	4.0	9.0	12.0	15.0
Total	100.0	100.0	100.0	100.0	100.0
Share in agricultural sector					
Farming (crop)	75.6	69.2	64.6	58.4	56.4
Forestry	4.3	5.2	4.3	3.5	3.3
Livestock	18.4	22.1	25.7	29.7	31.0
Fishery	1.7	3.5	5.4	8.4	9.3
Total	100.0	100.0	100.0	100.0	100.0
Sources of farmer's net income					
Agriculture	83.0	75.0	74.0	63.0	61.0
Non-agriculture	17.0	25.0	26.0	37.0	39.0

Note: Shares are calculated by using gross output value. Discrepancies in totals are due to rounding

Source: State Statistical Bureau, China Statistical Yearbook various issues. Ministry of Agriculture, China's Agricultural Development Report, 1997-98

Table 6.7: Labour input per hectare in crop production (man-days/hectare), 1978-96

Year	7 crops	Rice	Wheat	Maize	Cotton	Rapeseed	Peanut	Sugarcane
1978	537	603	447	412	947	489	539	939
1980	452	506	384	360	818	442	469	827
1984	331	367	243	245	692	341	384	822
1985	305	347	222	238	626	317	354	703
1990	292	319	217	246	608	288	387	631
1995	268	287	190	240	625	252	307	558
1996	262	288	186	240	627	234	288	561

Source: Huang and Rozelle 1999

Table 6.8: Rural public works programmes in India, Bangladesh, Pakistan and The Philippines: Scale of operation and costs

Country/Year/ Programme	Scale of Operation (million person/days, annual)	Total Cost per Person/Day of Employment Created (USD)	Labour Intensity
India, 1991-92, JRY	850	1.3	0.6
India, 1991-92, EGS	100-180	1.2	0.5
Bangladesh, 1991-92, FFW	105	1.6	0.5
Pakistan, 1992	5.15	2.8	0.6
Philippines, 1990	0.3	3.2	0.5

Note:

EGS = Employment Guarantee Scheme

FFW = Food for work.

JRY = Jawahar Rozgar Yojana

Source: Subbarao 1997, Table 2