Sustainable agriculture and eradication of rural poverty in Pakistan

Abdul Waheed Bhutto and Aqeel Ahmed Bazmi

Abstract

Poverty is rampant in the rural areas of Pakistan, where people are in a state of deprivation with regard to incomes, clothing, housing, healthcare, education, sanitary facilities and human rights. Agriculture generates nearly 20.9 percent of the country's GDP and provides employment for 43.4 percent of its workforce. Most importantly, 65.9 percent of the population living in rural areas is directly or indirectly dependent on agriculture for their livelihood. Rising population, shrinking agricultural land, increasing demand for water resources, widespread land degradation and inadequate infrastructure appear to be major concerns of the agriculture sector in Pakistan. An attempt has been made to examine the population growth–agriculture growth–poverty alleviation linkage. It is argued that agriculture will continue to be one of the most important sectors of Pakistan's economy for years to come. To alleviate poverty, it is suggested that Pakistan enhance the productivity of the agriculture sector through the provision of a series of inputs including provision of easy credit to the small farmer, availability of quality fertilizers and pesticides, tractor and harvester services, improvement in the effectiveness of the vast irrigation system and, finally, farmer education. It is concluded that the high rate of population growth needs to be curbed for increased agricultural productivity to have any significant effect on poverty in rural areas of Pakistan.

Keywords: Rural poverty; Agriculture sector; Population growth–agriculture growth–poverty alleviation linkage; Pakistan.

1. Introduction

In Pakistan the increasing rate of poverty in rural areas has prompted debate on growth and productivity trends in the agriculture sector. The average annual growth in agriculture was over 3.52% from 1995–96 to 2004–05; however over the last five years agriculture growth has witnessed mixed trends (See Table 1). Consequently, the rate of poverty in rural areas reached 38.65% in 2002–03. Poverty is rampant in rural areas, where people are in a state of deprivation with regard to incomes, clothing, housing, healthcare, education, sanitary facilities and human rights. Due to increasing population, natural resources are gradually depleting, putting major constraints on the efforts to eradicate poverty. The complex and enormous problems include declining availability of agricultural land and workforce, marginal producers with small land holdings, decreasing per capita land availability, conflicting demand for scarce water resources, urbanization and youth evading traditional farming. In the coming years, Pakistan will require food production for larger populations from less and less land. The biggest challenge is how to increase output from the shrinking agricultural sector, while sustaining the productivity potential of the available natural resources.

2. Role of agriculture in economy

Early classical theory viewed economic development as a growth process requiring the systematic reallocation of production factors from a primary sector characterized by low productivity, traditional technology, and decreasing returns to a modern industrial sector with higher productivity and increasing profits (Adelman, 2001). Agriculture was seen as a low-productivity, traditional sector that only passively contributed to development by providing food and employment.

Beginning in the 1960s, a major revision in development thinking contended that agriculture had a central role as a driver of growth, especially in the early stages of industrialization. This strategy was later labeled agricultural-demand-led-industrialization (ADLI) (Johnston and Mellor, 1961; Schultz, 1964; Adelman, 1984). The ADLI strategy stressed the central role of increased agricultural
productivity in achieving industrialization through expanding demand for goods produced by domestic industry. Two key characteristics of agriculture during the early stages of development justified its place in early development thinking. First, agriculture produces goods that directly satisfy basic human needs. Second, agricultural production combines human effort with natural resources, such as land and agro-ecological assets. Since natural resources were assumed to be freely available, early development theorists believed that agriculture could grow independently of other economic activities. It was also recognized that traditional agriculture could be transformed rapidly into a modern sector through the adoption of science-based technology, thereby making a large contribution to overall growth.

Beyond its direct contribution to growth, a number of features specific to the sector enhance its contribution to pro-poor growth, including the concentration of the poor in the sector, the large size of its growth linkages to other sectors, and the positive externalities from assuring food security and reducing food prices (Byerlee et al., 2005).

### Table 1. Economic indicators of Pakistan

<table>
<thead>
<tr>
<th>Facial Year</th>
<th>Population growth rate (%)</th>
<th>GDP growth rate (%)</th>
<th>Agriculture growth rate (%)</th>
<th>Poverty Indices: Head-count (Percentages)</th>
<th>Income Inequality</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Rural %</td>
<td>Urban %</td>
</tr>
<tr>
<td>1990–91</td>
<td></td>
<td></td>
<td></td>
<td>25.20</td>
<td>26.60</td>
</tr>
<tr>
<td>1991–92</td>
<td>2.87</td>
<td></td>
<td></td>
<td>24.60</td>
<td>28.30</td>
</tr>
<tr>
<td>1992–93</td>
<td>2.40</td>
<td></td>
<td></td>
<td>25.40</td>
<td>26.90</td>
</tr>
<tr>
<td>1993–94</td>
<td>2.28</td>
<td></td>
<td></td>
<td>33.1</td>
<td>22.6</td>
</tr>
<tr>
<td>1994–95</td>
<td>2.24</td>
<td></td>
<td></td>
<td>34.7</td>
<td>20.9</td>
</tr>
<tr>
<td>1995–96</td>
<td>2.40</td>
<td></td>
<td></td>
<td>39.0</td>
<td>22.7</td>
</tr>
<tr>
<td>1996–97</td>
<td>2.34</td>
<td></td>
<td></td>
<td>38.65</td>
<td>22.39</td>
</tr>
<tr>
<td>1997–98</td>
<td>2.36</td>
<td></td>
<td></td>
<td>2.11</td>
<td>1.8</td>
</tr>
<tr>
<td>1998–99</td>
<td>2.23</td>
<td></td>
<td></td>
<td>3.1</td>
<td>3.1</td>
</tr>
<tr>
<td>1999–00</td>
<td>2.20</td>
<td></td>
<td></td>
<td>4.7</td>
<td>4.7</td>
</tr>
<tr>
<td>2000–01</td>
<td>2.11</td>
<td></td>
<td></td>
<td>4.10</td>
<td>4.10</td>
</tr>
<tr>
<td>2001–02</td>
<td>2.13</td>
<td></td>
<td></td>
<td>38.65</td>
<td>22.39</td>
</tr>
<tr>
<td>2002–03</td>
<td>2.20</td>
<td></td>
<td></td>
<td>2.40</td>
<td>7.5</td>
</tr>
<tr>
<td>2003–04</td>
<td>2.26</td>
<td></td>
<td></td>
<td>2.26</td>
<td>8.6</td>
</tr>
<tr>
<td>2004–05</td>
<td></td>
<td></td>
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</tbody>
</table>


¹ The Gini coefficient is a measure of statistical dispersion most prominently used as a measure of inequality of income distribution or inequality of wealth distribution. It is defined as a ratio with values between 0 and 1: the numerator is the area between the Lorenz curve of the distribution and the uniform distribution line; the denominator is the area under the uniform distribution line. Thus, a low Gini coefficient indicates more equal income or wealth distribution, while a high Gini coefficient indicates more unequal distribution.

Agriculture accounts for nearly 20.9% of Pakistan’s national income (GDP), employs 43.4% of the country’s workforce and accounts for nearly 9% of the country’s export earnings (GOP, 2007). Moreover, this sector provides raw material to domestic agro-based industries, such as sugar, ghee, leather, and textiles. Most importantly, 65.9% of the country’s population living in rural areas is directly or indirectly dependent on agriculture for their livelihood (GOP, 2006). Given the high percentage of people in Pakistan who depend on agriculture for their livelihood, little progress can be made on poverty reduction if this sector languishes with a slow rate of growth. In addition to the direct impact of agriculture growth on poverty reduction, there is also a much larger indirect effect through the linkages between agriculture and non-farm growth in rural areas.

### 3. Linkage of agricultural productivity growth and rural non-farm growth

Agricultural productivity growth stimulates rural non-farm growth, especially where infrastructure and the investment climate are already in place (Barnes and Binswanger, 1986; Hazell and Haggblade, 1991). The linkage has proven most powerful when agricultural growth is driven by broad-based productivity increases in a rural economy dominated by small farms, as in much of Asia (Mellor, 1976). Small-to medium-sized farm households typically have more favorable expenditure patterns for promoting growth of the local non-farm economy, including rural towns, since they spend higher shares of income on agricultural goods and services, which are generally more labour intensive (Mellor, 1976; King and Byerlee, 1978; Hazell and Roell,
levels have started to rise. Despite the fairly strong performance of agriculture over the 1990s, where its average growth rate stayed above the population growth rate, rural poverty increased significantly. In 1990–91, rural poverty was 25.2% against 38.65% in 2002–03 (see Table 1). Poverty in Pakistan is characterized by large amounts of clustering around the poverty line. According to the Planning Commission, as much as 63% of the poor population falls between the poverty line and a level of consumption that is equivalent to 75% of the poverty line (GOP, 2003). This suggests a high proportion of poverty vulnerable population exists as a result of changing economic conditions. The Gini Coefficient, a measure of inequality, has also increased significantly during 1990 (See Table 1). So even though rural incomes were increasing in the 1990s, there were increasing distributional asymmetries that were also coming in. The rich, in rural areas, continued to get richer, while the rural poor became poorer. These figures do show that the share of the middle classes has also gone down.

During the 1990s, the government reduced subsidies in agricultural inputs. Fertilizer, pesticide and seed markets were directly hit by these cuts while the prices of fuel, electricity and water rose. This might have affected the cost of production and income levels.

5. Agriculture growth

Until the late 1960s, Pakistan produced a surplus of food items and had enjoyed a favorable balance of trade for being a net exporter of food products as well as cash crops. Thereafter, this position was retained intermittently for a short time. Since the early eighties, due to high population growth, water shortage and frequent natural calamities like floods, import of food items has become indispensable. The average annual agriculture growth rate over the 1990s was 4.54% which was lower than the average in the 1980s. Agricultural output over the 1990s varied from year to year. Although the growth rate was slightly lower, it remained positive throughout except for the period 1992–93. The country witnessed unprecedented drought during 2000–01 and 2001–02 and, consequently, agriculture registered negative growth in these two years. The next two years witnessed a modest recovery in agricultural growth as a result of improvement in the availability of water for irrigation purposes. In 2004–05, remarkable growth reached as high as 7.5% (GOP, 2005a).

6. Population growth

The population of Pakistan has increased from 33 million at the time of independence in 1947 to 153.95 million in 2005, making it the seventh most populous country in the world. The population grew at an average rate of 3% per annum from 1951 until the mid-1980s. Population
growth slowed to an average rate of 2.6% per annum between 1985 and 2000. Since 2000–01 the country’s population has grown at an annual average rate of almost 2.2%. The current growth rate is considerably high compared with the average population growth of developed and developing countries which is 0.9 and 1.7% respectively (GOP, 2005a).

7. Agricultural growth and poverty

Evidence consistently shows that agricultural growth is highly effective in reducing poverty. Gallup et al. (1997) reported that every 1% increase in per capita agricultural output led to a 1.61% increase in the incomes of the poorest 20% of the population. Thrift et al. (2001) concluded from a major cross-country analysis that, on average, every 1% increase in agricultural yields reduced the number of people living on less than US$ 1 a day by 0.83%. Broad-based agricultural productivity growth raises incomes of poor farm households as well as households of landless labourers who primarily depend on agricultural wages. Increased agricultural productivity also brings strong indirect benefits for the poor. The most important pro-poor linkage is generated by the effects of agricultural productivity growth on food prices (Timmer, 1997). The poor typically spend a high share of their income on staple foods, and therefore they benefit from a productivity-induced decline in the real prices of staple foods. Benefits are largest for the urban poor and landless labourers, but even many poor farmers benefit, since they are net food purchasers. Widely shared increases in incomes of farmers and farm workers also reduce poverty by providing a market for labour-intensive consumer goods.

Agriculture makes important contributions to nutrition, food security, and macroeconomic stability beyond the pro-poor growth linkages (Timmer, 2002). At the micro level, inadequate and irregular access to food reduces labour productivity and decreases investment in human capital (Bliss and Stern, 1978; Strauss, 1986; Fogel, 1994). Drawing on a sample of 97 countries, Nadav (1996) found that nutritional levels had a large and highly significant impact on economic growth. Fogel (1991) has also reported that increased caloric intake reduced mortality and raised productivity amongst the working poor during the early stages of Western Europe’s development. Overcoming hunger and malnutrition is now explicitly recognized as the first Millennium Development Goal.

However, this assumption denied the unequal power relationships which exist between men and women and between people of different castes, races and classes (Commonwealth Secretariat, 2001). Gender discriminatory practices are prevalent in Pakistani society. Women and girls experience intra-household discrimination in food distribution, healthcare and education. This is evident from gender disaggregated statistics whereby female literacy is only 42% as compared to 65% for men and gender gaps persist at all levels of the education system (GOP, 2007). Pakistan is also one of the few countries in the world where the sex ratio is biased in favor of men and there are 108 men to every 100 women (GOP, 2005b).

Women’s participation in the labour market in Pakistan is determined by rigid gender role ideologies, social and cultural restrictions on women’s mobility and occupational segregation. Another important barrier to women working for pay in the rural sector is the time burden imposed by domestic tasks, especially the collection of water and firewood. In rural communities, the impoverishment is very acute in households critically dependent on women’s labour for survival, due to the relatively lower skills base of women generally, and their restricted mobility. As a result, women find it difficult to compete for access to social and productive assets on an equal footing with men.

9. Agriculture growth and the role of gender

In Pakistan, women typically do not own land and, when they do, they typically do not control it (Morrison et al., 2007). Land rights are regulated by Islamic law; however, general practice deviates from principle to the detriment of women. According to Agarwal (1994) in South Asia the gap between female ownership and control is due to a mix of interrelated factors including, among other things, norms which circumscribe women’s mobility and occupational segregation. Another important barrier to women working for pay in the rural sector is the time burden imposed by domestic tasks, especially the collection of water and firewood. In rural communities, the impoverishment is very acute in households critically dependent on women’s labour for survival, due to the relatively lower skills base of women generally, and their restricted mobility. As a result, women find it difficult to compete for access to social and productive assets on an equal footing with men.

9. Agriculture growth and the role of gender

In order to strengthen the roles of women in agriculture, and thereby improve their status, women should be paid and have control over the cash earned as a result of their labour. Greater control of income by women will enhance their control over decision making, positively affect the wealth of the family, especially girls, and may help in closing the
income and education gaps between genders (Morrison et al., 2007). Increasing the education and income level of women, in the long run, will not only contribute to the quality of the labour force and hence to productivity, but also to food security through a lower rate of population growth.

10. Sources of income in rural households

The major sources of income in rural Pakistan are farming, agricultural wages and salaries and domestic and international remittance. According to Malik (2005), farm crops/products accounted for 49.49%, wages and salaries accounted for 35.81%, domestic and international remittance accounted for 11.14%, farming live product accounted for 1.84% and rental income for 1.73% of average household income in rural areas. Arif, Nazli and Haq (2000) and Adams and He (1995) found that wages, salaries and self-employment income are the major sources of non-farm income. For the self-employed, wholesale and retail trade appear to be the most important economic activities, whereas wage employees are concentrated in the construction sector. The construction sector absorbs most of the unskilled and low-skilled labour.

The majority of the non-poor are large landholders and depend on crops, however a significant percentage of non-poor are small landholders that depend on both crops and livestock. Livestock is an important component of livelihood in rural Pakistan as 30–35 million people are involved in livestock raising and these contribute 35 to 40% of their income (GOP, 2007). Nazli (2003) found that 47% of rural households depend either on farm or livestock for their livelihood while 13% of households depend solely on livestock. Adams and He (1995) have termed livestock as an inequality reducing source of income. An increase of activities in this sector has important consequences for poverty reduction in the country, since a little support enables a landless farmer to generate his income stream. However poverty is found to be high for those who depend solely on livestock or on small land (Nazli, 2003) as the income from the former accounts for only 1.84% of rural incomes (Malik, 2005). This clearly indicates that the poor tend to be landless livestock owners or small landholders who do not own livestock.

11. Land reform and security of land tenure

The literature has consistently underlined the key role of relatively equitable land distribution and the dominance of small-scale family farming in realizing the potential of pro-poor growth. Work carried out by Vollrath (2006) shows a significant negative relationship between land inequality as measured by the Gini coefficient and output per hectare. A drop in the Gini coefficient for the size of operational land holdings of one standard deviation would increase output per hectare by 8.5%. Jeon and Kim (2000) have documented significant productivity gains from the land reforms undertaken in Korea in the 1950s which limited the amount of land any individual could own. Besley and Burgess (2000) find that land reforms in India were associated with lower poverty and higher agricultural wages. They do find that land reforms had their greatest effect in those Indian states with the greatest initial land inequality. On the other side, increase in population is proportionate to the decrease in the number of large and mid-sized farms. Excessive land fragmentation and subdivision of landholdings from generation to generation are also causing a persistent decline in the size of farms and therefore in agricultural productivity. The poor households in all the countries studied had a larger family size with a greater dependency ratio.

Landlessness and the limited access to land is a glaring feature of rural poverty in Pakistan. Smaller farms tend to be less diversified and unable to cope with vulnerability. Table 2 shows the agricultural land distribution by farm size in Pakistan. Land distribution is much skewed. Eighty-one percent of farms owned are less than 5 hectares in size and cover only 38.7% of the total farm area. Only

<table>
<thead>
<tr>
<th>Size of farm (acres)</th>
<th>Number of farms (%)</th>
<th>Farm area (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 5</td>
<td>19.0</td>
<td>28.2</td>
</tr>
<tr>
<td>5 to &lt; 12.5</td>
<td>44.3</td>
<td>39.9</td>
</tr>
<tr>
<td>12.5 to &lt; 25</td>
<td>23.8</td>
<td>21.1</td>
</tr>
<tr>
<td>25 to &lt; 50</td>
<td>9.0</td>
<td>7.7</td>
</tr>
<tr>
<td>50 to &lt; 150</td>
<td>3.3</td>
<td>2.7</td>
</tr>
<tr>
<td>&gt; 150</td>
<td>0.5</td>
<td>0.4</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: UN (2000).
6.8% of large farms hold more than 10 hectares, accounting for 39.8% of the farm area. Small farms tend to use farming systems that are more labour intensive and less risky, while big farms prefer farming systems that are more intensive in capital as they can afford to take risks in the hope of higher returns. Because of highly skewed distribution of land ownership, the incidence of sharecropping in Pakistan has increased in recent years. Poverty among sharecroppers has been found to be considerably higher. However, further research is needed to understand tenancy and sharecropping arrangements and to find ways to address poverty among those groups. In general, ways that increase the opportunity of the poor to earn increased incomes and methods to heighten their security and empower them will lead to poverty reduction. This suggests broad based land reforms are required to ensure equitable access to productive resources and the restructuring of rural society on an egalitarian line. Such efforts have met with varying degrees of success in different countries depending on the correlation of socio-political forces.

There is also a need to concentrate more on income sources that are independent of land in order to reduce rural poverty. And, in order to reduce the dependence on the agricultural sector, there is a need for generating off-farm employment opportunities. This suggests providing easy access to credit, technology and information in the short run. In addition, there is an urgent need in the long run to enhance human capital through better quality education, training and health.

12. Additional land under cultivation

Out of 79.6 million hectares in the country, only 20 million hectares are available for farming in Pakistan (GOP, 2003). Irrigated agriculture is practiced on 16 million hectares and the remaining 4 million hectares utilize rain fed (known as Barani) farming. A sizeable portion of about 31 million hectares are forests and rangelands. The land use data for the last decade show that the total area under cultivation remained static (GOP, 2003). Land availability has become a constraint in increasing food production and supply. The diminishing supply of per capita arable land, combined with rapid population growth is resulting in rising urbanization. Significant improvements are required in productivity growth in agriculture to increase agricultural output through technological innovations and efficiency.

The government emphasis is on bringing additional land under cultivation through provision of adequate and efficiently managed water resources. According to the Economic Survey of Pakistan 2004–05 (GOP, 2005a), the government investment in on-going, water-related projects will bring an additional 2.88 million acres of land under irrigation and 4.44 million cubic feet of additional water will be available for the agricultural sector in the next 2–3 years. The government is expecting that it will boost agriculture output, productivity and employment in rural areas in a sustained manner and will help reduce poverty, particularly in rural areas. However, unsuitable rules for acquiring access to land can lead to environmental degradation. The implementation of the Pakistan government’s land capitalization policy will negatively impact on the quality of the environment since some land in the capitalization project is in the forest reserve and other protected areas. However, environmental degradation has not been at the centre of any government policies in the past decade. The impact of government policy should be examined, since it will not only affect the well-being of the poor, but also the quality of natural resources and the environment.

13. Access to education

Although land and labour are the most important assets of the poor in the early stages of growth, access to education and capital is more important in modernizing agriculture and rural non-farm sector development. Agricultural productivity, especially in modernizing agriculture, rural non-farm growth, and migration are all stimulated by investment in rural education and access to well-functioning finance markets. Over the long term, efforts to improve access to schooling in rural areas and especially to improve the quality of that education remain the best hope for equipping the rural poor with the skills to participate in expanding on-farm and off-farm diversification opportunities, including migration to better paid employment in urban areas.

14. Production efficiency

Development economists say that industrialization cannot achieve the goal of prosperity without the simultaneous transformation of the agricultural sector, the source of sustenance of the bulk of the nation’s people. Therefore, in the presence of an ever increasing population, a rise in agricultural productivity is imperative to support the growing needs of the people. Even though the last decade has seen a concentration of development in the urban manufacturing sector, Pakistan is still essentially an agricultural economy. Rising agricultural productivity is central to economic development and has been studied by the historians of many countries (Allen, 2000). Crop yields have received considerable attention and progress has been made in understanding their evolution.

The productivity of land can potentially respond to land scarcity without outside aid. The yield of major crops in Pakistan is significantly below the demonstrated potential (see Table 3), which is attributed to poor quality seed, low seed rate, conventional sowing methods, inefficient use of fertilizers, poor management practices and low level of...
farm mechanization. The production efficiency can be improved through the use of appropriate technologies. Researchers in environmental economics, demographics and population studies are generally in agreement that improvements in agricultural productivity will break the population–poverty–environmental degradation cycle. The first aim of the government of Pakistan should be to enhance the productivity of the agricultural sector through the provision of required capital inputs to accelerate the transformation process. These inputs range from provision of easy credit to the small farmers, availability of unadulterated fertilizer and pesticide, tractor and harvester services, improvement in the efficiency of the vast irrigation system, utilization of cultivable wastes and finally farmer’s education.

Agricultural technologies and techniques are constantly changing and farmers need to be made aware of and know how to use agricultural innovations for the exploitation of inherent yield potentials. As evident in Asian countries, the shift into cash cropping will press farmers to sacrifice their own food crops and lead to more food insecurity.

The prices of inputs in the production process have to be rationalized to reduce the costs of cultivation, which inevitably push up food prices. The development of the agro-business and the service sector in rural areas is imperative to absorb the pressure of surplus labour. The existence of the powerful informal sector with large landholders exerting control over the rural labour and capital market has to be abolished for the transformation mechanisms to have any effect.

### 15. Technological developments in agriculture

Agriculture has strong direct forward linkages to agricultural processing and backward linkages to input-supply industries (Johnston and Mellor, 1961). It is known empirically that a large share of manufacturing in the early stages of development is agriculturally related (Pryor and Holt, 1999; Gemmell et al., 2000). In addition, technological change and productivity growth in agriculture were linked to lower food prices, which in turn held down urban wages and stimulated industrialization and structural transformation.

Current globalization has affected all countries with an aggressive market based economy. The industrial sector is dominating and agriculture is getting commercialized due to private sector investment. The technologies are generated based on demand. These technologies may not be within the reach of the small farmers and the old technologies are also getting outdated as the products are not of the right quality to compete in the new global markets. Improved crop varieties could easily be adopted by small farmers, but it may not be the case with other technologies such as irrigation, machinery, high tech agriculture, etc. These are more favorable to commercial farmers; the poor may not adopt them or may do so with a long time lag when conditions become favorable.

Agricultural research has led to significant increases in productivity and enhanced incomes in developing countries (Lipton and Longhurst, 1989). The development of improved cultivators and management practices, mechanization, improved plant nutrition and crop protection technologies have been in the forefront of contributions to increased crop yields in many developing countries. The green revolution, which predominated in the early 1960s contributed to unprecedented increases in food production. Wheat and rice yields increased several fold. In the 1970s, due to the impact of the green revolution, rural poverty declined as agricultural growth and purchasing power of the people rose. Advances in agricultural science and technology have increased productivity and have a significant role in the quest to improve food and nutritional security and reduce the number of poor.

A study in India (Chadha, 2002) has indicated that new technologies generally benefit the poor after a time lag. Even the green revolution technologies, which initially worked against the poor, benefited them later on. Therefore, the benefits of technology will accrue to the second generation and not necessarily to those who are currently in the grip of poverty. This indicates that research should be targeted towards poor farmers over the short term, as well as for long-term development. In addition, the government should make arrangements to provide the poor with the knowledge and skills needed to enable new technology to benefit them. This cast some light on the research–poverty alleviation linkage.

The Asian successes were generated by a technological breakthrough in the form of high yielding varieties of rice.
and wheat, which provided a historically unprecedented jump in agricultural productivity, especially when farmers also had access to fertilizer and irrigation. While consistent productivity gains have been achieved since then, growth has been much slower, and there are concerns about yield stagnation.

In the present scenarios, biotechnology has emerged as a novel area of scientific endeavour with huge potential to realize the dream of sustainable agriculture. Being enriched by inputs from both conventional and modern scientific experimentation like genomic research, biotechnology could prove a panacea for uplifting degraded socio-economic and scientific infrastructure on a sound basis in all developing countries like Pakistan. Across the globe, intensive work is going on to exploit biotech knowledge augmented with genome reshuffling to address major agricultural and environmental issues like salinity, drought and biodiversity degradation which the green revolution has so far failed to resolve. However, the recent developments in biotechnology are driven by private and commercial agricultural interests and we are yet to see any impact on food crops grown by small-scale farmers in the developing world.

In Pakistan, a major portion of irrigated and rain-fed area is salt affected. Since the green revolution, different strategies based on physio-chemical methodologies have been proposed by scientific communities. Admittedly, some success stories exist within the domain of these approaches but in most cases, these proved timely. None of these helped the farming sector on a sustainable and long-term basis. Particularly, under natural conditions, it has not been possible to reap a large harvest due to the arid conditions. Drought coupled with salt affected conditions has proved a major limiting factor in the success of these conventional approaches to the attainment of sustainable agriculture.

Likewise the pest problem remained unresolved and became more severe. About 30–50% of food produced becomes victim to pests each year. In addition, extensive use of pesticides on crops has yielded contaminated commodities. Indiscriminate use of pesticides has also played havoc with environmental quality, biodiversity and public health in many parts of the country.

16. Poverty and land degradation

The impact of population on agricultural production includes low land per capita, intensive use of land, and a higher household income generation dependency ratio on land. The two most important driving forces behind the land degradation in Pakistan are limited land resources and increase in population. The result is small farms, low production per person and increasing landlessness. Land shortage and poverty, taken together, lead to non-sustainable land management practices, the direct cause of degradation. Poor farmers are forced to clear forests, cultivate steep slopes without conservation, overgraze rangelands and make unbalanced fertilizer applications. Land degradation then leads to reduced productivity: a lower response to the same inputs or, where farmers possess the resources, a need for higher inputs to maintain crop yields and farm incomes. This increases land shortage thus accentuating the cycle.

17. Poverty reduction strategy

Over the past several decades, there has been increasing acceptance worldwide that rapid economic growth over a prolonged period is essential for poverty reduction. At the macro level, economic growth implies greater availability of public resources to improve the quantity and quality of education, health and other services. At the micro level, economic growth creates employment opportunities, increases the income of the people and, therefore, reduces poverty. Economic growth also benefits the poor, but only if effective measures are taken focusing on and directly empowering them. Therefore, rapid growth is vital, but it has to be sustained and targeted for a meaningful reduction in poverty. Many developing countries have succeeded in boosting growth for a short period. But only those that have achieved higher economic growth over a long period have seen a lasting reduction in poverty, East Asia being a classic example.

A vibrant agriculture in Pakistan is central to the wellbeing of the largest and most rapidly growing section of the population living in rural villages (Coxhead and Jayasuriya, 1994), as well as for the welfare of the urban population and those working in agro-industrial enterprises. In the past 20 years, the country has generated economic growth and strengthened its macroeconomic indicators by implementing macroeconomic reforms. Like many other developing countries, Pakistan has also made significant efforts to integrate its economy with the rest of the world by lowering tariffs and taking measures to open its economy for investment. The performance of the economy remained dismal in the 1990s which caused poverty to rise. However, accounting for the rising trends in poverty during the 1990s, the Government adopted a strategy for poverty reduction in 2001. This strategy focuses mainly on five areas which include i) accelerating economic growth and maintaining macroeconomic stability; ii) investing in human capital; iii) augmenting targeted interventions; iv) expanding social safety nets and v) improving governance (GOP, 2003).

Agriculture plays an important role in economic development, such as provision of food to the nation, increase in exports, transfer of manpower to non-agricultural sectors, contribution to capital formation, and securing markets for industrialization. Improvement in agricultural productivity is the answer to realization of each of these goals. Historical records have shown that agricultural

productivity has been growing due to the introduction of modern technologies, commercialization of agriculture, increased availability of capital, factor shifts from agriculture to non-agricultural sectors, etc. This whole process could be called ‘agricultural transformation’, to which the contribution of each of these factors has been quantified in the existing literature.

A successful strategy for alleviating poverty and hunger in developing countries must begin by recognizing that they are mainly rural phenomena and that agriculture is at the heart of the livelihoods of rural people. The dilemma of Pakistan’s poverty reduction strategy is that it is aimed at poverty reduction without boosting agriculture. The spread of irrigation networks and modern farming techniques are both still missing in the policy packages. Pakistan has great potential in agriculture and should keep on working on its agricultural development, which is crucial for poverty reduction. All our poverty reduction strategies should primarily focus on development of the agriculture sector for the sake of the poor and industrialization for employment generation leading to reduction of poverty. Other issues that need to be addressed are, (i) soil erosion and degradation; (ii) inappropriate fertilizer and pesticide use; (iii) inadequate availability of quality seed; (iv) inadequate markets infrastructure; (v) non-availability of adequate farm power; and (vi) weakness of agricultural research and extension services.

All measures that are supposed to alleviate poverty must target the poor strata, providing them with the means of living, helping them build productive assets and generate income.

18. Conclusion

The analysis brings out the correlation among rural poverty, access to land, population growth and agricultural growth. Agriculture continues to be one of the most important sectors of Pakistan’s economy and has the potential for addressing unemployment, for the medium term at least, since it has higher employment elasticity than industry. Rising population, shrinking agricultural land, increasing demand on limited water resources from the expanding industrial and urban sectors, widespread land degradation and inadequacy of governing infrastructure are major concerns in the agriculture sector.

Pakistan should give high priority to enhancing the productivity of the agricultural sector through the provision of required capital inputs. These inputs range from provision of easy credit to the small farmers, availability of unadulterated fertilizer and pesticide, tractor and harvester services, improvement in the efficiency of the vast irrigation system, utilization of cultivable wastes and farmer education. The development of irrigation, rural electrification and rural roads and transport should also receive high priority in the development plans of the country giving impetus to the growth of agriculture and rural industries, raising the incomes of small farmers and artisans and increasing the employment opportunities for the rural poor, in general. The above trend in agricultural growth will increase income and reduce poverty.

The high rate of population growth needs to be checked for the increased agricultural productivity to have any significant effect on poverty. Greater control of income by women will positively affect the wealth of the family, especially girls, and help to close the income and education gaps between genders, and should increase food security through a lower rate of population growth.

Legitimate efforts are required to review biotech approaches in respective fields and future research work should be based on novel ideas that have direct impacts on food crops grown by small-scale farmers. There is also a dire need to upgrade the infrastructure of research institutes by undertaking reforms proposed by the scientific communities. Efforts should be made to rehabilitate degraded landscapes for production of high quality commodities. Exploitation of biological alternatives employed for sustainable crop production and environmental remediation should be promoted at academic and research institutes to resolve the different agricultural and environmental issues.

References


