Poverty Reduction through Improved Agricultural Water Management

Proceedings of the Workshop on Pro-poor Intervention Strategies in Irrigated Agriculture in Asia

Islamabad, Pakistan, 23-24 April 2003

Waqar A. Jehangir and Intizar Hussain, editors

International Water Management Institute

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FOREWORD

In order to address the poverty issues in irrigated areas, a six-country project on 'Pro-poor intervention strategies in irrigated agriculture in Asia' was initiated by IWMI in 2001 with the financial assistance of the Asian Development Bank. The main objective of this project was to promote and catalyze equitable economic growth in rural areas through pro-poor irrigation interventions in the participating Developing Member Countries (DMCs) (including Bangladesh, People's Republic of China, India, Indonesia, Pakistan, and Vietnam). The immediate objective was to determine what could realistically be done to improve the returns to poor farmers in the low-productivity irrigated areas within the context of improving the overall performance and sustainability of the established irrigation schemes. The study focused on selected representative low-productivity irrigated areas and their peripheries with a large number of people under persistent poverty in the participating DMCs. The emphasis was on identifying and assessing a set of appropriate economic, financial, institutional, governance, and technical interventions at field and system levels, and changes in overall policy and institutional framework as far as they affect access to water resources for the poor in selected representative low-productivity irrigated areas.

This volume presents the proceedings of the regional workshop of the project held in Islamabad, Pakistan on 21-22 April 2003. This two-day workshop was organized to share the project key findings of Pakistan component to obtain input and views of the audience on the project outcome and identify key practical actions for developing guidelines.

The workshop comprised technical sessions and group discussions, leading to recommendations, while the sequence of papers in this volume is organized into four technical sessions: (i) irrigation and poverty linkages; (ii) irrigation system performance and poverty; (iii) approaches to poverty alleviation; and (iv) pro-poor interventions in irrigated agriculture. Participants of the workshop included State Minister for Agriculture, Government of Pakistan, 34 policy makers, 27 practitioners, 31 researchers, 23 representatives of NGOs, and 22 high officials from different donor agencies. Speakers shared the key findings and messages with the participants, and finally, practical solutions of the problems and implementing guidelines were thrashed out in the discussion session. Taking the advantage of the presence of a large number of water experts, poverty specialists, policy makers and practitioners, two working groups were formulated to discuss a range of widely felt pro-poor issues and prepare guidelines and recommendations for policy makers, managers and farmers for providing a sustainable solution to the poverty issues in irrigated areas of the country. The report of these working groups is assembled in the latter part of the book.

Dr. Zhongping Zhu
Director, IWMI-Pakistan

INAUGURAL SESSION

WELCOME ADDRESS

Asad Sarwar Qureshi[1]

The Honorable Chief Guest, State Minister for Agriculture, Government of Pakistan, Mr. Sikandar Iqbal Bosan; Country Director, Asian Development Bank, Mr. Marshuk Ali Shah; Senior Economist, IWMI-Colombo, Dr. Intizar Hussain; Distinguished Guests, Ladies and Gentlemen.

It is indeed a matter of great pleasure for me to welcome you all to this highly significant and important workshop on 'Pro-poor intervention strategies in irrigated agriculture in Asia'. I am grateful to you, Sir, for sparing your precious time, despite your heavy official engagements, to inaugurate this workshop. Your presence amongst us is a source of great encouragement and demonstrates the importance, which the present government attaches to poverty alleviation programs in the country. Your valuable advice and guidance would certainly provide food for thought on how to deal with the increasing trends of poverty in South Asia in general and Pakistan in particular. I extend my warm welcome to the distinguished engineers, scientists, representatives of donor agencies, members of NGOs and other guests who have graced this occasion by their presence.

Ladies and Gentlemen, over the last 25 years, there has been progress in improving the living standards of people in developing countries. However, even today when the world is producing enough food to provide every person with more than 2700 calories per day, there are still over 800 million people in the developing world who suffer from chronic under nutrition. This is because many people do not have the ability to buy the food they need and often people living in absolute poverty are unable to express their demands fully. This clearly explains why hunger and food surplus can co-exist. In order to alleviate poverty, poor people need adequate means to obtain food in the quantities and qualities needed for a healthy life and greater access to skills, technology, markets and productive resources such as land and capital.

The issues of food security and poverty reduction are interlinked. There are evidences that for many developing countries, increase in agricultural productivity is a key to food security and poverty reduction. The success of irrigation in ensuring food security and improving rural welfare has been impressive. Analyses of information from Asia show that yields per area for most crops have increased by 100-400 percent as a result of irrigation. This has contributed positively in reducing food prices and improving real incomes of the urban and rural poor who spend large proportion of their income on basic food stuff.

After years of self-sufficiency, many Asian countries are once again on a crossroad facing tremendous new challenges because of continued population growth, globalization, environmental degradation and stagnation in farm productivity in intensive farming areas. Estimates of food demand and supply of different regions have long been made. These estimates differ depending on the objectives of the study. Many

[1]Acting Director, IWMI Regional Office for Pakistan, Central Asia & Middle East

of the studies done in the western world point out that the world as a whole can produce enough food for everyone. Other studies indicate that yet several regions, particularly South Asia, may face problems in achieving food security. This shows that food availability at one scale or one place does not guarantee food security at another scale or place. Thus, there is a the need for clear, isolated and more focused understanding of the problems and issues of each region and country. This understanding should then be translated into strategies and actions for reducing poverty by improving poor's access to resources and services.

Improving livelihoods of people through better land and water management has long been the focus of IWMI's research agenda. Over the past three years, IWMI has changed its research focus on Asia to better understand the linkages between water use in agriculture and incidence of poverty. Irrigated agriculture in this region is considered a vehicle for the provision of basic needs and the reduction of vulnerability to food insecurity. People in irrigated areas can benefit directly by increased and more stable incomes from increasing cropping intensities, improved yields and new farm enterprise and technology mixes.

Ladies and gentlemen, this two-day workshop is organized to share with you the results of two major studies IWMI has conducted in six Asian countries over the last three years. The presentations will focus on different aspects of irrigated agriculture and their role in securing food for the poor living in these countries. The findings of these studies are very timely and of extreme value because many countries in this region are in a process of developing work plans, frameworks of actions and policies to target poverty and improve livelihoods of the poor. The expert advice, suggestions and recommendations of the participants will be of great value to compliment the work done by IWMI scientists. I am confident that together we can come up with a real action plan to alleviate poverty from this region and particularly from this country.

What we are looking for, as an output from this workshop, is your feedback to improve our findings, a commitment to develop partnerships for the development of action plans to make positive impacts on the lives of the poor living in developing countries including Pakistan.

At the end, once again, I welcome distinguished participants, engineers, scientists and hope that your stay with us here will be useful and enjoyable.

Thank you.

INTRODUCTION OF THE WORKSHOP

Intizar Hussain[1]

Agriculture in developing Asia has made remarkable progress over the past three decades. Irrigation has substantially benefited societies through increased agricultural productivity and production, increased employment, and reduced food prices. Despite this, irrigated areas continue to remain home to large number of the rural poor. This study addresses the following main questions: (i) whether and to what extent, poverty in irrigated agriculture is related to water and non-water factors in agriculture? (ii) what are the linkages between agricultural water and poverty? (iii) how can we enhance the anti-poverty impacts of irrigation?

Performance of most irrigation systems is generally considered to be disappointing. Major deficiencies in irrigation performance are poor management, unreliable water supplies, poor maintenance and management of infrastructure, inefficiency and inequity in water use and distribution, and financial dependence on the public sector. We need to explore whether, and to what extent, does poor system performance affect the poor? Also, what are the constraints and opportunities to increase benefits of irrigation to the poor, through improved system performance? Poor performance of irrigation system is largely caused by: (i) institutional and managerial factors, (ii) poor governance, and (iii) lack of funds for maintenance. These can be addressed without large physical interventions at greater cost-effectiveness. Physical impacts of poor irrigation performance are tail-end deprivations, lower cropping intensities and yields, and waterlogging and salinity, while the social impacts of poor irrigation performance include persistent poverty in the irrigated areas due to constraints on potential agricultural productivity. Institutional reforms (decentralization, users' involvement, participatory management, financing) are initiated to improve irrigation performance. What is the implementation effectiveness of these reforms? Whether, and to what extent, these reforms improve performance of systems? How do these reforms affect the poor? How can these be made pro-poor? We explore these and other related questions in this study.

Overall goal of this project is to promote and catalyze equitable economic growth in rural areas through pro-poor interventions in irrigated agriculture in participating developing countries. The main objective of the project is to determine realistic options to improve the returns to poor farmers in the low productivity irrigated areas within the context of improving the overall performance and sustainability of the established irrigation systems. There are five research hypotheses, to be tested in the study.

1. An assessment of poverty in irrigated areas and analyses of linkages between poverty and irrigation – the objective is to improve the understanding of the ways and extent that irrigation can positively contribute to poverty reduction. This component identifies and analyzes key dimensions of the links between access to irrigation water and poverty reduction, and examines any spatial patterns of poverty along the various reaches of the irrigation systems.

[1] Senior Economist, IWMI-HQ, Colombo, Sri Lanka

2. An assessment of irrigation system performance and associated impacts on poverty – the objective is to improve our understanding of irrigation system performance and establish and document thorough knowledge of irrigation performance and management issues and their implications for the poor, specific to the country study areas.
3. An assessment of institutional interventions and innovations – the objective is to improve the understanding of the current interventions and innovations and their effectiveness to improve system performance, with focus on participatory irrigation management and irrigation management transfer, water allocation and water rights, and cost recovery and irrigation charging methods.
4. Identification of opportunities and constraints for improving performance of irrigation systems in system specific study sites – to help identify specific interventions and innovations that can have strong positive impacts on the improvement of irrigation system performance and poverty reduction.
5. Development of a menu of the pro-poor interventions.

The study has been conducted in 26 medium - and large-scale surface irrigation systems in six countries: Bangladesh, China, India, Indonesia, Pakistan and Vietnam. The selected systems varied in terms of size, source of water, adequacy/scarcity of water, water distribution, management type, performance and productivity, land distribution and poverty situation. The study covered analyses at macro, meso and system levels. It used primary household and system level data supplemented with secondary data and information and employed both qualitative and quantitative techniques of analyses.

The project has distinct features such as relevance, timeliness, and comprehensiveness in terms of geographic coverage and scope of the issues addressed. Some of the main findings and key lessons learnt from six countries are related to the following issues:

- Inequity and poverty in irrigation systems – magnitude, causes, and patterns
- Impacts of irrigation on poverty alleviation
- Irrigation system performance and poverty linkages
- Irrigation service charging – implications for the poor
- Irrigation sector reforms – implications for the poor
- Other major findings

The purpose of this regional workshop is to: (i) share the key messages; (ii) get input and views of the audience on project output; (iii) hold discussion and agreement on key practical actions; (iv) develop guidelines for implementation of identified actions; (v) identify key areas for further research, and (vi) develop partnerships.

PRO-POOR INTERVENTION STRATEGIES IN IRRIGATED AGRICULTURE IN PAKISTAN

Marshuk Ali Shah[1]

Honorable State Minister for Agriculture, Mr. Sikandar Hayat Bosan; Acting Director, IWMI-Pakistan, Dr. Asad Sarwar Qureshi; Senior Economist, IWMI-Colombo, Dr. Intizar Hussain; Respected Scientists, Researchers and Colleagues.

First of all, I would like to thank the International Water Management Institute (IWMI) for providing me and the participants of this seminar an opportunity to be a part of this important workshop.

Since the approval of the Asian Development Bank's policy on Agriculture and Natural Resources Research (ANRR) in November 1995, the Asian Development Bank (ADB) has provided four Technical Assistance (TA) grants to the Consultative Group on International Agriculture Research (CGIAR), amounting to $21.9 million for 19 studies for 14 CGIAR centers. This excludes the $5.8 million ADB grant approved under the Regional TA (RETA), which was approved in September 2000. The TA covers 6 participating developing member countries including Pakistan. The component to be discussed in this workshop is being implemented by IWMI with focus on pro-poor intervention strategies in irrigated agriculture.

Historically, ADB's lending to the agriculture sector in Pakistan has covered a wide range of sub-sectors including agro-industry and industrial crops, agriculture support facilities (e.g. credit, storage, agricultural inputs, marketing, and extension) and integrated areas development. About 36 percent of total lending in the sector has been provided for three program loans (Agriculture Inputs Program, Crop Intensification Program, and Agriculture Program). Since the late 1980s, the program was made more focused, concentrating more on integrated rural development projects, policy reforms and agriculture infrastructure.

During 1990s, ADB increased its annual lending upto 29 percent for the agriculture sector comprising 18 projects, aimed at: (i) enhancing agricultural productivity, (ii) promoting market-oriented policy reforms, (iii) strengthening the institutional framework, and (iv) developing resource-scarce areas of the country.

ADB's current sector approach is more consistent with the Government of Pakistan's strategy of treating agriculture as a vital sector for employment generation and poverty reduction. Reforms to achieve a sustainable production and marketing system, modernization and diversification to improve competitiveness and higher value addition, and a supportive policy and institutional environment for private investment are considered key elements to realize the employment generation potential of the sector. The Agriculture Sector Program Loan II amounting to $350 million, approved in December 2001, mainly focuses on this, promoting efficient markets for main commodities for market based incentive to farmers, liberalize markets for seed and fertilizer and strengthen small farmer support services. The thrust is more towards

[1] Country Director, Pakistan Resident Mission, Asian Development Bank.

targeted subsidies for the poor as against broad based subsidies on inputs (fertilizer, etc.) and outputs (price control).

ADB's assistance is also being concentrated in areas with the highest concentration of the poor such as Bahawalpur (36 percent poor) and D.G. Khan (24 percent poor) in Pakistan. Other integrated projects are the Malakand Rural Development Project and Barrani Areas Rural Development Project in NWFP. Activities under these projects concentrate on the improvement of irrigation infrastructure and roads in the area, village development services, access to financial services and economic and marketing activities, community development, and organizational and skills training for the beneficiary communities, particularly women.

On the other hand, projects like Swabi Salinity Control and Reclamation Project (SCARP) and Pehur High Level Canal (PHLC) have not only improved the irrigation infrastructure to provide additional water and drainage, but did also introduce innovative technological, social, and management options targeting the poor. These options include: the introduction of downstream control regime in PHLC to ensure adequate provision of water to poor and velnerable farmer located at the tail-end of the Swat System; introduction of pre-cast parabolic sections at affordable prices managed by the private sector for improved on farm water management; strengthening of farmer support units for poor farmers to provide quality support services for inputs and outputs at better prices, a concept which has been institutionalized in NWFP in the form of Farmer Service Centers; strengthening the cooperation of agriculture extension and research at the field level for joint planning; and organizing and strengthening Farmers' Organizations to take over irrigation and drainage management.

The ADB has also undertaken major rural finance initiatives to set up an accessible, affordable and sustainable system that will help the middle and lower end of the rural market to benefit from economic opportunities for better income and employment. This includes restructuring and privatization of inefficient and loss-incurring state institutions. In 2002, Agricultural Development Bank of Pakistan (ADBP), the primary rural finance institution with the largest borrower base in the country, was incorporated as the Zarai Tarraqiati Bank Limited (ZTBL) as part of the $150 million Micro Finance Sector Development Program (MSDP). This enabled the restructuring of ADBP to re-focus its operations towards the lower end of the rural finance market, and as a pre-requisite for other major ADB assistance under the Rural Finance Sector Development Program (RFSDP) approved in December 2002 for $250 million.

Under the Micro Finance Sector Development Program Loan, the ADB also assisted the Government of Pakistan to establish the Khushali Bank, the primary micro finance institution in the country.

The Rural Finance Sector Development Programme has been designed to assist the Government of Pakistan in accelerating rural economic growth by addressing key constraints in rural finance. The RFSDP consists of a program, and policy loan and project loan. It has the following four components:

- creating a favorable policy environment
- institutional restructuring of the ADBP
- setting up of a new bank fund (NBF)
- product and process innovation

The ZTBL scope of activities will include farm and non-farm lending, with a small-farmer and gender focus reaching 600,000 clients by end of 2005.

A related initiative under the RFSDP will be the New Bank Fund (NBF) for encouraging the establishment of sustainable MFIs at the provincial and district levels, under the framework of micro finance sector development programme (MSDP). The MFIs will provide affordable and sustainable services including savings, credit and leasing to the poor households. Social intermediation will precede and accompany micro finance services to ensure that social and gender dimensions of poverty are adequately addressed.

All these approaches have been introduced with variable level of success and are being monitored closely through an approach, which focuses on studying impact on small holders and the poor. We welcome and support the approach being practiced by IWMI of documenting and analyzing these and other innovative experiences, and to devise a mechanism, which would have sustained impact on poverty alleviation in the agriculture sector.

The key question that needs to be answered in this workshop is how can we increase productivity, equity and sustainability in irrigation/irrigated agriculture, without compromising our environment values? This will require an in-depth analysis of the range of potential pro-poor economic, financial, institutional, governance and technical interventions in the field and system level.

I am certain this workshop will be able to generate productive and forward looking debate.

Thank you.

ADDRESS BY THE CHIEF GUEST

Sikandar Iqbal Bosan[1]

Distinguished guests, ladies and gentlemen. I feel delighted to be present in the galaxy of scientists, researchers, donors and representatives of various institutions who belong to pro-poor research group. The issues to be deliberated in this workshop have a special significance for Pakistan as the government is very keen and gives high priority for the uplift of agriculture sector and alleviation of poverty.

The agricultural economy of Pakistan is mainly supported by the Indus basin irrigation system. Out of total 21.6 million hectare cultivated area, 16.9 million hectare land (i.e 78 %) is irrigated. Agriculture has special significance for our country as it contributes about 24 percent of GDP, provides employment to 50 percent of labor force, and more than 70 percent of population is directly or indirectly dependent upon this sector. The current population growth rate is 2.4 percent. With present growth rate, the population is estimated to increase to 180 million by 2010 and 280 million in year 2025. Therefore, the agricultural growth rate will have to be maintained above the annual population growth rate to meet the national food requirements as well as to have a reasonable exportable surplus. Similarly, the water requirements for agriculture, industrial use and human consumption will increase by 150 million acre feet by 2025.

At present, neither the land and water resources are fully utilized nor the achievable yield potential for crops has been obtained. The main reasons could be poor management of resources, non-consensus on water issues and failure in providing high yield production technologies at the farm level. Due to general inefficiencies prevailing in the agricultural sector, the yields of most agricultural crops are far below the demonstrated achievable potential.

The latest poverty scenario in Pakistan paints a very gloomy picture. According to the Government of Pakistan, about 28 percent of total population is currently living below the poverty line. The incidence of poverty is higher in rural areas (32 percent) than in urban areas (19 percent). The quality of life of poorer segments of the society continues to deteriorate. Not only income poverty has been on the rise in the country but other dimensions of poverty also present an equally dismal picture. Poverty is a complex and multi-dimensional phenomenon, which goes beyond the notion of income, and encompasses social, economic and political deprivations. Lack of such opportunities limits the abilities of the poor to secure gainful employment and bring about an improvement in their lives. Since poverty is a multidimensional problem, solutions to poverty cannot be based exclusively on economic policies but require a comprehensive set of well-coordinated measures. The volatility of agriculture has immense bearings on the incidence of poverty in Pakistan. Crop failure in one year translates into higher poverty with a lag while higher agriculture growth contributes towards poverty reduction, also with a lag.

I am extremely happy to learn that irrigation experts have taken up the onerous task of poverty alleviation. I understand that adequate supply of irrigation water to our water

[1]State Minister for Agriculture, Government of Pakistan

thirsty agricultural lands can help to achieve high level of agricultural productivity and bring about a relief from the horoscope of future growth in population.

I am sure this workshop will come forth with useful recommendations through which we will not only be able to solve the dilemma of poverty, but will also be able to paint a bright picture for our agriculture future.

In the end, I earnestly request you to thoroughly examine and deliberate each and every aspect of pro-poor strategies for irrigated agriculture during the course of this workshop. To come up with concrete suggestions and detailed action plans for wide scale adoption of pro-poor strategies under our developmental context, I look forward to specific policy recommendations for our government in creating an enabling environment for the general welfare of the farming community. I now declare this workshop formally open. Thank you very much for honoring me with the opportunity to perform this congenial task.

VOTE OF THANKS

Waqar A. Jehangir[1]

Honorable State Minister for Agriculture, Government of Pakistan; Country Director, Asian Development Bank; Acting Director, IWMI-Pakistan; Respective Delegates of the National Workshop, Secretaries, Researchers, Ladies and Gentlemen.

On behalf of the Organizing Committee of this Workshop, I express my deepest gratitude to your Excellency for gracing this occasion. You have been very kind, Sir, to spare your very valuable time to be with us in this workshop. Your kind presence has provided an ample evidence to indicate the strongest commitment of the Government of Pakistan to promote the pro-poor work for the prosperity of the country.

Sir, the phenomenon of poverty is receiving increasing attention of the researchers and policy makers. As the majority of the population in Pakistan is concentrated in rural areas and dependent on agriculture sector for earning their income, it becomes of special interest to dig into the root causes of poverty in these areas.

I hope that the spin-offs of this workshop will be important for Pakistan as well as the other five countries where the pro-poor project is being conducted. We are confident that this workshop would provide an excellent forum for exchanging views on various issues relating to the pro-poor intervention strategies in irrigated agriculture, and would result in evolving recommendations to set the agenda for future action research and collaborative activities, which would contribute to the pro-poor policies for irrigated sector in Pakistan.

We are grateful to Asian Development Bank for the financial support, which has enabled us to conduct this study and organize this workshop. My thanks are also due to Ministry of Food, Agriculture and Livestock, Pakistan Agricultural Research Council and Ministry of Planning for taking active part in organizing this workshop in Islamabad. I thank you all once again.

[1] Senior Agricultural Economist, International Water Management Institute (IWMI), Lahore, Pakistan.

TECHNICAL SESSION I:
IRRIGATION AND POVERTY LINKAGES

POVERTY AND IRRIGATED AGRICULTURE

Zafar Altaf[1]

Poverty determination and its extermination is dependent not on a universal basis but a number of reasons are responsible, and although there may be a generic base, there are site-specific reasons for poverty existence. If the diagnosis is modified then the prescription will always be different for not only different countries but also within the country. The interventions, then, have to match the reasons. That is seldom done. For example, the factors responsible for poverty in Baluchistan are different from the factors causing poverty in irrigated areas. Even in the irrigated areas, the factors responsible for poverty in Sahiwal will be different from those in Sargodha. In agriculture, the variations due to specificities are important. The soils, weather, culture, crops, human management, exercise of choice, equality and equity are important factors and must be kept in contention. Thus, to determine the economic capacity of people and area is to focus narrowly at the production base.

Our society is organized along power instead of reason and respect for the fellow citizens. It must be kept in mind that power in our society is paramount and occasionally more powerful than the institutions. The individual exercising such power may have been responsible for more pervasive poverty than the natural reasons. Organized as we are, we seek assets for ourselves at below market prices. The entire green belt and vegetable belt of Lahore was acquired for less than Rs.5000 per acre. The poor vegetable farmers became paupers over night and their management and expertise were as good as anyone.

The feudal powers that served the British colonialists so well are still in existence, and to that has been added an emerging force of feudal. These new forces are those that have obtained assets without due regard to either propriety or decency. They are also the most powerful and can take care of the opposition, as they like. The general farmer and the ruralite cannot dare to confront them. The tenants of Okara are a special case but no compensation was found for the 'maurusi' tenants who were supposed to have permanent rights. These individuals were evicted without any process. Thus, there are many examples where the powerful of the society have brought various rationalizations to justify their actions.

Actions in agriculture and income generation are not dependent on how well one has done in the sector. Other factors are responsible for the well being of the farmers, and nowhere is it more apparent than in Pakistan. One has to go beyond externalities to understand the compulsions of agriculture. The word that most describes this is 'consiliency' i.e. the other areas determine the welfare of the farmers as well as the income that would go to the farmers. Agriculture complexities are many and the simple decisions of the government are unlikely to make any dent in the welfare of the farmers.

In agriculture, space and time play an important part. Time for obvious reasons is responsible for productivity. There is an essentiality about time in agriculture. This is also the case with space. Each irrigated area as well as a non-irrigated area has its own

[1]Former Federal Secretary, Ministry of Food, Agriculture and Livestock, Government of Pakistan.

compulsions. The wisdom that is required is site specific as well as non-traditional. The effort is to balance the paradoxes and bring about a balance in the development of positive and negative trends. Ecological and environmental considerations do affect poverty levels. One can be in short-term or long-term interventions. Myopism as such plays a large role in the present and future outcomes that one is addressing. The issue is not only the addressing of paradoxical situations, which are based on the assessment and judgment of natural resources but also on the decision makers' lack of comprehension.

Reductionism rather than enhancement of the development process is part of this development in Pakistan, which has been exploitative rather than regenerative. Resource base has been depleted, and on the other hand, there is complete ignorance of resources. Some one said that weeds are those plants whose value is not known.

To a large extent, resource management is dependent on power distribution in society. These power groups have increased on the Pakistani scene and vested groups have made life for the ordinary citizen difficult. Pakistan has no engineering industry worth the name and all that it can boast of is an agrarian industry. For the agrarian industry to come to any benefit to the farmer, it has to be organized along efficient lines. At the moment, that is not so, and yet, it is vital to understand that demand creation and development is essential for obtaining optimum output rather than subsistent output. It is important to remember what 'output' means. It is not only a function of productivity but also what products are obtained from it. There are at least 22 products that can be obtained from corn. If we have the capability to move from primary production systems to value added, then irrigated agriculture would be booming.

Misuse of water can be eliminated along with inefficient use of this highly prized resource. The institutional process has broken down, the policy levels are unimproved, the software is not available except what IWMI has provided. IWMI cannot provide the necessary manpower; it can provide public goods that are based on knowledge and the fact that it is a living laboratory for the rest of the world. No one, and I repeat no one, in Pakistan has read the IWMI documents and obtained lessons from it. David Seckler and Professor Skogerboe (the former DG and the Director of IWMI, respectively) did a marvelous job in irrigation management.

Time will come, if it has not already come, for water to be allocated for different uses. Pakistan is no longer able to use this resource wastefully. There is a dire need of organization in agriculture sector. It is meaningless to expect that supply side of agriculture, which is meant for subsistence agriculture, will deliver. The produce of the farmer has to be tuned to the demand and then this demand is to be converted in to products. The product line is given to us. We never create our own. Hemp [Bhang] gives 27 products. It is not such a bad crop as it is labeled just because we have it in natural form. All tranquilizers use this crop as sedative but there are other products that can be made from it. Four crops in Pakistan take away 93 percent of resources, almost all of the resources. So where will you have pro-poor policies attacking the income issues? Only 40 percent of the farmers use any kind of fertilizer in unknown quantities. The requirement, for Pakistan then, is to revisit the objectives restate the priorities. Yet, it has to be decided that who will carry out this task and who will implement it. Also important is to reset our priorities: is income distribution our requirement or food security; is it well being or quality living?

The first and foremost requirement is to network the economy. Name a single product that is integrated in the national economy, disgraceful actions aside. Can we and are we capable of creating economic circles besides rejuvenating obsolete economic circles? What does it require to understand the mixing of the old and the new and how best to do it? Take the example of the Dairy industry and the Sugar industry where the investors want to earn on the basis of old concepts and at the expense of the producers. The income of the farmer would have been exceedingly better if vested groups had been fair minded. There is no dogma in policy and no doctrinaire in implementation. The fair and exceedingly important matter is to be as flexible as possible so that the outcome is beneficial for the producers. But if this is done the vested interest groups would play havoc with the system. They have the money and they have the will to keep their soft options intact.

The policy makers have a set of problems. The NGOs as the alternate to public intervention are not to scale. They lack resources and the eminence that is required. The enabling environment concept with the government will no longer work; it has never worked. Centuries of exploitation can not resolved by mere words. They require much more effort than lip service.

Growth for bare to be of prime quality has to be valued and not just quantified. But does Pakistan have the ability to say no to donor driven programs? These programs militate against the farmers and make matters more lopsided than before. In other words, there is no universality of options and interventions. The farmer has to be supported in a number of ways, and then, if he is given the requisite support he will produce optimally.

There are some success stories and some unsuccessful ones. It is always a mixed bag when it comes to agriculture. It becomes worse when the successor does not understand the basis for intervention, for that is the time when the vested interests attack to seek favors. Hala milk, which is a women's cooperative, has been at the forefront of indicating that marketing cooperatives can work. The women cooperative has 40 percent landless and 60 percent small farmers. The local police station is not required in that area. Economy has done wonders on the social side. Floriculture again has had a field day and what was started in the drawing room of the rest house in Lahore is now progressing satisfactorily. Similar success stories in the wheat and cotton growing areas have been known to be the function of good local leadership in the sector. But this leadership was disturbed by parochial interests and the inevitable debacle took place. Again olives and top lopping has increased the incomes of the range and tree owner-farmers.

All these interventions had specific knowledge-based interventions. Yet, the lessons from failures are more important. Some of these failures have been in Canola, Salicornia and Hippophae [Seabuckthorn]. These were the result of vested and parochial groups getting together in the name of benefit the farmer.

The reason for the failure boils down to the leadership at a particular time, for leadership is never constant, and since we are person-oriented nation, the variability is quite startling. The ability to change horses midstream also did not help. In the case of Salicornia, it was about an understanding of how seawater could be used for irrigation. In the case of Hippophae, there was a need to understand how pharmaceutical agriculture was important for the producer. Unfortunately, it is often forgotten that the organized structure of the institutions is a necessary condition for success.

What, then, are the lessons from all this? First, intangibles are important. Understanding and knowledge, if not accompanied with sensitivities, will not deliver. Second, there are no limits to getting things done. The limitations are of our mind. Again, there is no universality in marketing. What the channels are for one product may not be same for the other products. There has to be product appreciation, and then, a demand creation. The farmer responds to fair and equitable prices as we saw in Canola. Productivity enhancement routes are different, and again, different for different crops. This also varies by areas.

Lack of grass root realities is to be compensated by taking care of all that is mean and rapacious in the social and economic system. Besides, how could the social responsibilities of the powerful be reactivated? Once we have taken care of the intangibles, the tangibles shall take care of the problems by themselves. Poverty is related to factor markets and macro-markets. This implies a re-look at the factor markets. Unless the factor markets are reined, the farmers income will keep on taking knocks. Are Pakistan's input markets efficient or do they operate under monopoly conditions? Fertilizer, pesticide, energy and other utility markets are all in disarray. Water market suffers from lack of equity, efficiency and efficacy. Water quality has to be worked out and linked with water quantity in order to ensure a peaceful and harmonious rural sector. *Waderas* (landlords) of Sindh and feudals of Punjab take way the major chunk of water resources.

In the micro markets, there is a need for taking into consideration the factors that constitute growth and how these could be made meaningful for the farmers. Agriculture markets are inelastic, and if the produce is much, the farmer loses out on the high produce. These market failures are different for different crops, and if we go into the products, it indicates the lack of resiliency that we have. The perception of productive factors is difficult; perception, because the farmer is a low risk taker. In any case, the variables are mind-boggling.

The institutional changes, that are required, is a different matter altogether. The current institutions will not deliver. Present reforms are thoughtless, as they have added chaos to confusion. Difficulties cannot be resolved, what to speak of resolving conflicts. The human fallacies of the public servant now abound. Every thing that he does is questioned and ulterior motives attached to his actions result in his not doing anything. Leadership positions are to be developed, and yet, it is the area where not much can be done except to pray to God that one does not get a crank in the system. As a matter of fact, the leader has the right to disobey the current rules and regulations on two counts; first on facts, and the second on outcomes. The independent thought process is vital for the leader instead of subservience. Modern management concepts are alien to this sector as well as to the decision makers. The double jeopardy is that if the leader is not along these lines he has an unmatched ego.

Of recent times, the policy makers have been advocating the concept of free markets. But what do they understand by it? It is like the proverbial elephant and any one that has caught hold of something defines it as such. Most of the free marketers are tail holders and followers. They think that the free market is likely to deliver. They are not aware of the rule of Adam Smith that anything that is mean and rapacious should be done away with. Who are mean and rapacious? Ask the local cotton farmer and he will say it is the textile mill owner, ask the canola farmer and he will say it is the Ghee mill owners and

the importers of palm oil, ask the poultry farmer and he will say it is the feed mill owners and the chick producers and it is a world worst confounded as both are the same. Mafias abound and they have perverted perfectly sane concepts of capitalism. Look for over invoicing, look for sharp practices and look for things that do not seem quite right.

How will the competitive markets and structures develop? it is not a matter of competition. It is a matter of how assets to be used, what are the dead assets, and who is responsible for them? How can comparative advantage be worked in to the economy? Does Pakistan have any natural advantages? The questions are many and the actions sometimes are laid in determining more relevant questions. Development cannot take place in a neutral environment, and so it may be necessary to keep the big sharks away and take it to the poorer elements of irrigated agriculture. There has to be a duty of care towards them.

In short, what are we looking for are designed interventions that target relevant populations. We have to try and work out new challenges in water use as well as all resource use. The requirement is for new policies and programs determined by the interactive process that are designed for the many rather than the few. A duty of care and discipline is required for those who have ensured our food security at considerable cost to them and now seek a fair deal. There is no need for magic, just home grown knowledge and wisdom. Irrigation has been central to them and has managed to get them through.

APPROACHES TO ALLEVIATING POVERTY IN RURAL PAKISTAN

Intizar Hussain[1]

Background

More than 12 million people added to the poor in Pakistan between 1993 and 1999. The rising poverty was the result of poor governance and slow economic growth (Asian Development Bank 2002). All available evidence on poverty trends in Pakistan suggests that the problem of poverty in the country worsened during the 1990s, and this was more so in rural areas than in urban areas. Rural economy of the country is caught up in a vicious circle of problems – rapidly increasing population resulting in decreasing per capita resource base, low literacy level, continued high level of inequity in resource distribution, slow growth in both farm and non-farm sectors, and more importantly, continued poor governance. All these factors adversely affected the efforts to reduce poverty. Agricultural economy, which forms the backbone of broader rural economy of the country, is presently facing three major inter-related problems: (1) increasing water scarcity coupled with continued poor performance of irrigation systems, (2) increasing degradation of land and water resources, and (3) farmers' poor access to other key production inputs and services – all resulting in actual agricultural productivity levels continuing to be much below the achievable potential levels. Enhancing agricultural productivity through removing these constraints, especially for small farms, is one of the keys to address the problem of food and income poverty. This paper provides an overview of poverty trends in Pakistan. It highlights fundamental issues related to rural poverty and offers key approaches to enhancing agricultural productivity for food security and poverty alleviation in rural Pakistan.

Poverty Trends in Pakistan

According to recent estimates, Pakistan's has population is over 141.5 millions (2001), which was grown at an average annual rate of 2.5 percent during the 1990s. The population density is 183 persons per square kilometer. With a gross national income of only US$ 59.6 billion and large population size, per capita gross national income works out to be around US$ 420 in 2001. Among other measures of human welfare, there is life expectancy of 63 years, under-five child mortality rate of 110, and adult literacy rate of 57 percent only. As per official statistics, 28.20 percent of population was below poverty in the 1998-99, with incidence of poverty higher in rural (31.95 percent) than in urban areas (19.13). While poverty estimates vary from study to study, overall conclusion from all sources is that over one third of the population is living under poverty, and poverty is constantly increasing in Pakistan [note: according to the World Bank estimates released in October 2002, poverty rate in Pakistan in 1998-99 was 32.6 percent.] Recent micro level studies based on household level surveys show much higher incidence of poverty. For example, recent survey-based study estimates around

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59 percent of households below poverty line in Punjab (IWMI 2003). Further, income inequality among poor and non-poor is very high, with estimates in 1998-99 suggesting that the lowest 20 percent of households had only 6.2 percent of income and the highest 20 percent of households had 49.7 percent of income, with remaining 44.1 percent of income shared by middle 60 percent of households.

There was a considerable decline in poverty during the 1980s, followed by a somewhat rising trend in early 1990s and later the situation again worsened in late 1990s. Over the passage of time rural poverty increased than urban poverty but this does not mean that poverty in Pakistan is purely a rural phenomenon or rural areas are withholding progress in poverty alleviation. Rather, agricultural growth in rural areas has delivered considerable gains to both rural and urban poverty alleviation. During the period of 1985-1999, the correlation between agricultural growth and poverty rate was negative. During 1986-87, agriculture sector grew by 3.25 percent; consequently the incidence of poverty decreased to 17.3 percent in 1987-88. Poor harvests of 1992-93 resulted in negative agricultural growth of 5.3 percent, and thus registering a higher poverty incidence in 1993-94, particularly in rural areas. Similarly, severe drought and water shortages in 1997-98 affected agricultural productivity, thereby, increasing rural poverty to 31.95 percent. The relationship between availability of water supplies and its impact on national economy and incidence of poverty is self-evident. Overall, it can be concluded that poverty in Pakistan increased in the 1990s. The questions are now being raised on poverty being the permanent phenomenon in Pakistan or not.

Table 1: Incidence, depth and severity of poverty (percent of population) in Pakistan.

		1984-85	1987-88	1990-91	1993-94	1998-99
Incidence of poverty	Urban	38.2	30.7	28.0	17.2	24.2
	Rural	49.3	40.2	36.9	33.4	35.9
	Overall	46.0	37.4	34.0	28.6	32.6
Depth of poverty	Urban	9.2	6.1	5.7	3.0	5.0
	Rural	11.9	8.3	7.8	6.4	7.9
	Overall	11.1	7.7	7.1	5.4	7.0
Severity of poverty	Urban	3.10	1.8	1.7	0.78	1.51
	Rural	4.10	2.5	2.4	1.87	2.51
	Overall	3.8	2.3	2.2	1.55	2.2

Source: World Bank (2002), Pakistan Poverty Assessment-Poverty in Pakistan: Vulnerabilities, Social Gaps, and Rural Dynamics. Assessed October, 2002, http:/www.worldbank.org.pk

There is a considerable variation in poverty across regions and provinces in Pakistan. Province-wise breakdown of poverty reveals that the highest incidence of poverty is in NWFP and the lowest in Balochistan. The later is mainly due to lower population density in Balochistan, although it has one of the driest, water scarce and fragile environment. Poverty patterns in Punjab and Sindh appear to be fairly similar and are more or less in keeping with that of the country as a whole.

Research on poverty, particularly rural poverty, in Pakistan highlights some of the key characteristics of the poor and determinants of incidence of poverty. These show that: (1) poverty tends to be generally higher in rural areas than in urban areas and urban poverty is largely a function of rural poverty; (2) the incidence of rural poverty is generally higher among resource poor (land, water) and skill/education poor

households; (3) the incidence of poverty is generally higher among households with a large number of children and single earning members; (4) the incidence of rural poverty is generally higher among households where males/females have no formal education or they are unskilled agricultural laborers; (6) poverty is generally also higher among non-farm households as compared to farm households; and (7) female-headed households have a higher incidence of poverty than otherwise.

There are many poverty-related issues in agriculture. Over 67 percent of the country's population lives in rural areas. Rural households depend directly or indirectly on agriculture for their livelihoods. Bulk of the rural non-farm activity, supporting mostly non-farm population, also depends on agriculture. Overall, agriculture contributes around a quarter of the country's gross domestic product, generates 44 percent of the employment, and significantly contributes to export earnings. Any economic or climate shock to agriculture affects the entire country, with poor being hit the first and the hardest. Government of Pakistan has identified agriculture as one of the four major drivers of economic growth along with oil and gas, small and medium enterprises, and information technology. Therefore, any rural poverty reduction strategy in Pakistan must focus on rural agricultural economy and help to address its specific problems. These include inequitable distribution of resources, degradation of land and water resources, and low agricultural productivity.

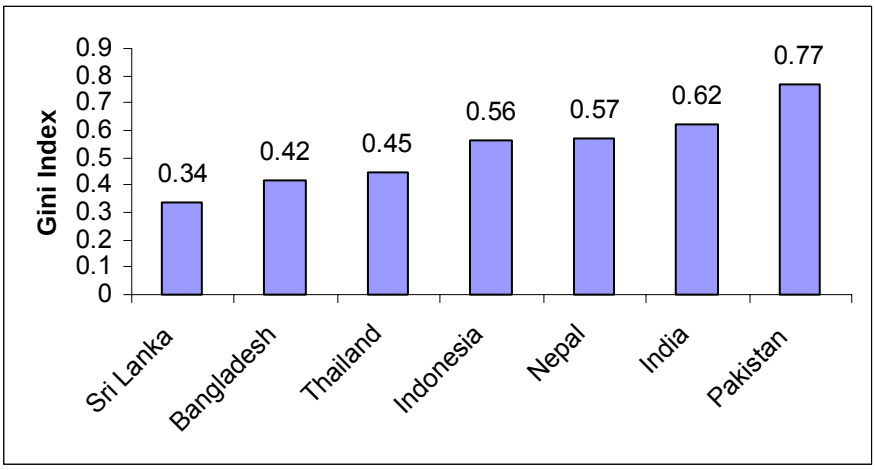
In Pakistan, land is a key rural resource, but it is highly unequally distributed. Land inequality in the country is highest in Asia, with Gini-coefficient is as high as 0.769 (Adams, Jr. 1995), as compared to other countries in the region. According to the official statistics from the Ministry of Agriculture (2000-01), there are 5.1 million farms in the country and 93 percent of these are up to 10 hectares, accounting for 60 percent of total cultivated area. Farms of less than one hectare account for 27 percent of the total farms but control only 4 percent of total land. On the other hand, farms with land comprising above 10 hectares are only 7 percent of the total farms but account for 40 percent of the cultivated area.

Recent observations show that inequitable land ownership has a substantial negative impact on agricultural productivity, and also has indirect negative effects on natural resource base and environment. Distribution of available public lands and undertaking overall land reforms in more effective and pro-poor ways, unlike the past efforts which were largely ineffective, would remain important to create assets for the poor, particularly for the landless who constitute the bulk of the poor in rural Pakistan.

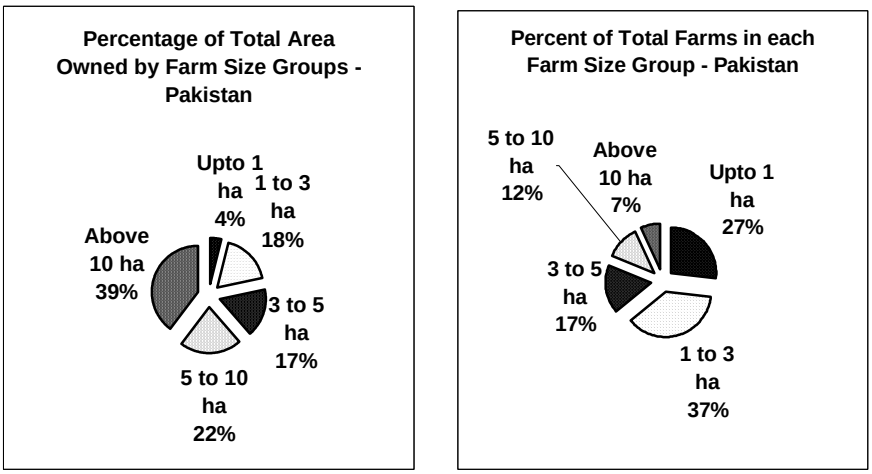
As mentioned above, agricultural productivity in Pakistan is very low in both absolute and relative sense. For example, productivity of wheat (an important crop in Pakistan) remains the lowest among major wheat producing countries (Figure 4).

Recent research by international organizations, including International Water Management Institute, suggests that there is considerable scope for improving agricultural productivity in Pakistan. The challenge is to narrow the existing productivity gap by removing a set of constraints (physical, technical, socio-economic, and institutional) at various levels – macro/policy level, meso and micro or field level. Some of these constraints relate to land and water resources, others relate to non-land and water factors and services such as access to seeds, fertilizers, production technologies, agricultural equipment, information and knowledge and finance/credit (for details, see Hussain et al. 2003).

Figure 1-3: Gini-coefficient for the selected countries in South Asia.

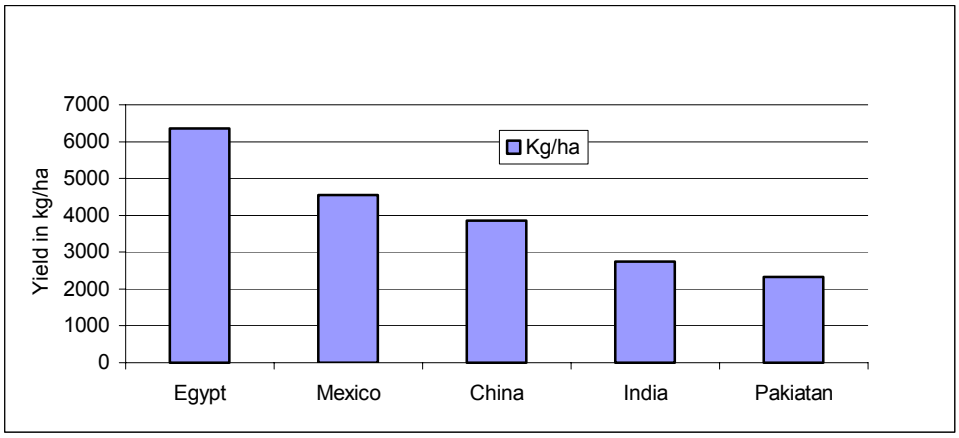


Sources: Adams, Jr. and Richard, 1995; Ray and Debraj, 1998; Hussain, Marikar and Thrikawala 2002.



Source: Agricultural Statistics of Pakistan 2001.

Figure 4: Wheat yield in selected countries, 2001.



Source: Agricultural Statistics of Pakistan 2001.

In aggregate terms, there is not much scope to further expand land and water resources in Pakistan due to physical scarcity of these resources, growing competition for resources across various use sectors resulting from population increases, expansion in urbanization and the growing overall economic activities. While, certainly, there is scope to increase productivity through improved management of land and water resources with effective interventions, overall gains in productivity will also depend on management of and access to other non-land and water factors and services, which are complementary to land and water. Even if most of the constraints related to land and water are removed through improved management, resulting gains in productivity may not be sufficient enough, in the presence of constraints related to other factors and services, to have any significant dent in poverty. In other words, improved management of land and water related factors will be important, but equally important will be improved management of and farmers' access to other factors and services.

In the past, most of these services (especially technology dissemination, information/extension, credit and finance) were supplied largely by the public sector. However, the performance of the public sector in provision of these services and in reaching to the poorest of the poor has been disappointing. Huge costs involved, sectoral approaches to services provision, and inherent inefficiencies in public sector management (largely due to lack of incentives) have been the key factors limiting wider access to these services, especially by the poor.

The issue is not really of availability but of access to the services and factors of production. New information and knowledge, technology, finance and inputs are available but these are not accessible when and where they are needed. This is so because institutional mechanisms that enhance access to these services and factors either do not exist, or if they exist they are fragmentary, anti-poor, limited, inefficient or exploitative. Access to these services and factors of production can be enhanced by establishing institutional mechanisms that: (a) ensure delivery of these services at wider scale, (b) provide services in integrated manner to reduce transaction costs not only in provision of these services but also in accessing these services by farmers, and (c) also ensures that there are strong incentives to the service providers. This can best be done

through involvement of private sector, with public sector playing an important role as an enabler, facilitator and regulator. In the financial sector in developing countries, Claessens (2002) reports that most analytical and empirical work to date finds provision of financial services in integrated manner to be beneficial as it enhances the efficiency of the sector and widens access to the services. In the agriculture sector in developing countries, the concept of 'Integrated Services Provision (ISP)' through private sector has not been promoted, so far, as an alternate to public sector provision of these services. However, over the passage of time various ISP-type experiments have been carried out or similar ideas and initiatives have emerged. These include modern cooperatives established and managed by the private sector such as those in India, contract farming by the private sector, private extension services such as web-based extension services through agri-clinics in India, and private/informal sector providing major services in integrated manner such as emerging agri-malls in Pakistan. Some of these entities provide inputs and related services, while others also provide direct or indirect services for output marketing.

Entities for 'Integrated Services Provision (ISP)' through private sector involvement could be viewed as 'one-stop-shops' established at the village/town level which would provide farmers with information and knowledge on cultivation practices, extension services, new production technologies including irrigation technologies, new seeds, fertilizers, farm equipment, credit, information on input and output prices, and help establish linkages with outputs markets, provide up date on government policies, and latest developments in agriculture - all provided under one umbrella. Technical guidance, business plans, quality control, monitoring, update on knowledge and technology and other similar functions would be carried out by apex bodies (created, say at the province level) of the private service providers facilitated by regulatory back-up from the government. Creating and promoting such institutions would help disseminate up-to-date knowledge and information to farmers, improve access to quality inputs and finance, reduce transaction costs to government, farmers and society as a whole, and expand access to key production inputs and services to all socio-economic groups including poor smallholders.

Government's New Poverty Reduction Strategy

The new government is developing a comprehensive poverty reduction strategy, will further strengthen the interim poverty reduction strategy formulated in 2001, and has the following main components: (1) engendering growth by correcting macro-economic imbalances, which has five sub-components – tax reforms, expenditure management, monetary policy, external adjustment and debt management; (2) broad-based governance reforms – devolution of power, civil services reforms, access to justice, and fiscal and financial transparency; (3) improving income-generating opportunities – empowering people by creating opportunities for improving livelihoods through improved access to assets including housing, lands and credit; (4) improving social sector – particularly improving health and education; and (5) reducing vulnerability to shocks by providing social safety nets.

Recently a number of anti-poverty programs have been initiated to improve the conditions of the poor. These include Khushaal Pakistan Program for community level public works, Food Support Program for poorest of the poor, *Zakat* Rehabilitation Grant, and micro-credit program. Another major program is the Social Action Program

with four target areas – elementary education, basic healthcare, family planning, and rural water supply and sanitation. These initiatives, if implemented effectively, can be expected to contribute for improving livelihoods of the target groups.

The government of Pakistan has recently reinvigorated its efforts to provide irrigation facilities to marginal areas, which are not yet served by the canal network. Priority areas in water resources development over the next decade include: (a) raising of Mangla dam, construction of Mirani dam, Gomal zam dam, Thal canal and other small and medium reservoirs; and (b) efficient use of stored water through construction of new irrigation schemes like Rainee/Thar canals, Kachi canal, greater Thal canal, and modernization of barrages in Punjab. According to the estimates in government's 10-year perspective plan (2001-2011), these developments would augment irrigation water by 6 million acre feet by 2011. These initiatives can be expected to contribute towards at least partially addressing the problem of growing water scarcity in the country.

It should be emphasized here that given the strong linkages between land, water and poverty, issues related to land and water should be at the forefront of the poverty reduction strategy paper for Pakistan. Similarly, poverty concerns should be clearly reflected in the new water policy.

Key to Reducing Rural Poverty

Rural poverty can be reduced by increasing crop/agricultural productivity through pro-poor interventions including:

- re-distribution of land and water resources
- integrated land and water management
- integrated service provision for non-land and water inputs and services through private sector
- increasing production and productivity of non-crop farm sector (e.g. livestock), that is, generating land-based employment and income opportunities for the poor
- developing non-farm sector for the poor, which is generating non-land based livelihood opportunities for the poor and landless through small-business and non-farm enterprise development and skill improvement and vocational training

Of course, good governance, improved human quality and sound macro-economic policies are important for creating conditions for enhancing effectiveness of poverty alleviation efforts.

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POVERTY ACROSS DISTRICTS IN IRRIGATED PUNJAB, PAKISTAN

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Abstract

Poverty is one of the main issues that is worrying most of the third world nations. These nations have focused their efforts towards the welfare of their people. A wide variation in incidence of poverty is experienced across countries and within countries across different regions. Similarly, the determinants of poverty also vary spatially and temporally. Poverty is a complex phenomenon and it is difficult to analyze and find out specific reasons that escalate it. A significant proportion of Pakistan's irrigated area, consisting of different agro-ecological zones, is also coping with poverty, which is menacing the material welfare as well as dignity of the affected people. A number of studies have attempted to estimate its incidence, depth, and severity showing large variation. However, it can be generalized that poverty is higher in the rural areas than in urban areas. Present study is also an attempt to analyze the variation in incidence of poverty across different districts of Punjab province of Pakistan, presenting different agro-ecological zones. A relatively lower poverty incidence was measured for Gujarat and Mandi Bahauddin districts as compared to Sargodha, Toba Tek Singh, and Bahawalnagar districts. Landholding, family size, dependency ratio, education of household's head, and gross value of production per hectare were found as major determinants of poverty in irrigated areas of Punjab, Pakistan.

Introduction

Understanding the phenomenon of poverty is imperative in order to curb its expansion and raise the welfare level of the population. Government of Pakistan (2002) has claimed the extent of poverty as 28 percent with recognition of higher poverty incidence in rural areas (32 percent) than in urban areas (19 percent). This indicates that the poor living standards would be fatal for rural population, if necessary measures were not taken. In a country like Pakistan where around 70 percent of the population resides in rural area and depend on agriculture directly or indirectly, curtailment and declining poverty require serious efforts.

Though poverty in rural areas is directly correlated with productivity of agriculture, the variation in incidence of poverty can be experienced across different ecological zones based on variation in cropping pattern, availability of surface water supplies, quality of groundwater available and other socio-economic characteristics of the area. As different areas differ with respect to their reliance on agriculture for income, the composition of their income sources also play a critical role in assessing the poverty status of the

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households. In general, the areas in upper part of Punjab are well developed as compared to the areas in the lower part of Punjab, Pakistan. Similarly, a higher incidence of poverty would be expected in lower Punjab areas as compared to the upper Punjab areas.

The agriculture sector, in general, experience unstable earnings owing to inequities in land distribution. Fragmentation of landholding (due to law of inheritance) decrease the availability of sufficient hectares of land needed to be used as viable and sustainable unit as a source of income to meet the basic needs of the households. This results in decrease of productivity and makes agriculture uneconomical for such landholding. Another important aspect that affects the productivity is the availability of surface irrigation water supplies. The insufficiency, inequitable distribution, and unreliability at the time of need are the main characteristics of the prevalent surface irrigation system. This hampers the income generating capacity of the farm households, resulting in lower productivity and profitability especially when the groundwater available is also of poor quality. Due to these two factors, the risk of falling into poverty trap increases and shows significant increase over the recent years.

Poverty has various dimensions. In-depth perception of these dimensions is useful in understanding the phenomenon of poverty and differentiating between the myths and realities attached with it. Incidence of poverty is directly dependent on income/expenditure of the households, which are not constant over all the months in a year. Moreover, good or poor harvest in different years are due to various agro-climatic and management factors. Incomes/expenditure fluctuate over times and so does the incidence of poverty. It is also empirically established that incidence of poverty varies across different areas.

The vulnerability of households to fluctuation in output produced and prices fetched increase the risk of earning low income in the agricultural sector. Even a good harvest may result in lowering of the farm incomes and increasing the risk of poverty. Degree of this risk varies spatially as the cropping pattern changes. In this context, it would be interesting to analyze the depth and severity of poverty in order to dig out the real root causes of poverty. Keeping in view these facts, incidence of poverty and its various dimensions are analyzed spatially for better comprehension of the phenomenon, which would lead to suggestions/policy implications for poverty reduction.

The current paper is divided into five parts. Methodology is described in part II. General results are discussed in part III of the paper while in part IV, the determinants of poverty are assessed. The paper ends with conclusions and implications made on the basis of current study.

Methodology

Study Area

The study was conducted in the Upper Chaj Doab (comprising Gujrat and Mandi Bahauddin districts) irrigated by Upper Jehlum Canal (UJC); Lower Chaj Doab (comprising Sargodha district) irrigated by Lower Jehlum Canal (LJC); Rechna Doab (comprising of Jhang and Toba Tek Singh districts) irrigated by Lower Chenab Canal (LCC) East, and tail part of the Hakra irrigation system (comprising Bahawalnagar district) irrigated by Hakra canal system (Figure 1).

Figure 1: Location of the Chaj Doab, Rechna Doab & Hakra 4-R area in the Punjab, Pakistan.

Total geographic area of the Chaj Doab, Rechna Doab and Hakra area is reported to be 1.2 million hectares, 2.98 million hectares and 20,000 hectares, respectively. The salient features of irrigation system in the study area are shown in Table 1.

Table 1: Salient features of the selected irrigation systems in Punjab.

System	District	Name of Distributary	GCA (100 ha)	CCA (100 ha)	Length (Km)	Outlets	
						Number	Discharge (Cusecs)
UJC System	Gujrat	9-R *	61.9	59.5	10.24	29	39
		10-R*	45.3	43.7	11.05	23	25
	Mandi Bahauddin	13-R **	30.4	28.7	13.81	18	26
		14-R **	241.6	221.8	47.94	135	193
Gujrat System		Kakowa*l	97.9	92.7	38.68	50	84
		Phalia**	299.1	269.1	75.24	152	289
LJC System	Sargodha	Lalian*	486.4	444.8	59.80	195	351
		Khadir*	520.0	474.3	89.05	166	235
LCC System	Toba Tek Sing	Khikhi*	419.7	329.4	53.30	158	341
Hakra System	Bahawalnagar	Hakra 4-R*	201.9	178.5	36.08	131	189

*P=Perennial **NP=Non-perennial

A stratified random sampling design was used to select the sample households in the study areas. The irrigated areas were divided into five irrigation systems listed below:

I. UJC System II. Gujrat System III. LJC System

IV. LCC System V. Hakra System

These systems are irrigated through Upper Jehlum Canal (UJC), Gujrat System, Lower Jehlum Canal (LJC), Lower Chenab Canal (LCC) East and Hakra 4-R, respectively. Since there were variations in irrigated systems in terms of cropping patterns and nature of perennial and non-perennial irrigation water supplies, therefore at the second stage, distributaries were selected on the basis of the agro-ecological characteristics based on cropping patterns, nature of water supplies (perennial/non-perennial) and location of the watercourses across head, middle and tail of the distributary. According to this criteria, the entire study area was divided into seven cropping zones, and ten distributaries were selected that irrigated areas in five different districts. While each distributary was fairly homogenous within its boundaries in terms of above characteristics, however, there could be intra-distributary variations especially in terms of access to water (head, middle and tail) due to differences in availability of water resulting from locational differences. These intra-distributary variations were captured through sampling across head, middle and tail within a distributary by selecting a watercourse. Households from each of the selected watercourses were selected through systematic random sampling from a complete sampling frame for each watercourse (i.e. list of all households on the watercourse). Landless households were selected from the voters' list through systematic random sampling, based on their proportion in total number of households on each selected watercourse. Equal allocation method was adopted for selecting distributaries and watercourses across head, middle and tail reaches of the selected distributaries and the sample households across each of the selected watercourses. A well-represented sample of 1224 farm households was selected for collecting information from the field through a well-designed pre-tested questionnaire. Details of sample size are provided in Table 2.

Table 2: Number of watercourses and sample household in selected distributaries.

District	Distributaries	No. of watercourse	No. of household	Total Number
Gujrat	9-R, Khoja and 10-R Dhup Sari	12	30	180
Mandi Bahauddin	13-R, Saroki, 14-R Maggowal, Phalia, and Kakowal	24	60	360
Sargodha	Lalian and Khadir	18	38	342
Toba Tek Singh	Khikhi	9	19	171
Bahawalnagar	Hakra 4R	9	19	171
	Total Sample	72	166	1224

Monetary Measures of Poverty

The measurement of income poverty involves specification of an indicator of well being such as income/expenditure, and specification of an income level or threshold below which a person or household is considered poor – the poverty line, and construction of poverty measures.

Foster-Greer-Thorbecke (FGT) class of measures are the most commonly used measures of poverty, which capture three aspects of poverty: incidence, depth/intensity, and severity of poverty. These measures are the Head Count Index, the Poverty Gap Index and the Squared Poverty Gap Index.

Headcount Index is defined as the share or proportion of the population which is poor, or whose income is below the specified poverty line. This is a measure of incidence of poverty. Suppose in a population of size n, there are q number of poor people whose income y is less than the poverty line z, then head count index can be defined as:

Head Count Index (HC) = q/n

Poverty Gap Index is defined as the mean distance separating the population from the poverty line. This can be interpreted as a measure of depth of poverty. Non-poor is given a distance of zero. This measure can be mathematically represented as following:

Poverty Gap $PG = \frac{1}{n}\sum_{i=1}^{n}\frac{z - y_i}{z}$

Where z is the poverty line, y_i is the income of the individual or household i, and the sum is taken only on those individuals who are considered poor (below the poverty line).

The poverty gap can also be defined as the product of the income gap and the head count index ratio, represented as following:

PG = I*HC, where I is the income gap

Where $I = \frac{Z - y_q}{Z}$ and $y_q = \frac{1}{q}\sum_{i=1}^{q} y_i$ is the average income of the poor.

Squared Poverty Gap Index is a measure of severity of poverty. The poverty gap takes into account the distance separating the poor from the poverty line, while the squared poverty gap $[PG]^2$ takes into account the square of the distance. The squared poverty gap index gives more weight to the poor, by taking into account the inequality among the poor, greater weights are given to larger gaps and the weights are simply the poverty gaps. It is represented as following:

Squared Poverty Gap $(PG)^2 = \frac{1}{n}\sum_{i=1}^{n}\left(\frac{z - y_1}{z}\right)^2$

Both Poverty Gap Index and the Squared Poverty Gap Index put more emphasis on those people who are further away from the poverty line. The general formula for all three measures is given below, which depends on parameter α, and takes a value of zero for the Head Count Index, one for the Poverty Gap Index and two for the Squared Poverty Gap Index:

$$P(\alpha) = \frac{1}{n}\sum_{i=1}^{q}\left(\frac{z - y_1}{z}\right)^{\alpha}$$

The above measures can be analyzed for various socio-economic groups and different geographic locations (within irrigation systems).

Poverty Line Used for Current Study. For the analysis of poverty situation in the present study, a rural poverty line of Rs. 676.31 per capita was used, which was established by Qureshi and Arif (1999) by using HIES survey data in 1998-99 prices on basic need basis. This was inflated to the prices of 2001, which resulted as inflated poverty line of Rs. 730.78 per person monthly. It should be noted that this poverty line in terms of money is almost equal to official poverty line (Rs 673.54 per capita for 1998-99 prices) as announced by the Government of Pakistan. Additionally for sensitivity analysis, another poverty line was also used as Rs. 530.78 per person.

Results and Discussions

Monetary measures of poverty were estimated for each of the five districts that encompass ten distributaries representing different physical, hydrological, agricultural, socio-economic, and institutional characteristics. Table 3 indicates poverty indices for each district based on household expenditure. The head count index based on poverty line I (PL I) shows that about 59 percent of the sample households were living below the poverty line. The highest proportion of poor household belonged to the Hakra 4-R system (Bahawalnagar district) while the lowest head count was observed among households living in the command area of Upper Jehlum Canal in the Gujrat district. Similarly, highest incidence of poverty across distributaries was estimated (77%) in case of Khadir distributary in Sargodha district while lowest count was found (40 percent) for 10-R Dhup Sari distributary in Gujrat district.

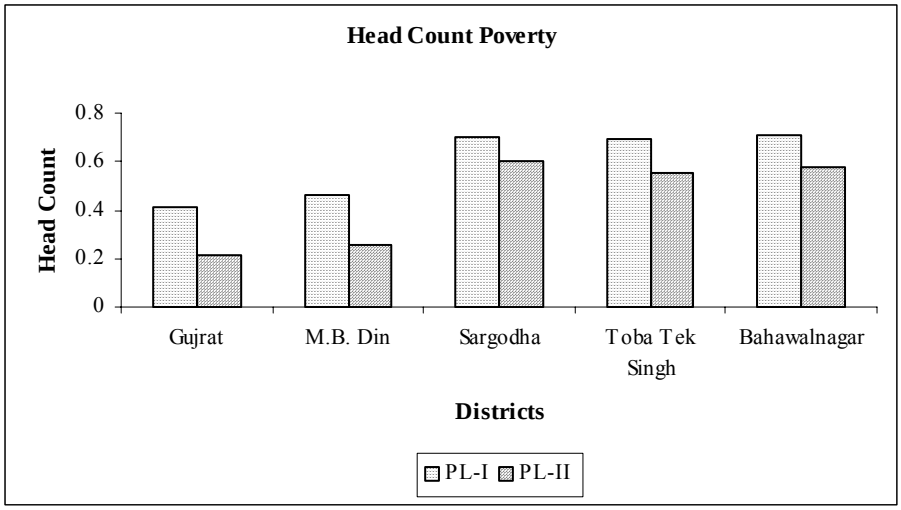
Sensitivity analyses show that at lower poverty line (PL-II) 43 percent of the households were poor indicating a sharp decrease of 16 percent in total poor households from PL-I estimates. These estimates conveyed that about 43 percent of households were chronic poor in nature, whereas about 16 percent households were on the verge of poverty line waiting for a productive push to convert them from poor to non-poor category.

However, the highest proportion of the poor (60%) was estimated for Sargodha district whereas the lowest proportion (21.5%) was found in case of Gujrat district. The comparison of head count poverty across all selected districts is shown in Figure 2. These results were consistent with other studies. Ahmad (1998) reported 47 percent poverty in 1992-93 and 50 percent in 1995-96 in Punjab, by using basic need poverty approach. Similarly, Bhatti et al. (1999) also reported that 50 percent of rural population was living below the poverty line.

Table 3: Estimates of poverty head count indices for households in irrigated areas (based on annual expenditure).

		PL-I = Rs. 730 per capita per month		PL-II = Rs. 530 per capita per month	
District	Distributary	Non Poor	Poor	Non Poor	Poor
Gujrat	9-R Khoja	0.578	0.422	0.800	0.200
	10-R Dhup Sari	0.598	0.402	0.770	0.230
	Group Total	0.588	0.412	0.785	0.215
M.B. Din	13-R Saroki	0.584	0.416	0.787	0.213
	14-R Maggowal	0.489	0.511	0.711	0.289
	Phalia	0.500	0.500	0.721	0.279
	Kakowal	0.568	0.432	0.773	0.227
	Group Total	0.535	0.465	0.748	0.252
Sargodha	Lalian	0.367	0.633	0.482	0.518
	Khadir	0.226	0.774	0.315	0.685
	Group Total	0.296	0.704	0.398	0.602
Toba Tek Singh	Khikhi	0.310	0.690	0.450	0.550
Bahawalnagar	Hakra 4-R	0.294	0.706	0.424	0.576
All Cases		0.411	0.589	0.568	0.432

Figure 2: Head count poverty across irrigated districts using PL-I and PL-II



Poverty Gap and Squared Poverty Gap

Table 4 shows the figures for the poverty gap according to PL-I, the overall poverty gap was estimated to be around 42 percent, indicating that poor households needed an additional 42 percent of the present expenditures to attain minimum basket of basic needs. Comparison of districts shows that the incidence of poverty was higher in Mandi

Bahauddin district as compared to Gujrat district; however, depth of poverty was lowest in Mandi Bahauddin (28.9%), while slightly high estimate was calculated for Gujrat (29.3%). The estimated depth of poverty was 17, 19.4, and 19.6 percent higher in Toba Tek Singh, Sargodha and Bahawalnagar districts than Mandi Bahauddin district, respectively.

The application of PL-II revealed that the highest poverty gap of 38.7 percent was estimated for Bahawalnagar district while lowest gap of 20.5 percent was computed for Mandi Bahauddin district. It is also clear that poverty gap was lower in case of distributaries for Mandi Bahauddin where it ranged between 17.9 percent in case of 13-R Saroki distributary to 24.6 percent in case of Kakowal distributary. Comparison of poverty gap using PL-I and PL-II reveals an overall decline of 8.6 percent. Highest decline in depth of poverty was estimated for Sargodha district (11.9%) while the lowest was estimated for Gujrat district (7.4%).

Table 4: Estimates of poverty gap and squared poverty gap in irrigated areas - based on annual expenditure.

		PL-I = Rs. 730 per capita per month		PL-II = Rs. 530 per capita per month	
District	Distributary	Poverty Gap	Squared Poverty Gap	Poverty Gap	Squared Poverty Gap
Gujrat	9-R Khoja	0.281	0.108	0.225	0.069
	10-R Dhup Sari	0.307	0.122	0.213	0.063
	Group Total	0.293	0.115	0.219	0.066
M.B. Din	13-R Saroki	0.270	0.099	0.179	0.050
	14-R Maggowal	0.291	0.115	0.203	0.058
	Phalia	0.285	0.110	0.194	0.057
	Kakowal	0.307	0.129	0.246	0.089
	Group Total	0.289	0.113	0.205	0.063
Sargodha	Lalian	0.457	0.248	0.347	0.159
	Khadir	0.504	0.286	0.377	0.179
	Group Total	0.483	0.269	0.364	0.171
Toba Tek Singh	Khikhi	0.459	0.247	0.357	0.161
Bahawalnagar	Hakra 4-R	0.485	0.276	0.387	0.192
All Cases		0.415	0.215	0.329	0.147

In case of PL-I, the lowest estimate of squared poverty gap of 11.3 percent was computed for Mandi Bahauddin district while the highest was estimated for Bahawalnagar district (27.6%), showing relatively high severity of poverty in Bahawalnagar district as compared to Mandi Bahauddin district. Employing PL-II, the highest severity of poverty was found to be 19.2 percent for households in Bahawalnagar district while the lowest (6.3%) was estimated for Mandi Bahauddin district.

The difference of poverty gap square estimated by using PL-I and PL-II showed the decline in severity of poverty across districts while using different poverty lines. The highest decline in severity of poverty estimate was observed 9.8 percent in case of Sargodha district. On the other hand, lowest decline in squared poverty gap estimate was estimated 4.9 percent for Gujrat district. Overall decline in severity of poverty was worked out 6.8 percent for all the sample households in the study area. The change in poverty gap and squared poverty gap across districts, using both poverty lines, is shown in Figure 3 and Figure 4, respectively.

Figure 3: Poverty gap across irrigated districts using PL-I and PL-II.

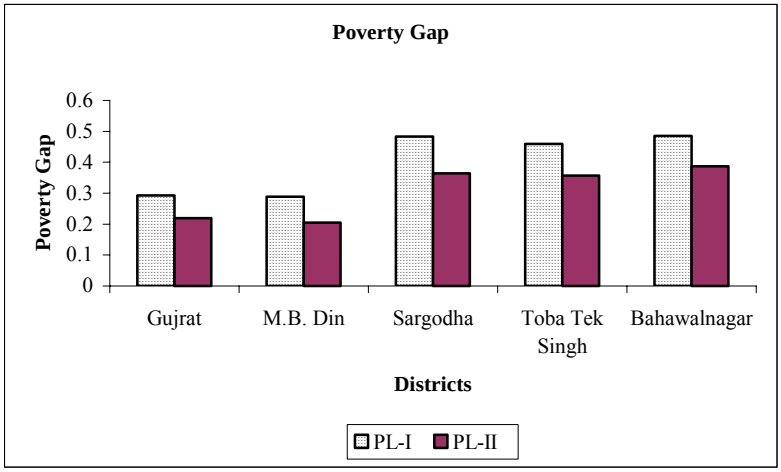
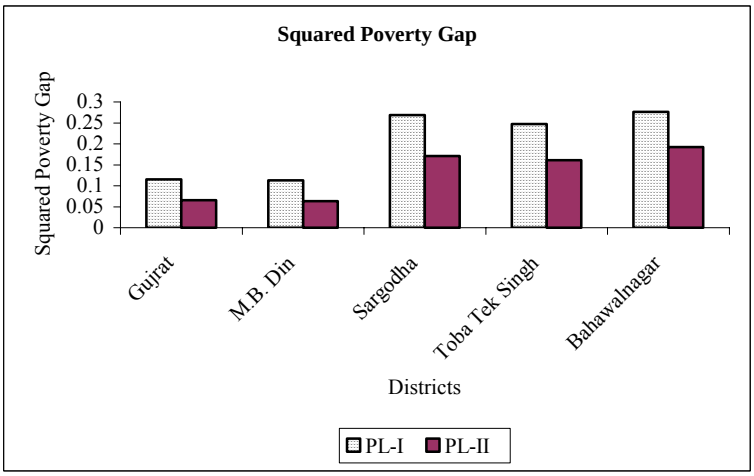


Figure 4: Squared poverty gap across in irrigated districts using PL-I and PL-II.



Sources of Income of Households

It was found that on an average, the highest annual income earning households were concentrated in Toba Tek Singh district indicating an average annual income of

Rs.100394 while the lowest annual income was reported for the households in Gujrat district (Rs. 59940) as shown in Table 5. Furthermore, it is evident that the households in the Gujrat and Mandi Bahauddin districts reported lowest annual income. However, a critical view reveals that the households in Gujrat district were heavily dependent on the non-crop income (80 % of annual income) for meeting their basic needs. It was due to the fact that one or more members of the households were settled abroad and the rest of the members were receiving remittances from them. Moreover, crop income constituted only 17.63 percent of the income for the households in Gujrat district whereas it was about 43.61 percent of income for the households in Sargodha district. Income from selling animals was high for the households in Sargodha district while it was lowest for the households in Gujrat district. Income from renting out of agricultural assets was very low across all the households in the five districts, though it was highest for the households in Bahawalnagar district.

Table 5: Various sources of household income across irrigated districts.

	Gujrat	M.B. Din	Toba Tek Singh	Sargodha	Bahawal-nagar	All
Crop income	10569	23635	29803	36448	21125	25788
	(17.63)	(33.25)	(29.69)	(43.61)	(24.69)	(32.60)
Non-crop income	48138	43012	64805	38993	55200	47463
	(80.31)	(60.51)	(64.55)	(46.66)	(64.52)	(60.00)
Income from selling animals	946	3158	3248	6940	6271	4333
	(1.58)	(4.44)	(3.23)	(8.30)	(7.33)	(5.48)
Income from agricultural Assets	287	1273	2539	1191	2960	1523
	(0.48)	(1.79)	(2.53)	(1.42)	(3.46)	(1.93)
Total annual income	59940	71078	100394	83571	85556	79108
	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)	(100.00)

Note: Figures in parentheses are percentages

Determinants of Poverty

Efforts to curtail the expansion of poverty are needed to address the key issues that are confronting the households. In order to determine the effects of different factors on poverty, Logit modeling was employed. Logit modeling technique is used when dependent variable is binary with values 1 or 0. The coefficients of independent variables tell about the probability of happening or not happening of one of the two possibilities of the dependent variable.

The model specifications are as follows:

$$\text{Poverty} = \beta0 + \beta1 * FS + \beta2 * DR + \beta3 * Edu\_HH + \beta4 * NLH ++ \beta5 * GVP\_Ha + \beta6 * DG + \beta7 * DM + \beta8 * DS + \beta9 * DT + e$$

Where:

Poverty	=	1 if poor, otherwise 0
FS	=	Family Size in number
DR	=	Dependency Ratio
Edu_HH	=	Number of formal schooling years completed by household head
NLH	=	Net Landholding (hectares)
GVP_Ha	=	Predicted values of gross value of production per hectare (in thousands rupees)
DG	=	Dummy for the Gujrat district
DM	=	Dummy for the Mandi Bahauddin district
DS	=	Dummy for the Sargodha district
DT	=	Dummy for the Toba Tek Singh district
$\beta 0$	=	Constant term
$\beta 1 \ldots \beta 9$	=	Coefficients to be estimated
e	=	Error Term

From the estimated coefficients of the model, marginal effect of each independent variable was calculated. The marginal probability is defined by the partial derivative of the probability that dependent variable assumes a value of 1 with respect to that independent variable. The marginal probability is defined by:

$\partial P / \partial B = f(BX)\, B$

Where B is the slope of the coefficient. X is the independent variable while f is the density function of the cumulative probability distribution function [F(BX)] (ranges from 0 to 1).The marginal effect could be interpreted as the change in the probability of household being poor with a one-unit increase in the explanatory variable. The marginal probability values were estimated as the mean values of the explanatory variables.

Family Size

It was expected that higher the family size, higher would be the probability of a household to be poor. Due to this fact, with increase in family size, higher amount of money would be required to meet the basic needs of the entire members of household. It was expected that coefficient of family size would have positive sign.

Dependency Ratio

Dependency ratio was defined as the ratio of number of household members below 16 years and above 60 years divided by family size. It was expected that with increase in number of dependents in the household, probability of being poor became higher due to higher amount of money demanded to fulfill the basic needs of the households. Moreover, as these dependent members did not earn any money, it was hard for the household to be above the poverty line. A positive sign for the coefficient of dependency ratio was expected, indicating an increased probability of the household to be poor with high dependency ratio.

Education of Household Head

Higher education leads to higher earning potential by better management of the household resources. It was expected to have a negative impact on poverty. Consequently, more education of household head would lead the household out of vicious circle of poverty. Therefore, expected sign for the coefficient was negative.

Net Landholding

The entitlement of more landholding was expected to result in more crop production and higher incomes. It was expected that increase in net landholding would decrease the probability of the household to become poor. So, a negative sign was expected for the coefficient of net landholding indicating inverse relationship with poverty.

Gross Value of Production per Hectare

Gross value of production was indicative of performance of individual farm households. Higher land productivity would result in higher annual income of the household that would eventually improve the ability of the household to provide all the basic needs to the family members by spending more. It was expected that with increase in gross value of production per hectare, poverty would decrease. Therefore, a negative sign was expected for the coefficient of gross value of production per hectare.

Location of the Households

The location of the households in different ecological zones reflected variation in access to surface irrigation water, groundwater quality, and relatively different socioeconomic situation prevailing in these areas. Thus, it was expected that these households had lower probability to become poor as compared to the households in other districts. The dummies used for different zones would explain the effect on poverty.

Model Results

The results of the Logit regression are presented in Table 6. Signs of all the explanatory variables were in conformity with *a priori* expectations. All the coefficients except dummies for Mandi Bahauddin, Toba Tek Singh and Sargodha districts were found significant at 99 percent level. However, dummies for Mandi Bahauddin and Toba Tek Singh districts were significant at 95 percent level. Dummy for Sargodha district was found insignificant. It was found that one member increase in family would increase the probability of household being poor by 0.026 due to the fact that higher family size required more income to meet the basic needs of the household members. One unit increase in dependency ratio would increase the probability of being poor by 0.283. It was according to this perception that if dependency ratio increases, additional burden of the new dependent would also be shared by limited number of earners, who were already taking care of other family members. Education of the household head was found as a tool to decrease the probability of the household to be poor since education enhances the capabilities of household head in making optimal and rational decisions. One more completed year of household head's education would decrease the probability of household being poor by 0.014. Similarly, land being the most important factor in

agricultural production and income was found important to reduce the probability of household to be poor. It was found that one-hectare increase in net landholding would reduce the probability of being poor by 0.034. The improvement of the welfare in case of rural household is directly attached with higher productivity and profitability of crops grown. It was estimated that an increase of one thousand rupees in gross value of production per hectare would diminish the probability of being poor by 0.012. Owing to the variation in family size, dependency ratio, and education, especially of the household head, and other members in general, lactation of household was found having a significant impact in ascertaining the probability to be or not to be poor. It was also found that probability of being poor decreases by 0.175, 0.115, 0.121, and 0.04, if household were located at Gujrat, Mandi Bahauddin, Toba Tek Singh, and Sargodha districts, respectively, instead of Bahawalnagar district. It clearly indicates that probability to be poor was minimum if households was located in Gujrat district when compared to a household in Bahawalnagar district.

Table 6: Regression results for farm households across irrigated districts.

Variable	Coefficients	Std. Error	Sig.	Marginal Probability
Constant	1.318	0.29	0.00**	0.290
Family size (Number)	0.116	0.023	0.00**	0.026
Dependency ratio (ratio)	1.286	0.294	0.00**	0.283
Education of the household head (Years)	-0.066	0.016	0.00**	-0.014
Net landholding (ha)	-0.156	0.021	0.00**	-0.034
Gross value of production per hectare (thousands)	-0.055	0.005	0.00**	-0.012
Dummy for Gujrat district	-0.796	0.271	0.003**	-0.175
Dummy for Mandi Bahauddin district	-0.523	0.241	0.03*	-0.115
Dummy for Toba Tek Singh district	-0.548	0.274	0.046*	-0.121
Dummy for Sargodha district	-0.179	0.243	0.46	-0.040
-2 Log likelihood =	1184.536			
Cox & Snell R Square =	0.276			
Nagelkerke R Square =	0.379			
Chi-Square = 389.278	Df = 9	Sig. = 0.00**		

* Significant at 95 percent significance level
** Significant at 99 percent significance level

Conclusions and Implications

- Incidence of poverty was highest in Bahawalnagar district while it was lowest in Gujrat district.
- Higher proportion of the households in Mandi Bahauddin district was lying on the verge of poverty line showing high sensitivity to variation in poverty line.
- Depth of poverty (poverty gap) was found highest for Bahawalnagar and Sargodha districts.

- Severity of poverty was highest for households in Bahawalnagar district.
- Higher proportion of annual income was captured by non-crop income for the households in Gujrat district as compared to other districts.
- The households in Sargodha district were heavily dependent on crop income as compared to the households in other districts.
- Annual income per household was highest in Toba Tek Singh district while it was lowest for the households in Gujrat district.
- An increase in family size was found to increase the probability of household to be poor. More investment in population planning was evident.
- Increasing size of landholding would reduce the probability of being poor for any particular household. This requires a new round of land reforms as well as legislation to stop further defragmentation of land into uneconomical unit size.
- Higher education to the head of the household would reduce the probability of household to become poor. More investment on education, especially on improving and strengthening the already prevailing setup, would impart its benefits quickly and efficiently.
- Measures to increase the productivity of land would decrease the probability of household to become poor as reflected by gross value of product per hectare.

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POVERTY IN PAKISTAN: TRENDS AND ISSUES

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Abstract

The phenomenon of poverty is receiving the increasing attention of policy makers and institutions with an attempt to improve the living standards of the third world countries. Pakistan is no exemption to that. As the majority of third world population is concentrated in rural areas and dependent on agriculture sector for income, it becomes of special interest to dig into the root causes of poverty in these areas. A number of studies have shown that poverty is concentrated in the rural areas of Pakistan. However, a wide variation in estimates of poverty was experienced owing to various approaches and different poverty lines used by the researchers in estimating the incidence, depth, and severity of poverty. Recently, the Government of Pakistan addressed this issue by circulating the official poverty line. Poverty being a complex phenomenon, its determinants vary from time to time and across different areas. However, most of the studies indicate that poverty in Pakistan is concentrated in rural areas of Pakistan. Applying dollar a day poverty line shows that the poverty in Pakistan is higher as compared with many other Asian countries.

Introduction

The latest poverty scenario in Pakistan paints a very gloomy picture. According to the Government of Pakistan (2002), about 28 percent of total population is currently living below the poverty line. The incidence of poverty is higher in rural areas (32 percent) as compared to urban areas (19 percent). The quality of life of the poorer segments of the society continues to deteriorate. Not only income poverty has been on the rise in the country but other dimensions of poverty also present an equally dismal picture. Strong rural-urban difference in the context of poverty is observed, with households living in the rural areas likely to be poorer than those living in urban areas. A comparison of incidence of poverty across irrigated regions of the country leads to some interesting observations.

Around 70 percent of the population is residing in rural areas of Pakistan. Majority of these directly or indirectly depend on agriculture for generating the household incomes. A significant proportion of rural population is engaged in raising crops for income to support the current livelihood standards. The landowners are the main beneficiaries while landless also derive income from providing different services to them. The increase in income of land owners through improved productivity and profitability shows trickle down effect on the betterment on the landless rural population while a failure on the part of landlord also affect the well beings of poor. Moreover, continuous

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fragmentation of land into small farms has decreased the efficiency and productivity of the farms, which has put tremendous pressure on the ever-increasing population of the rural areas. In addition to land, adequate and reliable supply of irrigation water is another constraint, which is inhibiting the increase in productivity to meet the potential productivity levels. As the productivity of these vital resources fluctuates, so is the income and risk of being poor vary from time to time and across different areas.

The attempts to analyze the incidence of poverty and finding its determinants are made from time to time and by using various yardsticks based on different sets of assumptions. However, most of the studies indicate that poverty in Pakistan is concentrated in rural areas of Pakistan.

The current paper is divided into five parts. In part II, literature on poverty is reviewed with reference to Pakistan and Asia. In part III, various definitions of poverty, limitations, and data requirements are discussed. Conclusions are drawn in the last part of the paper.

Poverty in Literature

A number of studies have been conducted assessing poverty situation and its dimensions in Pakistan regarding poverty lines, inequality, absolute versus relative poverty, unemployment, and different policies, social welfare programs, institutional reforms, gender, and demographic factors, irrigation performance and IMT, during the last three decades. A brief review of some of the important studies is presented below.

A head count rural poverty (32%) was estimated by using the poverty line of 2550 calories intake per day per adult equivalent by Irfan and Amjad (1984). They translated the detailed information available in the Micro Nutrient Survey of 1977 to determine an income-based poverty line at 1979 prices of Rs. 109 per capita per month (poor), and then used this line and Rs. 95 per capita per month (very poor) to obtain the head count measure for the year 1979. The study showed that rural very poor increased from 32 percent in 1963/64 to 43 percent in 1969/70 and declined to 29 percent in 1979.

A relative poverty line based on per capita expenditure of lowest 10 percent of the population was used by Akhtar (1988) on the basis of HIES data for the year 1979. The results showed that the incidence of poverty in rural areas was significantly higher than in urban areas. Moreover, it was found that poverty in Pakistan was concentrated in rural areas. The computed poverty line employed for analyzing the poverty situation was Rs. 948 and Rs. 1260 per year for rural and urban areas, respectively. The urban poverty line was set 33 percent higher than the rural one.

A decline in poverty was estimated in rural and urban areas by Ahmad and Allison (1990). They employed poverty line of Rs. 100 and Rs. 110 per capita expenditure on monthly basis, respectively for rural and urban areas. The poverty line was based on 2550 calories intake per adult equivalent basis assuming 10 percent higher estimate of poverty line for the urban areas. The study concluded that during 1979-1984/85, rural poverty declined from 20 to 25 percent while urban poverty declined from 20 to 16 percent indicating higher incidence of poverty in the rural areas as compared to the urban areas.

Based on basic needs approach, an increase in percentage of poor from 47 percent in 1992-93 to 50 percent in 1995-96 was estimated for Pakistan by Ahmad (1998). In

Punjab province, the percentage of poor consistently rose from 43 to 44 and then to about 50 percent in the years of analysis. The well known indices of poverty like the head count ratio, poverty gaps and FGT were also calculated by using data from the HIES and PIHS of 1992-93, 1993-94 and 1995-96. When basic needs poverty line was used, the percentage of poor increased from 47 percent in 1992-93 to 50 percent in 1995-96. An increasing trend in head count poverty was also found in Baluchistan and NWFP. Sindh was the only province where the poverty situation had improved slightly. It was concluded that poverty situation in the recent past had worsened and intensity increased. The author also analyzed the determinants of poverty by using the Logit model. The results on determinants of poverty identified various groups, which were most vulnerable and could be used as effective tools for policy makers. The results of model showed that dependency ratios, household size and level of education had strong correlation with poverty. A high incidence of poverty was observed for households whose heads were engaged in agriculture and related activities as well as in services and transport sectors. It was also found that households living in the rural areas of Pakistan were likely to be poorer than those in urban areas. The author observed that poverty reduction programs were needed to be targeted oriented.

A head count poverty of around 37, 40 and 33 percent was estimated by Qureshi and Arif (1999) for Pakistan, rural, and urban areas, respectively. The basic need approach was used in estimating poverty line using HIES data and estimates were calculated for the year 1998-99. A poverty line of Rs. 705.96 per month was used for assessing incidence of poverty in Pakistan while the corresponding figures for rural and urban areas of Pakistan were Rs. 676.31 and Rs. 898.94 per month, respectively.

A rise in incidence of poverty, both in rural and urban areas of Pakistan, was estimated by Arif et al. (2001). The issues surrounding non-farm employment and rural poverty in Pakistan were examined. It was found that poverty was relatively higher in rural areas and widespread across all groups of population. The wageworkers in the non-farm sector were better off than the agricultural laborers. Services and trade sectors were hindrance in reducing rural poverty. It was found that poor were concentrated in construction, transport and manufacturing sectors. The study was based on primary data set of 1996-97, Household Integrated Economic Survey (HIES). The non-farm category included wageworker whoever all self-employed people but not the self-employed in agriculture sector. The basic needs approach was used for poverty line determination. The multivariate analysis showed that age, education, sex and household size were the major determinants of being employed in the rural non-farm sector. Authors suggested that dynamic labor in agriculture combined with a modernizing non-agriculture sector could generate employment and income with resulting growth and elimination of rural poverty.

Historical Trend of Poverty in Pakistan

Table 1 shows the synthesis of various selective studies conducted in Pakistan, assessing the incidence of poverty using various approaches and related to various time periods. A variety of poverty lines were used in order to estimate the prevalent incidence of poverty in rural and urban areas as well as for Pakistan in general. Though majority of the researchers used HIES data sets to reach these estimate of poverty, however, different approaches led to different poverty line estimates, which in turn yielded different estimates of poverty.

Table1: Synthesis of selective studies on poverty situation in Pakistan.

Author	Study Year	Areas	Head Count Poverty
Irfan and Amjad	1984	Rural	41
		Urban	29
Akhter	1988	Rural	12
		Urban	20
Ahmad	1993	Pakistan	42
		Rural	24
		Urban	47
Gazdar and Zaidi	1994	Pakistan	34
		Rural	34
		Urban	31
Malik	1994	Pakistan	17
		Rural	21
		Urban	10
Jaffri and Khatak	1995	Pakistan	41
		Rural	22
		Urban	56
Government of	2000	Rural	34.7
Pakistan		Urban	20.9
Arif et al.	2001	Rural	39.8
		Urban	31.7

Poverty in Asia

Table 2 shows the comparison of poverty situation in selected Asian countries. The highest head count poverty was found in India (44.20 percent) while the lowest was envisaged in Thailand (<2 percent). The incidence of poverty was third highest in Pakistan (31 percent), which was slightly higher than in Bangladesh (29 percent). Depth of poverty (poverty Gap) was highest in India while it was lowest in Thailand (less than 0.5 percent). It is clear from Figure 1 that per capita income of China and Sri Lanka was almost double than in Pakistan but poverty statistics indicated higher incidence and depth of poverty prevailing in China than in Sri Lanka. Moreover, India had slightly higher per capita income (460 US$) while Bangladesh had slightly lower per capita income (US $ 370) as compared to Pakistan (US $ 420), though statistics show higher poverty in India and lower poverty in Bangladesh than in Pakistan.

Table 3 shows the estimated Gini-coefficient reflecting the inequality in income or expenditure prevailing in selected Asian countries. Highest level of inequality was envisaged in Thailand having Gini-coefficient of 0.414 while the lowest was found in Pakistan (0.312). It was found that in India and Bangladesh, relatively higher inequality in distribution of income exists as compared to Pakistan. It was also found that the lowest 10 percent of the population holds around 4.1 percent of the income in Pakistan, which was the highest among all the selected countries whereas the lowest figure was found in China (2.4 percent). On the contrary, the richest 10 percent of the population holds 33.5 percent of the income in India while the corresponding lowest estimate was for Indonesia (26.7 percent). The richest 10 percent of the population in Pakistan holds around 27.6 percent of the annual income.

Table 2: Poverty situation in selected Asian countries (Population below US $1 a day).

Country	Year	Head Count Poverty	Poverty Gap
Bangladesh	1995-96	29.07	5.90
China	1998	18.80	4.40
India	1997	44.20	12.00
Indonesia	1999	12.90	1.90
Pakistan	1996	31.00	6.20
Sri Lanka	1995	6.60	1.00
Thailand	1998	<2.00	<0.50
Nepal	1995	37.70	9.70

Source: World Bank (2000)

Figure 1: Per capita income of selected Asian countries in 2001.

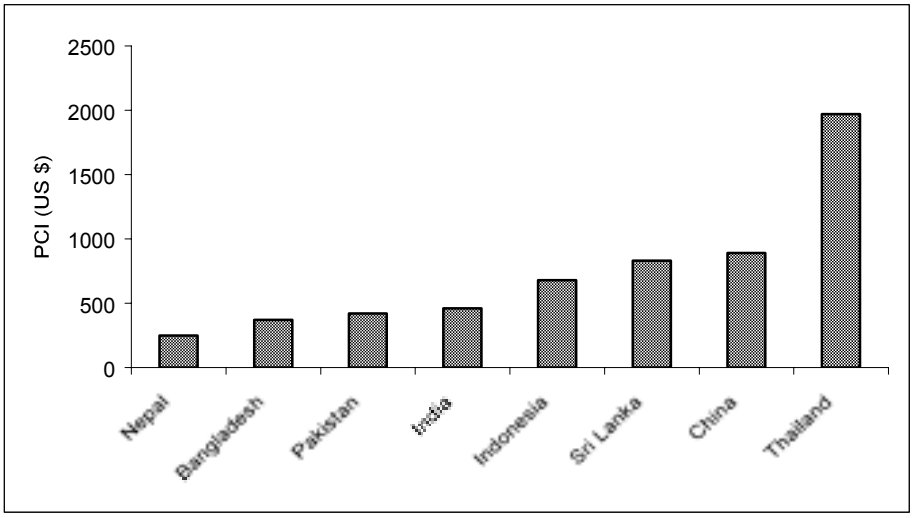

Table 3: Gini-coefficient and inequality in Asian countries.

			Percentage Share of Income or Consumption	
Country	Year	Inequality Gini-coefficient	Lowest 10% of Population	Highest 10% of Population
Bangladesh	1995-96	0.336	3.9	28.6
China	1998	0.403	2.4	30.4
India	1997	0.378	3.5	33.5
Indonesia	1999	0.317	4.0	26.7
Pakistan	1996-97	0.312	4.1	27.6
Sri Lanka	1995	0.344	3.5	28.0
Thailand	1998	0.414	2.8	32.4
Nepal	1995-96	0.367	3.2	29.8

Source: World Bank (2003)

Defining Poverty and Poverty Line

Over the past century, scholars and experts on poverty at the global level remained unable to define the term comprehensively and precisely. It is widely recognized that poverty is complex and multidimensional in nature.

Poverty line differentiates between poor and non-poor on the basis of minimum income or expenditures that are needed to fulfill required minimum calorie intake or to acquire minimum basket of basic needs. People whose income or expenditure is below the poverty line are assumed poor.

Some selective definitions of poverty, as available in the present literature, are summarized below:

On the Basis of Calorie Intake Approach

Ercelawn (1988) defined poverty line on the basis of per capita annual expenditure required to ensure the 2550 calories per day per adult equivalent. Using HIES survey data, a poverty line of Rs.1716 and Rs. 2592 per person for the year 1984/85, respectively, regarding rural and urban areas in current prices, was established.

Ahamd and Allison (1990) determined poverty line on the basis of total per capital expenditure per month of Rs. 100 and Rs. 110 in 1979 prices, which was required to ensure 2550 calorie intake per adult equivalent for rural and urban areas, respectively.

Planning and Development Division, Government of Pakistan (2002) defined poverty and poverty line on the basis of calorie intake per adult equivalent per day. Poor was defined as one who was unable to intake 2350 calories per adult equivalent per day. On the basis of this, a poverty line of Rs. 673.54 in 1998-99 prices was established.

On the Basis of Basic Needs Approach

Ahmad (1993) defined the poverty line on the basis of basic needs approach which included food, clothing, housing, health, education, transport, social interaction and recreational needs. The poverty lines were estimated as per capita expenditure of Rs. 300 and Rs. 419 per month at 1991/92 prices for rural and urban areas, respectively.

Jafri and Khattak (1995) estimated that monthly expenditure of Rs. 271 per person at current prices of 1990/91 was needed for meeting the basic needs (food, clothing, housing, health, education, transport, socialization and recreation) in rural areas.

Qureshi and Arif (1999) by using HIES survey data in 1998-99 prices on basic needs basis estimated a poverty line of Rs. 676.31 for rural areas of Pakistan. Subsequently, the estimated poverty lines for urban areas and Pakistan in general were Rs. 705.96 and Rs. 898.94, respectively.

Other Definitions (Relative Poverty Lines)

Akhter (1988) defined the poor as lower 10 percent of the population with lowest per capita expenditure on the basis of HIES survey data of 1979. A rural poverty line of Rs. 948 per person was established to differentiate between poor and non-poor while corresponding poverty line for urban areas was estimated to be Rs. 1260 per person.

Zaidi (1992) defined the relative poverty line for Pakistan as 75 percent of the national average expenditure. This poverty line was aimed at differentiation of those households

or individuals as poor, which were deprived of certain commodities or standard national consumption pattern prevalent in the society.

Monetary Measures of Poverty

The measurement of income poverty involves: 1) Specification of an indicator of well being such as income or expenditure; 2) Specification of an income level or threshold below which a person or household is considered poor – the poverty line; and 3) Construction of poverty measures. Foster-Greer-Thorbecke (FGT) class of measures is the most commonly used measure of poverty, which captures three aspects of poverty: incidence, depth/intensity and severity of poverty. These measures are Head Count Index, Poverty Gap Index and Squared Poverty Gap Index.

Head Count Index

Head Count Index is defined as the share or proportion of the population which is poor, or whose income is below the specified poverty line. This is a measure of incidence of poverty. Suppose in a population of size n, there are q number of poor people whose income y is less than the poverty line z, then the head count index can be defined as:

Head Count Index HC = q/n

Poverty Gap Index

Poverty Gap Index is defined as the mean distance, separating the population from the poverty line. This can be interpreted as a measure of depth of poverty. Non-poor are given a distance of zero. This measure can be mathematically represented as follows:

Poverty Gap Index

$$PG = \frac{1}{n}\sum_{i=1}^{n}\frac{z - y_i}{z}$$

Where z is the poverty line, yi is the income of the individual i or household i, and the sum is taken only on those individuals who are considered poor (below poverty line).

The poverty gap can also be defined as the product of the income gap and the Head Count Index ratio, represented as the following:

PG = I*HC, where I is the income gap

Where $I = \frac{Z - y_q}{Z}$ and $y_q = \frac{1}{q}\sum_{i=1}^{q} y_i$ is the average income of the poor.

Squared Poverty Gap Index

Squared Poverty Gap Index is a measure of the severity of poverty. The poverty gap takes into account the distance separating the poor from the poverty line, while the squared poverty gap $[PG]^2$ takes into account the square of the distance. The squared poverty gap index gives more weight to the poor; by taking into account the inequality among the poor greater weights are given to larger gaps and the weights are simply the poverty gaps. It is represented as follows:

Squared Poverty Gap

$$(PG)^2 = \frac{1}{n}\sum_{i=1}^{n}\left(\frac{z - y_1}{z}\right)^2$$

Both Poverty Gap Index and the Squared Poverty Gap Index put more emphasis on those who are further away from the poverty line. The general formula for all three measures is given below, which depends on parameter α, which takes a value of zero for the Head Count Index, one for the Poverty Gap Index and two for the Squared Poverty Gap Index

$$P(\alpha) = \frac{1}{n}\sum_{i=1}^{q}\left(\frac{z - y_1}{z}\right)^{\alpha}$$

The above measures can be analyzed for various socio-economic groups as well as for different geographic locations (e.g. within irrigation systems).

Sen Index

Sen (1976) proposed an index that sought to combine the effects of the number of poor, the depth of their poverty, and the distribution of poverty within the group. The index is given by:

$$P_s = P_o(1 - (1 - G^p)\frac{\mu^p}{Z})$$

where P0 is the head count index, μp is the mean income (or expenditure) of the poor, and G P is the Gini-coefficient of inequality among the poor. The Gini-coefficient ranges from 0 (perfect equality) to 1 (perfect inequality), and is discussed further below in the context of measuring inequality. The Sen index can also be written as the average of the head count and poverty gap measures weighted by the Gini-coefficient of the poor, giving:

$$P_s = P_o G^p + P_1(1 - G^p)$$

The Sen index has been widely discussed, and has the virtue of taking into account the income distribution among the poor. However, the index is almost never used outside the academic literature, perhaps because it lacks the intuitive appeal of some of the simpler measures of poverty, but also because it cannot be used to decompose poverty into contributions from different subgroups.

The Sen-Shorrocks-Thon Index

Scientists have modified the Sen index and perhaps the most compelling version is the Sen-Shorrocks-Thon (SST) index.

It is defined as:

$$P_{SST} = P_O P_1^p (1 + G)^P$$

which is the product of the head count index, the poverty gap index (applied to the poor only), and a term with the Gini-coefficient of the poverty gap ratios. This Gini-coefficient typically is close to 1, indicating great inequality in the incidence of poverty gaps.

Other Measures

There are other additive poverty measures, which are distribution sensitive. For example, the first distribution sensitive poverty measure was proposed by Watts (1968), and takes the form:

$$W = \frac{1}{N}\sum_{i=1}^{N} \log\left(Z / y_i\right)$$

Following Atkinson (1987), one can characterize a general class of additive measures, encompassing W, the FGT class of measures, and some other measures (such as the second measure proposed by Clark, Hemming and Ulph 1981), as taking the following form:

$$P = \frac{1}{N}\sum_{i=1}^{N} P(Z, y_i)$$

where p(z, yi) is the individual poverty measure, taking the value zero for the non-poor, (yi>z) and some positive number for the poor, the value of which is a function of both the poverty line and the individual living standard, non-decreasing in the former and non-increasing in the latter.

On Choosing the Yardstick (Poverty Line)

In general, there are two types of poverty lines used for estimating poverty, relative poverty line and absolute poverty line. Relative poverty line could simply be established by assuming some cut-off point in the welfare distribution (income or expenditures) below which lies the poor. For instance, lowest 25 percent of the population may be characterized as poor households or individuals. Unfortunately, though it is the simplest way of establishing a poverty line, it has certain drawbacks that constraints its usefulness. Most important is that there always exists a lower 25 percent of the population, no matter how good the whole population may be from the welfare point of view. Thus, it becomes impossible to compare poverty over time and space. Additionally, the use of welfare level of lowest 25 percent is totally arbitrary. It is difficult, if not impossible, to defend the use of lowest 30 percent or so instead of 25 percent of the population.

Absolute poverty line is obviously linked with some specific welfare level such as minimum money required to meet the minimum basic needs of life. It makes the comparison possible over time and space, and is preferable to relative poverty line in the context of developing countries. For developing countries, it is of particular interest to compare poverty incidence and its various dimensions over space and time.

On Data Requirement

Measurement of poverty incidence and other indicators, though, ought to be measured with respect to some common welfare measure. However, in practice, poverty is estimated using income or expenditure as measure of well being. In this regard, though

same poverty line is assumed, however, results estimated could differ due to inherent problem of these measures of well being. As long as the income is concerned, it is highly susceptible to the problem of under-reporting, which would lead to high estimates of incidence of poverty. On the contrary, there is a problem of exaggerated expenditure reporting on the part of individuals and households.

Similarly, even taking the same welfare measure for estimating incidence of poverty, in different countries with different surveys, the welfare measures differ from each other. Thus, even using the same poverty line for two countries would yield quite different results while keeping other things same. Moreover, comparison over time and space also becomes difficult when definition of poverty and poverty line changes. Even for the same poverty line, use of primary and secondary data would yield different results. Thus, the use of primary or secondary data set is solely according to the reliability, which normally lacks in the official statistics of the developing countries.

Conclusions and Implications

- Over time, poverty incidence is fluctuating in Pakistan.
- Poverty is higher in rural areas as compared to urban areas.
- It is difficult to define poverty precisely. The researchers used various definitions of poverty over time.
- It is difficult to compare the estimates of poverty over time because various poverty lines have been used for estimating the figures.
- Different poverty lines used owe their variation from selection of the approach used i.e. basic need, calorie intake, relative poverty line, etc.
- For different approaches to estimate the incidence of poverty, data requirement differs.
- Variation in sources of data also leads to significant variation in the results of poverty incidence.
- Applying one dollar a day poverty line shows that poverty in Pakistan is higher as compared to many other Asian countries.
- A relative low Gini-coefficient estimate for Pakistan, as compared to other Asian countries, show relatively lower level of inequality in income/expenditure distribution.

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TECHNICAL SESSION II:
IRRIGATION SYSTEM PERFORMANCE AND POVERTY

COMBATING POVERTY THROUGH FARM LEVEL WATER MANAGEMENT

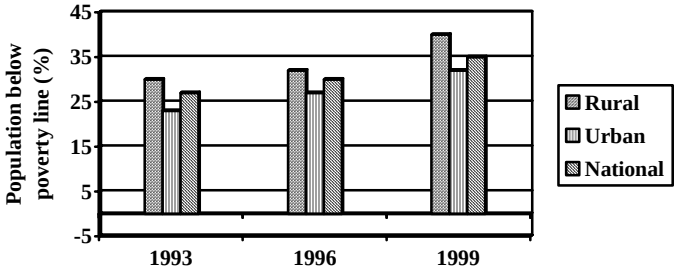
Mushtaq A. Gill[1]

Poverty Situation

There is general consensus that rapidly declining poverty trends during the 1980s reversed in the beginning of the 1990s and continued to scale up in Pakistan. It is being argued that this destitution is likely to persist due to the current trends of Pakistan economic performance and may become a permanent gesture of the nation. Poverty has emerged as a major challenge constraining the economic development of the country. Poverty has mainly concentrated in rural areas of the country, which are diverse in terms of climate, land fertility, availability of irrigation water, level of integration with urban sector, population growth and skill levels. The Government of Pakistan is preparing National Poverty Alleviation Strategy.

In spite of the government efforts to revamp the agriculture sector through land reforms, providing subsidies to encourage the use of fertilizers and plant protection services, encouraging farm mechanization, introduction of Green Revolution, and improving irrigation water availability, the poverty has increased in rural areas. The reason for this trend could be the terms of trade favorable for industrial sector, greater income inequality, and poor incentives for small farmers. It is documented that poverty has increased from 27 percent in 1993 to 35 percent in 1999. As rural population is dependent upon agriculture for their livelihood, the performance of agriculture sector directly relates to poverty trend in rural areas. The development in agriculture sector with aim to improve farm productivity may help in poverty alleviation in rural community.

Povety Trend in Pakistan



Agriculture is the mainstay of Pakistan's economy that contributes 25 percent of GDP. Besides, it provides employment to over half of the country's labor force and supports directly or indirectly about 70 percent of the population. Agriculture and agro-based

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products account for 80 percent of the nation's total export earnings other than being a source of raw materials for domestic, industrial and household requirements.

The 'Green Revolution Technologies' introduced in Pakistan during mid 60s and 70s led to dramatic increase in the yields and production of wheat and rice, the two most important staple food grains. These crops occupy 54 percent of the total world's area planted to cereals and provide 41 percent of the calories consumed by over six billion people around the globe. In the first decade of Green Revolution, grain production grew rapidly mainly due to high yielding varieties (HYV) and increased cropped area. Afterwards, the land devoted to rice and wheat was stabilized and since then there has been almost no scope for further expansion in area for these crops.

Challenges to Agriculture

Evidence is accumulating that growth in rice and wheat yields has begin to slow down in the high potential agricultural areas of Pakistan. This may have resulted from degradation of the resource base devoted to rice-wheat systems. The factors which stalled the Green Revolution are mining of soil nutrients, declining organic matter, increasing salinity, fluctuating watertable, and buildup of weed infestation and pest population. Another important element in stagnation of productivity could be traditional way of cultivation leading to heavy tillage. Contrarily, population of Pakistan is increasing at an annual rate of over two percent. These conflicting realities, i.e. declining rate of production and increasing population growth, are serious concerns for all of us.

Water Resource Constraints

As population grows, dependence on irrigation increases for meeting food requirements. This places extraordinary stress on freshwater systems, particularly in arid and semi-arid regions. In addition, freshwater ecosystems are being intensely modified and degraded by human activities. So much water is consumed for domestic, industrial and agricultural uses that the natural flow of major rivers, such as Colorado, Yellow, Indus, and Amu Darya, no longer reach the sea during dry season.

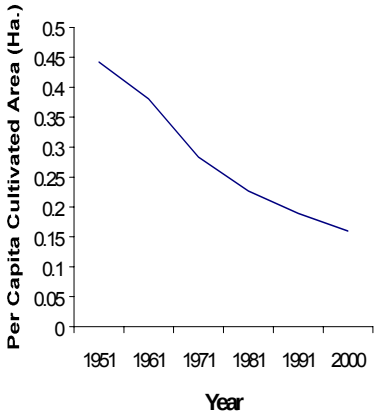
New estimates of water scarcity calculated by the World Resources Institute in collaboration with the University of New Hampshire show that 2.3 billion people live in river basins under water stress with annual per capita water availability below 1,700 m^3. Of these, 1.7 billion people reside in highly stressed river basins where water availability falls below 1,000 m^3 per capita annually and chronic water shortages threaten food production and hinder economic development. Assuming that current consumption patterns will continue, at least 3.5 billion people or 48 percent of the world's projected population will live in water-stressed river basins by the year 2025. Water is, therefore, certain to remain major topic of discussion and will be a perennial agenda at global gatherings of resource conservation and environmental policy makers during coming years. As such, it is highly important to develop better understanding for water scarcity and its trend in future. It is also necessary to consider possible strategies based on increasing water productivity (crop per drop) leading to efficient management of the scarce water resources.

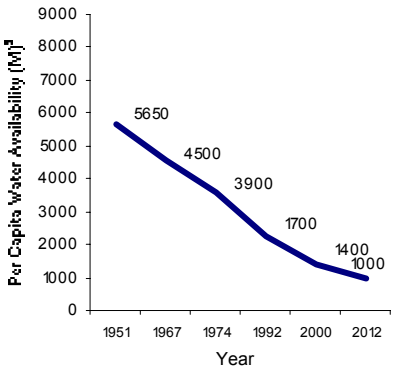
Canal Water Availability

Pakistan has the largest single contiguous gravity flow irrigation system in the world. The country is, however, facing serious water crises due to persistent drought condition in the last three years. This has resulted from highly lesser rainfall from the normal triggered mainly due to disturbance in main weather system responsible for generating water resources of the area. Water shortage registered during the last 3-4 years was as high as 40-50 percent. The total inflow of western rivers during Kharif season fell to 75.78 million acre feet (MAF) in 2001 from 116.05 MAF in 1998, while in Rabi season it dropped to 15.45 MAF in 2001-02 from 22.55 MAF in 1998-99. The total inflow of western rivers fell to 91.23 MAF in 2001-02 from 159.10 MAF in 1992-93. Resultantly, canal withdrawals in the Punjab during Rabi season fell to 9.78 MAF in 2001-02, which were more than 20 MAF from 1992-93 to 1995-96. The canal water deficit in the province usually remained around 1.99-5.74 MAF before the beginning of water crises. On the basis of current water shortages and rapidly increasing future demands, the experts have foreseen that this situation would simply be unsustainable for the agriculture and national economy.

Need to Conserve Agricultural Resources

The population of Pakistan was only 50 million in 1960 but it has increased to 156 million during the last four decades i.e. almost three times. Resultantly, per capita land availability has been declined from 1.59 to 0.50 hectares during this period. Similarly, per capita agricultural land availability has been reduced from 0.44 to 0.17 hectares during the last 40 years. Likewise, per capita water availability has also reduced from 5,650 m^3 to 1,400 m^3 during this period.





Agriculture in Pakistan has generally performed well and it grew by more than three percent a year for the past 40 years. Sources of growth, however, remained changing over the years from introduction of improved seeds, use of chemical fertilizers, and development of irrigation facilities during 1960s, to intensification of water and fertilizer use in the 1970s, and improvements in crop management and incentives in the

1980s. Although progress made in the past has been quite impressive but a careful look suggests that the momentum is running out. Stagnation in productivity is mainly due to factors such as resource degradation, failure to adapt technological changes and poor incentives. There is no chance of a significant increase in total cultivable land and irrigation infrastructure. At best, a 10 percent expansion in water resources can be expected, that too at exorbitantly huge costs.

The growth in the future will have to be achieved through increased productivity by making more efficient use of limited resources. There is a pressing need to ensure efficiency and sustainability in utilization and management of the two most important natural resources i.e. irrigation water and arable land. There are good prospects for enhancing productivity of all major crops, particularly that of wheat and rice by about 30-50 percent.

Majority of researches propose that developing countries should favor an agro-ecological model such as Conservation Agriculture which emphasizes biodiversity; recycling of nutrients; synergy among crops, animals, soils, and other biological components; and regeneration and preservation of natural resources. For example, 'more you till, more you harvest' phenomenon will remain no more sustainable. The priorities and options will, therefore, have to be re-fixed.

The trade policies in the past were conducive for developing countries allowing liberal marketing of their agricultural products in the world market. It will, however, become difficult for these countries to remain competitive in export markets after implementation of WTO policies because of their lower productivity levels viz-a-viz developed nations. Ways and means will, therefore, have to be adopted to lower the cost of production and enhance productivity simultaneously. The immediate available option is that of adoption of new resource conservation technologies, which offer both of these opportunities.

The above facts reveal that an abrupt change is needed for adoption of new technologies for crop production by making efficient use of available natural resources. Otherwise, it will become extremely difficult to fulfill food demand of the population of this region. The best option for effective utilization of resources and increasing productivity is adoption of resource conservation technologies.

Conservation Agriculture - An Option for Poverty Alleviation

Conservation Agriculture is an approach for the design and management of sustainable and resource-conserving agricultural system. It seeks to conserve, improve and make more efficient use of natural resources through integrated management of available soil, water, crop and other biological resources in combination with selected external inputs. It represents a resource saving and efficient/effective agriculture, which contributes to environmental conservation, and at the same time, enhances production on sustainable basis. Elements of Conservation Agriculture, inter alia, include organic soil cover, improved on farm water management, minimum tillage, direct seeding through the crop residue, and appropriate crop rotations to avoid disease and pest problems. Adoption of resource conservation technologies helps in improving input use efficiency and productivity leading to better farm returns for uplifting living standards of rural community.

Resource Conservation Technologies

The best option for effective utilization of resources and increasing productivity is adoption of resource conservation technologies, which do not pose threat to natural resources. Effective linkages, however, should be established for transfer of these innovations to the user community.

A resource conservation technology package has been developed for efficient utilization of available resources as described hereunder.

Watercourse Improvement

Tertiary irrigation conveyance network in Pakistan is called watercourses. These are community channels off-taking from government controlled irrigation system. The watercourses are operated and maintained by the shareholders receiving water through these channels. A watercourse commands an area of about 150-250 hectares and is shared by 40 to 50 farm families. Studies have indicated that about 40 percent of irrigation water is lost during its conveyance through country's about 135,000 watercourses because of their aging and deteriorated conditions.

Improvement of the watercourse consists of complete demolishing of community channel and it is rebuilding/re-aligning according to the engineering design with clean compacted soil. Parts of reconstructed channel are lined and necessary water control structures are installed to improve conveyance of irrigation water. All these works are carried out through active participation of the beneficiary farmers who contribute entire skilled and unskilled labor in addition to sharing 20-30 percent of the material costs. Starting with improvement of 1,330 watercourses under the Pilot Project, over five year's period, almost 40 percent of total watercourses of Pakistan have so far been improved.

Various studies and previous experience of watercourse improvement has shown that on an average, annual water saving in an improved watercourse is about 240 acre feet besides other socio-economic benefits. Some of the same are given in Table 1.

Statistics reveal that farmers with small and medium holdings have benefited more from watercourse improvement so far (Table 2), which has contributed in poverty alleviation in rural areas.

Table 1: Major benefits of watercourse improvement.

S. No.	Description	% age
1	Time saving in irrigation time	28%
2	Labor saving	50%
3	Increase in cropping intensity	23%
4	Increase in cropped area	17%
5	Increase in yield	16-37%
6	Increase in net farm income	20%

Table 2: Composition of beneficiaries from watercourse improvement.

Landholding (Ha.)	Total Area (Ha.)	No. of Beneficiaries	% of Beneficiaries
0 - 2	65,735.63	50,180	50.88
2 - 5	96,097.16	29,026	29.43
5 - 10	90,785.42	13,537	13.73
> 10	100,867.61	5,882	5.96
Total	353,485.82	98,625	100.00

Laser Land Leveling

Precision Land Leveling, another resource conservation technology, was introduced on an area of about 28,000 acres under the Pilot Project during 1976-80. About 500,000 acres have been precisely leveled in the country so far. Initially, bucket type soil scrappers were used for precision land leveling, which have now been replaced by laser beam guided automatic Scrappers for more precision in land leveling work. Impact assessment studies conducted (Abdul Sattar et al., 2001) reveal following benefits of precision land leveling.

- Curtailment in irrigation application losses upto the extent of 25 percent.
- Reduction in labor requirements for irrigation by about 35 percent.
- Enhancement in the irrigated area by about two percent by brining the number as well as length of field ditches and dikes to a minimum.
- Increase in the crop yields by about 20 percent.

To assess the adoption rate of precision land leveling among various farmer categories, an analysis was carried out for 7,565 beneficiaries of the technology. The data revealed that 80 percent of the farmers benefiting from this technology were having small landholdings (Table 3) and adoption of the technology helped in improving input use efficiency and crop yields and uplifting living standards of farming community.

Table 3: Composition of beneficiaries of precision land leveling technology.

Landholding (Ha)	Total Area (Ha)	No. of Beneficiaries	% of Beneficiaries
1 – 5	29,365.2	6,052	80
5 – 10	5,138.9	1,060	14
> 10	2,202.0	453	6
Total: -	36,706.1	7,565	100

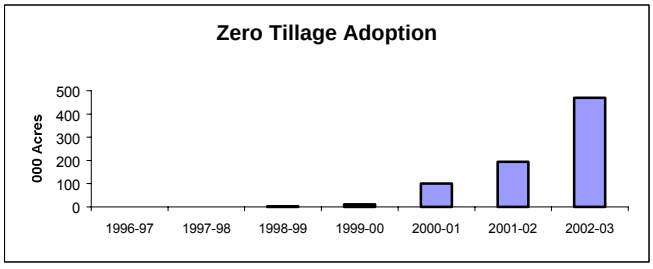
Zero Tillage Technology

Main reasons for low yields of wheat include late maturing of long-grain 'Basmati' rice variety sown in the region resulting in delayed wheat planting besides high cost of land preparation and other inputs. After rice harvest, sufficient residual moisture is generally available to establish new crop. Conventional tillage accelerates soil moisture evaporation and requires extra irrigation water for Rauni (pre-planting land soaking) to bring the field back to semblance of a seedbed. This causes major delays in wheat sowing, which ultimately affects final crop yields. Decreases in wheat yield at a rate of

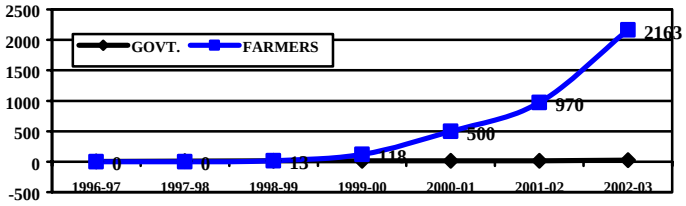
one percent every day due to delay in sowing after mid of November is well documented.

Minimum/Zero Tillage is an innovation that not only offers conservation of water and energy resources but also results in better crop yields. This technology was being practiced since long in many parts of the world and it was introduced in Pakistan during 1980s. Initial trials were confined to progressive and large farmers. Although, yields results were impressive but uptake of the technology remained limited. This was partly because of high cost of zero tillage seed drills and their limited availability, besides general apprehension of the farmers about the new technology. It could, therefore, not be popularized among the farming community in spite of a lot of its benefits.

On Farm Water Management (OFWM) took responsibility of its introduction amongst the farmers during 1996-97. This time, small farmers were targeted by making simple and locally manufactured relatively cheap drills commercially available. Wheat was grown on only 50 acres at 12 sites with five government-owned zero tillage drills during 1996-97. The technology was readily accepted by the farmers due to its contribution in reducing cost of production, conservation of resources, and improving yields. The area under zero tillage increased exponentially over a five-year (1997-2002) period. Wheat was grown with this technique on an area of about 470,000 acres (190,000 ha) in Pakistan during 2002-03, and presently, there are more than 2100 zero tillage drills owned by farmers.



Number of Zero tillage Drills



Years

Research studies carried out during past five years indicate the following benefits of zero tillage technology:

- saves cost of cultivation to the tune of Rs. 750 to 950 per acre
- saves irrigation water by 20 percent
- reduces use of diesel by 22 liters per acre

- allows early sowing of wheat by at least 5-15 days
- increases plant population upto 22 percent
- decreases weed infestation by 40 percent
- enhances microbial activities in the soil
- accelerates decay process of stubble
- improves soil fertility
- enhances fertilizer use efficiency
- increases grain yield upto 33 percent

Bed Planting Technology

Bed and Furrow planting technology permits growing of crops on beds with less water. This technique has been tested for various crops on limited scale and has proved quite successful. Wheat was grown on 137 acres during 1999-2000 with only four bed planters that expanded to 411 acres during 2000-2001. There are now 20 such machines with farmers. The technique is also being evaluated for rice production in farmers' fields this year. It has potential to be the technology of the future as its adoption can make it possible to grow more rice with less water.

Some of the advantages associated with furrow-bed technology of crop production are as follows:

- savings of about 30 percent irrigation water
- reduced chances of plant submergence due to excessive rain or over-irrigation
- lesser crusting of soil around plants and, therefore, suitable for saline and sodic soils
- adaptable for various crops without changing basic design/layout of farm
- enhanced fertilizer use efficiency due to local application
- minimizes the chances of crop lodging

Higher Efficiency Irrigation Technology

In barani and desert areas, water being the most scarce resource demands that it must be used most judiciously without wasting a single drop of it. In most of the barani areas, the land is undulating and gravity flow irrigation from tubewells and other sources is not possible, while at other locations like deserts, where soil is sandy, gravity irrigation results in significant water wastage due to seepage. These areas, having rich and fertile land, if provided efficient irrigation system, have a potential of increasing crop production by two to three folds. At such locations, higher efficiency irrigation systems like drip/trickle, portable rain gun units or multi-sprinklers, hand moved systems can be used for raising high value crops. The department of On Farm Water Management (OFWM) has completed 65 micro irrigation schemes in barani areas. Some of the major benefits of the same are given below:

- better application and distribution efficiencies
- adoptable under undulated areas
- allow judicious and efficient utilization of scarce water resources

Recommendations

- Resource Conservation Technologies like watercourse improvement, precision land leveling, higher efficiency irrigation techniques, zero tillage, bed and furrow planting, etc., may be promoted at an accelerated pace to combat drought crisis.
- Research, education, extension and water resource management institutions may be further strengthened and linked for knowledge/information sharing for efficient conservation, management and development of resources.
- Capacity building of staff involved in development and promotion of resource conservation technologies may be carried out through exchange visits among the provinces for sharing their experiences.
- More emphasis may be provided on mass awareness and participatory approach in planning and decision making for sustainable agriculture.
- Cost effective applications of conservation agriculture techniques may be developed for various ecological regions, marginal lands, and deteriorating groundwater resources.
- Socio-economic and environmental issues may be studied and mitigating methods and technologies should be developed to promote conservation agriculture in the region.

POVERTY ACROSS VARIOUS CANAL COMMANDS IN IRRIGATED PUNJAB, PAKISTAN

Muhammad Muddasser, Waqar A. Jehangir, Intizar Hussain and Muhammad Ashfaq[1]

Abstract

Agricultural income occupies significant share of rural households' income. Only ample and reliable supplies of surface irrigation water can guarantee its improvement. As poverty is inversely correlated with improvement in incomes, provided other factors remain the same, the policy makers can use irrigation as a tool in poverty reduction programs. The inequity in surface water distribution not only affects the rural households across different irrigations but also influences the distribution of income and poverty situation in different reaches of each irrigation system. Since long, it is asserted that households in the tail reach areas have relatively poor access to irrigation water as compared to those situated in the head and middle reach areas. It is evident that more distance from irrigation source brings more households in the poverty trap are located at the tail reach area. Here, the intensity of poverty would be higher than in the head and middle reach areas. This paper tests this hypothesis with results showing that poverty increases in the tail reach areas as compared to head and middle reach areas. This calls for the need to address current hurdles exercising equity and reliability in irrigation supplies in order to provide this vital input for increasing agricultural productivity of the tail end farm households.

Introduction

Agriculture sector is a dominant sector of Pakistan, which contributes 25 percent of the gross domestic product (GDP) by employing around 44 percent of the country's labor force. Around 67 percent of Pakistan's population resides in rural areas (GoP 2001). Uplifting the living standards of the rural area means improvement for majority of the country's population.

Agriculture sector is essentially the producer of food and fiber requirement of the population. With constant population increase, this sector is facing stress regarding to optimally use of available resources for higher production. Yet, this objective can only be achieved through efficient use of land and water resources. With very limited options of expanding the agricultural land, the burden is shifted on efficient use of available irrigation water to increase productivity through most efficient use of every drop of available irrigation water for uplifting the welfare of the rural population.

Surface water plays vital role in increasing the productivity of farmers while the deficiency is met through extraction of groundwater when and where it is needed to augment the irrigation water supplies. However, groundwater quality does not allow the

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farmer to explore the full benefits of ample and reliable water supply by relatively lower productivity gain through its use as compared to the surface water supplies. It is already established that surface water supply is experiencing inequities and unreliability which hinders the farmers to exploit its benefits in a fully efficient manner. However, in the face of all these problems, the surface water supplies play a significant role in achieving higher productivity standards.

As higher productivity is synonyms to higher income and increasing capability of the farm households to spend more on fulfilling the basic necessities of the family members, irrigation water plays crucial role in ascertaining the welfare level of the households. It has been experienced that incidence of poverty is higher in rural areas of Pakistan (Arif et al. 2001). The inequity in surface water supplies has increased the scarcity of irrigation water across different irrigation systems as well as at different reaches within each system. This resulted in variation in agricultural productivity, income, and poverty incidence.

Poverty has diverse dimensions. In depth, exploration of these dimensions is always useful in understanding the phenomenon of poverty and differentiating between myths and realities attached with it. Incidence of poverty is directly dependent on income/expenditure of the households, which are not constant over all the months in a year. Moreover, good or poor harvest in different years is due to various agro-climatic and management factors. Income/expenditure dimension fluctuates over times and so does the incidence of poverty. It is also empirically established that incidence of poverty varies across different areas. Keeping in view of these facts, incidence of poverty and its relationship with variation in access to surface water supplies is explored in this paper for better comprehension of the phenomenon, which would lead to suggestions/policy implications for poverty reduction.

The paper is divided into six parts. General results are discussed in part III of the paper while in part IV, concentration is made on assessing the determinants of poverty. Part V comprises the conclusions and implications made on the basis of the current study.

Methodology

Study Area

The study is being conducted in sample areas of the Upper Chaj Doab (comprising Gujrat and Mandi Bahauddin districts) irrigated by Upper Jehlum Canal (UJC), Lower Chaj Doab (comprising Sargodha district) irrigated by the Lower Jehlum Canal (LJC), Rechna Doab (comprising Jhang and Toba Tek Singh districts) being irrigated by the Lower Chenab Canal (LCC) East and tail part of the Hakra irrigation system (comprising Bahawalnagar district) irrigated by the Hakra canal system (Figure 1). The total geographic area of the Chaj Doab, Rechna Doab and Hakra area is reported to be 1.2 million hectares, 2.98 million hectares and 20,000 hectares, respectively. The salient features of irrigation system in the study area are shown in Table 1.

A stratified random sampling design was used to select the sample households in the study areas. The irrigated areas were divided into the following 5 irrigation systems:

1. UJC System 2. Gujrat System 3. LJC System 4. LCC System 5. Hakra System

Figure 1: Location of Chaj Doab, Rechna Doab and Hakra Area in Punjab, Pakistan.

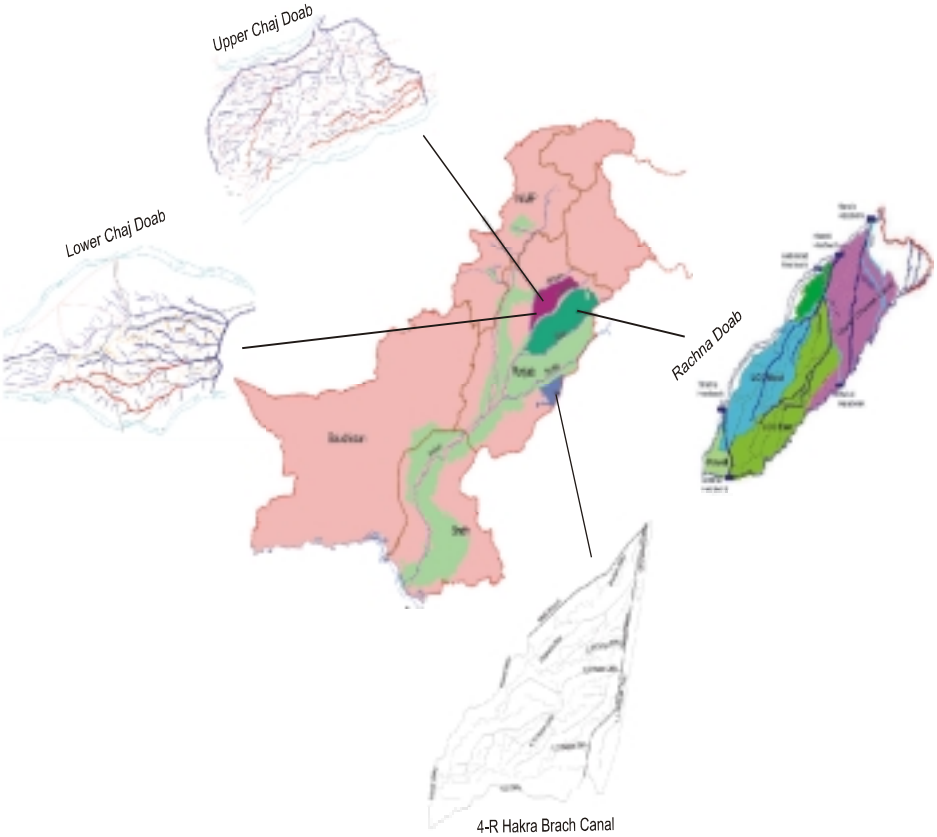


Table 1: Salient features of the selected irrigation systems in the study area.

System	Name of Distributary	Perennial/Non Perennial	GCA (100 ha)	CCA (100 ha)	Length (Km)	Outlets	
						Number	Discharge (Cusecs)
UJC System	9-R	P*	61.9	59.5	10.24	29	39
	10-R	P	45.3	43.7	11.05	23	25
	13-R	NP**	30.4	28.7	13.81	18	26
	14-R	NP	241.6	221.8	47.94	135	193
Gujrat System	Kakowal	P	97.9	92.7	38.68	50	84
	Phalia	NP	299.1	269.1	75.24	152	289
LJC System	Lalian	P	486.4	444.8	59.80	195	351
	Khadir	P	520.0	474.3	89.05	166	235
LCC System	Khikhi	P	419.7	329.4	53.30	158	341
Hakra System	Hakra 4-R	P	201.9	178.5	36.08	131	189

*P=Perennial
**NP=Non-perennial

These systems were irrigated through Upper Jehlum Canal (UJC), Gujrat System, Lower Jehlum Canal (LJC), Lower Chenab Canal (LCC) East and Hakra 4-R, respectively. Since there were variations in irrigated systems in terms of cropping patterns and nature of perennial and non-perennial irrigation water supplies, therefore at the second stage, distributaries were selected on the basis of the agro-ecological characteristics based on cropping patterns, nature of water supplies (perennial/non-perennial) and location of the watercourses across head, middle and tail of the distributary. The selected areas of distributaries were homogenous in terms of these characteristics. The Upper Jehlum Canal (UJC) sub-system was divided into six distributaries, with two distributaries (9-R and 10-R) having rice-wheat as dominant cropping pattern with perennial irrigation supplies, and 13-R and 14-R having rice-wheat pattern with non-perennial supplies. Sugarcane, rice and wheat were main crops grown in command areas of Kakowal and Phalia distributaries. Irrigation supplies in these distributaries were perennial in nature. Lalian, Khadir and Khikhi distributaries had mixed-wheat cropping pattern and received perennial irrigation supplies. The Hakra 4R distributary had cotton-wheat cropping pattern and received perennial irrigation system. While each distributary was fairly homogenous within its boundaries in terms of above characteristics, however, there could be intra-distributary variations especially in terms of access to water (head, middle and tail) due to differences in availability of water resulting from location differences. These intra-distributary variations were captured through sampling across head, middle and tail within a distributary.

Households from each of the selected watercourses were selected through systematic random sampling from a complete sampling frame for each watercourse (i.e. list of all households on the watercourse). Landless households were drawn from the voters' list through systematic random sampling based on their proportion in total number of households on each selected watercourse. Equal allocation method was adopted for selecting distributaries and watercourses across head, middle and tail reaches of the selected distributaries and the sample households across each of the selected watercourses. A well-represented sample of 1224 households was selected for collecting information from the field through a well-designed pre-tested questionnaire. In case of first six distributaries in Gujrat and Mandi Bahauddin districts altogether, 540 households were selected along 36 watercourses located on the head, middle and tail areas. In each of the first six distributaries in irrigated areas, about 90 households were selected from every selected distributary in a way that equal number of 30 households from head, middle and tail reaches of the distributary was attained. In the case of last four distributaries (i.e. Lalian, Khadir, Khikhi and Hakra 4-R), about 171 households were selected from each distributary in such a way that equal number of households was interviewed from three watercourses of the head, middle and tail reaches of distributaries.

Monetary Measures of Poverty

Different measures of poverty are: 1) specification of an indicator of well being such as income or expenditure 2) specification of an income level or threshold below which a person or household is considered poor – the poverty line; and 3) construction of poverty measures. Foster-Greer-Thorbecke (FGT) class of measures is the most commonly used measure of poverty, which captures three aspects of poverty: incidence,

depth/intensity and severity of poverty. These measures are more commonly known as the Head Count Index, the Poverty Gap Index, and the Squared Poverty Gap Index.

1. Head Count Index is defined as the share or proportion of the population which is poor, or whose income is below the specified poverty line. This is a measure of incidence of poverty. Suppose in a population of size n, there are q number of poor people whose income y is less than the poverty line z, then head count index can be defined as:

Head Count Index HC = q/n

2. Poverty Gap Index is defined as the mean distance separating the population from the poverty line. This can be interpreted as a measure of depth of poverty. Non-poor are given a distance of zero. This measure can be mathematically represented as follows:

$$\text{Poverty Gap } PG = \frac{1}{n}\sum_{i=1}^{n}\frac{z - y_i}{z}$$

where z is the poverty line, y_i is the income of the individual i or household i, and the sum is taken only on those individuals who are considered poor (below poverty line).

The poverty gap can also be defined as the product of the income gap and the Head Count Index ratio, represented as follows:

PG = I*HC, where I is the income gap

Where $I = \frac{Z - y_q}{Z}$ and $y_q = \frac{1}{q}\sum_{i=1}^{q} y_i$ is the average income of the poor.

3. Squared Poverty Gap Index is a measure of the severity of poverty. The poverty gap takes into account the distance separating the poor from the poverty line, while the squared poverty gap $[PG]^2$ takes into account the square of the distance. The squared poverty gap index gives more weight to the poor by taking into account the inequality among the poor—greater weights are given to larger gaps and the weights are simply the poverty gaps. It is represented as follows:

$$\text{Squared Poverty Gap } (PG)^2 = \frac{1}{n}\sum_{i=1}^{z}\left(\frac{z - y_1}{z}\right)^2$$

Both Poverty Gap Index and the Squared Poverty Gap Index put more emphasis on those who are further away from the poverty line. The general formula for all three measures is given below, which depends on parameter α, which takes a value of zero for the Head Count Index, one for the Poverty Gap Index and two for the Squared Poverty Gap Index.

$$P(\alpha) = \frac{1}{n}\sum_{i=1}^{q}\left(\frac{z - y_1}{z}\right)^{\alpha}$$

The above measures can be analyzed for various socio-economic groups and for different geographic locations (within irrigation systems).

For the poverty analysis, a rural poverty line of Rs. 676.31 per capita was used, which was established by Qureshi and Arif (1999) by using HIES survey data in 1998-99 prices on basic need basis. This was inflated to the prices of 2001, which resulted as inflated poverty line of Rs.730.78 per person. It should be noted that this poverty line in terms of money is almost equal to official poverty line as announced by the Government of Pakistan. Additionally for sensitivity analysis, another poverty line was used as Rs. 530.78 per person.

Results and Discussions

Monetary measures of poverty were estimated for the study area, which constitute ten distributaries spread over five different districts of Punjab, representing different physical, hydrological, agricultural, socio-economical, and institutional characteristics. The poverty head count, poverty gap, and squared poverty gap estimates were employed in order to fully analyze the current status, depth, and severity of the poverty across different reaches of the individual distributaries as well as for the study area as a whole. The analyses were aimed at understanding the extent and distribution of poverty due to variation in irrigation water supplies. For this purpose, two different poverty lines were used to estimate poverty, i.e. Rs. 730 per capita per month (PL-I) and Rs. 530 per capita per month (PL-II). Poverty estimates were computed on the basis of household expenditure instead of income due to generally accepted opinion that expenditure is a better reflector of the household's financial and economic position than income. The household expenditure approach is also used to circumvent under-reporting problem of income, which raises more concerns than exaggeration on the part of expenditures.

Spatial Dimension of Poverty across Irrigation Systems

It is important to analyze the various dimensions of poverty across different irrigation systems and reaches in order to develop in depth understanding of why poverty is high in command areas and reaches of some distributaries and less in others. Since the income of rural farm households is directly dependent on efficiency and reliability with which surface water is supplied by the irrigation systems, poverty is expected to vary across different reaches (head, middle, and tail reaches) of individual irrigation systems.

Table 2 indicates that by using poverty line-I, overall comparison of poverty incidence at different reaches of the distributaries revealed that lowest number of poor households resided in the middle reach of the distributaries while highest head count poverty estimates were computed for head reach of the distributary. The overall incidence of poverty was estimated as 55, 58.9, and 62.9 percent for middle, tail, and head reach areas, respectively. Higher incidence of poverty in the head reach was due to high dependency ratio. At the head reach, highest poverty incidence is shown at Khikhi and Khadir distributaries where 81 and 77 percent of the household were poor, respectively. Across the head reach, the lowest poverty incidence was 37 percent, which was estimated for Kakowal distributary. In the middle reach areas, the highest incidence of poverty was 70.2 percent, again for Khadir distributary, while lowest was 37 percent, computed for 14-R Maggowal distributary. In the tail reach, highest head count poverty

estimate was 86 percent in case of Khadir distributary while lowest was 27 percent for 10-R Dhup Sari distributary.

Table 2: Estimates of poverty head count across different reaches at distributaries-based on annual expenditure.

	PL-I = Rs. 730 per capita per month			PL-II = Rs. 530 per capita per month		
Distributaries	Head	Middle	Tail	Head	Middle	Tail
	Poor	Poor	Poor	Poor	Poor	Poor
9-R Khoja	0.484	0.379	0.400	0.226	0.207	0.167
10-R Dhup Sari	0.444	0.500	0.267	0.222	0.367	0.100
13-R Saroki	0.400	0.571	0.290	0.167	0.250	0.226
14-R Maggowal	0.600	0.367	0.567	0.333	0.233	0.300
Phalia	0.633	0.464	0.393	0.367	0.214	0.250
Kakowal	0.367	0.586	0.345	0.200	0.276	0.207
Lalian	0.696	0.509	0.698	0.536	0.456	0.566
Khadir	0.768	0.702	0.855	0.679	0.579	0.800
Khikhi	0.807	0.526	0.737	0.614	0.439	0.596
Hakra 4-R	0.684	0.684	0.750	0.596	0.526	0.614
Table Total	0.629	0.550	0.589	0.450	0.396	0.450

By using PL-II, it was found that overall incidence of poverty was estimated to be 39.6 percent for the households at the middle reach areas while it was computed 45 percent for both head and tail reach areas. In the head reach, highest poverty incidence was estimated to be 68 percent for Khadir distributary while lowest (16.7 percent) was found in 13-R Saroki distributary. In the middle reach, lowest incidence of poverty was computed to be 20.7 percent for 9-R Khoja distributary while highest was 58 percent in case of Khadir distributary. Similarly, lower head count estimate was calculated for 10-R Dhup Sari distributary (10 percent) while a higher estimate was observed in the tail reach areas of Khadir distributary as 80 percent.

The comparison of estimates based on PL-I and PL-II shows that at head reach, the highest decline in head count poverty was observed 26.7 percent in case of 14-R Maggowal distributary while lowest reduction of 8.8 percent was estimated for Hakra 4-R distributary, indicating that more households at 14-R Maggowal distributary close to the poverty line would be able to shift above the poverty line if a productive push is provided to them. In the middle reach areas, the comparison of PL-I and PL-II estimates showed the probability of the highest decline in poverty to be 32 percent in case of 13-R Saroki distributary while lowest was computed to be 5.3 percent for Lalian distributary. Similarly, in the tail reach areas by comparing the estimates computed through PL-I and PL-II showed that the highest decline of poverty is possible (26.7 percent) for the command area of 14-R Maggowal distributary while lowest estimated (5.5 percent) was found for Khadir distributary. Overall comparison of incidence of poverty across head, middle and tail reach areas is shown in Figure 2 and spatial distribution of head count poverty across distributaries is revealed in Figure 3 and Figure 4 by using poverty line I and poverty line II, respectively.

Table 3 compares the poverty gap across different reaches of the distributaries by employing poverty line-I. It shows that depth of poverty was higher in tail reach areas (44.1 percent) while the lowest was prevailing in the middle reach areas (38.9 percent). However, there was significant variation among different distributaries at head, middle and tail reach from their respective overall estimates as a whole. At head reach, the highest poverty gap was estimated to be 51.2 percent for Hakra 4-R distributary while the lowest was computed to be 26.5 percent for 13-R Saroki distributary.

Figure 2: Head count poverty according to location by using PL-I and PL-II.

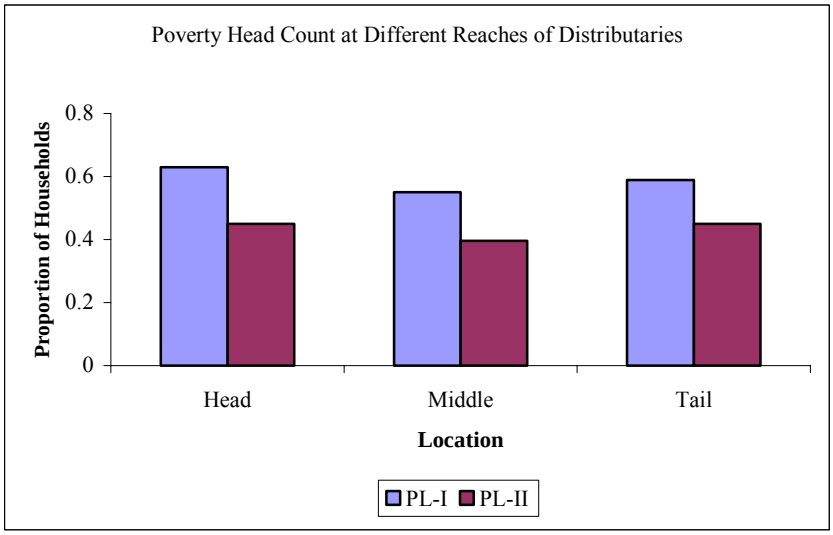


Figure 3: Head count poverty according to location at distributaries by using PL I.

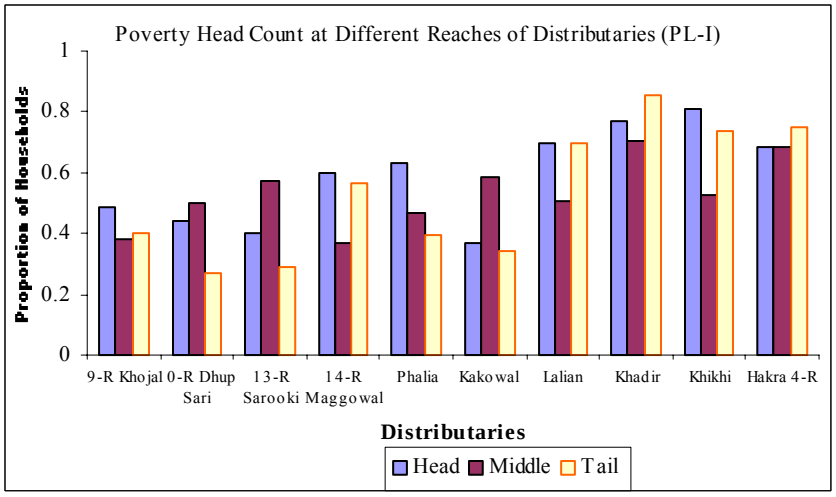


Figure 4: Head count poverty according to location at distributaries by using PL-II.

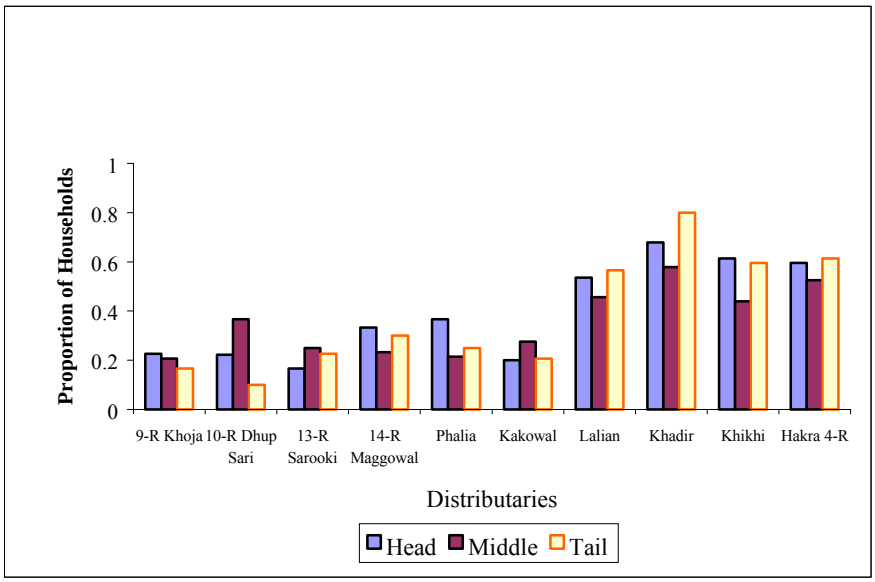


Table 3: Estimates of poverty gap and squared poverty gap across different reaches at distributaries - Indices based on annual expenditure (PL-I).

	PL-I = Rs. 730 per capita per month							
Distributaries	Head		Middle		Tail		Total	
	Poverty Gap	Squared Poverty Gap	Poverty Gap	Squared Poverty Gap	Poverty Gap	Squared Poverty Gap	Poverty Gap	Squared Poverty Gap
9-R Khoja	0.307	0.130	0.270	0.092	0.257	0.094	0.281	0.108
10-R Dhup Sari	0.271	0.110	0.361	0.149	0.259	0.089	0.307	0.122
13-R Saroki	0.265	0.112	0.237	0.074	0.338	0.126	0.270	0.099
14-R Maggowal	0.271	0.102	0.315	0.120	0.298	0.125	0.291	0.115
Phalia	0.293	0.113	0.258	0.108	0.303	0.108	0.285	0.110
Kakowal	0.296	0.111	0.291	0.118	0.346	0.166	0.307	0.129
Lalian	0.458	0.256	0.429	0.210	0.478	0.269	0.457	0.248
Khadir	0.509	0.285	0.447	0.231	0.549	0.334	0.504	0.286
Khikhi	0.446	0.236	0.466	0.247	0.469	0.259	0.459	0.247
Hakra 4-R	0.512	0.294	0.458	0.255	0.486	0.279	0.485	0.276
Table Total	0.413	0.214	0.389	0.190	0.441	0.239	0.415	0.215

Poor households at the middle reaches required an additional 39 percent of income to fill the poverty gap. The highest poverty gap prevailed in Khikhi distributary, which was 46.6 percent, while the lowest, 23.7 percent, appeared of 13-R Saroki distributary. At tail reaches, the highest poverty gap was estimated to be 55 percent Khadir distributary

while the lowest was estimated to be 25.7 percent for the tail reach at 9-R Khoja distributary.

Estimates of squared poverty gap indicated that the severity of poverty was lowest at middle reach and highest at the tail reach areas. At head reach, the highest squared poverty gap estimate was computed to be 29.4 percent for households at Hakra 4-R distributary, which was 8 percent higher than the average squared poverty gap for overall head reach households. On the other hand, the lowest estimate was reckoned to be 10.2 percent for 14-R Maggowal distributary and it was 11.2 percent lower than the overall estimate for households at head reach area. At the middle reach area, squared poverty gap was estimated 19 percent for all the households in study area. The highest severity of poverty appeared at Hakra 4-R distributary with a squared poverty gap estimate of 25.5 percent, which is around 6.5 percent higher than the overall estimate for all middle reach households. In the tail reach area, severity of poverty was estimated to be 23.9 percent for the households in that area. The highest and lowest estimates of squared poverty gap were estimated to be 33.4 percent and 10.8 percent for Kakowal distributary and Phalia distributary, respectively. Figure 5 reveals the comparison of poverty gap and squared poverty gap across head, middle and tail reaches for the whole study area by using poverty line-I (PL-I) while Figure 6 shows the poverty gap across different reaches of the selected distributaries by using PL-I.

Figure 5: Poverty gap and squared poverty gap according to location by using PL-I.

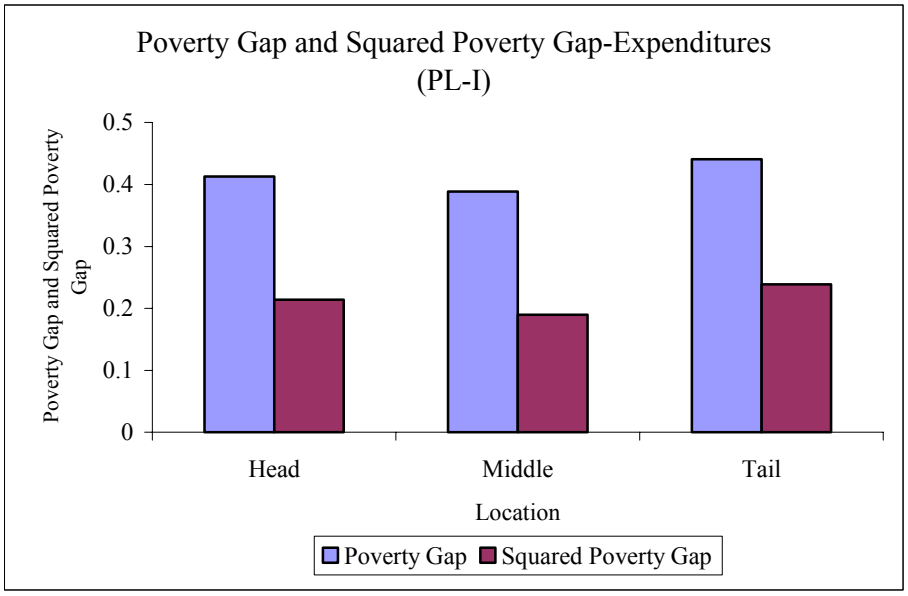
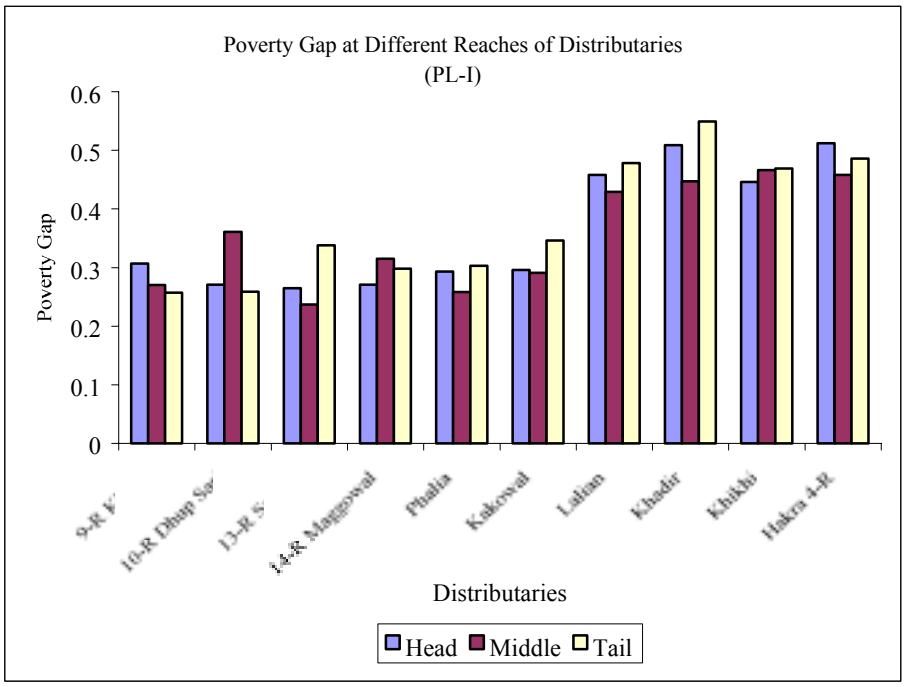


Figure 6: Spatial variation in poverty gap across distributaries using PL-I.



Comparison of poverty gap by using poverty line-II (PL-II_ as shown in Table 4 reveals that the depth of poverty was highest (35.8 %) at tail reach while the lowest (29 %) was prevailing at the middle reach area. At head reach, poor households required about 34 percent of additional expenditure to fill the poverty gap. The lowest depth of poverty was estimated to be 17.2 percent for the households at 14-R Maggowal at the head reach while the highest estimate was 39.5 percent for households at Hakra 4-R distributary.

Poor households at the middle reach required an additional 29 percent of average expenditure to fill the poverty gap. Relatively higher estimates of poverty gap were found for poor households at 3 out of 10 distributaries than overall estimate of 29 percent in the middle reach. The highest estimate was computed for Hakra 4-R distributary (37.5 percent) while the lowest estimate was worked out for 13-R Saroki distributary (13.3 percent). About 36 percent additional expenditure was required by tail reach households to bridge the gap from the poverty line.

Severity of poverty was estimated lowest at middle reach (11.8 %) and highest at the tail reach (17.3 %) areas. Highest squared poverty gap estimate (19.1 %) was computed at head reach of Hakra 4-R distributary while lowest 4.9 percent was worked out for the head reach of 14-R Maggowal distributary. In the middle reach area, the highest severity of poverty was found in Hakra 4-R distributary (18.5 %) while the lowest was 2.7 percent at middle reach of 13-R Saroki distributary. Similarly, in the tail reach area the lowest and the highest squared poverty gap estimates were calculated as 3 percent and 22.2 percent for 13-R Saroki distributary and Hakra 4-R distributary, respectively. Figure 7 shows the comparison of poverty gap and squared poverty gap across head,

middle and tail reaches for the study area while Figure 8 shows the poverty gap across different reaches of the selected distributaries by using poverty line-II.

Table 4: Estimates of poverty gap and squared poverty gap across different reaches at distributaries – Indices based on annual expenditure (PL-II).

	PL-II = Rs. 530 per capita per month							
Distributaries	Head		Middle		Tail		Total	
	Poverty Gap	Squared Poverty Gap	Poverty Gap	Squared Poverty Gap	Poverty Gap	Squared Poverty Gap	Poverty Gap	Squared Poverty Gap
9-R Khoja	0.294	0.110	0.150	0.029	0.218	0.057	0.225	0.069
10-R Dhup Sari	0.228	0.078	0.213	0.057	0.183	0.058	0.213	0.063
13-R Saroki	0.275	0.110	0.133	0.027	0.158	0.030	0.179	0.050
14-R Maggowal	0.172	0.049	0.188	0.043	0.251	0.080	0.203	0.058
Phalia	0.184	0.056	0.260	0.086	0.154	0.035	0.194	0.057
Kakowal	0.190	0.050	0.240	0.092	0.309	0.122	0.246	0.089
Lalian	0.387	0.185	0.261	0.100	0.381	0.184	0.347	0.159
Khadir	0.384	0.173	0.320	0.135	0.413	0.219	0.377	0.179
Khikhi	0.353	0.160	0.340	0.149	0.373	0.171	0.357	0.161
Hakra 4-R	0.395	0.191	0.375	0.185	0.408	0.222	0.394	0.200
Table Total	0.339	0.151	0.290	0.118	0.358	0.173	0.331	0.148

Figure 7: Poverty gap and squared poverty gap according to PL-II.

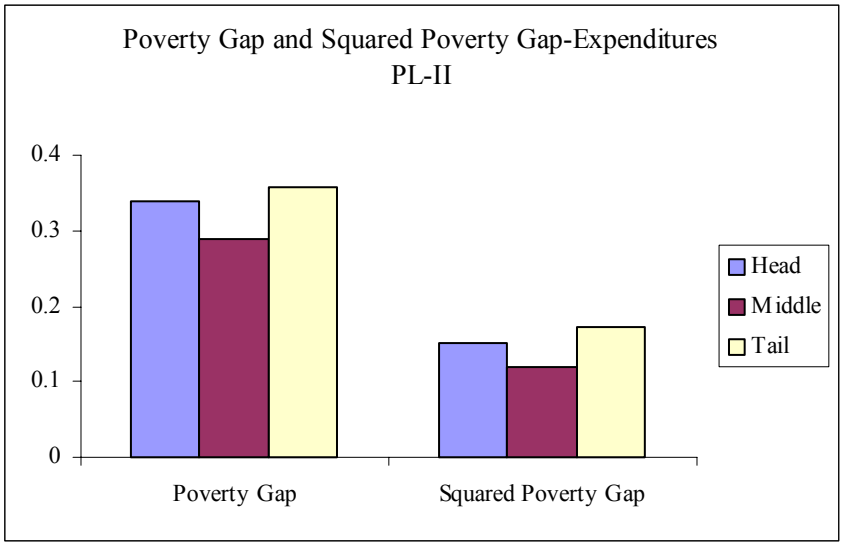
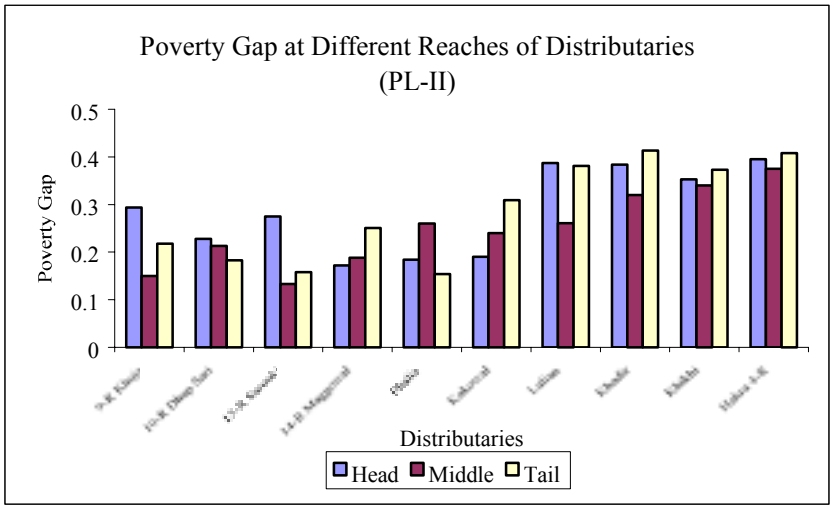


Figure 8: Poverty gap according to location at distributaries by using PL-II.



Determinants of Poverty

In order to determine the effect of differential access to ample and reliable surface irrigation water on poverty, Logit modeling was employed. Logit modeling technique is used when dependent variable is binary with values 1 or 0. The coefficients of independent variables tell about the probability of happening or not happening of one of the two possibilities of dependent variable.

From the estimated coefficients of the model, marginal effect of each independent variable was calculated. The marginal probability is defined as the partial derivative of the probability that dependent variable assumes a value of 1 with respect to that independent variable. The marginal probability is defined by:

$\partial P / \partial B = f(BX)B$

B is the slope of the coefficient. X is the independent variable while f() is the density function of the cumulative probability distribution function[F(BX), which ranges from 0 to 1). The marginal effect could be interpreted as the change in the probability of household being poor with a one-unit increase in the explanatory variable. The marginal probability values were estimated at the mean values of the explanatory variables.

The model specifications are as follows:

Poverty	=	$\beta 0 + \beta 1 * FS + \beta 2 * DR + \beta 3 * Edu\_HH + \beta 4 * NLH ++ \beta 5 * GVP\_Ha + \beta 6 * DM + \beta 7 * DT + e$
Dependent variable	=	Poverty (if poor then 1, otherwise 0)
FS	=	Family Size in number
DR	=	Dependency Ratio
Edu_HH	=	Number of formal schooling years completed by household head
NLH	=	Net Landholding (hectares)

GVP_Ha	=	Predicted values gross value of production per hectare (in thousand rupees)
DM	=	Dummy for the Middle Location
DT	=	Dummy for the Tail Location
β0	=	Constant term
β1…β7	=	Coefficients to be estimated
e	=	Error Term

Family Size

It was expected that higher the family size, higher would be the probability of the household to be poor. Due to this fact, with increase in family size, higher amount of money would be required to meet the basic needs of all the members of household. It was expected that coefficient of family size would be positive with respect to sign.

Dependency Ratio

Dependency ratio was defined as the ratio of number of household members below 16 years and above 60 years divided by family size. It was expected that with increase in dependent members in the household, probability of being poor would be higher due to higher amount of money demanded to fulfill the basic needs of the households. Moreover, as these dependent members did not earn any money, it would be hard for the household to be above the poverty line. A positive sign for the coefficient of dependency ratio was expected, indicating an increased probability of the household to be poor with high dependency ratio.

Education of Household Head

More education simply leads to higher earning potential by better management of the household resources, and thus has negative effect on poverty. Consequently, more education of household head would lead the household out of vicious circle of poverty. Therefore, expected sign for the coefficient was negative.

Net Landholding

The occupation of more landholding was expected to result in more crop production leading to higher agricultural income. It was expected that increase in net landholding would decrease the probability of the household to become poor. So, a negative sign was expected for the coefficient of net landholding indicating inverse relationship with poverty.

Gross Value of Production per Hectare

Gross value of production was indicative of performance of individual farm households. Higher land productivity would result in higher annual income of the household that would eventually improve the ability of the household to provide all the basic needs to the members of the households by spending more. It was expected that with increase in gross value of production per hectare, poverty should decrease. Therefore, a negative sign was expected for the coefficient of gross value of production per hectare.

Location of the Households

The location of the households along the irrigation system reflected the farmers' access to irrigation water in presence of inequities prevailing in distribution of this vital input

of agricultural production. It was expected that households at the head reach of the irrigation system would have better agricultural production and income leading to decreased probability of head reach households to become poor as compared to households at middle and tail reaches of the distributary.

Estimated Results

The results of the Logit regression are presented in Table 6. Signs of the explanatory variables were in conformity with the a priori expectations. All the coefficients except dummies for middle and tail reaches were found significant at 99 percent level. It was found that one member increase in family would increase the probability of being poor by 0.026. It indicates the positive correlation with poverty. It was also estimated that one unit increase in dependency ratio would increase the probability of being poor by 0.246. Keeping in view the positive correlation of increase in family size and dependency ratio, an inclusion of new born or exclusion of a family member from the category of working member and inclusion into dependents would increase the probability of the household to become poor. One more completed year of household head's education would decrease the probability of household being poor by 0.017. Similarly, one-hectare increase in net landholding would reduce the probability of being poor by 0.035. An increase of one thousand rupees in gross value of production per hectare would diminish the probability of being poor by 0.009. It was also found that probability of being poor increases by 0.012 and 0.96, if households were located at middle and tail reach areas, respectively, instead of head reach. It clearly indicates that the probability of increase in poverty in the tail reach area was higher than in the head and middle reach areas.

Table 6: Regression results according to location at distributaries.

Variables	Coefficients	Std. Error	Sig.	Marginal Probability
Constant	0.756	0.233	0.001**	0.143
Family size (Number)	0.125	0.023	0.00**	0.026
Dependency ratio (ratio)	1.178	0.287	0.00**	0.246
Education of the household head (Years)	-0.069	0.016	0.00**	-0.017
Dummy for middle reach	0.05	0.174	0.775	0.012
Dummy for tail reach	0.31	0.179	0.083	0.096
Net landholding (ha)	-0.148	0.021	0.00**	-0.035
Gross value of production per hectare (thousands)	-0.055	0.005	0.00**	-0.009
-2 Log likelihood = 1193.546				
Cox & Snell R Square = 0.271				
Nagelkerke R Square = 0.371				
Chi-Square = 380.269	Df = 7	Sig. = 0.00**		

** Significant at 99 percent significance level
* Significant at 95 percent significance level

Conclusions and Implications

- Incidence of poverty was highest in the head reach area while it was lowest in the middle reach area.
- Higher proportion of the poor population in the head reach area was found sensitive to change in poverty line as compared to middle and tail reach areas.
- The highest poverty gap was estimated for the tail reach area while the lowest was found in case of poor households in the middle reach area.
- In case of change in poverty line, the highest decline in poverty gap estimate was experienced for poor households in the middle reach areas as compared to head and tail reach areas.
- The severity of poverty was higher in the tail reach areas as compared to the head and middle reach areas.
- In case of using lower poverty line, the highest decline in severity of poverty estimate was observed for households at the middle reach area as compared to head and tail reach areas.
- Though slightly lower incidence of poverty was estimated for tail reach areas, the depth and severity of poverty was higher in tail reach areas as compared to head and middle reach areas.
- Family size was found an important determinant of poverty. A rise in family size was expected to increase the probability of household to become poor.
- An increase in dependency ratio was expected to increase the probability of the household to become poor.
- Increase in net landholding was found capable of decreasing the probability of household to become poor.
- More education for all the family members, especially for the head of the household, would enhance the ability to fight against the poverty.
- Improvement in agricultural performance of household as reflected through gross value of product per hectare decreases the probability of household to become poor.
- Household located at the head reach of the distributary had lower probability of becoming poor as compared to households at the middle and tail reach areas of the distributary.
- The more investment in population planning and new round of land reforms for the creation of viable economic land units is necessary for poverty reduction.
- The improvement to surface irrigation water access would decrease the probability of the household to become poor.
- Measures to decrease the inequity and unreliability in surface water supplies should be addressed to decrease the chances of rise in poverty in middle and tail reach areas as compared to the head reach areas.

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PRO-POOR IRRIGATION MANAGEMENT INTERVENTIONS IN PUNJAB, PAKISTAN: ISSUES AND OPTIONS

Israr-ul-Haq[1]

Abstract

The paper discusses the pro-poor irrigation management issues and options in Pakistan in the context of global research and thematic framework. It highlights the irrigation sector strategies and interventions under consideration and implementation in Punjab for addressing the challenges of poverty alleviation.

Despite the expansion of irrigated agriculture that brought significant increases in food production in the past three decades, there remain vast areas in the established irrigation systems where productivity and income of farmers remain quite poor. This is attributed to inequitable distribution of surface water and groundwater caused by inadequate management and a range of other physical, socio-economic and institutional constraints. The global research identifies the need for proactive policies and actions, and that how the economic, institutional, governance, and technical interventions can address poverty-related constraints.

The 'Mission' of irrigation management recently developed is to provide equitable and sustained irrigation to the culturable land of the Punjab for increased productivity, social security, poverty alleviation, and rural development, thus, ensuring that the food security of the Punjab province and food deficit of other provinces is met. In this context, the most important objective is to provide irrigation water in an equitable manner to large and small farmers alike as per their allocations. The paper also highlights other pro-poor strategies and interventions undertaken in the province, which include institutional reforms, development of water resources in *barani* (rainfed) areas, environmental protection strategies, alternate rate mechanism, and groundwater management.

The Global Context

The global population is projected to grow from 6.1 billion in 2000 to 7.9 billion by 2025. The impact of this growth will be focused mainly in the developing countries, where currently some 1.2 billion people are living in extreme poverty. The bulk of the population growth will be in the regions of the world least able to absorb large increments of people. This would result in build-up of poverty and increased migration as well as threatening social order, quality of life and sustainable development (UNFPA, 2003).

Water is essential for all aspects of life. Apart from its life-sustaining qualities, water strongly influences economic activity and social roles. Fresh water is distributed unevenly. It has been estimated that two-thirds of the world's population may be subjected to moderate to high water stress by 2025. It is also expected that the world

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will need 17 percent more water to grow food for the increasing population in developing countries, and that total water use will increase by some 40 percent (UN 2002).

Both the shortage and the uncontrolled excess of water can be life-threatening and the essential balance must look to achieve appropriate priorities, equity and economy in managing this vital resource. There is growing recognition that the urgent and deepening crisis in water management is a particularly acute problem in developing countries and especially among the poorest communities. Depletion of water resources increases poverty through declining employment and income opportunities for the poor. The combination of rural poverty, population pressures and dwindling water supplies is set in the vicious circle of frustration, urban migration, development of slums in cities, which result in aggravation of poverty, water pollution and health problems (Hunter 2001).

Increasingly, there is an emerging recognition that a new approach is required for convergence in thinking and practice to align the efforts of the governments, development organizations and the civil societies at all levels to address the poverty issues and achieve the common goal of sustainable development. The strategies in this regard envisage more realistic planning, integrated action, community and multi stakeholder participation and greater equity in water resources development and management (INWEH 2001).

The Millennium Development Goals (MDG)

At the Millennium Summit in September 2000, the 189 states of the United Nations reaffirmed their commitment to working towards a world in which sustainable development for present and future populations would be assured. At that summit, political leaders from around the world took the unprecedented step of deciding to adopt eight mutually reinforcing goals through a global development partnership aimed at substantially resolving the major issues of our time with particular emphasis on eradicating poverty. The member developing governments (MGDs) targets include reducing the incidence of poverty and hunger by half; ensuring universal access to primary education; eliminating gender disparity at all levels of education; reducing the under-five mortality rate by two-third and maternal mortality by three-quarter; reversing the spread of HIV/AIDS, malaria and other diseases; and concurrently promoting environmental sustainability; all in the context of a global partnership for development. Each MDG target is important in itself, but for their effective achievements and ameliorating poverty, all the MDGs must be viewed as interlinked and mutually reinforcing.

The central role of water linked with food as a basic human need and an essential resource with major role in production and consumption was fully recognized. The major water-related MDGs highlighting targets and critical linkages to water are presented in Box-1 (DFID et al. 2002).

Box-1: MDG Targets and Critical Linkages to Water.

Millennium Development Goal	MDG Target for 2015	Examples of Critical Linkages to Water
Eradicate extreme poverty	• Reduce by half the proportion of people living on less than a dollar a day • Reduce by half the proportion of people who suffer from hunger	• Rural livelihoods and incomes of the poor often depend on availability and access to water for agriculture. • Increased productivity of crop production, livestock and fisheries through efficient water use would contribute to lower food prices. Urban poor would benefit from reduced food expenditure. • Reduction of water-borne diseases through safe water supply would contribute to better health and increased human productivity for livelihood earning opportunities.
Ensure environmental sustainability	• Integrate the principles of sustainable development into country policies and programs; reverse loss of environmental resources • Reduce by half the proportion of people without sustainable access to safe drinking water • Achieve significant improvement in lives of at least 100 million slum dwellers by 2025	• Sustainable and efficient groundwater, river basin resources use, protection of ecologically important wetlands, productive agriculture, clean local hydropower development where feasible, especially to meet energy needs of the urban and peri-urban poor, reduction in solid fuels, reduced land degradation from water erosion, reduced incidence of water-born diseases, would all contribute to environmental sustainability and reduction of poverty.
Develop a global partnership for development	• Good governance, development and poverty reduction, and fair-trading and effective financial systems • Special needs of least developed and land locked countries and small island states • National and international measures for debt sustainability • Productive and decent youth development • Access to technological innovations, particularly the private sector information and communication technologies	• Resolution of local and international water conflicts • Availability and access to safe water resources would result in improved productivity and higher incomes. • International cooperation and development aid and investments for urban water supplies (including role of private sector), hydropower for clean energy, agricultural development and livelihood of the rural poor, etc., would lead to reduction in global poverty and income disparities. • Access to knowledge and world-wide experiences, both scientific and traditional, of water resources management technologies for development and environmental sustainability

The Asian Experience

Agriculture in Asia has made tremendous progress over the past three decades when cereal production more than doubled, due to increased irrigation coupled with increased availability of yield enhancing inputs, credits and other supporting services. Despite impressive achievements, the productivity of a large part of irrigation systems remains severely constrained by insufficiency of some or all of these inputs. Such low-productivity areas are characterized by persistent rural poverty, often exacerbated by other physical, economic and socio-cultural constraints. Poverty is increasingly viewed as a multidimensional condition typified by lack of access to resources, assets and opportunities. This multidimensional approach is reflected in a wide array of poverty reduction strategies, policies and papers (ADB, 1999; World Bank, 2000; IWMI, 2003).

The on going research linking access to irrigation water and poverty alleviation by IWMI and other research institutes appear to suggest that poverty along the irrigation system exhibits both spatial and temporal patterns. Tail portions of the irrigation systems suffer increasing water shortage creating difficult situation for farmers. The lessons learned and key issues identified from the on going research are depicted in Box-2 (IWMI 2003; Hussain et al. 2002).

Box-2: The Asian Research: Preliminary Findings and Issues.

(Research in six ADB developing member countries: Bangladesh, China, India, Indonesia, Pakistan and Vietnam)

- Poverty is still viewed largely as an income/production deficiency and poverty dimensions are largely ignored in planning.
- Indicative spatial patterns of poverty are correlated with water scarcity and poor management.
- In the selected irrigation systems, the incidence of rural poverty is highest in Pakistan and Bangladesh, and lowest in China. Estimates also suggest that the incidence of rural poverty is decreasing over time in all study countries except Pakistan.
- In rural settings, land and water resources are important determinants of poverty. Past development of land and agricultural water resources in all the six countries (indicated above) have played an important role in improving household, community and regional food security and reducing the incidence of chronic poverty through increased productivity, employment, wages and income and by increasing consumption of both food and non-food items.
- Inequity in the distribution of land and water resources is highest in the selected systems of South Asia.
- Crop and water productivity levels in China, Vietnam and Indonesia, where landholdings are generally small, are fairly high. On the other hand, crop productivity levels are generally low in the selected systems in South Asia, particularly in Pakistan and India, with substantial variations in productivity across households, communities and systems. There is considerable scope to increase both the physical and economic productivity of land and water through interventions in the water and non-water sectors.
- There is significant inequity in the distribution of water across head, middle and tail reaches of the systems. Inequity in water distribution translates into productivity differences, which in turn translates into higher incidences of poverty.
- The problem of tail reach poverty exists mostly in situations where there are neither alternative water sources (e.g. groundwater) nor non-alternative sources of employment (e.g. non-agricultural enterprises and market towns).

The Pakistan Scenario

Pakistan is faced with serious problems of slow growth, heavy debt, social gap and widespread poverty. These problems have their roots in economic and social policies as well as institutional weaknesses. A recent study by the World Bank (2003) brings out that Pakistan's social gap is quite well known. Not only did social indicators not improve in line with the growth in GDP, but also, the gap between Pakistan and comparable low-income countries has tended to widen as below:

- Poverty headcount fell in Pakistan during the 1980s but stopped falling in 1990s leaving 45 million people below the poverty line.
- Pakistan's overall spending on education has decreased as compared to other countries in the region.
- Most social indicators for Pakistan, especially Pakistani women, are much worse than other countries in the region.
- Fertility ratio has begun to fall in Pakistan, but it is still among the highest in Asia.

A study for Participatory Poverty Assessment conducted by Punjab Planning and Development (P&D) Department (2003) identified lack of livelihood assets; vulnerability to adverse shocks and trends; inadequate basic services; social exclusion and gender inequality; and lack of access to justice as the main causes of poverty. A synthesis conducted during the study revealed various common factors that were said to define the poorest localities and the people living within them. These factors largely relate to community level characteristics of poverty and are summarized following:

- landlessness, together with status as a tenant and size of landholdings
- lack of access to irrigation water, particularly in the vulnerable tail reaches of the system and in the saline groundwater areas
- lack of facilities and basic services
- lack of access to main roads
- salinity and waterlogging
- desert or drought affected areas
- poor flood and rainwater drainage

The policy recommendations made for addressing the poverty issue include increasing access to key livelihood assets, reducing vulnerability, making public institutions pro-poor, tackling social exclusion and gender inequities, and improving access to justice. In view of the limited access of the poor to the basic public services, it has been brought out that a determined effort is required to focus the public services towards the poor through enhanced outreach and better targeting of these services. Improving the effectiveness of public expenditure is, therefore, crucial for achieving the objectives of the government's poverty reduction strategy, which requires streamlining the budgetary and planning processes and procedures, rethinking the role of the government, improving governance and accelerating and deepening financial management reforms.

Pro-poor Irrigation Management Interventions in Punjab

The Backdrop

Pakistan has the distinction of having the largest contiguous gravity flow irrigation network in the world. It has been estimated that the present value of the Indus irrigation system is around US $ 300-500 billion, while the present value of Punjab's irrigation infrastructure is estimated around US $ 200-300 billion. The system serves as lifeline for sustaining the present level of agriculture. In fact, agriculture without irrigation is impossible in the arid to semi-arid climate of the country. Irrigated lands supply more than 90 percent of the total agricultural production, account for about 25 percent of GDP, and employ around 50 percent of the labor force. These lands supply most of the country's needed food-grain and also are the source of raw materials for major domestic industries and exports.

Water resources development and management has assumed new dimensions in Pakistan due to a number of factors, which are reflecting on the irrigated agriculture. In the past, it was possible to keep the agricultural production in pace with population growth by progressively improving the irrigation water availability. The future prospects are, however, not very promising and the sustainability of irrigated agriculture appears to be jeopardized due to rapidly escalating water demands, limited water resources and environmental concerns. The deteriorating health of the aging irrigation infrastructure and lack of financial resources to address the rehabilitation and modernization needs of the system is emerging as a major issue that is increasingly assuming serious dimensions (Haq 1998).

The existing Indus Basin Irrigation System (IBIS) is gigantic and integrated with limited flexibility. The length of the main distributary canals exceeds 60,000 kilometers. It serves over 14 million hectares of culturable commanded area through about 100,000 outlets in 43 main canal systems in the four provinces of Pakistan. The irrigation system was designed as a gravity flow, run-of-the river system to support subsistence agriculture at low cropping intensities of 50 to 75 percent. The existing storage capacity of reservoirs, constructed sequel to Indus Water Treaty, is rather small, being less than 10 percent of mean annual river flows. Further, the time distribution of river flows is highly uneven, as more than 70 percent of the flows occur during three monsoon months.

Irrigation Mission and Objectives

The 'Mission' of the Punjab Irrigation Department (PID) is to provide adequate, equitable and sustained irrigation to the culturable land of the Punjab, for increased productivity, social security, poverty alleviation and rural development, thus, ensuring that the food security of Punjab and food deficit of other provinces is met. In this context, the following objectives have been outlined for planning and implementing action plans:

1. *Adequate Irrigation Supplies.* This is required as a minimum supply to provide sufficient water, which supports cultivation of crops, required for food security.
2. *Equitable Supplies.* Ensuring that in all circumstances especially in water shortage situation, large and small farmers alike, as per scientific requirements, share water equitably.

3. *A Sustainable System.* To operate and maintain the irrigation system in a manner that pure irrigation supplies are always provided to healthy cultivable lands of the Punjab province.
4. *Protecting Productivity.* Due to droughts and drying of rivers, some 500,000 tubewells pump 33 MAF from underground aquifers. Deeper layers of the aquifers contain salts, which are harmful to the soil. Too much pumping can permanently damage aquifers.
5. *Improved Food Security*. Ensuring that the basic food needs of the population are met, now and in the future.

The Pro-poor Strategies

The pro-poor irrigation management strategies and interventions undertaken in the Punjab province are summarized in Box-3. The most significant of these strategies include institutional reforms, improved canal operations for equitable distribution, development of water resources in *barani* areas and environmental protection strategies.

Participatory irrigation management is being implemented in a phased manner in keeping with the local socio-economic and technical setting. This involves establishment of *Khal* and *Nehri Panchayats* to resolve the water disputes at local level, and to progressively take over the distributary system management. The pro-poor strategies, which need special mention, are that the membership of the *Panchayats* is based on the principle of one farmer – one vote and not on the basis of land ownership. The other significant point is that the rules and regulations stipulate that three out of five members of the *Khal Panchayat* should be small farmers possessing five hectares or less agricultural land. Similarly, it has been provided that majority of the members of the management committee of *Nehri Panchayat* should be from the tail portions of the system.

Improved irrigation management for ensuring equitable distribution of canal water has also been a major pro-poor intervention which is accomplished by planned water allocations, proper maintenance and desilting of canals, control of water theft, and stakeholders' participation in planning and monitoring of canal operations. Groundwater management is another important intervention that is being planned at the provincial level for its sustainable use. This is important because groundwater is contributing significantly to the present level of the irrigated agriculture in the province. In addition, a comprehensive program for providing irrigation and drinking water facilities to the most deprived and less-deprived *barani* areas is being planned through construction of new small dams, management of D.G. Khan hill torrents by construction of dispersion structures on the flashy streams, and pilot construction of village reservoirs in the Cholistan area.

Box-3: Pro-poor Irrigation Management Interventions.

Policy / Strategic Interventions	Main Thrust	Status	Expected Pro-Poor Outcome
Institutional reforms	Improving the governance and management of water/irrigation sector with focus on holistic planning, participatory management and sustainability	On-going	+ + (-)
Canal water operation planning for equitable distribution	To improve canal water operation plans through input of Agriculture Department / WACs	Being implemented	+ + +
Emergent system rehabilitation and modernization	Rehabilitation and up-gradation of irrigation canals and barrages to ensure sustained operations, and to meet the future demands	Being planned	+ + (-)
Irrigation and drinking water supplies to *barani* area	To reduce the vulnerability of the most deprived areas during droughts ▪ Small dams ▪ Hill torrent Management ▪ Village ponds in Cholistan	Being planned / implemented	+ + +
Dis-investment of public FGW tubewells	Relieving the public sector of the O&M costs for the FGW SCARP tubewells	Being implemented	+ (- -)
Groundwater management framework	Developing a comprehensive management regulatory and framework for optimizing the sustainable use of groundwater	Being designed	+ + (-)
Alternative rate mechanisms	Review of various modes of assessment to bring about transparency, economy and ease in assessment. Redefine assessment and collection procedures	The flat rate system of water rates based on land acreage in the culturable commanded area has been approved by the Government and is being implemented.	+ + (-)
Environmental protection strategies	To adopt legal and institutional measures for maintaining the quality of provincial water resources at environmentally acceptable levels	Being planned	+ + +

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TECHNICAL SESSION III:
APPROACHES TO POVERTY ALLEVIATION

DETERMINANTS OF POVERTY

Khalid Mahmood Khan[1]

Understanding the Nature of Locus of Poverty

For strategy formulation, it is important to understand who the poor are, where they live, and what is their source of livelihoods. Poverty is multi-dimensional and extends from low levels of income and consumption to poor health and lack of education to other 'non-material' dimensions of well being, including gender disparities, insecurity, powerlessness and social exclusion. A good understanding of the nature of poverty enables a comprehensive exploration of poverty determinants.

Poverty reduction is the most urgent task facing humanity. The estimates for the world show that about one-third or more than 1.3 billion people in developing world still struggle to survive on less than one dollar a day. The World Bank (2002) reported that 31 percent of the population was living below one dollar a day during 1997 in Pakistan. ActionAid - an NGO, reported the same estimates. Moreover, 67 percent of women and 43 percent of men are illiterate, and only 42 percent of rural population has access to adequate sanitation in Pakistan.

What Causes Poverty?

The determinants of poverty could be macro, sector-specific, community, household and individual characteristics. The paper highlights some of the characteristics of the poor by region, community, household and individual characteristics followed by quantitative and qualitative description of the major determinants of poverty. These characteristics can be used to determine the factors causing poverty, or at least the factors correlated to poverty. Note that correlation means association but does not necessarily mean causality.

Regional Level Characteristics

At the regional level, there are numerous characteristics that might be associated with poverty. The relationship of these characteristics with poverty is country specific. In general, however, poverty is high in areas characterized by geographical isolation, a low resource base, low rainfall and other inhospitable climatic conditions. For example, the economic development in Bangladesh is severely retarded due to its susceptibility to annual floods. The geographically isolated remote areas of Nepal or other countries are generally poor. Within the regions, certain other characteristics might be responsible for poverty such as in Pakistan, the province of Balochistan faces severe shortage of water. Also, drought conditions affect not only Balochistan but the areas of Thar in Sindh and Cholistan in Punjab provinces.

Other important regional and national characteristics that affect poverty include good governance, a sound environmental policy, economic, political and market stability, mass participation, global and regional security, intellectual expression and a fair, functional, and effective judiciary. Regional-level market reforms can boost growth and

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help poor people, but it is important to note that they can also be a source of dislocation. The effects of market reforms are complex, deeply linked to institutions, and to political and social structures. The experience of transition, especially in countries of the former Soviet Union, vividly illustrates that market reforms in the absence of effective domestic institutions can fail to deliver growth and poverty reduction. There is also a case for bringing vulnerability and its management to center stage. Participatory poverty work underlines the importance of vulnerability to economic, health and personal shocks. So did the financial crises of the 1990s, not least in East Asia, the shining example of success in development and poverty reduction and the sequence of devastating natural disasters.

Inequality is also on the agenda. New work shows the importance of gender, ethnic and racial inequality as a dimension and cause of poverty. Social, economic and ethnic divisions in regions are often sources of weak or failed development. In the extreme, vicious cycles of social division and failed development erupt into internal conflict (within or across regions), as in Bosnia, Sierra Leone, Iraq and Palestine with devastating consequences for people.

Community Level Characteristics

As with regional characteristics, there are a variety of community-level characteristics that may be associated with poverty for households in a community. At the community level, infrastructure is a major determinant of poverty. Indicators of infrastructure development that have often been used in econometric exercises include proximity to paved roads, whether or not the community has electricity, proximity to large markets, availability of schools and medical clinics in the area, and distance to local administrative centers. Other indicators of community-level characteristics include human resource development, equal access to employment, social mobility and representation, and land distribution.

Recent research has also stressed the importance of social networks and institutions, and social capital in the community. In addition to removing social barriers, effective efforts to reduce poverty require complementary initiatives to build up and extend the social institutions of the poor. Social institutions refer to the kinship systems, local organizations and networks of the poor, and can be thought of as different dimensions of social capital. Research on the roles of different types of social networks in poor communities confirms their importance. An analysis of poor villages in North India, for example, shows that social groups play an important role in protecting the basic needs of poor people and mediating risk.

It is important to ponder that how does social capital affect development. The narrowest view holds social capital to be the social skills of an individuals' propensity for cooperative behavior, conflict resolution, tolerance and the like. A more expansive meso view associates social capital with families and local community associations and the underlying norms (trust, reciprocity) that facilitate coordination and cooperation for mutual benefit. A macro view of social capital focuses on the social and political environment that shapes social structures and enables norms to develop. This environment includes formalized institutional relationships and structures such as government, the political regime, the rule of law, the court system, and civil and political liberties. Institutions have an important effect on the rate and pattern of economic development. An integrating view of social capital recognizes that micro,

meso and macro institutions coexist and have the potential to complement one another. Macro institutions can provide an enabling environment in which micro institutions develop and flourish. In turn, local associations help sustain regional and national institutions by giving them a measure of stability and legitimacy, and by holding them accountable for their actions. Social capital is clearly a complicated characteristic and often researchers find it difficult to identify appropriate variables that measure social capital quantitatively.

Household and Individual Level Characteristics

Some of the important characteristics in this category would include the age structure of household members, education, gender of the household head, and the extent of participation in the labor force. In recent times, other components that fall under this category have included domestic violence prevention, and gender-based, anti-discrimination policies. The following discussion organizes these characteristics into groups and discusses them in greater detail. These groups are demographic, economic and social characteristics.

Demographic Characteristics

Demographic characteristics of the household can be broadly classified into three categories:

Household Size and Structure

This indicator is an important one as it shows a possible correlation between the level of poverty and household composition. Household composition, in terms of size of the household and characteristics of its members (such as age), is often quite different for poor and non-poor households.

Dependency Ratio

The dependency ratio is calculated as ratio of the number of family members not in the labor force (whether young or old) to those in labor force in the household. This ratio allows one to measure the burden weighing on members of the labor force within the household. One might expect that a high dependency ratio will be correlated positively with the level of household poverty.

Age & Gender of the Household Head

It is widely believed that the gender of the household head significantly influences household poverty, and more specifically, the households headed by women are poorer than those headed by men. Women play an important role in the labor force, both in the financial management of the household and in the labor market but appear to face greater degree of discrimination. They are severely affected by both monetary and non-monetary poverty; for example, they have low level of literacy; they are paid lower wages; and have less access to land or equal employment.

Economic Characteristics

Economic characteristics include employment, income, consumption spending and household property:

Household Employment

There are several indicators for determining household employment. Within this array of indicators, economists focus on the rate of participation in the labor force, the real rate of unemployment, the rate of underemployment and job changes.

Household Income

Income represents a very important area to consider when characterizing the poor. Of interest is the level of income as well as its distribution among the household members and among the various socio-economic groups. However, in practice, income indicators present us with certain problems. Income is difficult to define as it includes several components, of which only some are monetary (for example, farm households consume most of their production on-site). Secondly, individuals tend to make false declarations about their income level, which is generally under-estimated. It is possible, in part, to correct these declarations but only at the cost of carrying out a large-scale data-gathering operation on economic activities, the costs of production factors and inputs and the prices of products. Given these limitations and the fact that savings are low, there is often a tendency to use the household's total spending as an approximation to its disposable income.

Structure of Household Consumption Expenditure

The structure of household consumption expenditure can be used to characterize households by describing the make-up of food and non-food spending. What is of interest is to measure the relative weight of the goods and services consumed by the household according to its poverty level. This measurement gives some indication as to the probable impact of price variation on household purchasing power. We can expect basic products, especially food, to represent a more significant part of total spending by the poor.

Household Property

The property of a household includes its tangible goods (land, cultivated areas, livestock, agricultural equipment, machinery, buildings, household appliances and other durable goods) and its financial assets (liquid assets, savings and other financial assets). These indicators are of interest as they represent the household's inventory of wealth and, therefore, affect its income flow. Furthermore, certain households, especially in rural areas, can be poor in terms of income but wealthy when their property is taken into consideration. Despite its importance, property is difficult to evaluate in practice in any reliable way. First, one encounters the same problem of under-declaration. Second, it is very difficult to measure certain elements of property such as livestock. Finally, the depreciation of assets may be difficult to determine for at least two reasons: 1) the life span of any given asset is variable; 2) the acquisition of these assets occurs at different moments in each household. Therefore, property is more difficult to use than certain other elements in the characterization of poverty.

Social Characteristics

Besides demographic and economic indicators, there are social indicators to characterize poverty and household living standards. The social indicators generally selected are health, education and shelter.

Health within the Household

Four types of indicators are normally used to characterize health in analyzing a household's living standards. These indicators include nutritional status (for example, anthropometrics indicators such as weight for age, height for age, and weight for height), disease status (for example, infant and juvenile mortality and morbidity rates as related to certain diseases such as malaria, respiratory infections, diarrhea and sometimes poliomyelitis), the availability of health care services (primary health-care

centers, maternity facilities, hospitals and pharmacies, basic health care workers, nurses, midwives, doctors and traditional healers, and medical service such as vaccinations, access to medicines and medical information) and the use of these services by poor and non-poor households. IMR has decreased in Pakistan considerably but still remain in the indices of poor countries.

Water and sanitation are especially important influences on health and nutritional status. The poor are extremely disadvantaged in access to safe sources of water supply and sanitation. A large population does not have access to clean drinking water. Similar differences are apparent in access to sanitation. Another indicator of housing standards is access to electricity. Here again, the access of the poor lags far behind. Access to electricity from a generator or line connection rises sharply with income. Other indicators of household wealth include ownership of transportation. Access to cars, jeeps or motorbikes is very rare among the poor and rises sharply with income. Overall, the shift from bicycles to motorized transport is a strong indicator of wealth of families with access to a wider variety of services and amenities.

Education

Three types of indicators are normally used to characterize education in an analysis of household living standards. These include the household members' level of education (literacy rate with poor households having lower literacy), the availability of educational services (primary and secondary schools) and the use of these services by the members of poor and non-poor households (children's registration in school, drop out rate of children by age and gender and reasons for dropping out, percentage of children who are older than the normal age for their level of education and average spending on education per child registered).

Literacy and schooling are important indicators of the quality of life in their own right, as well as being key determinants of poor people's ability to take advantage of income-earning opportunities.

Shelter

Shelter refers to the overall framework of personal life of the household. It is evaluated by poor and non-poor household groups according to three components (some of which overlap with the indicators mentioned above): housing, services, and the environment. The housing indicators include the type of building (size and type of materials), the means through which one has access to housing (renting or ownership), and household equipment. The service indicators focus on the availability and the use of drinking water, communication services, electricity and other energy sources. Finally, the environmental indicators concern the level of sanitation (touched on before), the degree of isolation (availability of roads and paths which are usable at all times, length of time and availability of transportation to get to work) and the degree of personal safety.

It is generally established that poor households live in more precarious and less sanitary environments, which contribute to the poorer health and lower productivity of household members.

Determinants of Poverty Reduction

The conditions for growth and the degree of inequality are two key factors, which appear to determine the extent of poverty reduction, given the rate of per capita economic growth.

Poverty reduction depends on the economic conditions that generate pro-poor growth. There are many conceptions of what economic conditions are required to generate 'pro-poor' growth. This econometric study supplemented by country case studies, tested some possible conditions against past experience and found that four of them were associated with a greater reduction in poverty. First, there is more reduction in the proportion of poor people if the national stock of capital grows faster than the labor force. It is necessary to generate enough extra capital to gainfully employ the extra (often poor) hands and raise their productivity. Second, poverty reduced more in those countries where capital was used more efficiently (i.e. where a given amount of investment produced a larger amount of additional goods and services). Although this only gives us a rough guide, it does indicate that efficiency (in the use of capital at least) is not the enemy of poverty reduction but an aid to it. Third, in South Asia and sub-Saharan Africa (though not elsewhere) the performance of the agricultural sector appears critical because poverty is lower where agricultural productivity per worker was high, relative to the modern sector. Fourth, historically the countries with more 'open' economies have lower poverty ratios. Taking into account the levels of national income per capita, a higher proportion of countries, which had less restriction on international trade, had less poverty. The criteria for 'openness' included the number of controls on exports and imports and the extent to which governments controlled the prices of exports. However, this last finding must be interpreted with some caution since some other recent studies have not confirmed a favourable relationship (See ODI Poverty Briefing 6: December 1999).

The importance of income equality for poverty reduction is that with a given rate of economic growth, poverty falls faster in those countries where inequality of income is lower. The so-called 'Gini-coefficient' measures statistically the degree of inequality in the distribution of household income. The higher the coefficient, the more extreme is the observed inequality. Analysis of developing countries in the 15 years between 1985 and 1990 showed that they fell into two groups. In the low income-inequality countries (average Gini-coefficient = 0.34), 10 percent economic growth was associated with a fall in the proportion of people below the poverty line by 9 percentage points. In the high income-inequality countries (average Gini-coefficient = 0.55), 10 percent growth was associated with only the three percentage point reduction. Pakistan falls in high inequality group. The growth rate during 90s was below four percent on an average.

Importance of Agricultural Productivity

Improved agricultural yields are associated with poverty reduction in South Asia and sub-Saharan Africa. This reinforces the case for a rural-based development strategy. The promotion of agriculture can stimulate linkages between farm and non-farm activities, which are important for poverty reduction. Policies to improve incentives for both farm and non-farm enterprises in rural areas have been recognized for some time (e.g. deregulation of pricing and marketing in agriculture, better marketing opportunities,

information and extension services for smallholders' crops and small producers of non-farm products). Credit networks and similar measures to encourage livelihood creation in non-farm rural businesses are needed but so far few strategies for ensuring access to credit for remote rural areas and the poor seem to have worked out. Flexible credit repayment periods and provision of crop insurance would assist the poor together with development of 'Green Revolution' type higher yields.

More Attention to the Distributive Impact of Policies

Reducing the degree of inequality would speed up the process of poverty reduction dramatically. Some actions for the re-orientation of government actions on asset and income distribution are urgently required.

First, policies to reduce high degrees of income inequality need to focus on the access to and distribution of assets, which determine income flows for the poor - especially land. Where inequality is high, agricultural growth does not seem to reduce poverty so well. The potential for re-distributive land reform is clearly greater in countries with a higher degree of inequality in landholdings and where there is political support for land redistribution. In Pakistan, we need political support for land reform program.

Second, greater equality of income is served by improving the productivity of the poor, especially through improving basic education and health and the skills of poorer groups (e.g. landless laborers and marginal farmers), so they can better take up rural non-farm options or urban-oriented livelihood opportunities. Action by the state to redistribute state subsidies from tertiary to primary and sometimes secondary levels of education and health services and to improve the coverage and quality of these services, has been recognized as necessary for sometime. Yet, there was a limited shift of expenditure in that direction in the 1990s and we hardly know how far the poor actually benefited from these services.

Third, policy makers need to know much more about how the poor can participate in the economy and establish the distributive consequences of changes in taxes and charges, privatization under different regulatory frameworks, trade liberalization, and the removal of government subsidies and price controls. To achieve more pro-poor outcomes, greater state capacity is required to regulate market activity and privatized firms in what are often non-competitive market conditions. We know for sure that reduction of bureaucratic interference with small-scale activities in the informal sector would benefit the income of the poor.

Mainstream Gender Equality

Gender inequality is a constraint on growth and poverty reduction. An increase in the number of girls in school and female literacy is likely to reduce poverty. It also means that over the longer term, fertility rate will fall also (i.e. the number of children borne to a woman in her lifetime). Also, child survival will improve. These factors themselves contribute to higher productivity and per capita growth. Low level of technology available to women, time constraints and discrimination in their access to credit and other markets, restrict the supply response to any new incentives for small-scale producers.

The Government of Pakistan has taken steps by increasing the number of seats in Parliament for women. Government policies can help create an environment where traditional conceptions of appropriate or 'normal' roles for men and women are

challenged. Demonstration effects are important, and thus, affirmative action programs that ensure that women are represented in key professional positions – the judiciary, ministers in government and positions in local government, for example – can help to stimulate change. Governments can take action to support women, and in some cases, with legal representation, to ensure that statutory rights are adhered to. Only with such changes in culture will households decide to send children to school rather than have them work and allocate time and money to use health care facilities for women and children rather than alternative uses.

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POVERTY TRENDS IN THE 1990s & POVERTY REDUCTION STRATEGY FOR PAKISTAN

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This paper tries to draw trends of poverty in the country over the decade of 90s and highlights the salient features of the strategy being followed in the country for the purpose of its reduction. The paper is divided into three sections. Section I gives the theoretical background of poverty, while Section II discusses the same in the context of Pakistan: explaining the methodology being followed for the estimation of official poverty line, along with the calculation of poverty indices and the regional as well as overall poverty trends in the country over the decade of 90s. In this respect, HIES/PIHS 992-93, 93-94, 96-97 and 98-99 data series has been utilized. The reasons for the changing trend of poverty over this period are also highlighted. Section III explains the framework and the strategy being followed by the government for poverty reduction in Pakistan.

Section I

What is Poverty?

One can define poverty in various ways but the core concept remains the same: deprivation and dichotomy. Deprivation implies the lack of well being or welfare, while dichotomy implies the division of the population into two groups, those who 'have' and those who 'have not'. Thus, the lack of basic health services, education facilities, access to safe drinking water and elementary sanitation, along with the women and child specific deprivations constitutes what is called 'poverty'.

Poverty can be absolute or relative in nature. One can be poor due to simply the lack of basic necessities or one can be poor as compared to the other members of the society, even though one is able to meet the basic needs. The absolute poverty line is sketched at a specific point in welfare level distribution. Thus, it allows the comparisons over time. The relative poverty line is determined from a percentage cut-off point in the welfare distribution e.g. income or consumption level below which 'x' percent of the population is located. This approach is simple and transparent, but it is not very useful if one wants to monitor poverty over time since there is always a bottom 'x' percent of the population even if the living standard has risen over time and it is quite arbitrary. This paper is going to concentrate on the absolute measures of poverty.

Whenever poverty is discussed, two of its features are highlighted: the categorization of each household as poor or non-poor at the micro level, and the aggregate characterization of the society at the macro level. The first feature is highlighted through the use of 'poverty line' as a tool, while the second is highlighted through estimation of different poverty measures such as the head-count index, poverty gap, the poverty severity, and the human poverty index. The first three represent the income deprivation of poverty while the last one gives a human face to poverty. Even though poverty should

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be taken as a 'multi-faceted phenomenon', this paper is going to concentrate on the income face of poverty only.

Measuring Poverty

In order to combat poverty, extensive knowledge of the magnitude and direction of its growth along with its nature is a preliminary condition. This can only be done through the identification of the poor i.e. those who are deprived of the welfare. This justifies the measurement of poverty.

Steps for the Measurement of Poverty

Following are the three steps that need to be followed for the measurement of poverty (Ravallion 1998)

1. Defining an indicator for welfare
2. Identification of data set and making it usable
3. Establishing a poverty line by setting up a minimum acceptable standard to separate the poor and the non-poor.
4. Estimation of poverty indices by generating a summary statistic to aggregate the information from the distribution of this welfare indicator and its position relative to minimum acceptable standards.

Defining an Indicator for Welfare

The two monetary measures of poverty are as follows:

1. Per Capita Income level of the household
2. Per Capita Consumption or Expenditure level of the households

In the developing countries, income as a measure of welfare is usually not recommendable because of the problem in defining it, as well as due to it being under reported along with extensive fluctuations over the period of one's lifetime. On the other hand, the consumption remains relatively stable. In case, the 'Per Capita Consumption or Expenditure level of the households' is chosen as a measure of welfare, the construction of an 'Expenditure Function' is required which gives the minimum level of expense or the resources required, to attain the set level of well being or to meet the given level of utility 'u' derived from the consumption of the vector of goods 'x', at prices 'p'. Thus, the construction of an 'Expenditure Function' is the first step in the measurement of poverty.

Identification of Data Set and Making it Usable

The data on poverty comes primarily from two sources at the country level:

- Service or administrative records
- Surveys

The service records are usually kept by different ministries. e.g. Ministry of Health, Ministry of Education, etc. Surveys are conducted by different agencies e.g. World Bank's Living Standard Measurement Survey (LSMS), and Core Welfare Indicator

Questionnaire (CWIQ), or the Household Integrated Economic Survey (HIES), Pakistan and Integrated Household Survey (PIHS).

The food cost of an individual varies within the same household depending on whether the individual is an infant, adolescent or adult. These factors are commonly taken into account by the use of an 'equivalence scale' which equalizes the income or expenditure for differences in needs and economies of scales in household consumption. For instance, in Pakistan, there are many suggested equivalence scales. One suggested by Jafri, (1995, 1999), and FBS (1984-85) is given as:

$AE = a_1X_1 + a_2X_2+a_3X_3 + a_4X_4$

Where:

AE	=	Adult Equivalent
a_1	=	1.00
a_2	=	0.85
a_3	=	0.75
a_4	=	0.45
X_1	=	Adult in household (Age >16 years)
X_2	=	Children between 10-16 years of age
X_3	=	Children between 6 to 10 years of age
X_4	=	Children below 6 years of age

Poverty Line Estimation

Poverty line is that level of income which is just enough to achieve the so-called minimum level of welfare or utility 'u'. Thus, extending eq (iv), given 'Ū' as the minimum level of welfare, and 'Z' as the minimum expense required to achieve it:

$Z = f^{-1} (\bar{U})$

where 'Z' is the poverty line by definition.

There are two main categories of the methods for the estimation of the poverty lines, namely:

1. Food Energy Intake (FEI) Method
2. Costs of Basic Needs (CBN) Method

No matter what method is used to estimate the poverty line, following four axioms are to be followed by an ideal poverty line:

1. The poverty line should be proportional to individual needs.
2. If two persons 'A' & 'B' have the same needs, facing the same prices, then the person 'A' should not have a higher poverty line than person 'B' because of its expensive tastes.
3. If person 'A' enjoys a higher standard of living than person 'B', then the real poverty line for person 'A' cannot be higher than that of person 'B'.
4. A person on the poverty line in time period 't', denoted by 'Zt' should have exactly the same standard of living as the person on the poverty line in time period 't', denoted by 'Zt'.

Through the 'FEI' method of 'Z' estimation, the level of consumption expenditure is estimated, which is enough to meet the minimum energy requirement through the consumption of food along with the non-food items. The non-food items are taken into consideration as well because the poor also consume some clothing and shelter, implying that at margin, these needs must be as valuable as the additional food.

As mentioned earlier, the principal of the 'Cost of Basic Needs' (CBN) approach of poverty estimation is to come up with different food baskets that yield the same specified caloric minimum and select the one with the minimum cost. The same line is raised by a certain factor to take into consideration the non-food items consumptions as well. The cost of the selected basket becomes the poverty line.

Estimation of Poverty Indices

There are a number of aggregate measures of poverty that can be computed. The most common measures of poverty are as follows:

a Head Count Index
b Poverty Gap Index
c Squared Poverty Gap Index
d FGT Index

These are described in detail as below:

Head Count Index. It measures the proportion of population that is poor. It is denoted by P_0. Formally, it is given by:

$$Po = 1/N * [\Sigma I (yi \leq z)] = Np / N$$

Where:

N = Total Population

Z = Poverty Line

I (…) = Indicator value that takes the value of 1 if the bracketed expression is true i.e. household income is less than the poverty line, otherwise 0

The Head Count Index is very simple to calculate and is easily understood. But, it has two main drawbacks:

1. It does not take the intensity of poverty into account.
2. It does not indicate how poor the poor are and hence does not change if the people below the poverty line become poorer. Hence, it violates the monotonicity axiom.

Poverty Gap Index. It gives the extent to which individuals fall below the poverty line as a percentage of the poverty line. The Poverty Gap Index is denoted by P_1. Formally, it is given by:

$$P_1 = 1/N [\{\Sigma \{(z-y_i)* I (y_i \leq z)\} / z]$$

Where:

N =Total Population

Z=Poverty Line

I (….) =Indicator value that takes the value of 1 if the bracketed expression is true i.e. household income is less than the poverty line, otherwise 0.

This gives a good measure of the depth of poverty. However, poverty gap may not convincingly capture the differences in the severity of poverty. The poverty gap will be unaffected by the transfer of income from a poor person to a poorer person. It gives equal weights to the poverty deficit of the poor and therefore, is insensitive to the distribution of living standards among the poor, thus violating the transfer axiom.

Squared Poverty Gap Index. It is the weighted sum of the poverty gaps (as a proportion of poverty lines), where the weights are the proportionate poverty gaps themselves. Hence, implicitly, it gives more weight to observations that fall well below the poverty line. The Squared Poverty Gap Index is denoted by P2. Formally, it is given by:

$$P^2 = 1/N \, [\{\Sigma \, \{(z-yi)^* \, I(yi \leq z)\} / z]^2$$

Where:

N =Total Population

Z =Poverty Line

I (…) =Indicator value that takes the value of 1 if the bracketed expression is true i.e. household income is less than the poverty line, otherwise 0.

This measure is not easy to interpret and hence is not used very widely.

FGT Index. Foster, Greer and Thorbecke (1984) introduced the class of poverty measures that not only reflect the severity of poverty but also satisfy the axiom of decomposability additively. The FGT Index is denoted by $P_\propto$. Formally, it is given by:

$$P_\propto = 1/N \, [\, \{\Sigma\{(z-yi)^* \, I(yi \leq z)\} / z]^\propto$$

Where:

N =Total Population

Z =Poverty Line

I (…) =Indicator value that takes the value of 1 if the bracketed expression is true i.e. household income is less than the poverty line, otherwise 0

In case:

$\propto$=0, FGT=P_o

$\propto$=1, FGT=P_1

$\propto$=2, FGT=P_2

Section II

Estimated Poverty Line and Poverty Measures for Pakistan (2000-2001)

Data Source

Household Integrated Economic Survey (HIES) 2000-2001, Round-IV, provincial data.

Poverty Line

The national poverty line on the basis of 2350 calories per adult equivalent per day for the year 2001-2002 is estimated to be Rs. 748.565344/- per capita per month at the prices of 2001-2002.

Poverty Measures

Poverty Indices	National
Head Count	32.13
Poverty Gap	6.84
Severity of Poverty	2.04

** The overall Pakistan poverty indices are based upon the national poverty line of Rs. 748.565344 per capita per month.

Methodology of Poverty Line Estimation

Given an adequate level of energy intake 'K', it can be easily stated that:

$K = f(y)$ (i)

$y = f^{-1}(K)$ (ii)

Since:

$y = p * q$ (iii)

This implies:

$p * q = f^{-1}(K)$ (iv)

Thus, extending eq (iv) further, given 'K min' as the minimum level of adequate energy requirement, and 'Z' as the minimum expense required to achieve it:

$Z = f^{-1}(K \text{ min})$ (v)

where 'Z' is the poverty line by definition.

The functional form used for the estimation of the national poverty line is:

$\ln Z = \propto + \beta * K \text{ min}$ (iv)

Where:

Z = Total per adult equivalent monthly Expenditure

K min = Total per adult equivalent minimum monthly Calorie Requirement

Assumptions

- There exists specifically defined amount of calories that is considered essential. Here, this per adult equivalent minimum calorie requirement (K min) is 70500 calories per month.
- In case the minimum calorie requirement is achieved, then implicitly, the non-food essential items are also achieved.
- Same goods basket is consumed in all the provinces.
- The first three per adult equivalent consumption expenditure quintiles are used so that the consumption pattern of the rich does not affect the determination of the poverty line.

Poverty Trends in the 90s in Pakistan

From the start of the decade, in 1992-93, poverty increased from 24.9 percent to 27.7 percent in 1993-94. It reduced in 1996-97 and was brought down to 24.5 percent. But this decline was not kept for long and in 1998-99, poverty jumped to 30.6 percent. Again, poverty increased to the level of 32.1 percent in 2000-2001. This was a marked increase in poverty but the rate of change declined. This is further explained by the following tables 1 and 2 and figures 1 and 2:

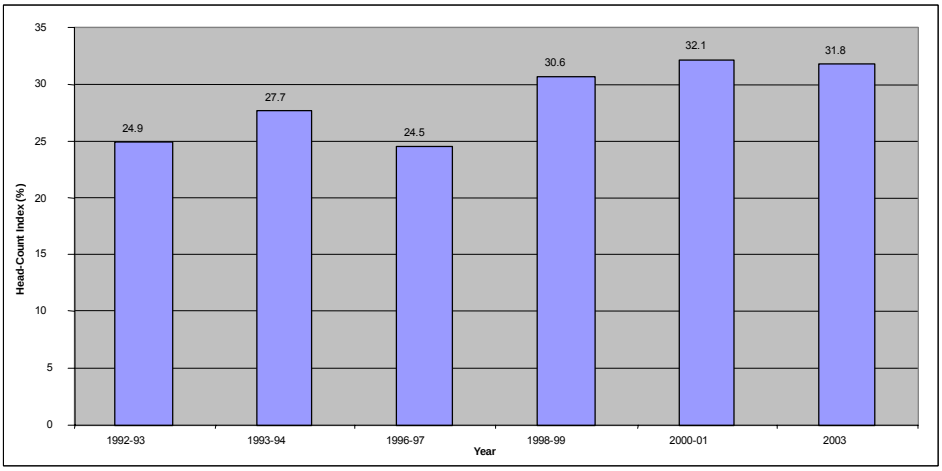
Table 1: Head Count Index in urban and rural areas of Pakistan.

Head Count	1992-93	1993-94	1996-97	1998-99	2000-01*	2003**
Pakistan	24.9	27.7	24.5	30.6	32.1	31.8
Urban	19.76	15.15	14.83	20.91	-	-
Rural	27.03	32.99	28.83	34.67	-	-

* Based on official poverty line of Rs. 748.565344/- per capita per month.

** Based on the post enumeration survey of HIES 2000-2001, conducted in 2003. (Only 5% of the original sample.)

Figure 1: Head Count Index.

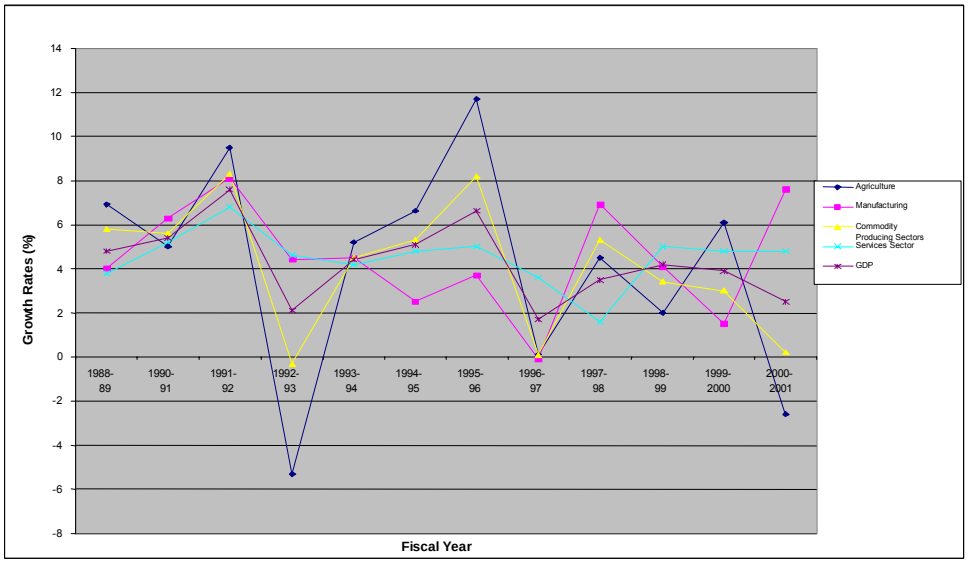


Source: Planning & Development Division, GoP.

Table 2: Economic Growth in the '90s in Pakistan.

Year	1988-89	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-2000	2000-2001
Agriculture	6.9	5	9.5	-5.3	5.2	6.6	11.7	0.1	4.5	2	6.1	-2.6
Manufacturing	4	6.3	8.1	4.4	4.5	2.5	3.7	-0.1	6.9	4.1	1.5	7.6
Commodity Producing Sectors	5.8	5.6	8.3	-0.3	4.5	5.3	8.2	0.1	5.3	3.4	3	0.2
Services Sector	3.8	5.2	6.8	4.6	4.2	4.8	5	3.6	1.6	5	4.8	4.8
GDP	4.8	5.4	7.6	2.1	4.4	5.1	6.6	1.7	3.5	4.2	3.9	2.5

Figure 2: Average annual growth rates (%).



Relationship between Poverty and Growth in Pakistan

The change in poverty over the period of time can be attributed to the change in two factors. One is the economic growth relating to the change in the mean income, and the other is the income inequality relating to the change in the inequality. The economic growth always has a positive impact on the poverty reduction, while on the other hand, inequality growth has a negative impact on poverty reduction. In case poverty is more sensitive to the growth changes, then the maximization of economic growth can become a major tool to reduce poverty. On the other hand, if poverty is more sensitive to the changes in the inequality, then the policies that are pro-poor, and thus reduce inequality, should be adopted for rapid reduction in poverty. Thus, we can safely say that the positive impact of GDP growth on poverty is counterchecked by the negative impact of income inequality. This impact of income inequality may and may not completely wash out the positive impact of economic growth.

In case of Pakistan, it seems that poverty is more sensitive to the inequality. This explains why even with the increase in economic growth rate poverty has been on the rise and with the decrease in the economic growth rate poverty has also fallen. Consider the Table 3 and Figure 3. The two figures show that with an increase in the GDP growth

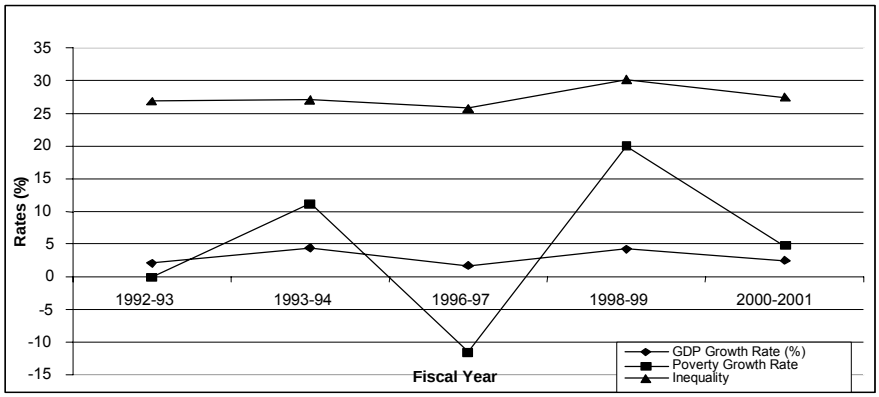
rate, the average nominal income increases in the economy which has appositive impact on poverty reduction but this positive impact is washed out due to the negative impact of worsening income inequality and vice versa.

Table3: Historic changes in growth and poverty in Pakistan.

Year	1992-93	1993-94	1996-97	1998-99	2000-2001
Economic Growth					
Agriculture	-5.3	5.2	0.1	2.0	-2.6
Manufacturing	4.4	4.5	-0.1	4.1	7.6
Commodity					
Producing Sectors	-0.3	4.5	0.1	3.4	0.2
Services Sector	4.6	4.2	3.6	5.0	4.8
GDP	2.1	4.4	1.7	4.2	2.5
Poverty					
Head Count					
Growth Rate	-	11.24	-11.55	19.93	4.90
Inequality	26.85	27.09	25.85	30.19	27.43

Source: Economic Survey 2000-2001, FBS.

Figure 3: Relationship between poverty and growth.



Section III

Poverty is lack of ability to access the essential physical and social assets. The poverty reduction strategy is the creation of conditions in which the poor are either given, or enabled to acquire, the assets and enabling environment to get returns from those assets.

The Poverty Reduction Strategy summarizes country's strategy for reducing poverty. Some of its salient features are:

- It is a country-owned document.
- It is developed through a participatory process.
- It is a process of focusing economic reforms towards poverty reduction and human development through consultative dialogue.
- It is based on comprehensive understanding of poverty and its determinants.
- It identifies public actions that have the greatest impact on reducing poverty.
- It uses indicators that are set and monitored through a participatory process.

Poverty reduction framework provides that poor should be empowered by:

- food security
- access to basic education, primary health, nutrition, water and sanitation services
- right to sustain themselves by their labor and be reasonably rewarded
- equal opportunities for income, employment and wages
- protection from shocks
- freedom of information
- freedom of participation

Pakistan has witnessed a prolonged and sustained period of economic growth with economy growing at an annual average rate of about 6 percent in the past three decades (fastest in South Asia). But this economic growth has failed to show its impact on the poverty levels prevailing in the country substantially. The constant rise in the income inequality accompanied by the ever rising number of the poor as well as some other factors has led to the slowing down of the growth in the '90s.

Several areas for policy reforms emerge from the examination of the causes of current trends of poverty and human deprivation, and suggest that a holistic approach is needed to address the various dimensions of poverty.

This has led to the formulation of a poverty reduction strategy by the government of Pakistan. This strategy aims to broaden and deepen the development process in ways that enlarge the basis of achieving high rate of economic growth with a combination of mutually reinforcing factors. These include a high rate of economic growth, which have translated directly or indirectly into enlarging the employment opportunities for the poor and their disposal incomes and strong commitment to investments in physical and social assets creation for the poor, especially health and education, and a system of social protection.

The poverty reduction strategy is 'three pronged' and is based upon the following:

1. Pro poor, sustainable economic growth
2. Fiscal and social assets creation for the poor
3. Safety net mechanism to protect poor from shocks

This strategy revolves around five activities, which are to be implemented in a balanced manner. Fragmented implementations are not allowed. These activities are:

1. Economic reforms
2. Physical asset creation for the poor
3. Social asset creation for the poor
4. Social safety nets
5. Governance

These are the collective goals that PRS seeks i.e. equitable income growth and complementary social development.

Economic reforms as a package are necessary for rapid economic growth. Economic growth is a necessary (but not sufficient) condition for poverty reduction. Expansion of domestic savings (including tax reforms) is needed to improve economic self-reliance. The government is introducing the new economy by expansion of domestic Information Technology and scientific capacity. Private sector development as a package consisting of:

a) Creation of enabling conditions for private investment
b) Privatization
c) Complementary public sector investment in social and physical infrastructure

Public expenditure is to be directed towards production of public goods – education, health, rule of law, and lower transaction cost for dealing with government.

Programs for land allocation, credit, *Zakat* and *Ushr* for capital formulation will be used to create physical assets for the poor. A minimum level of physical capital accumulation is required to enhance the income-earning capacities of the poor. The government is to perform the following steps:

- expand the physical asset base of the poor by distribution of state land (~3.0 m acres)
- creating access to micro-credit to acquire assets like livestock, fishing boat, a shop, and other income producing assets
- complementary human development programs to enable optimum returns from the physical assets
- energy and water management policies to ensure that the environment (land, forests, water, air) is not mined

Creation of social assets by ensuring cost-effective provision (public or private) of basic needs of the poor i.e. access to education, health, nutrition, water supply and sanitation is also the strategy adopted by the government. This is for human and social capital formation for the poor through a participatory process involving the poor and civil society. The government has decided to take the following measures in this regard:

- allocation of additional resources for human capital formation
- devolution/Decentralization to significantly improve delivery efficiency of social services – education, health, population, social protection, and water supply
- adult literacy program with focus on female literacy (up to secondary levels)
- using public information strategically to empower consumers of health care and enable people to be better providers of their own health
- engaging the private sector and civil society to participate in meeting societal health and education goals

For the chronic or transitionally vulnerable groups, the strategy to create social safety nets will provide adequate supplementary transfers to ensure satisfaction of basic needs i.e. food, shelter and social protection.

- significant expansion of public sector transfer programs (from Rs. 13.0 billion to Rs. 23.5 billion by 2004)
- incentives to expand private sector transfers via charity (from Rs. 139 billion to Rs. 175 billion by 2004)
- food Support Programs to compensate the poor for reduction in wheat subsidy
- revamping of *Zakat* and *Ushr* system to create a Social Protection Program

On the governance front, the government is to improve efficiency in the public and corporate sectors to provide rule of law, and improve the efficiency of service delivery. This is to be done through:

- decentralization / Devolution of power and responsibilities
- private sector development (Enabling conditions for private investments)
- civil service reforms to improve public sector efficiency (education; right sizing; merit based induction / promotion)
- expand capacity of judicial system – via IT – to provide speedy justice

It is expected that the government shall be able to reduce poverty substantially by adopting the above strategy and the trickle down effect of the economic growth to the general masses shall become possible.

Poverty Reduction - Goals and Instruments

Sr. No.	Goals	Instruments
1	Significant economic growth	∗ Open economy ∗ Education
2	Rule of law	∗ Civil service reform ∗ Devolution ∗ Judicial reform
3	∗ Food poverty ∗ Basic needs ∗ Opportunity	∗ Agriculture ∗ rural ∗ Education ∗ Health/Nutrition ∗ SME
4	∗ Malnourishment of children under 5 ∗ Health	∗ Community & NGOs participation in targetted food distribution programs ∗ Coverage of pre-natal care, immunization, safe
5	Adult literacy (functional)	∗ Education via radio/t.v ∗ Community voluntary
6	Scientific capability	∗ Tertiary education ∗ Curriculum reform ∗ Industry/academic/government
7	Human rights	∗ Justice ∗ Security ∗ Clean air/Water

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KNOWLEDGE, APPROACHES AND PRACTICES IN POVERTY ALLEVIATION

Khadija Khan and Moiz Ali[1]

Introduction

The Pakistan Poverty Alleviation Fund (PPAF) has been established to enhance the accessibility of resources and services to the poor across Pakistan. It started its operation in April 2000 through engaging a small number of social sector organizations as partners.

PPAF has three windows through which financial and technical assistance is provided to the partner organizations (POs):

- Lines of credit for expansion of poverty targeted micro-credit programs;
- Grants for community physical infrastructure (CPI) on a cost-sharing basis; and
- Grants to strengthen and build the institutional capacity of POs and communities.

The partner organizations (POs) are working in diverse geographical areas with distinct social and cultural settings. This leads to adopting and devising varied approaches in reaching out to the communities and ensuring their participation.

The PPAF has extended its operations to 70 districts through 35 POs by December 2002 and has disbursed an amount of Pak Rs. 2.59 billion that covers the following key indicators of operations.

Loans disbursed	153,332
CPI schemes completed	2,638
Households covered	327,121
Beneficiaries	1,502,437
Trainings provided	927
POs Offices/Units established	188

Besides, the PPAF undertook a large number of organizational activities including giving input to poverty reduction policy development at the national level and conducting research on related issues.

The PPAF recently commissioned a study of its nine partner organizations on the theme of poverty entitled Knowledge, Approaches and Practices in Poverty Alleviation called KAP study in short.

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Objective of the Study

The main objective of the study was to collect and consolidate field experiences of a diversified group of organizations working across Pakistan in varied economic and socio-cultural environment; and draw conclusions to have a better understanding of issues directly related to PPAF's operations. Major issues that were researched in this study are:

- The perception of poverty at community and organization level
- Methodology and processes used in targeting poverty and role of social mobilization
- Innovative and successful practices at community and organization level
- Assessment of capacity building needed to bridge gaps in the knowledge, methodology, processes and practices for effective poverty alleviation

The geographical coverage of the study included both irrigated and non-irrigated areas in the four provinces of Pakistan where PPAF partner organizations have undertaken interventions for poverty reduction through Micro Credit and Micro Enterprise Development, Community Physical Infrastructure and Capacity Building, both at community and organization level.

The Micro Credit and Micro Enterprise operation is designed to facilitate access of poor communities to financial services through partner organizations. Attached with it is the component for capacity building with emphasis on institution building and human resource development for efficient use of financial resources and sustained recurring benefits made available through the program.

In Community Physical Infrastructure, PPAF's thrust of work is on providing communities an access to water for drinking and irrigation purposes, building link roads, bridges and culverts as well as sanitation facilities at a smaller scale. Major operation takes place in rural areas. The need and demand for water has been worsened over the last three years due to drought and drought-like situation in a large number of districts in Pakistan. It called for attention to better water management and drought mitigation on priority basis. Therefore, PPAF is initiating an extensive drought mitigation program in Balochistan.

Coverage of the Study

The study tried to grasp the communities' understanding of poverty situation and provide PPAF planners and managers an insight into the issues so that they can align their program with community needs for effective poverty alleviation. The regional diversity captured in the study is reflected in the box below.

Sr. No.	Organizations	Area included in the study	Topography	Socio/Economic Environment	Program Interventions of the Partner Organization	Beneficiaries
1.	Punjab Rural Support Program (PRSP)	Sialkot district 6 villages Punjab	Barani (rain irrigated) area Fertile soil with tubewells and canal irrigation	Mixed economy based on industry and agriculture Skilled labor force, both men and women Strong manufacturing base of sports goods, surgical instruments and other export items High literacy rate Well developed physical and social infrastructure such as roads, transportation, communication, health and education facilities	Social Organization Human Resource Development Capital Formation through Micro Credit and Saving Community Physical Infrastructure Natural Resource Management Linkages Social Sector Services	Men and women Community Organization members Households Entire community
2.	Development Action for Mobilization and Emancipation (DAMEN)	4 Union Councils on the periphery of Lahore city Shahpur, Chung, Thoker Niaz Baig and Ali Raza Abad Punjab	Situated close to Ravi river on the main highway Land is fertile as water is available Land is being irrigated through tubewells Pressure on environment due to urbanization	Mixed economy based on industry and agriculture Skilled labor force, both men and women; Manufacturing of garments, iron, towels, engineering goods and medicine High literacy rate Well developed physical and social infrastructure such as roads, transportation,	Micro credit program Training and capacity building (Through teachers training children are indirectly benefited) Health and non-formal education (social services) Network and linkages	Women entrepreneurs Women & children

Sr. No.	Organizations	Area included in the study	Topography	Socio/Economic Environment	Program Interventions of the Partner Organization	Beneficiaries
				communication, health and education facilities		
3.	Poverty Eradication Network (PEN)	Khairpur district 4 villages visited Sindh	Land is fertile, and being irrigated through canals Some parts of the district are arid wasteland where there exists water shortage In some areas water quality is poor	Agriculture and livestock base economy Casual labor Main crops are wheat and cotton Physical and social infrastructure such as roads, transportation, communication, health and education facilities available	Social Organization Micro Credit and Savings program Capacity building and linkages	Partner CBOs & community
4.	Sindh Agriculture and Forestry Workers Coordinating Organization (SAFWCO)	Sanghar district 4 villages visited Sindh	Sanghar district is primarily agriculture based Land is irrigated through a network of canals Where water is not available, land is a barren wasteland Livestock is mainly kept by farming community	Agriculture and livestock base economy Casual labor Low literacy in adults, especially among females Poor infrastructure such as health, education, transport and veterinary services	Social mobilization Human resource development Gender development Credit and enterprise development Health and sanitation Advocacy & networking Natural resource management Community physical infrastructure	Men, women, children and the entire community

Sr. No.	Organizations	Area included in the study	Topography	Socio/Economic Environment	Program Interventions of the Partner Organization	Beneficiaries
5.	Balochistan Rural Support Program (BRSP)	Mustang district 5 villages visited Balochistan	Land abundantly available but it is mostly arid Agriculture and orchards are present in areas where water is available Topography is mountainous, dry and barren Scarcity of water Groundwater rapidly depleting Irrigation is being done through Karezs and tubewells	Economy based on livestock, agriculture, orchards and construction work Villages are scattered and far apart Unskilled daily wage earners/casual workers; Art and craft skills among women Extremely low literacy rate, especially among females Lack of access to drinking water and sanitation facilities Lack of infrastructure such as roads, electricity, health, education and veterinary services Each village has its own head, who takes all decisions concerning his village Tribal culture and joint family system prevails	Social mobilization Credit and Savings program Capacity building, Human Resource Development Community Physical Infrastructure Natural Resource Management/tree plantation Linkages Social Sector Services in education and health	Men & women, CO members entire community

Sr. No.	Organizations	Area included in the study	Topography	Socio/Economic Environment	Program Interventions of the Partner Organization	Beneficiaries
6.	Taraqee Foundation (TF)	Peri-urban areas in Quetta city and 3 villages in Pishin district Balochistan	In Pishin district, land is abundantly available Topography is mountainous, dry and barren Apple orchards are present in the area Scarcity of water due to drought Groundwater rapidly depleting	Economy based on livestock, agriculture and orchards irrigated with Karez system Population mainly living in villages which are scattered and far apart Lack of access to drinking water and sanitation Women have embroidery skills Lack of infrastructure such as roads, health, education and veterinary services	Micro Credit Enterprise Development (MFED) Community Physical Infrastructure Basic Health and Education (BHES) Linkages Drought Relief	Women, children and men Community
7.	National Rural Support Program (NRSP)	Turbat region 5 villages Balochistan	Land is available in abundance but it is mostly barren, uneven, dry and rocky Some areas are prone to floods Water is scarce and mostly muddy and brackish Some areas are rich in date plantation	Economy based on livestock, agriculture and orchards irrigated with Karez system Extremely low population density Unskilled casual work force Highly illiterate population Women are skilled in embroidery work on traditional Balochi dresses Lack of infrastructure such as roads, health, transport, drinking water and	Social Mobilization Human Resource Development Rural Credit & Enterprise Development Natural Resource Management Physical Infrastructure and Technology Development (PITD) Social Sector Services Linkages	Men, women CO members, Entire community

Sr. No.	Organizations	Area included in the study	Topography	Socio/Economic Environment	Program Interventions of the Partner Organization	Beneficiaries
				education The main highway to Karachi is unmetalled		
8.	Sarhad Rural Support Program (SRSP)	Peshawar and Kohat region were visited NWFP	In Kohat, land is abundantly available but it is arid and rain fed Water is scarce Livestock is abundantly kept as an income earning source and for meeting the food requirement	Economy / livelihood based on employment in armed forces Fewer income earning opportunities for women Strong tribal customs and traditions Lack of civic amenities Poor infrastructure No industry in the area	Social Organization Credit and Enterprise Development Human Resource Development Productive Investment (PI) Natural Resource Management Linkages Social Sector Services	Men, women CO members, Entire community
9.	Khwendo Kor (KK)	Peshawar and two regional program units in Karak and Dir districts Peshawar and Karak districts were visited NWFP	Abundantly available land Topography is mountainous, dry and barren Water scarcity Livestock such as sheep and goats are kept .	Economy based on agriculture and livestock as well as on employment in the armed forces Population mainly living in villages, which are scattered and far apart People in villages are involved in agriculture Women mostly have embroidery skills Lack of access to drinking water and sanitation Lack of infrastructure such	Social Organization (SO) Women Micro Enterprise Development (WMED) Human & Institutional Development Community Based Primary Education for girls (CBEF) Primary Health Care (PHC) Advocacy	Men, women and children Entire community

Sr. No.	Organizations	Area included in the study	Topography	Socio/Economic Environment	Program Interventions of the Partner Organization	Beneficiaries
				as roads, health, education and veterinary services Tribal culture prevails Joint family system		

A more precise understanding on issues related to poverty and poverty reduction strategies and programs has now started to emerge as a result of close interaction both with social sector organizations and client communities. An important learning of PPAF over a period of three years is that effective poverty alleviation needs accurate poverty targeting based on community's own perception of poverty and not that of the implementing or funding agency. Similarly, community mobilization for active participation in the program right from the planning stage is also essential. Other issues such as better management of natural, human, financial and material resources and equitable distribution fall within the ambit of social mobilization. Community Driven Development approach strongly advocates and applies this principle. Main conclusions drawn from the KAP study are given below.

Main Findings and Conclusions

Poverty Perception

There does not seem any significant difference between the community and organization's perception of poverty. Due to access to information and knowledge, the organizations are obviously more eloquent in enlisting the indicators that reflect the phenomena and situation of poverty in their area of operation. Communities, on the other hand, are aware of their circumstances and conditions that entrap them into poverty net. They are also trying to find space and break through limitations posed by circumstances to get out of poverty cycle. Their strife is supported by social sector organizations that are providing a host of direct facilities as well as access to services at local, regional, provincial and national level.

It was learnt from focal group discussions in communities that people do not confine poverty to income or consumption only but considers all its dimensions. Common perceptions of poverty are based on core economic and social issues such as unemployment, low income and high indebtedness, non-availability of water, no access to education and health services, and no recourse to justice. Environmental degradation is also considered a manifestation of poverty in communities dependent on natural resources for survival. The implication of such a notion is that the incidence of poverty is far greater than generally depicted.

Different geographical areas have different poverty threshold at the micro level that reflects differences of prices and basic needs. In rural areas, a large part of consumption is not in money terms. Therefore, communities were asked to determine the level of income at which they would not consider themselves poor. Generally, the level of income people talked about was higher than the national poverty line, which was Rs. 650/- per capita per month.

According to communities' response across regions, a mean income of Rs. 6000/- for a family of 5-8 members is being considered reasonable to afford living and food expenses. That, however, does not give space for children's education and family health care. (Please refer to document 'Extracts from the Survey Report for details).

Other poverty indicators perceived by the communities and partner organizations' staff members at the field level are given below.

Communities perceptions regarding poverty	POs' Staff perceptions
Economic Indicators Poverty prevails when there is lack of work opportunities or less income, unemployment, lack of regular occupation of the household head, low wages; inflation; lack of assets, in particular land as well as possession of uncultivable land, high expenditure, high utility bills and lack of financial resources, under debt from shopkeepers, lack of water and cheap fuel, delayed returns on agricultural produce, no capacity to save **Social:** Poverty prevails when there is a large family, large number of children, low level of education and literacy, lack of facilities and utilities, poor health, sudden death in family, poor food intake, children forced to work at early age **Absence of Well Being:** When children have dirty clothes, no shoes, people have one meal a day, meal based on pulses and vegetables, no spare money for entertainment Poverty is spread across generations; one is poor if born in a poor family **Lack of Empowerment:** When there is a feeling of helplessness, despair, hopelessness; no serenity or peace of mind, high crime, no recourse to justice, lack of self-esteem, inferiority complex, isolation as people do not want to associate with the poor, lack of awareness on how to use resources **Gender Development:** When poor women who are involved in home enterprises do not have marketing opportunities to sell their products; wages are not paid in full Critical to gender development was the perception that a person is poor who has many daughters with responsibility of their marriage and burden of dowry; similarly a widow or a woman without a husband is considered poor **Environment:** When floods destroy standing crops, there are no facilities to store rainwater; livestock is affected due to drought	In addition, **Economic:** Unproductive use of money, underdeveloped agriculture, weak marketing capacities, poor quality of products, involvement in litigation, migration, lack of access to capital, lack of linkages with the government agencies for economic activities, economic shocks through government's macro policies; vulnerability of poor due to no reserves or assets **Social and Empowerment:** When there is lack of information, lack of life skills, lack of representation and participation of poor in decision making **Environment:** When there is urbanization without provision of basic necessities, in rural areas there are scattered settlements, decrease in rain, vegetation and resources due to environmental change

It has emerged from the review of above mentioned indicators that people are fairly aware of the causes of poverty and apply them to define poverty in specific community and geographical context. There are short-term as well as long-term and chronic poverty situations that shall be addressed by development planners and managers, preferably in close collaboration with communities.

Poverty Targeting

It is learnt from the study that poverty targeting depends on a number of factors such as:

- perception of poverty in local context (as elaborated in the above section)
- methodology adopted to define poverty and identifying poor in which social organizer and activists play a significant role
- choices between organizational sustainability and poverty targeting
- interventions modus operandi and the terms and condition of participation and participation cost

Methodologies and processes used in poverty targeting by PPAF partner organizations are varied. These ranges from informal method of identification of deprived communities and disadvantaged areas to more structured approach of situation analysis and need assessment using Participatory Rural Appraisal (PRA) tools.

Participatory Rural Appraisal/Participatory Learning and Action (PRA/PLA) methodologies help to collect poverty related information about the area and people. The PRA/PLA tools provide a flexible and relaxed environment to the people in which they themselves can assess their situation. Besides this, organizations also collect quantitative data through which per capita income/consumption of members' households can be assessed. However, no one is doing this analysis because national poverty line is not being used as a benchmark for defining the poor.

Some of the most common elements in poverty targeting are population or community profile, socio-economic profile of the area built on information available in census reports or developed by the organizations through proxy indicators, geographical and topographical conditions, gender construction and finally community's attitude, initiative and responsiveness to undertake development projects. The last factor seems to play a critical role in the sustainability of community projects and its benefits through effective implementation, operations and maintenance.

Social mobilization appears to play a significant role in community organization and collective action towards poverty alleviation. The key players are the social organizers, area activists and village focal persons. The process of poverty targeting depends on their understanding of communities' socio-cultural background and interpersonal/intergroup relationships. Their main responsibility is to ensure accurate identification and assessment of deserving client communities and their participation in programs' benefits. This is an evolutionary process and needs significant investment of time, patience and personal commitment.

Organizations are constantly weighing the choices between reaching out the poorest of the poor and making the program sustainable. It is feared that a greater emphasis on sustainability weakens the process and ultimate realization of poverty targeting. Similarly, strict terms and conditions laid out in the agreement between the organization and community affect the initiative and spirit of the community. These deductions are

based on the fact that many deserving communities, due to lack of resources and capacity to contribute, are excluded from certain interventions under poverty alleviation program. Micro credit facility is one such intervention. It does not seem to reach out the poorest of the poor as they are not considered credit worthy according to the eligibility criteria. There has to be a pre-micro credit intervention to support the poorest communities as to bring them up to the level where they can acquire small loans, utilize these loans productively and make enough money to replay regular installments.

Cost effectiveness is another key element related to sustainability. It is also directly connected to the modus operandi adopted by the social sector organizations in implementing poverty alleviation programs. The issue is being constantly discussed at various forums among development organizations. At micro level, the PPAF study of its partners highlights the fact that besides the cost incurred by the Apex and implementing organizations, communities also bear a hidden cost over and above their elaborate contribution to the project. It consists of the value of time community members spend in commuting to attend meetings as well as the lost wages for the day:

Innovative and Successful Practices

The study discovered a number of innovative and successful practices used by partner organizations in identification and targeting of poor communities. For example, by applying PRA tools including focal group discussions within the community, organizations enlist the number of people perceived as poor and the reason as to why the same are considered poor. In some cases, a distinct classification or categorization of the whole community/village population is conducted to establish the ratio of poor to the non poor as well as the poverty gap and intensity. Rural Support Programs (RSPs) use participatory method to establish five main categories for poverty analysis in the village or community as follows:

1. Well to do
2. Better off
3. Poor well
4. Very poor
5. Destitute

Specific needs, then, are identified to plan interventions once again through participatory method. Holistic approach is preferred where funding is available to address the key issues in the area under community driven development approach such as applied by the Pakistan Poverty Alleviation Fund.

It is learnt that in many projects meant for the poor, even well off population (including non-residents) of the area, also contributed to ensure successful implementation and distribution of benefits to the disadvantaged groups.

Democratic processes are being introduced in the group formation at community or village level in which women and minorities' equity is ensured.

Organizations through persistent social mobilization inculcate among individuals and communities a sense of collective action and responsibility. It results in self-initiated projects to start with leading to larger projects through external funding. Where direct service delivery mechanism is not possible, communities are encouraged to gain access to public sector services available in the area for which linkages are developed by the

NGOs. The devolution process has opened numerous opportunities for such linkages and collaboration in development work.

Mutual trust for building resource base to achieve self-reliance is increasingly taking place within PPAF POs' communities. As a result, saving campaigns are being initiated. Some communities are able to have significant collective saving which is now being used for internal lending among community members. Similarly, joint actions to operate and maintain infrastructure projects are taken at community level with the support of partner organizations (POs).

POs have developed some standard practices for up scaling projects. A successful way is to sort out technical and administrative problems in the pilot phase, built common base of interest for all stakeholders and strengthen operational relationships before embarking on enlarging the scope of work and replicating experiences in other geographical areas. Simultaneously, keep sufficient flexibility to make amendments in the local context while replicating experiences.

Capacity Building Needs

The study also looked into the capacity building needs at three levels i.e. PO's Head Office, Field Office and the Community. Then it and made an assessment of strengths and weaknesses in the knowledge, methodology, processes and practices for effective poverty alleviation.

One of the major conclusions of this assessment is that greater coordination and synergy among the organizational elements, i.e. people, tasks, technology and infrastructure, would help to enhance performance and reduce operation cost. That may in turn lead towards sustainability within a reasonable period of time.

The study further elaborates that these four elements are linked together through processes, mechanisms, internal rules and regulations and external environments.

Capacity building issues have been divided into three categories:

1. Organizational level issues
2. Personnel level issues
3. Communities level issues

Partner organizations' institutional development is one of the main responsibilities undertaken by the PPAF. It is closely related to ultimate viability of PO's operation and sustainability of its benefits in communities over a period of time. Similarly, the cost of service delivery and trade off between poverty targeting and program sustainability are the areas where substantial technical and intellectual input is required. There is also a need to develop pro-poor products in micro credit as well as programs to access quality social services. Organizations need exit strategies after having built capacity of communities to undertake, operate and maintain development projects or linkages with other service providers, particularly public sector institutions. A continuous resource generation and mobilization strategy and action plan is to be worked out in order to avoid sudden break down of lines of service delivery for lack of financial input.

A corresponding aspect of institutional development is human resource development covered in the study under the title of Personnel Level Issues. Primarily, the requirement is to have an elaborate personnel policy and employment package that should include

definition of job with elaborate TOR, selection criteria and induction process as well as realistic career planning and human development by the organization. Exposure to variety of experiences and learning opportunities, building leadership and enhancing team spirit through continued motivation would be an essential part of the human development strategy. Gender and minorities' participation in the organization and communities could be another important indicator of well-rounded personnel development policy.

The study highlighted strong working relationship between communities and social mobilization teams working in the field. Their dedication and honesty is making an impact on the participatory development processes for successful implementation of the program. Continued efforts would be needed to sustain mutual trust and collaboration among all stakeholders.

POVERTY AMONG FARMING COMMUNITY IN MARGINAL AREAS OF PUNJAB

Munawar Hussain[1]

Abstract

Land resources having low productive potential than those in normal areas are treated as marginal areas. These marginal areas are mainly due to lack of irrigation facilities, uneven topography and bad soil structure. Due to low agricultural productivity, farmers are poor in the marginal areas. There are 1.8 million hectares of Potohar Plateau, 4.48 million hectares of Desert areas (Thal and Cholishtan), 3.31 million hectares of Hilly areas (Muree, Salt range, Siwalik range, D.G. Khan) and 1.23 million hectares of Riverine areas classified as marginal areas in Punjab (ABAD 1988). Agriculture is totally dependent on rainfall in these areas. The present study was carried out in Potohar Plateau to assess poverty situation among farming community. Two villages were selected from each of the tehsils (Jand, Gujar Khan and Attock) based on their location, one near the road and other at least 10 kilometers away from the main road. Ten farmers and five non-farmers from each village were chosen for this study. A relatively lower poverty incidence was measured for Jand tehsil in Attock district as compared to Gujar Khan tehsil of Rawalpindi district. Family size, dependency ratio, education of the household head, landholding and noncrop income were found as the major determinants of the poverty in marginal areas of Punjab, Pakistan.

Introduction

Poverty is one of the main issues that could be considered an important impediment in the way of development of the country. Poverty affects the economic growth in two ways, when we have to spare resources to fight poverty and when low productivity of the poor slashes GDP of the country. In Pakistan, the extent of poverty is about 28 percent with recognition of higher incidence in rural areas (32 percent) than in urban areas (19 percent). In Pakistan, about 70 percent of the population reside in rural area and depends on agriculture sector, directly or indirectly, for their livelihoods. That is why the farming community is a major victim of poverty in Pakistan.

The lands having productive potential less than that of normal irrigated lands due to low and erratic precipitation, severe temperature, rough topography, poor soil structure and drainage can be termed as marginal lands. Such lands include rain fed, reverine, coastal, desert and hilly areas. According to a report of the National Commission on Agriculture, an increase in crop yields mainly from vertical expansion overriding the limitation on the area expansion imposed by the limited irrigation water supplies was recommended (Government of Pakistan 1988). However, targeted investment in marginal areas could offer greater scope of horizontal expansion in agriculture of the country. The detail of marginal areas of Pakistan is given in Table 1.

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Table 1: Distribution of marginal areas in the country (million hectares).

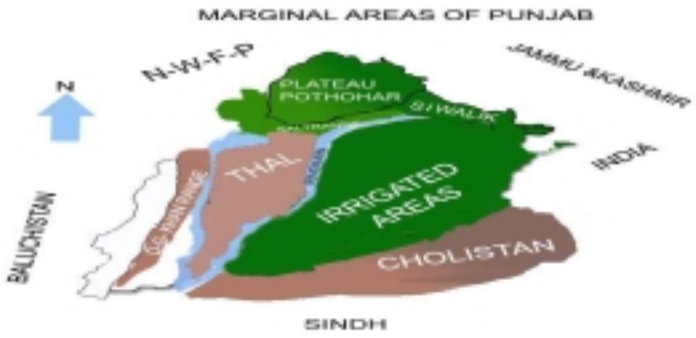
Areas	Punjab	Sindh	NWFP	Baluchistan	Pakistan
Rain Fed	1.8*	-	1.06	-	2.86
Hilly Areas	3.31*	-	1.40	17.71	22.42
Reverine	1.23*	1.54**	-	0.80	2.57
Desert	4.48*	2.80**	-	2.20***	9.48
Coastal	-	1.36	-	0.77	2.13
Total	10.82	5.7	2.46	21.48	40.46

Source: Government of Pakistan 1997, *ABAD 1988, ** Pakistan Desertification Monitoring Unit 1983 and ***Khan 2001

The important categories of marginal areas in Punjab are Potohar Plateau, Reverine Areas, Deserts (Thal & Cholistan) and Hilly areas (DG Khan, Muree, Salt Range and Siwalik Zone). *Potohar Plateau* is the north central area, comprising the major part of the marginal areas (1.8 million hectares) ranging from 1500 to 2000 feet in elevation. Half of this area is under cultivation with poor yield due to dry land farming. *Reverine Areas* (1.23 million hectares) located along main rivers are upper reaches of active flood plains of Ravi, Chenab, Jehlum and Indus from Kalabagh to Mithan Kot. This area has high potential of groundwater and the installation of shallow tubewells can serve the agricultural crops. *Thal Desert* (1 million hectares) is an integral part of the Indus plains with sandy and silty soils. The groundwater can be captured with deep well turbine pumps for growing crops in the region. *Cholistan Desert* (3.48 million hectares) is located in the districts of Bahawalpur and Bahawalnagar and the rainwater is stored in ponds for livestock and human being. This area can support the growth of forage trees like Acacia, Zizyphus and many shrubs for grazing of the animals. D.G. Khan and Rajanpur districts (1.67 million hectares) have the loamy soils with low rainfall, i.e. up to 250 millimeter annually. *Muree Hills* (0.09 million hectares) are located in the north east of the province, ranging from 2000 to 7000 feet in elevation. These are also called wet mountains, receiving rainfall in more than 1000 millimeters. The important land uses are for forestry and grazing along with the production of maize, wheat and fruit trees. *Salt Range* (0.90 million hectares) is ranging from 2000 to 3500 feet in elevation with inter mountain valleys covered by lose soils. Foothill plains are served with hill torrents. *Siwalik Zone* (0.65 million hectares) covers north eastern part of the Gujrat and Sialkot districts comprising plains deposited by hill torrents originating in the adjoining areas of Jammu and Kashmir hill ranges. Groundwater table is high in the region and the entire area can be used for cultivation of crops.

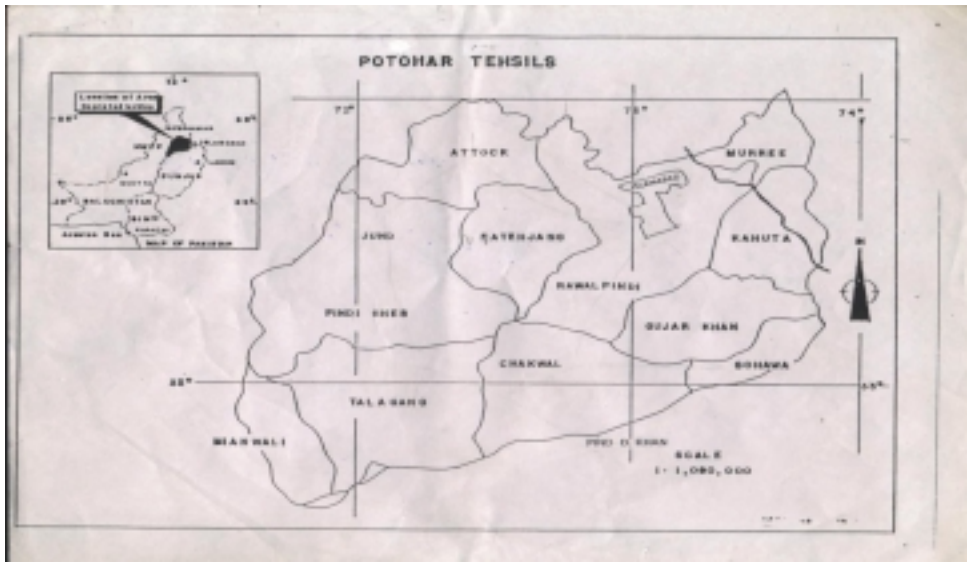
As the marginal areas are less productive than normal lands, poverty prevails among rural communities because they are mostly dependent on agriculture for their livelihood. The present study was planned to assess the poverty situation among farming community of the marginal areas along with some important determinants of poverty to extend some suggestions for the policy makers to cope the situation.

The current paper is divided into five parts. Methodology is described in part II. General results are discussed in part III of the paper while part IV, carries assessment of the determinants of poverty. Part V contains the conclusions made on the basis of current study.



Research Methodology

The Potohar Plateau (1.8 million hectares) was selected as study area, which forms the large contiguous block of rain fed agriculture in Pakistan. The study was carried out to assess poverty situation among farming community of Jand, Gujar Khan and Attock tehsils of the area. Two villages were selected from each tehsil based on their location, one near the road and the other 10 kilometers away from the main road to capture both the scenarios. Jand and Attock tehsil, are situated in the northeast while Gujar Khan tehsil is located at the south east of Potohar Plateau. Ten farmers and five non-farmers from each village were included in the survey for this purpose. Data was collected on a well-designed and pre-tested questionnaire.



Monetary Measures of Poverty

Foster-Greer-Thorbecke (FGT) class of measures is the most commonly used measure of poverty, which captures three aspects of poverty: incidence, depth/intensity, and severity of poverty. These measures are the Head Count Index, Poverty Gap Index and the Squared Poverty Gap Index.

Poverty Line Used for Current Study

For the analysis of poverty situation in the present study, official poverty line of Rs.673.54 per capita per month for 1999 on basic need basis was used. This was inflated to the prices of 2003, which resulted in inflated poverty line of Rs.742.38 per person. For sensitivity analysis, two other poverty lines, i.e. Rs. 642 and Rs. 542 per person per month, were used.

Results and Discussions

Poverty Line I (Rs. 742 / month)

Monetary measures of poverty were estimated for each of the three tehsils. Table 1 indicates poverty indices for each tehsil based on household income and expenditure at poverty line I (PL-I). The Head Count Index on annual expenditure basis shows that about 73.30, 80.00 and 47.80 percent of the sample households were living below the poverty line in the Attock, Gujar Khan and Jand tehsils, respectively. The highest proportion of poor households belonged to the Gujar Khan tehsil.

On an overall basis, the incidence of poverty in the areas was 67.60 percent whereas on the basis of income, the percentage of poor was 93.30 percent in Attock, 76.70 percent in Gujar Khan and 65.20 percent in Jand tehsil. The overall percentage was found to be 76.50 percent.

Table 1 also shows the figures for the poverty gap according to PL-I. The overall poverty gap was estimated to be around 39 percent, indicating that poor households needed an additional 39 percent of the present expenditure, to attain minimum basket of basic needs. Poverty gap squared annual expenditure was calculated as 20 percent, poverty gap annual income 50 percent and poverty gap squared annual income was 33 percent.

Table 1: Estimates of annual poverty based on Poverty Line I (Rs. 742 per capita / month).

		Tehsil			
Indicators	Category	Attock	D.G. Khan	Jand	Total
Poor-on expenditures basis	Non-Poor	26.70	20.00	52.20	32.40
	Poor	73.30	80.00	47.80	67.60
Poor-on income basis	Non-Poor	6.70	23.30	34.8	23.50
	Poor	93.30	76.70	65.20	76.50
Poverty Gap - Expenditures		0.29	0.41	0.45	0.39
Poverty Gap Squared – Expenditures		0.12	0.22	0.23	0.20
Poverty Gap – Income		0.53	0.54	0.40	0.50
Poverty Gap Squared – Income		0.38	0.38	0.21	0.33

Poverty Line II (Rs. 642 / month)

Table 2 depicts poverty situation on the basis of poverty line II i.e. Rs 642 per person per month. On the basis of annual expenditure, the poverty incidences were about 60.00, 73.30 and 43.50 percent of the sample households, indicating the percent of people who were living below the poverty line in the Attock, Gujar Khan and Jand tehsils,

respectively. The highest proportion of poor households belonged to the Gujar Khan tehsil. On overall basis, the incidence of poverty in the areas was 60.30 percent. Continuously on the basis of annual income, the percentage of poor were 80.00 percent in Attock, 73.30 percent in Gujar Khan and 56.50 percent in Jand tehsil whereas the overall percentage was found to be 69.10 percent.

Table 2 also represents the figures for the poverty gap according to PL-II. The overall poverty gap, based on annual expenditure, was estimated to be around 34 percent, indicating that poor households needed an additional 34 percent of the present expenditure to attain minimum basket of basic needs. Poverty gap squared annual expenditure was calculated as 16 percent, poverty gap based on annual income was calculated as 47 percent and poverty gap squared based on annual income as 31 percent.

Table 2: Estimates of Annual Poverty based on Poverty Line II (Rs. 642 per capita/month).

		Gujar Khan Tehsil			
Indicators	Category	Attock	G. Khan	Jand	Total
Poor - on Expenditure basis	Non-Poor	40.00	26.70	56.50	39.70
	Poor	60.00	73.30	43.50	60.30
Poor - on income basis	Non-Poor	20.00	26.70	43.50	30.90
	Poor	80.00	73.30	56.50	69.10
Poverty Gap – Expenditure		0.24	0.36	0.41	0.35
Poverty Gap Squared – Expenditure		0.1	0.18	0.19	0.16
Poverty Gap - Income		0.56	0.49	0.35	0.47
Poverty Gap Squared – Income		0.39	0.35	0.18	0.31

Poverty Line III (Rs. 542 / month) and Poverty Gap

Poverty situation on the basis of poverty line III is given in Table 3. On the basis of annual expenditure, the poverty indices were about 33.30, 53.30 and 39.10 percent of the sample households, indicating the percentage of people who were living below the poverty line in the Attock, Gujar Khan and Jand tehsils, respectively. The highest proportion of poor household belonged to the Gujar Khan tehsil. On an overall basis, the incidence of poverty in the areas was 44.10 percent whereas on the basis of annual income, the percentage of poor was 80.00 percent in Attock, 56.70 percent in Gujar Khan and 43.50 percent in Jand tehsil. The overall percentage was found to be 57.40 percent.

Table 3 also presents figures for the poverty gap according to PL-III. The overall poverty gap based on annual expenditure was estimated to be around 34 percent, indicating that poor households needed an additional 34 percent of the present expenditure to attain minimum basket of basic needs. Poverty gap squared based on annual expenditure was calculated as 7 percent, poverty gap based on annual income 47 percent and poverty gap squared based on annual income 32 percent.

From the sensitivity analysis by comparing the results of PL-I and PL-III, it is evident that 44 percent are chronic poor and 23 percent are at the verge of poverty line waiting for any positive change in the business cycle to be converted in to the category of non poor. In Attock, 40 percent of the persons are at the verge of poverty line while this percentage is 27 for Gujar Khan. Also the comparison of poverty gap of PL-I and PL-III indicates overall decline of five percent while it is highest, 12 percent, for Jand and

lowest, 2 percent, for Attock. Highest decline in severity (18%) was observed in Jand while lowest (9%) was observed in Attock.

Table 3: Estimates of Annual Poverty based on Poverty Line III (Rs. 542 per capita / month).

Indicators	Category	Tehsil			Total
		Attock	G. Khan	Jand	
Poor - on expenditure basis	Non-Poor	66.70	46.70	60.90	55.90
	Poor	33.30	53.30	39.10	44.10
Poor - on income basis	Non-Poor	20.00	43.30	56.50	42.60
	Poor	80.00	56.70	43.50	57.40
Poverty Gap – Expenditure		0.27	0.36	0.33	0.34
Poverty Gap Squared – Expenditure		0.03	0.09	0.05	0.07
Poverty Gap – Income		0.48	0.54	0.35	0.47
Poverty Gap Squared – Income		0.34	0.4	0.17	0.32

These results were consistent with other studies. Ahmad (1998) reported 47 percent poverty in 1992-93 and 50 percent in 1995-96 in Punjab, by using basic needs poverty approach. Similarly, (Bhatti et al. 1999) also reported that 50 percent of rural population was living below poverty line.

Sources of Household Income

Highest annual income was observed in Gujar Khan tehsil for non-poor with the average annual income of Rs. 65933 while lowest annual income was seen in case of poor where average annual income was Rs.39622. Crop income shares very minor portion in total annual income. Remittances contribute major portion in non-crop income followed by pension.

Determinants of Poverty

In order to determine the effects of different factors on poverty, Logit regression was employed. Logit regression technique is employed when dependent variable has value of 1 or 0. The coefficients of independent variables tell about the probability of being or not being of one of the two possibilities of dependent variable. The model specifications are as follows:

$$\text{Poverty} = \beta_0 + \beta_1 * FS + \beta_2 * DR + \beta_3 * HHE + \beta_4 * NLH + \beta_5 * NCI + e$$

Dependent variable is equal to Poverty (if poor then 1, otherwise 0) and the independent variables are FS (Family size in number), DR (Dependency ratio), HHE (Education of the household head), NLH (Net landholding in hectares), NCI (Non crop income in thousand rupees). Here, □0 is the constant term and □1…□5 are the coefficients while e stands for error term.

From the estimated coefficients of the model, marginal effect of each independent variable was calculated. The marginal probability is defined by the partial derivative of the probability, which dependent variable assumes a value of 1 with respect to that independent variable. The marginal probability is defined by:

$\partial P/\partial B = f(BX)\, B$

Where B is the slope of the coefficient. X is the independent variable while f is the density function of the cumulative probability distribution function f (BX), which ranges from 0 to 1. The marginal effect could be interpreted as the change in the probability of household being poor with a one-unit increase in the explanatory variable. The marginal probability values were estimated as the mean values of the explanatory variables.

Family Size

Higher the family size, higher the probability of the household was found to be poor. With increase of one member in the family size, the marginal probability of being poor for that family was estimated as 0.046.

Dependency Ratio

Dependency ratio was the ratio of number of household members below 16 years and above 60 years divided by family size. With increase in number of dependents in the household, probability of being poor became higher and was estimated to be 0.048.

Education of the Household Head

The education of the head of the family also plays important role in being poor or not. Families with educated head were less poor than households with no education. With the attainment of education, marginal probability of being poor decreased and was estimated as -0.097.

Net Landholding

It was indicated that increase in net landholding would decrease the probability of the household to become poor and the marginal probability was estimated as -0.011. Negative sign for the coefficient of net landholding was indicating inverse relationship with poverty.

Non Crop Income

Income from resources other than agriculture is very supportive for rural community. It has negative correlation with poverty. People having such income resources were found less poor than those without non-crop income and the marginal probability was -0.004.

The regression results are shown in Table 4. Here, the number of observations is 68 and Log likelihood function is -35.57420. Similarly, restricted Log likelihood and Chi-squared is 42.80609 and 14.46376, respectively. Degree of freedom is 5 and significance level is 99 percent.

Table 4: Regression Results.

Variables	Coefficients	S- Error	T-ratio	P-value	Marginal Probabilities
FS	0.228	0.115	1.972	0.049	0.046
DR	0.239	0.755	0.317	0.752	0.048
HHE	-0.482	0.235	-2.051	0.040	-0.097
NLH	-0.056	0.092	-0.607	0.544	-0.011
NCI	-0.021	0.009	-2.315	0.021	-0.004
	0.824	0.880	0.937	0.349	0.166

Conclusions

Incidence of poverty was highest in Gujar Khan tehsil while it was lowest in Jand tehsil. Higher proportion of the households in Attock tehsil was lying on the verge of poverty line showing high sensitivity to variation in poverty line. Depth of poverty (poverty gap) was found highest in Jand and Gujar Khan tehsils. Severity of poverty was highest for the households in Jand. Higher proportion of annual income was captured by non-crop income for the households in all the three tehsils. Annual income per household was highest in Gujar Khan tehsil while it was lowest for households in Attock tehsil. An increase in family size was found to increase the probability of household to be poor. More investment in population planning would be effective. Increasing size of landholding would reduce the probability of being poor for any particular house. This requires land reforms as well as legislation to stop further de fragmentation of land into uneconomical unit size. More education of the household head would reduce the probability of household to become poor. More investment on education, especially on improving and strengthening the already prevailing setup, would impart its benefits quickly and efficiently.

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FOREST POLICIES FOR SUSTAINABLE DEVELOPMENT AND POVERTY ALLEVIATION IN PAKISTAN

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Abstract

Local livelihoods and state policies have a dual interface. One, policy changes affect rural livelihood practices, informal local institutions and peoples coping strategies. Two, these changes do affect resource use sustainability since local livelihoods are embedded in the local resource base. Financial constraints, land, and alternative means of livelihood are critical factors forcing many people into unsustainable patterns of natural resource use. Paucity of choices forces the poor to adopt short-term survival strategies. People without any hope for the future have little incentive to manage natural resources well. Until recently, forests were the sole objective of forest policy and people were taken as enemies of the forest. However, now there has been a realization that forestry should be an instrument of the policy rather than its objective, thus leading towards sustainable livelihoods and reducing pressure on the fast dwindling forests. This paper with focus on mainly the case study conducted in NWFP (where 40% of Pakistan's natural forests are present) emphasizes that legal, institutional and policy reforms alone are not sufficient to achieve sustainable development and poverty alleviation. Good laws and policies are useless without political and administrative will to change. Otherwise, the poor would remain mired in poverty pushing us into a spiral of over exploitation in the wake of all forest policy failures.

Introduction

Human Environment Interaction

Environment and human life are co-related, and hence, influence each other. The population explosion pollutes environment against the need for a cleaner environment, which is critical to their lives. There are three ways with which the human beings interact with environment. Firstly, they depend on environment for life; secondly, they modify environment; and lastly, they adapt to environment. These activities, if not carried out in a way to meet key aspect of sustainability - as well as in high population growth, which is partly an outcome of this process - can lead to environmental degradation (Khan and Naqvi 2000).

The concerns over the balance between human life and environment assumed international dimension only during the 1950s and the policies articulated in documents such as the Stockholm Declaration and Program of Action, the World Conservation Strategy, Our Common Future, the Rio Declaration and Agenda 21, have driven the environmental agenda so far (UNEP 2002). Environment is one of the four pillars of sustainable development (Box-1). All four pillars - social, economic, institutional, and environmental - are mutually supportive and essential for achieving sustainable

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development. However, the experience of the last 30 years[1] (1972-2002) reveals that in practice it becomes difficult to maintain a balance among these four pillarrs. Maintaining this balance becomes even difficult when there is a strong pressure of human activities on natural resources to secure livelihoods.

Box-1: Four pillars of sustainable development.

Environmental sustainability is achieved when the productivity of life-supporting natural resources is conserved or enhanced for use by future generations.
Economic sustainability is achieved when a given level of expenditure can be maintained over time.
Social sustainability is achieved through minimising social exclusion and maximizing social equity.
Institutional sustainability is achieved when the prevailing structures and processes have the capacity to continue performing their functions over the passage of time.

Livelihood Strategies – State Policy Interface

A livelihood comprises the capabilities, assets (material and social resources) and activities required for a means of living. Understanding the interface between local livelihoods and state policies is of vital importance for developing sustainable local natural resources management. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets, both now and in future, while not undermining the natural resource base (Chamber and Conway 1992). State policies, and regional and international institutions[2] - which are exposed to and embedded in national economies, market forces and processes of globalization/global changes - have an impact on local people's sustainable livelihood practices and strategies as well as on local institutions developed by the people themselves (informal institutions). On the other hand, these institutionally shaped livelihood strategies have an impact on the sustainability of resource use. Taken together, policies and institutions form the context within which the individuals and households construct and adapt livelihood strategies. In effect, they determine the freedom with which the people have to transform their assets into livelihood outcomes. Policies and institutions determine, among other things:

- people's access to various assets (such as land or labor)
- benefits people are able to derive from different types of capital (through markets)
- environment for private sector investment
- extent to which people are able to engage in decision making process
- individual and civil society rights

In most of the developing countries including Pakistan, policies and institutions generally tend to discriminate against those people with few assets (social as well as economic) and disadvantageous poor people. Forest policies and laws enacted from time

[1] 30 years have passed since the international community laid the foundation in 1972 for collective global action to mitigate adverse impacts on the environment through United Nations Conference on the Human Environment in Stockholm, Sweden.

[2] Institutions or rules of the game are defined as the rules, norms and values that shape our behaviour. These institutions can be formal (e.g. land tenure laws) and informal (e.g., social customs and conventions); created (e.g. as a result of deliberate political decisions) or may evolved over time (DFID 2000).

to time to implement these policies are not an exception to this general rule. Such discriminatory policies and institutions not only exclude the marginalized groups such as women and children, but also lead to unsustainable natural resources management. Due to few choices available, the poor are forced to adopt short-term survival strategies and unsustainable natural resources management practices.

Pakistan's forest policies are tied to its British colonial past. At the time of independence, the policies, procedures and structures that administered the new nation's forests were largely left intact (Poffenberger 2000). The first forest policy of Pakistan was announced in 1955; it was revised and updated in 1962, 1975, 1980, and in 1988, as well as in 1991 as part of the National Agricultural Policy. At provincial level[3], in NWFP (where 40% of Pakistan's natural forests exist) a new forest policy was introduced in 1999, whereas at federal level a national forest policy is under preparation. According to Ahmed and Mahmood (1998), most forest policies, until recently, have viewed people as the prime threat to the forests, and have attempted to exclude groups other than the government from decision making. This approach did not only affect the sustainability of the livelihood strategies of the local people, but also increased the vulnerability of the marginalized sections of the communities. It ultimately led to unsustainable management of natural resources and forest depletion.

It is a proven fact that none of the policy initiatives or the policy in itself, can be successful and effective without a legal cover. For decades, the only reference point for dealing with new problems in the forestry sector had been the 1927 Forest Act. List of important legislations governing forestry sector in Pakistan are presented in Annexure I. It is pertinent to mention here that so far the existing laws, including the recently promulgated NWFP Forest Ordinance 2002, are punitive in nature, while providing penalties for contravention of their provisions do not contain incentives for compliance, which are recommended in the National Conservation Strategy, Forestry Sector Master Plan, and forest policies of the Punjab and NWFP.

New Trends in Shaping Forest Policies

At the global level, importance of forests in poverty reduction and providing livelihood to local communities is being recognized. Forests resources directly contribute to the livelihood of 90 percent of the 1.2 billion people living in extreme poverty and indirectly support the natural environment that nourishes agriculture and food supplies of nearly half the population of the developing world (World Bank 2001). In order to utilize the potential of forests in poverty alleviation, forest policies of many countries and international lending institutions are being revised to be more policy oriented on forestry for rural development and poverty alleviation. Hence, forestry becomes an instrument of policy rather than an object of the policy. This new trend in shaping forest policies not only has a potential to maintain a balance among four pillars of sustainable development, but also covers secure sustainable livelihood. Pakistan is also attempting to adopt this trend with the financial assistance of some international development agencies as well as with a loan from Asian Development Bank (ADB). The initial period of ADB funded NWFP Forestry Sector Project was six years. However, it was extended by another year in 2002 to complete the reform process. Hence, the efforts to bring reforms in forestry are in its seventh year now and forestry sector in Pakistan

[3] Forestry is a provincial subject according to the Constitution of Pakistan.

makes an interesting case study to assess the role of environmental policies in fostering sustainable development and poverty alleviation.

Forestry Sector in Pakistan

Forestry Sector in Pakistan and Its Role

There is a considerable debate over the precise area under forests in Pakistan (UNCED 1992). The problem stems from the definition of legal areas of forestland as an indication of forest cover, irrespective of the actual measure of tree cover and its condition. Areas usually described, as 'forest areas' are the lands that are under the administrative control of provincial Forest Department (FD). But areas officially designated as forests may be devoid of trees, while substantial tree cover may be found in localities other than the ones classified so. Different government departments have been publishing different forest statistics since 1947. In the recent past, data of land use including forest areas has been reported by the Forestry Sector Master Plan (FSMP) Project in 1993, with the help of satellite imagery covering entire Pakistan. According to the FSMP of 1993, Pakistan had 4.2 million hectares covered by forests and trees, which was equivalent to 4.8 percent of the total land area. However, according to the more recently released FAO State of Forest 2001, total forest area of Pakistan (sum of natural forests plus forest plantation) was reported to decrease from 2.75 million hectares in 1990 to 2.36 million hectares in 2000. Thus, there is an annual change of 0.39 million hectares (-1.5% per annum rate of deforestation) in forest cover over the last decade (FAO 2001). FAO's statistics also challenge the credibility of the Government of Pakistan (GoP)'s claim that the forests have been increased from 3.46 million hectares in 1990 to 3.66 million hectares in 1999 (GoP 2001). Asian Development Bank (ADB) also claims that forest cover in Pakistan has been dropped from 3.6 percent of the total land in 1990 to 3.2 percent of the total land in 1999 (ADB 2001). Therefore, for the purpose of academic debate, we would take FAO's statistics as reference for this paper.

Forests in Pakistan have four important functions including protection of natural environment, regulation of atmospheric conditions, production of goods, and contribution towards a sustainable livelihood of people who are directly or indirectly dependent on them (forests) through agriculture, animal husbandry and logging. In this context, we have to maintain a balance between sustainable production and sustainable consumption of the forests. However, we are unable to strike the right balance. Also, forest depletion has emerged as one of the most serious environmental issues for Pakistan, which is accompanied with many other environmental effects such as landslide, soil erosion, floods, soil degradation and displacement of people.

Review of Past Forest Policies

Before independence, the first set of forest legislation was promulgated in 1878 to control logging. The Indian Forest Act of 1878 put the major part of forests under state management and gave limited rights to local people. The spirit of that Act continued in Indian Forest Policy of 1894. On attaining independence in 1947, Pakistan inherited the Indian Forest Policy of 1894, which it continued to follow till 1955. This policy contained guidelines for forest conservancy but noted the importance of meeting 'the reasonable forest requirements of the neighborhood' in which the forest is situated. While providing for government ownership of forest lands, and thereby, creating a small area of public forests under the Forest Department, the policy gave vast discretionary

powers to the officials of Forest Department in determining what they deemed 'reasonable forest requirement'. Thus, in practice, only the requirements of elites and notables were fulfilled.

The 1955 policy coincided with the formulation of the first five-year National Development Plan and focused very much on the role of forestry in economic development. It sought to increase the area under forests, through irrigated and linear plantations, and on unused government lands.

The 1962 policy contained some radical proposals including shifting of populations out of the hills, acquisition of rights of tree removal and grazing in public forests, and compulsory growing of minimum number of trees on private lands. While some suggestions were implemented, others such as the shifting of populations were found to be impractical, as it would have adversely affected the livelihood of local communities.

In 1972, a National Forestry Committee was constituted to review the post 1971 war situation. The committee's recommendations formed the basis of 1975 policy. The policy extinguished 'rights' of local people, focused to stop deforestation of the wooded areas, and transferred plantations to Forest Department.

The National Policy on Forestry and Wildlife 1980 formed a part of the National Agricultural Policy 1980. While recommending plantation of fast-growing species, raising of fuelwood trees outside public forests and involvement of people in tree plantation and nature conservation schemes, the policy lacked concrete initiatives for achieving its objectives.

National Forest Policy 1991 emerged after a consultative workshop of various stakeholders. It called for multiple uses and the consideration of social and (particularly) environmental objectives, although it remained vague about the means for achieving these objectives (Ahmed and Mahmood 1998).

In 1992, there were severe floods in NWFP, which were largely attributed to the indiscriminate timber logging. The federal government opted a policy of imposing a moratorium on commercial timber harvesting. That ban was lifted after nine years in 2001. However, timber mafia (comprising influential people involved in illegal timber harvesting) always remained active during the ban period and timber harvesting continued unabated (Geiser 2001).

Analyzing the consequences of forest policies adopted till 1992, the Forestry Sector Master Plan (FSMP) found that while the policing powers of the Forest Departments, exercised through restrictions on the use of forests, helped to conserve them, public apathy towards forests also developed as a consequence. People's participation in plantation and management of forests was not given sufficient attention, and social and cultural aspects of forest management were ignored (GoP 1993). In fact, it was indirectly admitted in this analysis that policy initiatives cannot achieve their objectives until and unless the sustainable livelihood of stakeholders is not taken care of.

Forest Policy and Change in Managing Resources

Latest Policy Initiatives

It is already discussed in the previous section that most of the policy initiatives, until recently, were to conserve the forests and livelihood provisions of the local communities

were ignored. However, even the conservation aspects of these policies were never implemented in true spirit. Consequently, in practice, forest resources were made inaccessible for the poor and marginalized sections of the communities, whereas the influential people along with members of the timber mafia consumed these resources at their own sweet will (Geiser 2001). This dichotomy created the feeling of lack of ownership among the marginalized sections, not only adding to their miseries but also encouraging them to adapt unfair means to meet their fair requirements of forest resources.

Among the recent policy initiatives, the National Conservation Strategy and the Provincial Conservation Strategies (as strategic contexts for policy and institutional development) and the Forestry Sector Master Plan (FSMP) and Provincial Forest Resource Inventory (PFRI) are the most significant initiatives. These policy initiatives introduced a new concept of forest management giving it an environmental dimension. They also influenced the subsequent interventions in forestry sector.

The Pakistan National Conservation Strategy (NCS), approved in 1992, recognizes the need for the Provincial Forest Departments to associate local people in protection and management of forests. Indeed, community participation is a vital element of NCS implementation in all the three core program areas relating to the forest sector - supporting forestry and plantations; protecting watersheds; and restoring rangelands and improving livestock quality.

The Sarhad Provincial Conservation Strategy (SPCS) and the Balochistan Conservation Strategy (BCS) also recommend community-based management of forests (GoNWFP 1996).

The 25-year Forestry Sector Master Plan (1992–2017) calls for a greater participation of local people at every level of planning, along with extended role for the private sector. It also recommends that the existing Forest Act 1927 be updated and revised to make it less prohibitive and punitive and more participatory. It suggests that new provincial legislation be enacted to encourage people's participation in policy formulation and management of forest rangelands and watersheds (GoP 1993).

The Perspective Plan 2001-2011 adopts community participation through decentralization as one of the overriding principles governing the proposed strategy to tackle problems of deforestation and the damaged ecosystems. The plan reaffirms Government's commitment to the continued implementation of the FSMP, and mentions forest as one of the areas on which conservation efforts will be focused. The National Environmental Action Plan, approved by the Pakistan Environmental Protection Council in 2001, also provides for participation of the private sector, NGOs and citizen groups in execution of projects at local level.

After the floods of 1992, PFRI study was conducted in northern NWFP to provide maps and basic data on the distribution and condition of the forest resources in NWFP (PFRI 2000). This study challenged the statistics of FSMP and insisted that forest resources were being depleted at much intensive level and faster rate than estimated in earlier studies.

The Punjab Forest Policy Statement 1999 states the provincial government's intention to involve stakeholders in management of forests and watersheds and encourage private

sector investment in forests through joint forest management, joint ventures, long-term leases and suitable incentives.

The NWFP Forest Policy 2001 includes the participation of local communities and promotion of private sector investment among its cardinal principles. The policy also recommends revision of forestry legislation for joint forest management.

The draft National Forest Policy 2001 mentions the sustainable development of renewable natural resources (RNR) of Pakistan for the maintenance and rehabilitation of its environment and the enhancement of the sustainable livelihoods of its rural masses especially women, children and other deprived groups as its fundamental goal. The policy calls for involvement of local communities in implementation of projects, management of forests and protected areas, protection and sustainable management of mangrove and riverine forests, and implementation of social forestry programs. In order to reduce the impact of socio-economic causes of renewable natural resources (RNR) depletion, the policy proposes implementation of appropriate population planning programs in critical ecosystems; providing substitutes to firewood in the wooded mountains; reducing poverty through integrated land use projects with participation of organized local communities; programs for health and education improvement, particularly of women and children; and promoting revenue generation through timber harvesting, fuelwood collection and utilization of non-wood forest products, again with involvement of local communities.

However, it is pertinent to mention that legislation measures taken so far to implement the policies from time to time including the recently promulgated Forest Ordinance of NWFP (Forestry is a provincial subject, and provinces have to make their own laws) contradict the spirit of different policy measures. They are punitive in nature and tend to increase the policy role of Forest Department. For instance, NWFP Forest Ordinance 2002 designates Forest Department staff a uniform force bearing arms and also enhances their police powers, which go against the intent of the forest policy that enshrines the principles of participatory social forestry. Similarly, the discretionary powers of forest officers to revoke a community-based organization (CBO) /Joint Forest Management Committee (JFMC) agreement as provided in this ordinance would result in uncertainty and insecurity among different JFMCs/CBOs.

NWFP Forest Sector Project (NWFP FSP) and Institutional Reforms

Different policy and community initiatives and planning documents mentioned in the previous section evolved new dimensions in the concept of forestry management and opened up the doors to forestry reforms. Based on Forestry Sector Master Plan (FSMP), a feasibility study was carried out with the assistance of ADB, which ultimately led to the formulation of the NWFP forestry sector project. The Forest Sector Project (FSP) commenced in 1996 with the help of a loan from Asian Development Bank (ADB) (US$ 26.95 million) while the Government of the Netherlands provided a grant for consultancy, capacity building and farm forestry. Various FSP components have to address the institutional capacity of the DFFW, legal reforms for social forestry, resource mapping and management planning, physical development work including afforestation/reforestation, rehabilitation of rangelands, and farm forestry. It also aims to provide/upgrade physical office facilities and community infrastructure schemes (ADB 1995).

To ensure the effectiveness of the participatory and sustainable natural resource management process, in NWFP FSP, the field interventions were to be supported by institutional reforms in provincial Forest Department (FD). Initially the progress in institutional reforms was slow, which upheld the release of capacity - building funds by donors until the mid-term review of the project. In 1999, the Forest Sector Project (FSP) made some moves with institutional reforms (Hussain and Khan 2000) [4]. The FSP, together with the Institutional Transformation Cell (ITC), a joint Dutch-Swiss-assisted project, devised a set - up to improve decision making and ownership of the institutional reforms in DFFW, making use of existing experiences and proposals generated by other projects. Thematic working groups were established which developed a number of proposals between March and June 1999. These proposals were submitted to an internal department, Support Group, chaired by the Secretary of DFFW. Decisions surpassing the competence of DFFW were referred to the Steering Committee chaired by the Additional Chief Secretary. The four thematic working groups dealt with the reorganization of the department, capacity building, role of civil society, and institutionalization of positions and role of women in the forestry sector. At the same time, a new forest policy was prepared and promulgated in 1999. Moreover, a new forest ordinance was drafted, a forum called the Provincial Forestry Round Table was set up, and recently, members of the Forest Commission have been nominated.

Impacts of Institutional Reforms on Poverty/Poor and Women

The ongoing institutional reform process in NWFP forest department, which is meant to cater the enabling environments for enhanced participation and project implementation, is being criticized by various stakeholders. In 1995, GTZ study of the forest sector recommended the creation of the Forest Commission. The commission was to be supported by the Forestry Round Table. To kick off the process, the Government of NWFP constituted a high level Forestry Steering Committee that came up with the first Action Plan in February 1996. Contrary to the primary objective of creating effective platforms for the interface between the key stakeholders including Forest Commission and Forestry Round Table, the FSP transferred the control of the process into the folds of the Forest Department on the pretext of ownership. This move took the process away from its key objectives because many stakeholders were critical to the procedures adopted and the working of these institutions. As a result, the forest policy, though sounding progressive, remains a piece of paper with the Forest Department that continues to enjoy power and control over the forestry resources.

Moreover, the Forest Department avoided forging an effective linkage between the devolution of power plan and sectoral reform process that was underway much before inception of the devolution plan of the incumbent government. One was expecting that the Forest Department would take a lead to bring the lessons it learnt from the reform process into the devolution plan itself. Rather than being proactive, unfortunately, the Forest Department by choice remained reactive to date for obvious reasons to protect their power base to the maximum possible extent. They have been successful in remaining at the provincial level and decentralizing the most important functions to the

[4] This paragraph is aimed to record the sequence of events as they occurred and does not discuss the merits and de-merits of these institutional reforms. The impacts of institutional reforms on poverty/poor and women would be discussed in the next section.

district level. Thus, they have missed a chance to achieve sustainable natural resources management that was possible through enhanced participation and inclusion of marginalized sections of the society, which could have been the ultimate result of decentralization of powers. Specific impacts of institutional reforms in forestry sector in NWFP on poverty, poor and women may be observed through a case study of selected villages where FSP was implemented. Sustainable Development Policy Institute (SDPI) conducted this study in 2001[5] (ADB 2002).

Case Study of Selected Villages where FSP was Implemented: Issues and Options

Background

The objectives of Forest Sector Project (FSP), as stated in the project documents, is to steer the Forest Department towards true spirit of social forestry. It aims at a joint forest management, gender sensitized policies, and enhanced participation. It is to do so by developing and applying an integrated, participatory natural resources management methodology to foster socio-economic and environmental well being of the people. In order to ensure participation of communities according to social forestry principles in the planning and implementation process, NWFP is divided into different units and subunits. Resource Management Subunit comprising many villages is the planning unit for project interventions, while village land use plan (VLUP) at each village level serves as a tool for participatory planning and the organization of the village community and natural resources management. Village community is responsible to implement the village land use plan (VLUP) through Village Development Committees (VDC) and Women's Organizations (WO) (FSP-revised PC1).

As mentioned in the previous section, different institutional reforms in NWFP forest department were initiated to cater the enabling environment for project implementation. It was in this context that SDPI conducted an empirical study to assess the impacts of various reform processes initiated through FSP in selected villages of civil divisions (An administrative unit comprising two or more districts) of Hazara, Mardan and Malakand in NWFP. Community mapping, focus-group discussions, and individual interviews were used as tools to collect data for this study. A checklist of topics (Box 2) was prepared for fieldwork to assess the impacts of FSP on pro-poor growth, social development and good governance.

[5]Details of the study are available at Asian Development Bank website http://www.adb.org/projects/forestpolicies/case_studies.asp

Box 2: Issues and topics explored during fieldwork in project villages.

Governance

A. Level and extent of public participation and involvement in:
VDC/WO preparation
VDC/WO decision making
Resource contribution [to investment and community infrastructure (CIS) Development]
Implementation, administration, and coordination
Benefits (actual and perceived)
Level and extent of FSP/FD staff participation and involvement in implementation of the project activiti s.

Social Development

A. Human capital development and physical well being:
Level of knowledge and awareness of existing Natural Resources Management (NRM) practices
Land tenure and how it affects the implementation of the project
Existing income-generation and livelihood measures
Coping mechanism in case of any financial difficulty
B. Services:
Level of existing social services in the community such as drinking water, health, and education
Level of existing infrastructure for the social services available
CIS development plans of the VDC/WO
What sort of interventions the community was expecting from the project?
C. Social capital and social inclusion:
Status of non rightholders/non-landowners
Status differential
Social organization in the village and their main functions
Coping mechanism in case of any financial difficulty
D. Rural energy (commonly-used fuels, any impact of project interventions)
E. Gender and equity development:
Status of women in rural societies
The say of women in decision making and other household matters
Role of women in Natural Resources Management (NRM)
Workload distribution (Is FSP causing any extra burden on women?)
Effectiveness of WOs

Summary of Findings

It was observed that the project implementation process, including formation of village land use plan, VDCs, and WOs, was not pro-poor. The VDCs and WOs were neither representative nor functioning in a democratic way. Village notables and elites had dominated the VDCs and WOs. The benefits of project interventions tend to accrue to village influential. The poor and landless could be benefited only either from village infrastructure investment that benefit all, or/and from increased labor or sharecropping opportunities. It was also noted that the interventions that supported the livelihood strategies of the individual community members (such as plantation of fruit trees in

private farms or house yards) were more successful than those without a direct positive impact on local livelihoods (such as plantation in the communal areas or along the road sides).

The project interventions were not gender oriented. According to the project documents, the recommendations of WOs for village infrastructure development schemes were to be given priority over the recommendations of VDCs. However, in practice, most of the WOs were non functional and VDC members were proposing the infrastructure development programs without consulting the WOs. Thus, VDCs were asking for construction of road to the village whereas the women informed the research team that provision of drinking water and trained birth attendants were their main demands. It was also observed that project interventions ignored the livelihood strategies of women and some of the project interventions such as putting a ban on grazing in the local pastures and firewood collection from the local forest these interventions had increased the hardships of women, and children and landless shepherds who were using these sites either to graze their livestock or to collect firewood.

It was learnt from the case study findings that empowerment of communities is still not up to the mark and in many instances the 'pro-poor dimensions' of the project interventions are masked largely due to poor governance, a desire to maintain status quo, and/or due to lack of capacity at the executing end. The study concluded that it would be a combination of improved governance and pro-poor development, focused on local livelihood strategies that would lead to poverty alleviation and gender empowerment.

Conclusions

The dilemma with most of the natural resources management policies in the recent past has been the absence of human dimension and a focus on 'pro-conservation' approach even at the cost of local livelihoods. Part of the problem stemmed from non-participatory culture that prevailed (mainly) in most of the developing countries. However, the trends are changing now and today the world is no more involved in the 'conservation' versus 'development' debate. Rather, a new approach 'conservation as well as development' has now emerged. The proponents of this approach including many governments, international donors and international lending agencies are revisiting their 'vision and mission statements' to articulate themselves in a scenario that leads to development without distorting the conservation of natural resources.

On the face of it, the above-mentioned trend seems very good, and in this context, the journey of forest policies in Pakistan that started from the Indian Forest Act of 1878 to the Draft National Forest Policy of 2001 (at federal level) and NWFP Forest Policy 2001 (at the provincial level) is a giant leap. However, for any development effort to be pro-poor, good governance is a must. Unfortunately, Pakistan (like other developing countries) lacks good governance as well as the political will to change the status quo. Although during the formulation of new policies, consultation with a group of experts has become a common practice in the recent past, yet the consultation process (if any) remains confined to the folds of professional circles. Thus, the policies become stronger on technical consideration but lack the required flexibility to be workable in real life situation, presenting multiple sets of actors and factors.

Consequently, the stakeholders often find themselves in a situation where state policies either do not support or have harmful effects on their livelihood strategies. It is in this scenario that policies do not meet the expectations of people who, in turn, are forced to utilise the natural resources unsustainably to secure their livelihoods. Consequently, neither the developmental nor the conservational objectives are met with. Forestry Sector Project in NWFP is an example of one of these situations. The project finished by the end of year 2002 (1996-2002) and despite its ambitious aims and radical goals, there is no let up either in the miseries of the stakeholders or in the depleting forest stocks.

There is a sheer need to put people at the centre of development. This focus on people is equally important at higher levels (when thinking about the achievement of objectives such as poverty reduction, economic reform or sustainable development) as it is at the micro or community level. At a practical level, this means before formulating and implementing a policy, the policy makers should:

- begin with an analysis of the people's livelihoods and how these have been changing over time
- involve people and respect their views
- focus on the impact of the proposed policy and institutional arrangements upon people/households and the dimensions of poverty they define
- have enough flexibility in their proposed interventions to promote the agenda of the poor (a key step is political participation by poor people themselves)
- work to support people to achieve their livelihood goals (though taking into account considerations regarding sustainability)

Sustainable livelihood would be secured only if policies work with people in a way that they congruent with their current livelihood strategies, social environment and ability to adapt. *People – rather than the resources they use or governments that serve them – are the priority concern*. Adhering to this principle would not only ensure provision of sustainable livelihood but would also enhance involvement of all sections of society in sustainable natural resources management. In this context, it should be realized that generation of income and employment is as important as generating government revenue alone; and forestry should be an instrument of sustainable forest management policy rather than its objectives. Otherwise, the poor would remain mired in poverty pushing us into a spiral of over exploitation in the wake of all forest policy failures.

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Annexure I

Forestry Sector Legislations

a) Statutes[6]

Balochistan Forest Regulation 1890

Balochistan Wildlife Protection Act 1974

Cattle Trespass Act 1871

Cutting of Trees (Prohibition) Act 1975

Forest Act 1927

Islamabad (Preservation of Landscape) Ordinance 1966

Kohat Mazri Control Act 1953

Land Reforms Act 1977

Land Revenue Act 1967

NWFP (Conservation and Exploitation of Certain Forests in Hazara Division) Ordinance 1980

NWFP (Sale and Sawing of Timber) Act 1996

NWFP Forest Development Corporation Ordinance 1980

NWFP Forestry Commission Act 1999

NWFP Hazara Forest Act 1936

NWFP Protection of Trees and Brushwood Act 1949

NWFP Wildlife (Protection, Preservation, Conservation and Management) Act 1975

Pakistan Environmental Protection Act 1997

(Provincial) Local Government Ordinances 2001

Provisional Constitution Order 1999

Punjab Development of Damaged Areas Act 1952

Punjab Forest (Sale of Timber) Act 1913

Punjab Wildlife (Protection, Preservation, Conservation and Management) Act 1974

Sindh Wildlife Protection Ordinance 1972

Transfer of Property Act 1882

West Pakistan Firewood and Charcoal (Restriction) Act 1964

West Pakistan Goats (Restriction) Ordinance 1959

Draft NWFP Forest Ordinance

[6] Statutes: A law expressly enacted by Federal Government.

Draft Punjab Forest Act

Draft Balochistan Forest Act

Draft Azad Jammu and Kashmir Forestry Act

Rules[7]

Hazara Management of Wastelands (Guzara) Rules 1950

Hazara Protected Forests (Community Participation) Rules 1996

Hazara Reserved Forests (Community Participation) Rules 1997

NWFP Forest Produce River Transport Rules

NWFP Forest Produce Transport Rules 1975

Draft NWFP Forests Management (Community Participation) Rules

Draft NWFP Protected Forests Management Rules

Draft NWFP Management of Wasteland (Guzara) Rules

Draft NWFP Forest Produce Transport Rules

Draft NWFP Forest Produce River Transport Rules

[7] Under the provision of an act/ordinance, rules are made for the elaboration of that specific act/ordinance.

TECHNICAL SESSION IV:
PRO-POOR INTERVENTIONS IN IRRIGATED AGRICULTURE

WATER FOR AGRICULTURE AND FUTURE CONSERVATION STRATEGIES IN THE INDUS BASIN

Zakir Hussain[1]

Introduction

As we enter the 'Greenhouse' century of climate change with its greater likelihood of extreme droughts and floods, most countries are going from boom to bust. At the end of 20th century, 150 years modern irrigation age is winding down. The cultural, economic and political forces that shaped this era are being realigned. On the economic front, irrigation expansion in many areas has reached the point of diminishing returns. Indus basin is no exception, and is more vulnerable to such global changes (climate and trade) because of its political ecology and narrow resource base. Until recently, the country having1400 M^3 per capita water, was net food importer. Many economists believe that water scarce countries can generate much more income from water by using it in commercial and industrial enterprises and purchase their grain in international market. This tidy logic is shaken by the rapidly growing population, which will be living in water scarce countries, will follow this path. Water long left of the food security equation, may now be driving it. As domestic competition for water spills into international competition for grain, it will be the poor of these food deficit nations that lose out. Without a concomitant rise in the income levels of the very poor, a rise in food prices in the wake of URAoA regimes could place the health and lives of many additional millions at risk. Confronting this threat head-on will take efforts to raise the domestic food production in the country. Thus, irrigation water has to play a key role in meeting this challenge in the Indus basin.

Pakistan will soon become water poor country. In many areas, farmers are pumping groundwater faster than nature is replenishing it, causing a steady drop in watertable. Groundwater over-pumping could now be the single biggest threat to Indus agriculture. Over-tapped rivers are easy to see and the consequences are fairly visible. Groundwater overdraft, though hidden from view, is even more serious problem. This, coupled with global warming, will further exacerbate the issue of water insecurity in Pakistan. The pace of dam building is slowing down because of the resource constraints, environmental concerns and regional conflict. The surface water, though scarce, if managed properly, could only ensure the sustainability of agriculture. Now that water is increasingly scarce, however, raising productivity—getting more service, satisfaction and benefit out of every drop we remove from a river (Indus and other tributaries), lakes, mountain spring, or underground aquifer—is the key to meeting future needs of the country. Thus water productivity—getting more crops per drop seems to be the agricultural frontier for Indus basin in the 21st century. The equity ratio in water distribution between head and middle farm is 5:1 and the efficacy of water is only 27 percent. The over all irrigation efficiency of the system is only 26 percent (conveyance efficiency: 75 percent; delivery efficiency: 60 percent and application efficiency: 75 percent).

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Stocktaking of Water Resources

Role of Water in the Economy

The central issue in any less developed country continues to be broadly defined as economic development. Given the low level of income, literacy and life expectancy, high incidence of poverty, malnourishment, and infant and maternal mortality in these countries, it is simply not possible for the government or any other social group to place a higher priority on the pursuit of any objective other than poverty alleviation, human resource development and generalized economic growth. The pressure that these inescapable needs exert on the natural resource base of the country are further compounded by demographic pressure in the form of a high rate of population growth and a correspondingly rapid increase in the urban population. The focus of policy planning and action must, therefore, be on: i) the achievement of a reasonable rate of economic and demographic change consistent with the objective of human development; ii) the mitigation of the effect of these pressures on the natural resource base; and iii) the strengthening of institutions to harmonize development and environmental objectives.

The most essential elements of the natural resource base of any country are climate, land and water. However, water is the most limiting resource for economic development in the arid environments of the developing countries. The pressure exerted by economic and demographic process on the national resource base is a serious concern. Water is already being used at maximum capacity in most of the developing countries. There is scarcely any excess capacity to meet the growing demand of water for the expansion of: a) irrigation; b) provision of drinking water; c) recharging of groundwater supplies and wetlands; and d) flushing away of municipal and industrial wastes. Therefore, water must be seen in the context of:

- Water for Agriculture;
- Water for People; and
- Water for Nature.

All the three above mentioned users of water contribute significantly in sustained economic growth in the country. The Indus basin provides an opportunity for addressing complex and multiple issues related to the conjunctive use of water (precipitation, surface water and groundwater).

Water and Agricultural Economy

Importance of agriculture sector in the economy of country can be viewed from the factor that it contributes significantly to the gross domestic product of the country (25 percent) and provides job opportunities to the labor force (55 percent). It also accounts for most of the total export earnings of the country (80 percent) (Government of Pakistan, 2001). Within the agriculture sector, irrigation plays a predominant role as it provides 90 percent of the total wheat production of the country and almost 100 percent of cotton, sugarcane, rice, fruits and vegetables mainly within 16 million hectares (mha) of the Indus basin. Also, the irrigated agriculture plays a major role in the industrialization process of the country with the production of cash crops (cotton, sugarcane, citrus, mango) and dairy cattle.

During the 60s and 70s, the country benefited from technological development of the Green Revolution through improvements in self-reliance of agriculture and food products due to significant increases in cropping intensities and crop yields. Later

during the 80s, the agricultural water management programs in the country also contributed towards increase in agricultural productivity and productions. In the last 50 years, the productivity was almost doubled mainly due to the Green Revolution and improved agricultural water management. This was very much true for the cereal crops like wheat, rice and maize where yields doubled.

Irrigated area increased from 9 million hectares in 1950 to about 18 million hectares in 2000. This doubling in irrigated area in 50 years is a major factor in increasing agricultural productivity and productions. Coupled with increase in cropping intensity from 60 percent in 1950 to 120 percent in 2000 provided a four-fold increase in production as compared to 1950. This four-fold increase was mainly due to increase in water availability from both surface and groundwater sources. This is a sufficient indicator that water contributed significantly in reaping the benefits of Green Revolution Technologies for enhancing production and productivity of the irrigated agriculture in the country.

- With a population estimated at more than 140 million inhabitants today, which is expected to reach 155 million by the year 2010, the demand for food products is expected to continue to grow. Thus, unless there are significant improvements in agricultural productivity (crop per drop) and total production at least in the same order of magnitude as witnessed during the Green Revolution period, the imbalance between supply and demand of basic agricultural goods is expected to increase in the future. This will threaten the self-reliance goal of the country.
- Problems associated with irrigation system and availability of non-water inputs are the main causes for low productivity of the Indus basin. Although, the benefits of irrigation per unit area are fully recognized under the arid environments, little would grow without irrigation. Yet the irrigation sector has become increasingly the target of criticisms and considered to be main cause for productivity problems in agriculture because of water scarcity, inefficiency, inequity, inefficacy and sustainability issues.
- Presently, total water use for agriculture sector in the Indus basin is around 190 billion m^3, contributing 94 percent of the total water use in the country. Thus, agriculture is the largest user of water in the country.

Water for Industrial Economy and Domestic Use

- Presently, total water use for the domestic and industrial sectors in the country is around 10.25 billion m^3 per annum, which is nearly 5 percent of the total water use in the country.
- Availability of groundwater has contributed significantly for the industrial development in the country because it provides demand based system of water availability to the industrial sector.
- Water is an essential element for human life. Thus, provision of safe water for domestic purposes, including drinking and sanitation uses, helps to provide safe and hygienic living to the population in the urban areas.

Water for Nature

- Presently, total water use for the environmental sector in the country is around 1.5 billion m^3, which is approximately one percent of the total water use in the country.

- Diversion of 130 billion m^3 of water to the Indus basin contributes to recharge the groundwater due to extremely low conveyance efficiency. This in combination with rainfall in the basin has created a huge groundwater resource of around 2000 billion m^3 in the Indus basin, which represents about a depth of freshwater of 12.5 meters over the basin area of 16 million hectares. Thus, the indirect contribution to the groundwater recharge is significant.
- Water is an essential element for wild life. Thus, provision of safe water for environmental purposes, including the wetlands and national parks, helps to provide opportunity for recreation to the country's population and tourism industry.

Surface Water and Extent of Irrigation

Pakistan has the best irrigation system in the world. Indus and its tributaries supply surface water, 93 million acre feet (MAF), at the farm gate through 40,000 mile long canals and 130,000 watercourses. Groundwater in the sweet zones is another important source of irrigation water (53 MAF annually). Of the total cropped area, 82 percent is irrigated, 43 percent is irrigated through canal, 37 percent is in conjunctive use and 17 percent has the share of tubewells. Irrigation water is fugitive input and is subjected to over withdrawals. There is a tendency of excessive irrigation through surface supplies as well as groundwater is over drafted. The overall water conveyance efficiency is 45 percent; 75 percent from canal to outlet; and 60 percent from outlet to farm gate. Thus, about 40 million acre feet water is lost in the system (25 MAF canal to outlet and 15 MAF outlets to farm gate). Annually 35 million acre feet is lost to the sea, especially in summer months during the monsoon season. Canal losses are attributed to deferred operation and maintenance. Farm gate losses are due to unlined watercourses and application inefficiencies. The pace of watercourse improvement is slow (only 36000 watercourses have been improved in the last two decades).

The equity and efficacy of irrigation water at the farm is yet another issue. The tail ender is getting one-third of the water available to head farmer. The efficacy is as low as 27 percent. The consumptive use of water per crop or per matured acre is quite low despite affordable supplies. The system losses and application inefficiencies undermine the consumptive use.

Area Irrigated by Sources

Source	Million Hectares	Percentage
Canal	7.79	43.3
Canal cum Tubewells	6.74	37.4
Tubewells	3.00	16.7
Others	0.47	2.6
Total Area Irrigated	18.00	100

Water availability at the farm gate:	133 MAF
Surface water	93 MAF
Groundwater	40 MAF
Total Watercourses (Nos)	130,000
Improved (Nos)	36,000
Annual Improvement Rate (Nos)	4,000
Water Conveyance Efficiency	
From canal head to outlet	75%
From outlet to farm gate	60%
Overall	45%

Groundwater - Source

Groundwater is mined through public and private tubewells (493,000). Private farmers install most of the tubewells in sweet water zone. Public tubewells were installed in the Salinity Control and Reclamation Program (SCARP) areas to pump out effluent discharge from waterlogged areas. These tubewells were of bigger capacity installed near canals to pump out groundwater to lower watertable. It was often argued that SCARP tubewells, pumped out recharged sweet water from the canals, did not serve much purpose. However, in certain areas, these tubewells were able to lower the watertable reclaiming valuable agriculture land. These SCARP tubewells outlived their utility and the government decided to privatize these tubewells in a phased manner. The size of the tubewells was large, thus, farmers were unable to purchase them. The SCARP transition program could not be implemented in letter and spirit. Farmers often agitated not to close tubewells unless they could install their own small tubewells. The process was delayed due to untimely electricity connections and other attendant problems.

Presently, private tubewell owners are over drafting the aquifer due to which watertable is going down. The case in point is Balochistan where the draw down is severe and of threatening dimension. Some of the people have started migrating from Chaghai area in search of water. Since water scarcity is looming large, per capita water availability is dwindling. It is important to regulate groundwater carefully in order to arrest over mining of the aquifer.

Tubewell Capitalization and Water Markets

In recent decades, Pakistan has witnessed rapid growth in demand for water, particularly in domestic and industrial sectors due to population growth, urbanization, industrialization and rising incomes. This growth in demand has not been matched by an increase in supply. The problem is compounded by pollution of water, which has reduced its suitability for various uses. At the same time, in traditionally water intensive sectors of the economy such as agriculture, costs of irrigation have increased significantly. Under these circumstances, it is more important than ever to use water efficiently. It is also necessary to anticipate and address inter-sectoral conflicts over

allocation and use of water. The standard approach so far has been to advocate reform of water pricing across sectors to reflect the scarcity value of water. This advocacy is based on theoretical and empirical evidence on the need and desirability of such reforms including willing-to-pay studies. Nevertheless, major users of water, particularly of irrigation water, have resisted these reforms so far. In this context, economic theory tells us that markets increase economic efficiency by allocating resources to their most valuable uses. In other words, if certain conditions are met, markets provide the correct incentives and lead to efficient resource use. Therefore, one way to change the incentives, so that water users support the reallocation of water and achieve efficient allocation of water, is through water markets. These allow water users to buy and sell water, thus, changing the whole incentive structure and breaking the logjam of water-pricing reforms. When water users can gain from reallocation, they would be willing to sell water or pay a higher price for new supplies.

Table 1: Tubewell development in Pakistan.

Period	Number of Tubewells		
	Electric	Diesel	Total
1970-71	36 921	60 301	97 222
1975-76	60 386	100 569	160 955
1980-81	83 855	115 818	199 673
1985-86	99 224	158 058	257 309
1990-91	113 635	226 205	339 840
1995-96	113 823	369 962	483 785
2000-01	125167	420402	545569

Source: Agricultural Statistics of Pakistan, 2000-01.

Irrigation plays a key role in Pakistan's strategy for increasing agricultural productivity. Surface irrigation has allowed the extension of cultivation into areas and seasons that lack sufficient rainfall for agriculture. However, public and irrigation systems do not provide farmers with adequate water or enough control over irrigation deliveries to meet the demands of the more intensive agriculture that came in the wake of Green Revolution and increasing population pressure in Pakistan. Moreover, allowances are not made for water losses in the channels. Problems with operation and maintenance of the canal systems mean that tail-end distributaries and watercourses do not receive enough canal water for the current cropping intensity, and delivery schedules are unreliable in many areas.

All this has led many farmers towards groundwater from private tubewells as a sole or supplement source of irrigation. However, tubewell ownership is limited to a relatively small proportion of farmers, who tend to be the larger and more affluent landowners. Sale and purchase of groundwater through informal water market offers other farmers the opportunity to use groundwater.

Water markets have been in operation in many countries including Pakistan. Although informal water markets have been in operation since decades, they are gradually developed in Pakistan over the past two decades. The formal markets having well defined, private and transferable water rights are relatively of recent origin. In several cases, water trading has helped to overcome water scarcity and increased farm income. International experience also equally demonstrates that formal and well developed water markets provide incentives for conservation and more efficient use of water. Farmers have responded by switching to water-saving technologies (drip and sprinkle irrigation) and high-value, less water consumptive crops.

Many regions of the world are switching to water markets as best alternative to allocate water among the competing sectors. When the irrigators can buy and sell water at will, they have to use allocated water supply more carefully. For instance, if farmers use water more efficiently, they can increase their incomes by trading the water they save. Farmers can choose to grow less thirsty crops; they are at liberty to sell the water they no longer require. The recent experience with informal water markets in Pakistan has been encouraging, although there have been only limited gains as markets have remained informal, site-specific and traditional at best due to supply oriented and ridged water distribution system. Formal water markets can only work where the farmers have legal rights to their water and where these rights can be traded. Formal water markets can provide cost effective alternatives to augment water supplies rather quickly.

Water markets provide one of the most promising institutional mechanisms for increasing access to irrigation from groundwater, particularly for tenants and small farmers. While water markets are found in all provinces of Pakistan, they are most prevalent in canal-irrigated areas of Punjab and North West Frontier Province (NWFP). Large landowners are more likely to own tubewells and pumps, while smaller landowners and tenants are more likely to rely on purchases from other farmers' tubewells for access to groundwater. Contractual arrangements for water include hourly charges, buyer providing the fuel plus a fee for wear and tear, and sharecropping for water.

The recent evidence in Pakistan shows that informal markets are developing over time and canal water is freely traded, often sold and bought. The survey results reveal that 6-7 percent of the sampled farmers buy and sell water at head and 20 percent sell water at the tail end of the distributaries. However, over 80 percent of head and middle farmers trade water. The canal water rate varies from 2-3 dollars per hour mostly to neighboring farmers. Sale of groundwater is quite common, and due to short supplies of surface water, conjunctive use of water is increasing. Almost all the tubewell owners at the head and middle reaches sell water whereas over 50 percent tail enders also sell water. The tubewell water rate varies from $ 1.00 per hour to $ 3.00 per hour. The distance over which water can be transported provides a limitation to water market sales, but lined watercourses increase the distance over which tubewell water can be sold.

Unreliability of access to purchased tubewell water is another problem for water buyers. Purchasers are more likely to have unreliable access to groundwater if they buy water from small-capacity, electric-powered tubewells, or if they are young and own little or no land.

Policy measures to improve access and reliability of groundwater through water markets include increasing the density of tubewells, especially by assisting small farmers to purchase tubewells; lining water delivery channels; and providing more reliable electrical power supply to rural areas. Furthermore, the replication of Participatory Irrigation Management on the Pattern of Hakra 4-R will improve reliability of irrigation water and canal supplies will be increased.

Table 2: Province-wise number of tubewells - 1997-98 (Nos, 000).

Province	Public			Private			Total		
	Electric	Diesel	Total	Electric	Diesel	Total	Electric	Diesel	Total
Punjab	8.9	0.1	9.0	70.7	355.6	426.3	79.5	355.7	435.2
Sindh	4.3	0.1	4.4	13.7	5.5	19.2	18.0	5.6	23.6
NWFP	1.3	0.1	1.4	8.9	1.6	10.5	10.2	1.7	11.9
Balochistan	1.0	0.9	1.9	10.7	9.4	20.1	11.9	10.3	22.2
PAKISTAN	15.5	1.2	16.7	104.0	372.1	476.1	119.6	373.3	492.9

Source: Provincial Agriculture Departments

Of the total surface irrigation water, 110 million acre feet is diverted to canals, 70 percent of the water is withdrawn in Kharif season and 30 percent in the Rabi season. Canal withdrawals have been quite erratic in the past decade depending upon the snowmelt and rainfall during the monsoon. The provincial share in the Kharif withdrawals was 49 percent, 47 percent, and 4 percent, and Rabi withdrawals was 54 percent, 43 percent and 3 percent in Punjab, Sindh, Balochistan and NWFP, respectively, in the year 1998-99. The availability of water as per canal withdrawals is 1.5 acre feet, 5 acre feet, 1.5 acre feet and, one acre feet per cropped acre in Punjab, Sindh, Balochistan, and NWFP, respectively. This shows that surface water is not enough to cater the consumptive needs of crops. Thus, surface supplies are augmented with conjunctive use of tubewell water at very high pump age cost. The surface water at the farm gate in only 93 million acre feet. 17 million acre feet is lost in the canal system, which needs to be conserved through canal lining in brackish water zones and regular repair and maintenance.

Table 3: Province-wise canal withdrawals (million acre feet).

Kharif crops

Year	Punjab	Sindh & Balochistan	NWFP	Total
1989-90	33.95	29.21	2.11	65.27
1990-91	35.90	31.07	2.01	68.98
1991-92	34.85	34.17	2.04	71.06
1992-93	31.28	28.20	2.10	61.58
1993-94	34.90	24.00	2.40	61.30
1994-95	32.60	22.60	2.10	57.30
1995-96	31.10	29.30	2.40	62.80
1996-97	35.10	34.80	2.80	72.70
1997-98	32.80	32.13	2.57	67.50
1998-99	36.41	33.84	2.54	72.79

Table 3: Province-wise canal withdrawals (million acre feet). (Continued)

Rabi crops

Year	Punjab	Sindh & Balochistan	NWFP	Total	Grand Total
1989-90	20.11	15.46	1.25	36.82	102.09
1990-91	22.30	17.18	1.26	40.74	109.72
1991-92	19.45	17.74	----	37.19	109.46
1992-93	21.28	16.56	1.49	39.33	100.91
1993-94	18.80	15.60	1.60	36.00	107.30
1994-95	20.50	15.00	1.60	37.10	94.40
1995-96	21.10	16.70	1.80	39.60	102.40
1996-97	20.00	16.70	1.70	38.40	111.10
1997-98	18.41	15.77	1.46	35.64	103.14
1998-99	20.01	16.39	1.51	37.71	110.07

Source: Water Management Directorate, WAPDA

The recent initiative by the armed forces for canal cleaning (22,000 miles) is laudable and goes a long way in increasing the productivity of crops. The same zealous effort may be replicated for proper maintenance of the rest of the canals. The present system of canal withdrawals is based on political consideration. Distribution of surface supplies must be cropping pattern oriented, and canal withdrawals may be measured and monitored through telemetry. The recent initiative of the distribution of water must be done in close collaboration with provincial agricultural departments and the Ministry of Food, Agriculture and Livestock. Government should consider constituting a canal water distribution and monitoring committee under the auspices of Provincial Irrigation Development Authorities (PIDAs) duly representing the irrigators and respective provincial agricultural departments.

The Escapage Surface Water below Panjnad and Kotri

The Escapage below Panjnad and Kotri is 22 million acre feet and 35 million acre feet annually (3). The average flow below Kotri is as high as 47 million acre feet (Table 4). The outflow is more in the month of July and August depending upon the volume of monsoon rainfall. The down flow below Panjnad goes to Indus, which can be further utilized, but escapage below Kotri (35 MAF) is a cause for concern. Some of the outflow (10 MAF) is essential to check seawater intrusion and preservation of mangroves, and the rest needs to be conserved through construction of upstream dams. The Kala Bagh dam envisaged for this purpose has been subjected to unnecessary political controversy.

Table 4: Escapages below Panjnad and Kotri barrages (MAF).

Year	Panjnad below			Kotri below		
	Kharif	Rabi	Total	Kharif	Rabi	Total
1989-90	10.9	2.3	13.2	16.9	0.4	17.3
1990-91	17.1	4.7	21.8	38.2	4.1	42.3
1991-92	21.9	3.1	25.0	50.1	3.2	53.3
1992-93	30.2	4.2	34.4	69.2	12.3	81.5
1993-94	14.6	0.6	15.2	28.5	0.6	29.1
1994-95	24.2	2.7	26.9	88.2	3.6	91.8
1995-96	32.0	2.6	34.6	61.1	1.7	62.8
1996-97	28.9	1.8	30.7	44.7	0.7	45.4
1997-98	15.46	9.68	25.14	16.98	3.81	20.79
1998-99	15.26	6.68	21.94	32.50	2.15	35.15

Source: Water Management Directorate, WAPDA

The Provincial Canal Withdrawals and Annual Variation

The Indus and its tributaries divert water through 40,000 miles long canals. Some of the canals are perennial and others are non-perennial. The canal system can be safely divided into six zones based on the particular river supplies. The Peshawar valley draws water mainly from Swat and Kabul rivers. Total discharge capacity is 3350 cusecs encompassing a gross command area of 696,000 acres. All canals are perennial and the net irrigated is 606,000 acres depicting average irrigation intensity (*Irrigation Intensity = net irrigated area/gross command area*100*) of 87 percent. Second is the northern zone-Indus plains drawing water from Jhelum, Chenab and Ravi rivers. The capacity of canals from the Jhelum river is 7000 cusecs, gross command area is 2.2 million acres, perennial net irrigation area is 1.6 million acres and non-perennial is 389,000 acres. The irrigation intensity is 93 percent. Total canal capacity from Chenab river is 25,500 cusecs with gross command area (GCA) of 6.9 million acres. The net irrigated area (NIA) through perennial canals is 4.3 million acres and non-perennial is 1.6 million acres. The average irrigation intensity on these canals is 86 percent. Most of the water of Ravi river is lost to India under famous Indus Water Treaty (1960); however downflow streams supply water to center and lower Bari doab canals with total capacity of 14100 cusecs. The GCA is 2.5 million acres, perennial NIA is 2 million acres, and non-perennial NIA is 43000 acres showing acreage irrigation intensity of 83 percent.

Third zone is northern plain drainage water from Sutlej and Punjnad. Most of the canals are non-perennial. Total capacity is 10,100 cusecs. The GCA is 1-6 million acres of which 0.51 million acres is served through perennial source and 6.94 million acres through non-perennial source. The average irrigation intensity of these canals is 89 percent. Fourth zone is northern plain drainage water mainly from the Indus river. The capacity of this is huge (110900 cusecs) with GCA 22 million acres. Of the total GCA, 13.57 million is perennial canals and 5.96 million acres is non-perennial. The irrigation intensity is 88 percent. The southern plain on Indus river includes Pat feeder, desert and Begari Sindh and Ghotki canals with 45,200 cusecs capacity. The GCA is 3.26 million acres. All the canals are non-perennial covering an area of about three million acres and the irrigation intensity is 92 percent. The last and the second largest southern plain, Indus river has a capacity of 181900 cusecs providing irrigation water to 14.46 million acres. The perennial area is 7.29 million acres and non-perennial is 5.6 million acres. The irrigation intensity is 92 percent.

Water Balance in the Indus Basin

The total water is flowed from Indus river and its tributaries is 139 million acre feet annually (Table 5). The total consumptive use is 46 million acre feet (consumptive use: 31 MAF, municipal use 5 MAF and outflow to sea 10 MAF) and the losses are 93 million acre feet. The losses through the surface supplies are huge. Water losses are of two types, conveyance losses (68 MAF) and loss to the sea (25 MAF after accounting for seawater intrusion). The conveyance losses include canal to watercourse head (26 MAF) losses for watercourse head to outlet (35 MAF) and application losses (12 MAF).

Table 5: Water balance for Indus basin (2001-2002)

A. Water Inflows (+/-)

Sr. No.	Water Inflows	MAF	% Share
1.	Rim Station Inflows	139.00	93.10
2.	East River's Contribution	2.00	1.34
3.	Tributary Inflows	8.30	5.56
4.	Storage Changes (+ / -)		
	Total Water Inflows		

B. Water Uses (-)

Sr. No.	Water Inflows	MAF	% Share
1.	Canal withdrawals		
	Head of Watercourse	78	
	Field Nakas	43	
	Consumptive Use	31	29.81
	Conveyance Losses (Canal)	26	25.00
	Conveyance Loses Head to Naka	35	33.65
	Field Application Losses	12	11.54
	Total Canal Withdrawal		
	(Consumptive Use + Losses)	104	100
2.	Industrial and Municipal Uses	5	3.5% of A-1
3.	Required See Outflow to Check Sea Intrusion	10	
	Total Use of Water	46	
C	Water Losses		
1.	Conv. evap. and other losses	68	
2.	Excess Outflow towards Sea	25	
	Total Water Losses	93	

Surface Water Balance (MAF)

Inflows = Uses + Losses

A = B + C

139 = 46 + 93

Other Water Sources

Groundwater	MAF	% Share
SCARP	9	17
Private	44	83
Total	53	100.00
At Field Nakas	41.00	
Crop Consumptive Uses	29.00	
Field Application Losses	24.00	

Groundwater Balance (MAF)

Total Ext. = Consumptive Use + Losses

53 = 29 + 24	MAF
Rain	30
Consumptive Use	9
Run Off	17
Field Application Losses	4

Rain Water Balance

Total Rainfall = Consumptive Uses + Losses

30 = 9+21

Overall Water Balance

Surface.Flows + T-Well +	=	139+53+30
	D =	222 MAF
Consumptive Use + Losses + Outflow	=	84+113+25
	E =	222

Besides surface water, the country is endowed with groundwater resources. The groundwater is pumped through SCARP tubewells (9 MAF) and private tubewells (44 MAF). Of the total groundwater (53 MAF), 29 million is consumptively used for crops and the rest are losses. Public tubewells were installed in late 50s and early 60s to control waterlogging and salinity. The design capacity of these public tubewells was 4-6 cusecs and they were installed in the periphery of canals. Through these tubewells, effluent water was pumped and discharged in the canals. The scarp tubewells outlived their utility and phased out. Since the capacity of these tubewells was large, farmers were unable to purchase and maintain them. It was deemed appropriate to let these tubewells die their own death till private sector install led their own tubewells.

Private tubewells are a big source to augment surface supplies and consumptive use of water. These tubewells are energized through electricity and diesel. The electric tubewells have been running on flat rate basis, which has caused over-exhaustion of the aquifer. This calls for a preventive regulation in order to preserve and manage groundwater efficiently. Until recently, the government has switched to meter-system and electricity tariff is high, therefore, farmers are unable to bear high cost of water

through electric pumps. In Balochistan, flat rate is continued in spite of the evidence of over-exhaustion of the aquifer. The watertable of Quetta valley has a severe draw down. Due to drought, most of the wells have been dried up. It is, therefore, necessary to invoke rural regulation for groundwater development and its proper management.

In addition to above two sources of water, rainwater, especially in monsoon, is available. Annually about 30 million acre feet of water is received, of which, 9 million acre feet is consumptively used and rest are losses through seepage, run-off and outflow to sea. Rainfall is a natural gift and the country has to manage and conserve rainfall water, especially in Rodkohi areas where large tracks of land can be brought under cultivation by proper diversion.

Overall water available is 222 million acre feet (surface flows; 139 MAF + tubewells, 53 MAF + rains; 30 MAF). Out of this total water availability, 84 million acre feet is consumptively used, 113 million acre feet are losses and 25 MAF outflows to the sea. This shows overall water balance of the Indus basin.

Water Issues in the Indus Basin

- shortage of water - vis-à-vis water storage
- seasonality in water availability and inflexible canal irrigation system
- inequity in water distribution
- inadequate O&M funding and poor cost recovery
- increase in waterlogging and salinity hazards due to poor maintenance
- excessive groundwater pumpage in certain regions resulting in secondary salinization
- effluent disposal and related environmental issues
- absence of conducive environment required to introduce and implement water efficient irrigation techniques and practices
- lack of private sector participation
- deteriorating institutional capacity of key water sector institution
- poor linkages among water, agriculture and rural development policy strategies
- lax water shed management silting existing water reservoirs
- lack of consensus on dams sites leading to hydro-politics

Future Options for Water Development

Pakistan has a tremendous potential for additional storage to replace lost capacity of existing dams, which is to the tune of 6 million acre feet. In addition, there are 18 feasible dam sites where additional storage can be built. Out of these 18 sites, Kala Bagh, Basha, and Akhori Sakurdu are the best conceivable sites. The feasibilities of Kala Bagh (6.1 MAF) and Basha (7.3 MAF) are near completion in the years 2004 and 2006, respectively. There is a need to develop national consensus in order to conserve 13.4 million acre feet of water. If the nation would not decide upon such important projects of water, the country would experience water shortage. Thar, Cholistan and vast land in Balochistan have already faced a brunt of it. There is a need to conserve 35 million acre feet of water, presently out-flowing to the sea.

As pointed out earlier, there are colossal losses through conveyance and canal watercourses. Therefore, lining of canals, raised section and watercourse improvement will save another 20 million acre feet of water. The pace of watercourse improvement is very slow and in the past three decades, the country was able to improve only 30,000 watercourses from a total 130,000 watercourses. This is not a happy augury and the

government may divert resources for watercourse improvement as a crash program to conserve water. Maintenance of canals and their cleaning remained a major issue and mostly canal maintenance has been deferred due to scarcity of resources.

The current allocation of the required operation and maintenance (O&M) cost is 87 percent, 76 percent, 41 percent and 53 percent in Punjab, Sindh, NWFP and Baluchistan, respectively. The actual releases against these allocation are even less. The recovery of O&M cost is 32 percent, 22 percent, 38 percent and 12 percent in Punjab, Sindh, NWFP and Baluchistan, respectively. Last year, the present regime followed a holistic approach to clean canals on a war footing and out of 40,000 miles canals, 50 percent have already been cleaned with the help of Army and local people. This has greatly helped in achieving equity between head and tail end farmers. This has saved water up to 15 percent, which has been translated in the wheat productivity as a result of bumper crop this year.

There is a large area of Rodkohi, Salaba and Riverine areas covering about 3.25 million hectares. This can be brought under cultivation through spat irrigation system, proper diversion and sinking of tubewells in Salaba and Riverine areas. The construction of check and delay action dams in Balochistan area will help address the water scarcity issue. In the rain fed areas, small dams and earthen ponds can be constructed to store run-off water in mountains. In NWFP, Punjab and Balochistan, two million acre feet of water can be made available through such small irrigation schemes and dams.

Groundwater with existing contribution of 53 million acre feet is becoming a parallel source of irrigation but its rising cost may automatically be served as a regulatory mechanism to pump less water ranging between 10-15 million acre feet. In the wake of water scarcity and drought, the country must conserve its groundwater resources for future years. The fugitive supply of groundwater will over exhaust the aquifer. Water managers must endeavor to utilize water resources efficiently. The country can save up to 55 million acre feet water through energy and efficient pumping system. There is a need to increase cropping intensity within Riverine areas by proper water management at the system level.

Options for Future Water Development

Options

- conserve flow of water
- water allocation based on marginal productivity
- experience water shortage in the new millennium

The future strategies to be followed are listed below:

Surface Water

- additional storage to replace lost capacity of existing dams - 6 MAF
- additional storage to add new supplies to the Indus basin canal diversions - 14 MAF
- saving of conveyance losses in canals and watercourses - 20 MAF
- development of Spat Irrigation System in Rodkohi, Salaba and Riverine areas covering 3.25 million hectares
- small dams and earthen ponds to store runoff in mountainous and barani areas of NWFP, Punjab and Baluchistan - 2 MAF

Groundwater

- existing contribution of groundwater - 40 MAF
- reduction in groundwater pumping due to high energy prices - 10 MAF
- sustained pumping up to 55 MAF through energy efficient pumping systems

Future Strategies

- crash Program for cleaning and lining of raised section of canals, watercourses, minors and distributaries
- remodeling of outlets for uniform distribution of water
- crop independent water rates (Abiana) may be charged on gross farm area in order to recover the O&M cost and gradually moving to a volume based pricing
- Minimize element of rent seeking by irrigation personnel
- participatory water management through Provincial Irrigation Development Authorities (PIDAs) may be encouraged at secondary and tertiary canal level
- investment in surface supplies to improve remaining 74,000 watercourses. (The current pace is slow)
- groundwater pumpage may be regulated through licenses in order to check over draft of the aquifer
- consensus on new dam sites is imperative to ensure water supplies
- improve water-shed management to halt silting of dams (Tarbela and Mangla)
- increase cropping intensity within Riverine area by better water management at system level

The options for improving irrigation water productivity are:

- technical (land leveling, surge irrigation, high irrigation efficiency technologies (HIET)—drip and sprinkler)
- managerial (better scheduling, improve canal operations, water application at critical period, water conservation tillage, better O&M and drainage reuse)
- institutional (establishing of water users associations (WUAs) for managing the system, reduction of water subsidies and introducing conservation-oriented pricing, water markets, private sector initiative for developing HIET)
- agronomic (selection of crop varieties with high yield per liter of transpired water, inter-cropping, better matching and sequencing crops, drought tolerant crops and evolution of water-efficient crop varieties)

RURAL DEVELOPMENT AND POVERTY NEXUS

Muhammad Aslam Khan[1]

Abstract

The development experience indicates a strong link between rural development and poverty reduction. In Pakistan agriculture is the major source of economic growth, employment and livelihood. The agricultural productivity is low and many factors are responsible for its low productivity. Majority of rural population is marginalized in terms of access to physical and social assets, and in terms of institutions and inequality. Rural poor lack access to instruments to mitigate and cope with shocks that affect their well being and ability to come out of poverty. Gender and rural/urban differences in human development and poverty are substantial. This paper examines the influence of public policies and past development efforts on rural development, poverty reduction and rural welfare outcomes. In Pakistan, misguided policies and institutional weaknesses stifled rural development and resulted in increase in rural poverty, inequality and vulnerability to shocks. The most important impediment to rural development is an overly restrictive policy regime: assets distribution, availability of credit and subsidies. Frequent changes in agricultural support policies resulted in inefficient use of resources and low agricultural productivity. Poverty in rural areas is also perpetuated because of weak research and development (R&D) base, lack of adequate infrastructure and agricultural markets, poor soil and water management practices. The declining financial resources added pressure on already weak infrastructure. In the 1990s, drought conditions led to acute livelihood problems and sharp rise in rural poverty. The paper emphasizes that there is considerable scope for policy interventions aimed at harnessing development potential and improving livelihood opportunities of million of people living in poverty and human deprivation. The last section of the paper provides concluding remarks.

Introduction

Nearly third-fourth of the poor in developing economies are in the rural sector (FAO 1999; Lipton and Ravallion 1995; Quibria 1993). The survival of the majority of rural population is mainly depends on agriculture and related activities to it for their livelihood, either directly, as producer or hired workers, or indirectly in sectors, which derive their existence from farming activities (trading, transportation, processing, etc.). Improvement in the well being of the rural population in the short-term and their ability to escape poverty in the long-term is associated with significantly high and broad-based agricultural growth and creation of income and employment opportunities (HDC 2002; Rosegrant and Hazell 1999; Ranis and Stewart 1993). The cross-countries experience show that rapid growth in agriculture induces rural non-farm growth and hence substantial poverty reduction in rural areas (Balisacan 2001).

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Most critical to poverty reduction are rural poor's access to assets, employment and income opportunities, infrastructure, institutional capacities, public services, and instruments to mitigate and cope with shocks and human and financial resources to support the process of rural development and poverty reduction. A study of eight Asian countries revealed that about 60 percent population of developing countries residing in rural areas is working with as little as 10 percent of required resources (Asian Development Bank 2001). The situation in the 1990s further worsened; the developing countries experienced significant reduction in funding for rural development (Forbas-Watt 2002). The proportion of official development assistance going to agriculture has fallen from about 20 percent in the late 1980s to about 12 percent today. Assistance to agriculture from international financial institutions has followed a similar path (IFAD 2001). Difficulties have been witnessed mobilizing capital for agricultural development (FAO 2002). Capital formation per agriculture worker has remained stagnant or declined in countries where agriculture growth is essential for poverty reduction and food security (FAO, AFAD & WFP 2002). The declining financial support for agriculture is extremely damaging to efforts to reduce poverty and hunger (IFAD 2001). Sachs (2002) argues that in developing countries US$ 24 billion are needed annually in public investment in agriculture and rural development to address the problem of poverty and development.

Pakistan for a considerable long period has enjoyed notable economic progress in terms of both growth in gross domestic product (GDP) and structural changes in the composition of output. Real GDP has grown at an annual average rate above 6.0 percent during 1961-1990. Performance in the key sectors, in the same period, has generally been satisfactory. Manufacturing value-added has grown about 8.0 percent per annum. The service sector has achieved an annual average growth rate of 6.0 percent. The agricultural growth was high by South Asian standards. Agricultural value-added averaged 4.6 percent per annum. In the subsequent periods, 1991-2000 and 2001-02 GDP growth and value-addition in all sectors declined to 4.6 percent and 3.6 percent per annum. The agricultural value added experienced rapid decline to 4.4 percent and 1.7 percent in the same period (Table 1).

Table 1: Gross domestic product 1990-2002 (Growth Rates %-annual average).

	1961-80	1981-90	1991-00	2001-02
GDP (FC)	5.8	6.5	4.6	3.6
Agriculture	3.8	5.4	4.4	1.4
Manufacturing	7.7	8.2	4.8	4.4
Commodity Producing Sector	5.4	6.5	4.6	2.1
Services Sector	6.5	6.7	4.6	5.1

Source: Government of Pakistan, 2003. Economic Survey of Pakistan: Statistical Supplement 2001-2002, Islamabad: Finance Division

The gains of economic progress, however, have not been shared equally amongst various economic groups. The "trickle down" theory failed to ameliorate sufferings of the poor, the disadvantage and marginalized segments of population, majority of which lived in rural areas. The belief that the individual greed of the 'robber barons' of industry would lead to a larger national cake and eventually benefit the entire society did not materialize (Papaneck 1967:149; Noman 1990:40). As a result social inequalities widened (Haque and Montiel 1992).

Rural Setting

The rural sector of Pakistan comprises 68 percent of the total population in some 50,000 villages. There are about 13.5 million rural households with an average of 7.0 persons per household (FBS 2002). The majority of rural households depend on agricultural activities for employment and income, and for other livelihood facilities. The economic status of households is largely dependent on ownership and cultivation of land.

Agriculture in the rural setting assumes a considerably important role in stimulating growth, providing employment and income opportunities to the majority of rural population and creating a growth structure leading to alleviation of poverty and human well being. It contributes a quarter of country's GDP and employs about 50 percent of the labor force. About 75 percent export earnings are derived from this sector (Table 2). In the 1990s, low growth in agricultural value added translated into increase in the rural poverty and reduction in welfare levels of rural population. In 2000-01, of the 95 million rural population 37 million were poor. In 2000-01, more than 75 percent of Pakistan's poor were living in rural areas of Pakistan.

The performance of agriculture sector has been influenced by many factors such as distribution, particularly land, water shortages emanating from deficiencies in storage capacity and poor use of available water; farm to market roads; use of technology; rural infrastructure; poor channels of marketing; availability of resources; shortage of warehouses; cold storage; and grading and processing facilities. Lack of effective support mechanism for various agricultural commodities at times of crisis weaken the financial position of the farming community especially the poor. Frequent and ad hoc changes in the support prices have resulted in wild swings in the output levels of various crops (Kemal 2002).

Table 2: Agriculture in the national economy.

	1980-81	1985-86	1991-92	1995-96	2000-01
Rural Population (Million)	61	69	78	85	97
Share of Agriculture in GDP (%)	24.22	24.78	26.30	26.10	24.60
Employment	49.56	52.05	47.86	46.79	48.42
Imports	10.90	21.1	15.33	17.18	13.43
Exports	83.10	86.35	78.16	75.21	75.76
Raw Items	40.38	32.88	17.24	14.85	10.84
Semi-Manufacturing	11.83	16.50	21.59	21.66	14.90
Manufactured	30.78	36.97	39.33	38.70	49.94

Source: Pakistan Economic Survey (Various issues)
Agricultural Statistics of Pakistan (Various issues)

The rural household income varies substantially by occupational groups. Table 3 gives details on rural households from various sources and by occupational groups. The households derive 52.8 percent of the total income from agricultural sources (agriculture income + employment in agriculture). The pattern of household income indicates that sources of income vary among different quintiles. The crop profits as percentage of agriculture incomes is the biggest source of income to the rural household. It varies from 46 percent to 80 percent between different quintiles (World Bank, 2002b). Non-

agriculture income constitutes 47.2 percent of the total income of which 37.6 percent income is earned from employment outside agriculture.

Table 3: Pakistan-distribution of total rural income per household by occupational groups and by source of income rupees.

Source of Income	Agricultural Income						Non-Agricultural Income				
Occupational Groups	Crop Income	Livestock Income	Income from Tractors & Tubewells	Income from Land Rent	Income from Fish-farming, Forestry, Bee keeping, etc.	Total Agricultural Income	Income From Enterprises Income from Employment in agriculture	Income from Employment Outside Agriculture	Income from Other Sources	Total Rural Income
Non-Agriculture	-	3633	24734	11722	25000	5985	32652	7387	30662	10759	37583
Household		(371)	(7)	(106)	(2)	(469)	(249)	(518)	(1313)	(91)	(1490)
Livestock	-	14192	3583	24607	-6	15148	34816	8051	27230	12321	47226
Holders		(568)	(7)	(23)	(1)	(571)	(104)	(277)	(468)	(30)	(585)
Farm	29659	9838	-3314	55838	26576	38648	28388	5426	32772	30641	64510
Households	(3892)	(3322)	(536)	(72)	(56)	(3929)	(465)	(1270)	(2259)	(278)	(3945)
Total	29659	9878	-2873	29024	26102	32865	30502	6270	31444	24738	56167
Households	(3892)	(4261)	(550)	(201)	(59)	(4969)	(818)	(2065)	(4040)	(399)	(6020)
All Households	19177	6992	-262	967	255	27130	4145	2151	21103	1638	56167
	(6020)	(6020)	(6020)	(6020)	(6020)	(6020)	(6020)	(6020)	(6020)	(6020)	(6020)
Percentage	34.1	12.4	-0.4	1.7	0.5	48.3	7.4	3.8	37.6	2.9	100

Figures in parenthesis show number of households

Source: State Bank of Pakistan, 1998. Rural Credit Study (Phase II), Final Report (Main Report- Table 5.1.2) September.

Poverty Profile and Human Development

The profile of poverty in Pakistan is affected by inherent differences in natural and economic resources, which limit access to income and employment opportunities, empowerment and security of poor household (Khan 2002). A number of studies suggest that poverty in Pakistan increased rapidly in the 1960s, then declined sharply in the 1970s up to mid-1980s and began to increase again from the late 1980s (Naseem 1973; Irfan and Amjad 1984; Amjad and Kemal 1997; Jafri 1999; Qureshi and Arif 1999; FBS 2002). Using the same approach and consistent time series data and 2350-calorie average per adult equivalence calories requirements, it has been observed that between 1992-93 and 2000-01 poverty increased from about 25 percent in 1992-93 to 32 percent in 2000-01. The increase in poverty is mainly in rural areas where the head-count moved upward from 27 percent in 1992-93 to 39 percent in 2000-01, whereas in urban areas it only increased marginally from 20 to 22 in the same period. Table 4 below gives details on various poverty indicators.

Table 4: Incidence of poverty – overall, rural and urban.

Poverty Incidence	1992-93 HIES	1993-94 HIES	1996-97 HIES	1998-99 HIES	2002-031 HIES
PAKISTAN	24.96	27.72	24.54	30.63	32.13
Poverty line/per capita per month (Rupees)	369.88	411.52	576.18	673.54	728.0
RURAL					
Population (Million)	80.45	87.32	87.57	91.04	96.21
Poverty incidence	27.03	32.99	28.83	34.67	38.98
Poverty gap	3.83	5.32	4.27	6.60	7.84
Severity	0.95	1.46	1.08	2.04	2.30
No. of poor persons (in '000)	21,746	28,807	25,246	31,563	37,512
URBAN					
Population (Million)	36.42	37.55	41.47	44.11	48.19
Poverty incidence	19.76	15.15	14.83	20.91	22.67
Poverty gap	2.87	2.31	1.90	3.69	4.30
Severity	0.72	0.56	0.46	1.09	1.20
No. of poor persons (in '000)	7,197	5,689	6,150	9,223	10,925

Source: Government of Pakistan, 2001. Poverty in the 1990s, Islamabad: Federal Bureau of Statistics (April) Planning Commission, 2003. Preliminary Estimates, Islamabad.

Many explanations have been given to explain the rising trend in poverty in rural areas. The main factor contributed to increase in poverty is the low agricultural productivity. Critical factors stirring poverty upward lies in the rural structure and methods of production. The agricultural productivity is low because of inequality in land ownership and skewed distribution of land and weak support system. The distribution of assets, especially agricultural land, has a major impact on rural areas development and poverty reduction efforts. Land reforms in Pakistan in 1959, 1972 and 1977 intended to enhance the assets of the poor and to reduce the concentration of landed wealth in few families. However, because of poor implementation, the first two reforms failed to achieve the desired results, while the third one remained largely unimplemented. In the absence of supportive services and poor governance, there has been no visible improvement in the living standards of many poor farmers who have received land as a result of land reforms undertaken to date. The collateral requirements also prevented poor households to borrow from the formal credit market for the long-term productive investments in land and agricultural implements that can help them to come out of poverty. Governance issues, particularly corruption in public canal irrigation system, are also widely viewed as a constraint on agricultural productivity (World Bank 2002b).

Poverty in rural areas is also because of weak social indicators. Past efforts to improve access to social services through specialized programs such as Social Action Program explicitly designed at increasing the availability of social services and improving quality to the targeted population, especially poor and women in areas of elementary education, basic health care, family planning, and rural water supply and sanitation were substantially short of expectations. Almost all human development indicators are weak. The situation is poor in rural areas. Gross and net primary school enrolment rate, adult literacy rate, household expenditure per pupil, health, water supply and sanitation indicators as compared to urban areas show that poverty reduction efforts should also concentrate on the provision of social services to the rural population. Efforts should not

only be on increasing the public expenditure but on proper implementation and management. Table 5 indicates that between 1995-96 and 2001-02 the rural share vis-à-vis in the provision of social services in majority of cases is deteriorated. Marginal improvements have been observed in adult literacy rate and rural sanitation.

Table 5: Availability of social services in rural areas (% of urban areas).

	1995-96	1998-99	2001-02
Gross Primary School Enrolment			
Male	85	79	80
Female	60	54	59
Both	74	67	70
Net Primary School Enrolment			
Male	84	74	67
Female	56	54	54
Both	71	65	60
Adult Literacy Rate			
Male	68	71	72
Female	33	36	38
Both	54	55	56
Per Pupil Expenditure on Education			
Male	28	52	25
Female	60	73	60
Both	52	62	45
Full Immunization Rate			
Male	94	73	69
Female	81	67	63
Both	88	70	66
Infant Mortality			
Male	114	146	153
Female	119	114	120
Both	133	130	135
Pre-Natal Consultation			
Rural	..	60	63
Urban	..	22	26
Overall	..	35	35
Safe Water Supply to Households			
Rural	11	9	8
Urban	56	50	53
Overall	25	22	22
Sanitation- Flush System			
Rural	17	22	26
Urban	75	88	89
Overall	34	41	45

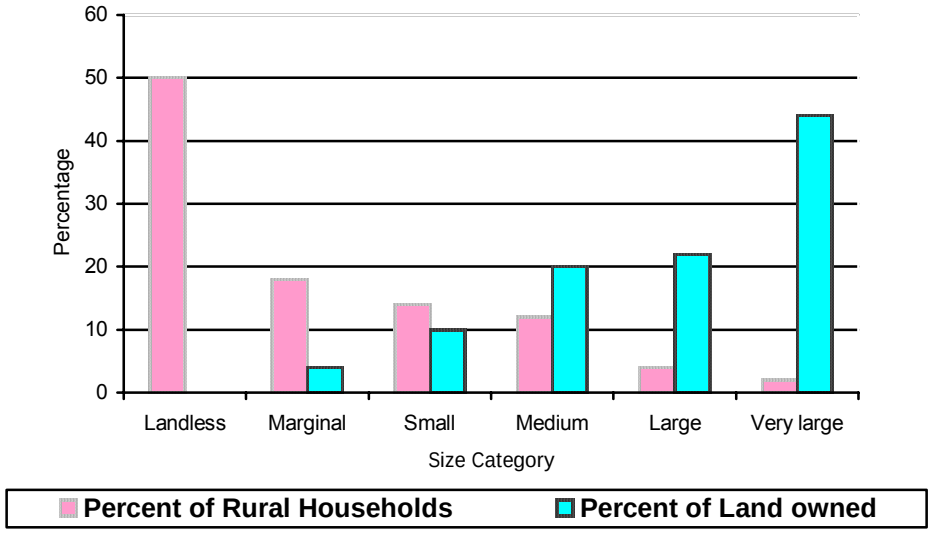
Sources: Federal Bureau of Statistics, 2002; Pakistan Integrated Household Survey 2001-02.

The main reason of increase in rural poverty during the period of 1996-97 and 2001-02 is the slow economic growth, particularly agricultural growth due mainly severe drought. In the past seven years, drought has drastically reduced the vegetative cover in 51 districts of Pakistan slumping the agriculture growth to about 2 percent on the annual average during 1996-2002 from 11.7 percent in 1995-96.

Distribution of Land Ownership and Other Assets

Poverty and landownership nexus is strong. The ownership of land in rural areas is a critical means of alleviating poverty and reducing vulnerability. Incidence of poverty varies across rural population on the basis of ownership of landholding, and is relatively low among households whose head is owner-cultivator of land (World Bank 2002b). Over the years, changes in land ownership reflect growing landlessness in the country. It has been estimated that 64 percent of the poorest households are landless and own only 10 percent of land area, small and medium farmers own 32 percent of area and around 2 percent of households own more than 40 acres of land and control 44 percent of the land area (Figure 1). Collectively, large and very large farmers control 66 percent of all agricultural land (World Bank 2002b).

Figure 1. Distribution of land ownership.



Note: Marginal <= 2 acres of land, small > 2 and <=5, medium >5 and <=15, large >15 and <=40 and very large >40 acres.

Source: World Bank, 2002. Poverty Assessment: Pakistan Vulnerabilities, Social Gaps, and Rural Dynamics (Figure 4.1, p.84).

Access to Credit

Availability of credit is one of the most important elements for addressing the problem of poverty in rural economy. Significant effects of institutional credit on agricultural output, household consumption and other household welfare indicators have been witnessed across countries (Kuroski 1995). However, experience of developing countries including Pakistan suggests that big landlords and influential groups preempt major share of institutional credit.

In Pakistan, rural credit has a history of market failures. The formal credit system is not uniform. In the 1960s and 1970s, allocation of credit was meant for productive purposes by lending at lower (subsidized) interest rates. This strategy led to created many problems. Subsidized credit failed to reach the targeted population, and too many rent-seeking intermediaries i.e. the big landlords preempted large share of institutional credit. This emphasis shifted in the 1980 and, it was argued that market based rates should be adopted to reflect costs and risks of lending (Khandker and Faruqee 2000). However, the shift in policy has not resulted in the desired change. In the 1990s, it was realized that poor's problem is not high interest rates, but their inability to borrow from formal sources (Malik 1999).

Pakistan Rural Credit Survey (1985) estimates that between 40-50 percent of all rural households in Pakistan borrow regularly, and that farm households borrow more than non-farm households. The landless households barrow 91 percent from the informal sources and only 9 percent from formal loan market. Similarly, marginal and small farm size households depend on informal sources for their credit requirements. The large and very large farm size households (7.4 percent of the total households) preempt above 75 percent of formal loan amount (Table 6).

Table 6: Credit status by farm size category.

Farm Size by Category	Households	Loan Amount	
		Informal	Formal
	%	%	%
Landless	46.7	91.3	8.7
Marginal	18.3	74.6	25.4
Small	15.2	57.5	42.5
Medium	12.4	44.6	55.4
Large	5.1	21.1	78.9
Very Large	2.3	24.0	76.0
Average	100.0	59.1	40.9

Source: World Bank, 2002b.

Natural Disasters

The international experience suggests that natural disasters, such as drought, results in billions of rupees damage to private and public property, loss of life, and slow economic growth and progress on poverty alleviation. The worse victims of drought shock are marginal households whom in the absence of assets and other income support mechanism poverty of the poor, the disadvantage and marginalized households further increased (Khan 2002). Vosti (1995) argues that drought affects assets of the poor households through: (a) natural resource, composed of water (ground and surface), ground cover and its (bio) diversity (trees, bushes), wild fauna and flora, and soil/land; (b) human resource endowment, composed of education, health, nutritional status, skills, and number of people; (c) on farm resources (livestock, farmland, pastures, reservoirs, buildings, equipment); (d) off-farm resources; (e) community-owned resources such as roads and dams, and institutions; and (f) social and political capital.

Key objectives of policymakers faced with drought ad other such disasters are to smooth consumption over these shocks i.e. keep households from falling into poverty, and

minimize the negative impacts of these shocks on economic growth and poverty alleviation. In the context of rural Pakistan, the focus is on weather-related shocks of particular importance since these were by far the most important adverse events reported by communities. The poorest, particularly the landless households, depend on tenant farming and casual wage labor for their livelihoods. The drought condition during 1998-2002 in 51 districts across the country negatively affected the agricultural production including livestock, and is one of the main causes of sharp increase in rural poverty.

Drought conditions particularly affected poor who make their living from subsistence agricultural activities on marginal lands. Drought radically skewed assets of the poor. The weakening of these assets reduced flows of product and/ or cash income and destroyed the physical assets of the poor households, communities and areas by reducing its value due to prolonged collapses of asset markets (e.g. decline in the value of farm land in drought affected areas). Figure 2 provides details of assets components, which are normally affected due to drought.

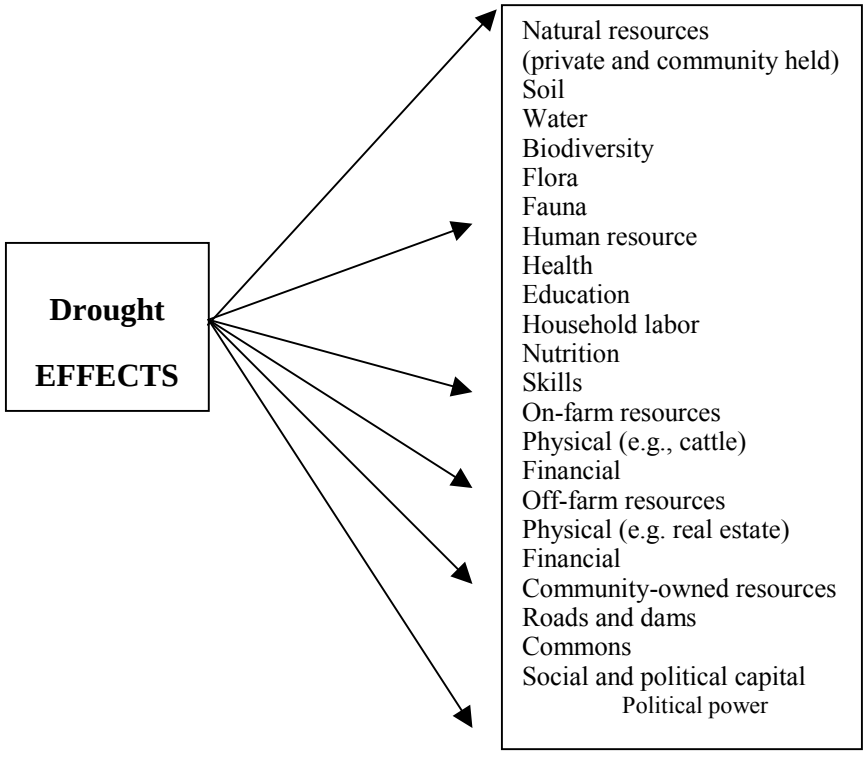
Rural Development Efforts

In the past 55 years, all the governments in power implemented development programs to exploit the vast rural areas potential for improvement in the living conditions of population. Non-profit sector also implemented programs in many areas to reduce poverty by empowering the poor to enable them to participate in the social and economic activities. The primary objective of these programs was to ensure food security and basic services to the rural population, and develop a social protection system for marginalized rural population to protect them on the eve of sudden illness, injury, loss of livelihood, drought and other natural catastrophes.

The emphasis of public sector programs was on the rehabilitation of poor on sustainable basis, delivery of basic social services – primary education, primary health care, safe drinking water and sanitation, rural development, including farm-to-market roads, rural electrification and family welfare services, while NGOs worked for providing basic social services, small credit, empowerment of communities and social protection.

The outcome of these programs is in great variance to the objectives and physical and financial targets. Since impact analysis of these programs is not available, it is, therefore, difficult to assess contribution of these programs on the life of the people, particularly the rural poor. The growth and human development outcomes have not matched with the allocation of huge addition in public expenditure in the past five decades through specialized programs. It appears that weak performance of public sector programs is mainly because the intended beneficiaries only played a passive role in their own development.

Figure 2: Assets of poor affected due to drought.



Source: Stephen A. Vosti, 1999. Understanding and Coping with Natural Disasters: El Nino in Latin America and the Caribbean (Draft).

Some of the major programs implemented for rural development by the public sector and non-profit organizations are discussed below.

A. Public Sector Programs

a) Village AID Program (1953-1962)

The First Plan emphasized development of rural infrastructure and cottage industries for creation of sustainable employment and income generation opportunities for rural population. The objectives of the program were: i) to increase the output of agriculture and village industries for higher rural income through improvement in crop and livestock production, building roads, particularly feeder roads, small dams, culverts, etc.

Village AID (Agricultural and Industrial Development) program in 1953 was the first effort for rural development in Pakistan. The 1951 census estimated rural population as 85 percent of the total population. It was realized that comprehensive efforts were needed to ameliorate the sufferings of rural population, and the government alone, through a few large-scale agriculture and water projects would not be able to make a difference to the life of the rural people. The village AID concept rested on the standard notion of the existence of surplus labor which could be utilized to increase production

from agriculture and village industries to enhance incomes of the rural people (Tahir, 1999). The design of the Program aimed to cater the rural population needs such as schools, health centers, and better water supply and recreational facilities. The management of the program was with the government. The Development Officers, Supervisors and Specialists were appointed to oversee the work of village AID workers. In each district, 150-200 villages (100,000-140,000 population) were organized as Development Area. Village AID workers, trained to guide the villagers to make plans for local development and to motivate them to modernize agriculture and improve health and education, and rural improvement, facilitated this process.

In 1959, after the established of Basic Democracies, the organizational structural of Village AID was changed. In the new set-up, Village AID Union Councils supervised workers. The resulting power struggle between elected representatives and bureaucrats resulted in the abandoning of the Program in 1962. The Village AID program made no significant dent into the problem of mass underemployment. The higher than expected population growth and stagnant per capita income meant that neither the additions to labor force could be absorbed, nor was there any reduction in the backlog of the unemployed (Tahir, 1999). Village AID was criticized for expecting too much from the community - as much as 50 percent. Rural Works Program did not specify any contribution by the community, though contributions of the order of 15-20 percent of the total outlay were estimated. As estimates of works were mostly based on guesswork, there was widespread pilferage of funds. Bulk of the funds in the Second Plan period was utilized on roads, mostly *kutcha* roads, which is a sub-sector most susceptible to misuse. As a matter of fact, no physical targets were fixed. Worse, the Program did not envisage any arrangement for proper operation and maintenance of the physical facilities. It opened the doors for corruption.

Various lessons could be learned from the program:

1. The program was optimistic in its expectation that a technically trained, bike-riding village worker will have the vision and capacity for social mobilization in a feudal structure (Tahir 1999).
2. Ad-hoc management with conflict between government functionaries hampered its progress;
3. There was lack of capacity and lack of coordination within the government agencies and implemented groups.
4. The development skills and model was externally imposed on village from outside, and therefore, not accepted.

b) Rural Works Program (1963-1972)

Agricultural breakthrough was achieved in the Second Plan period. The Plan succeeded in achieving balanced agricultural and industrial growth. Agriculture average annual growth at 3.4 percent was above the population growth of 2.6 percent per annum. While the poor as consumers benefited from steady food availability and relatively stable prices, they were not among the growth makers. Agricultural growth essentially contributed by a sharp increase in fertilizer use and augmented water availability through tubewells, both resulting from subsidies, the benefit of which did not reach the credit-denied small or subsistence farmer. The Rural Development Program (1963-73)

substituted Village AID program. It was based on the results of pilot project for community development.

Directed by Dr. Akhtar Hameed Khan, the Comilla pilot experiment showed encouraging results in which rural communities with government support completed link road and minor/irrigation channels. The outcome was increase in agriculture growth and rural employment opportunities. The Comilla pilot indicates that with communities' participation the government can achieve sustainable rural development. The Rural Works Program was started in 1963 in both the wings of the country, separately. The following four principal objectives were sought:

1. To provide larger employment in rural areas by creating work opportunities on local projects not requiring large capital investments, the benefits of which can easily be recognized by the workers;
2. To create an effective nucleus for planning and development at local level, and to associate an expanding segment of population in the development effort;
3. To create infrastructure such as roads, bridges, irrigation channels and the like in rural areas; and
4. To raise additional financial and manpower resources for the implementation of local projects, through taxation and voluntary labor.

Emphasis, however, was placed on building rural roads and drainage water facilities. The program:

1. Completed 60,000 rural infrastructure and services projects; at cost effective manner;
2. Mobilized commodities to contribution labor, land, and cost equal to 15 percent of the total cost provide jobs;
3. Reduced the level of sectoral employ improve village infrastructure; and
4. Created averages about the development needs.

It was claimed that the financing of the Rural Works Program through PL-480 grants stabilized food prices at the cost of drive towards food self-sufficiency, particularly in edible oils. The Program massively suffered when aid was cut down and the grants became smaller and smaller.

The PL-480 support, however, undermined the indigenous efforts of improvement food self-supplies. Dependence on PL-480 created an artificial food supply and financial support for counter part funds released from the sale of PL-480 commodities, which latter with reduced food supplies under PL-480 directly affected the implementation of Rural Works Program.

c) Integrated Rural Development Program (IRDP) (1972-1977)

Pakistan witnessed a new era of political process with new government in office in 1971. The reform agenda of the new government was to satisfying food, shelter and other basic needs of the population. Two major initiatives, i.e. land reforms and rural development, through Integrated Rural Development Program (IRDP) were initiated in 1972 to improve the welfare of rural people. The IRDP was started with an ambitious set of objectives:

1. To improve the socio-economic status of the rural people to raise their living standard;

2. To increase agricultural output through modern techniques;
3. To create conducive economic and social environment to slow down the migration of people from rural to urban areas;
4. To create based on participatory affords and strengthen the local institutions; and
5. To develop skills, and technical know-how.

IRDP centers were set up to achieve the above objectives to serve an area of 50-60 villages of a population of 60-75 thousand. The focal point of IRDP was the *markaz* (centre) to service as administration unit of local government in each district. The centre provided a framework for joint action by farmers, line departments and private sector organizations by physically locating the windows of the later at the centre. The IRDP was abandoned in mid 1977 with the military take over. The following lessons can be learned from the program:

1. Too many objectives chased by too few instruments, overlap with other programs such as Peoples Works Program, an emphasis on civil works rather than developing civil society, absence of elected local institutions and the bureaucratic leadership quickly brought out the inherently flowed nature of the program (Tahir 1999).
2. There was poor response of the line departments for providing the trained officials; the market response to the use of improved agriculture methods and inputs such as seed, fertilizer and credit helped the rural community to improve their living conditions. IRDP played a marginal role in this process.
3. Lack of coordination with communities resulted in poor or no proper assessment of local needs.
4. Poor governance resulted in increasing rent seeking and corruption. Allocated resources were largely used for civil works (structures, building, etc.) where the objectives of interest groups could have been met easily.

d) Prime Minister's Five Point Program (1986-90)

On 31 December 1985, the Prime Minister's Five Point Program was announced to achieve rapid equitable economic growth, reduce unemployment, and provide a better life to the common man within four-year period. The Program cost was estimated at Rs 117 billion to be spent on development projects related to rural education, rural electricity, network of rural roads, supply of clean draining water, setting up of a Basic Health Unit in every Union Council in addition to the setting up of Rural Health Centers, 7 Marla Small Scheme for rural housing, improvement and development of *Katchi Abadis* (Shanty towns) in urban areas and creation of a National Employment Fund. Similarly, the program created opportunities for National Vocational Training Project as well as loans for doctors, engineers and other professionals through Small Business Finance Corporation, and to the youth also by the Youth Investment Promotion Society. Developing linkages with large-scale manufacturing through better-designed deletion programs encouraged self-employment in small-scale manufacturing. Expenditure on women development increased significantly focusing on training and support facilities for the employed as well as job seeking women.

Too much bureaucratic involvement based on a top down approach created problems in the implementation of the program from very beginning. Like previous programs, the

stakeholders were not consulted in the design of the program. The projects and schemes were drawn by government agencies and execution of these projects was assigned to the federal and provincial government agencies, under the overall coordination and guidance of the Planning Commission. High level Committees were constituted to supervise and ensure the effective implementation of the program, including the Cabinet Committee under the Chairmanship of the Prime Minister at the federal level, and Monitoring Committees headed by Chief Minister at the provincial level. The monthly meetings to watch the implementation of the Program with federal and provincial ministers as members was chaired by the Deputy Chairman of the Planning Commission, and once in a quarter by the Federal Planning Minister.

The Special Local Development Schemes under the Program were identified by members of national assembly and senators to meet the urgent socio-economic needs of the rural population and the urban poor. These schemes fell broadly into two categories: Education and Local Development. To institutionalize the arrangements, a high level inter-ministerial implementation committee was set up to scrutinize and approve these schemes. These schemes were executed through local institutions like District Councils, Municipal Committees and departments of the government.

The program failed in achieving its objectives. Since Rs.117 billion for the program were drawn from various sectors financed by normal annual development program (ADP), and no additional resources except MNA/Senator Programs were earmarked. It was difficult to ascertain its physical and financial achievements. All were reflected in respective sectors. The program like previous progress was too ambitious. Despite maximum political commitment and administrative support it failed. As against the allocated Rs 117 billion, only Rs 2.7 billion was spent on the Program.

e) The Social Action Program and Others

The main instrument through which planned efforts were made to expand access and improve quality of social services provided by the government since 1992-93 has been the Social Action Program (SAP). SAP evolved as a response to the serious imbalance between economic growth and human development. It aimed to increase government spending on the coverage, quality and effectiveness of delivery of basic services (basic education, basic health, population welfare, rural water supply and sanitation) to the people, especially children, women and the girls. The program was designed as an integral part of cross-sectoral objectives.

Like previous special programs, SAP also targeted rural areas. The design of program made a balance between the development-and-current expenditure and salary-and-non-salary expenditure. It also sought institutional reforms and improvement in governance as a pre-condition for the success of the program.

The implementation design emphasized enhanced allocations for development, maintenance and quality inputs to departments and institutional arrangements and procedural improvements to ensure their timely release and monitored utilization. Community-based approaches were supported through a small component of participatory development of political allocation. District Development Committees during the first government of Nawaz Sharif and the District Social Action Boards of the second government of Benazir Bhutto distorted merit-based site selection and recruitment. Analysis of SAP-I (1992-96) and SAP-II (1996-2000) expenditure

indicates that the level of public expenditure attained during the SAP-I period could not be maintained during the SAP-II period.

During the early years of SAP, the total government expenditure did increase rapidly but a sharp decline was witnessed in subsequent years, such that the spending had fallen even below pre-SAP levels. In spite of precarious budgetary position, public spending on SAP continues at a rate which would be sufficient to provide a reasonable level of basic public services, but because of weaknesses of public institutions at all levels of government, mismanagement, misuse and wastage, the desired results were been achieved. One of the most important lessons learned from the SAP is that increased expenditure is a necessary but not sufficient condition to expand access and improve the quality of social services. Unless required environment and capacities are created, institutional efficiency enhanced and broader participation of communities is ensured, SAP experience indicates that public resources likely to be misused.

Public expenditure, in real terms, during the SAP-I period has shown visible increase as per its objective, showing an average annual growth of 11.5 percent. Expenditure on education grew by 10.8 percent (current expenditure by 10.5 percent and development expenditure by 12.1 percent); health expenditure by 19.2 percent (current expenditure by 11.6 percent and development by 32.6 percent); rural water supply and sanitation by 7.3 percent (current expenditure by 3.5 percent and development expenditure by 8.6 percent) and miscellaneous expenditure, including expenditure on population welfare, increased by 7.4 percent (Table 7). SAP-II was expected to consolidate the SAP-I and build capacities. However, it failed to sustain the momentum gained by SAP-I. During the SAP-II period, average annual growth of public expenditure on social services declined, witnessing a negative growth of 2.9 percent. In real terms, all sectors covered by SAP showed negative growth rates during SAP-II period.

As a proportion of GDP, SAP expenditure increased from 1.7 percent in 1992-93 to 2.4 percent in 1996-97. Thereafter, it declined to 1.6 percent in 2000-01. Table 7 provides details on this.

The sectoral share of SAP expenditure also did not show any visible change. Education claimed 65.6 percent of SAP-I expenditure, while SAP-II has allocated 64.7 percent for education. Health share in SAP-II, however, increased from 17.5 percent in SAP-I to 20.0 percent, while rural water supply and sanitation share reduced to 11.6 percent during SAP-II from 14.0 percent in SAP-I.

In SAP-I and SAP-II, expenditure on salary claimed around 90 percent of the current expenditure and non-salary expenditure about 10 percent. During SAP-I, about 76 percent of development expenditure was financed by local components and 24 percent by foreign aid. During SAP-II, however, local component financed 70 percent of the development expenditure and share of foreign aid increased to 30 per cent. In SAP-II, current expenditure claimed 73 percent of SAP expenditure as compared to 67.6 percent in SAP-I, whereas share of development expenditure was reduced from 32.4 percent in SAP-I to 27.1 percent in SAP-II.

Table 7. Trends in SAP expenditure since 1992-2001.

	1992-93	1995-96	1996-97	2000-01
As % of GDP				
Education	1.1	1.2	1.5	1.1
Health	0.3	0.3	0.4	0.3
Rural Water Supply and Sanitation	0.3	0.3	0.3	0.2
Miscellaneous	0.1	0.1	0.1	0.1
Total:	1.7	1.9	2.4	1.7
Real Growth Rate (%)		SAP-I (1992-96)		SAP-II (1996-2001)
Education		10.8		-1.6
Health		19.2		-2.6
Rural Water Supply and Sanitation		7.3		-11.8
Miscellaneous		7.4		-1.4
Total:		11.5		-2.9

Source: Federal and Provincial Budget documents (Various issues)

f) Khushhal Pakistan Program (1999-2002)

The developing countries suggest that public work programs experience of help to reduce unemployment and poverty and build human and physical capital in a fiscally sustainable manner. The data indicate that these programs have measurable impacts, benefiting thousands of people. For example, Nicaragua created about 137,000 jobs of varying length, for about 21,500 person-years of employment. In Bangladesh, the public works intervention under the Rural Development Project in 1997-98 created 440,000 additional jobs (30 percent of whom were women). This brought direct benefits to more than 1.7 million household. In Egypt Social Funds Development Program provided substantial support for building the required infrastructure of the poor and help to create additional jobs.

Since October 1999, the Khushhal Pakistan program was implemented as an important public sector initiative to create employment opportunities for the unemployed poor. The program is designed to reach every nook and corner of Pakistan. The Program is to provide essential infrastructure in rural and low-income urban areas by building farm-to-market roads, water supply schemes, repairing existing schools, small rural roads, streets, drains, and storm channels in villages. The schemes are also directed towards lining watercourses, desilting canals, and providing civic amenities in towns, municipal committees and metropolitan corporations. Communities are empowered to identify projects and implement them under a participatory approach.

The local communities are involved in identifying projects according to their needs, but still much needs to be done to involve fully local communities in planning, designing and implementing the development schemes under the program through community social mobilization. In the past, similar programs implemented with the same vigor and zeal resulted in partial results. Transfer of implementation of Khushhall Pakistan Program to the provinces from 2002-03 is likely to improve its implementation further, provided the provincial governments receive needed financial support.

g) Micro Finance Institutions (MFIs)

In Pakistan, improved access to small credit is seen as a potent means for increasing the income of the poor. Micro-credit has a proven track record of meeting the demands and needs of the poor at the grassroot level (Box 1). In addition to the existing windows such as Pakistan Poverty Alleviation Fund (PPAF), Agricultural Development Bank (ADB), First Women Bank, National Rural Support Program (NRSP), etc., the government has established a new 'Khushhali Bank' or 'Micro Finance Bank' for provision of micro credit to poor communities. The Khushhali Bank will also support NGOs and Rural Support Programs (RSPs), which are already dealing with micro-credit. In addition, SME Bank has been established to support and develop the SME sector in Pakistan by providing the necessary financial assistance and business support services on a sustainable basis. In the private sector, First Micro Finance Bank Ltd has been established as a non-listed public limited company. The National Commercial Banks also have some facilities for micro-credit but because of collateral requirements these windows are not very effective. Coverage of micro-credit from all the above windows is limited and not fully catering the substantial demand of credit.

The government facilitated the establishment of Khushhali Bank in August 2000. Three public sector, 11 private sector and two foreign banks own Khushhali Bank. The Khushhali Bank has expanded its operations into 30 districts, disbursed over Rs 0.3 billion and serviced nearly 30,000 loans while ensuring that over 30 percent of its clients remain women. The bank is now targeting to serve 100,000 households each year reaching every corner of Pakistan to give the poorest of the poor the loans up to thirty thousand rupees for their self-improvement. Major goals of the bank are reduction in poverty and improving the status of women through enhanced income generating activities. The Khushhali Bank will promote the process of establishing such community organizations, which can sustain credit operations and promote saving habits among the poor. The bank will also support some small infrastructure projects, which on completion will be amenable to the levy of service charges and for which the community will provide appropriate guarantees. Benefit will accrue directly to the poor through income generation activities and improved infrastructure.

An encouraging policy framework and support mechanisms to encourage private investments in the sector are now in place. Enactment for creation of micro-finance banks in the private sector has become effective. First entry based on this legislation is the First Micro Finance Bank sponsored by the Aga Khan Foundation as essentially an initiative of the non-government non-profit sector. MFIs are permitted to be established at any level district, province or national, and mobilize resources from local markets. Licensing procedures, supervisory regulations and disclosure standards have been simplified. While the government and non-government sector have entered the field, the formal private sector has not yet come forward, probably because of collateral conditions and risk involved.

h) Drought Emergency Relief Assistant Program (DERA)

In the past four years, prevailing drought condition has affected half of Pakistan. It has reduced overall growth, agricultural productivity, livestock and non-farm incomes. The poor households in the drought-affected areas (52 districts out of 97 districts) became vulnerable as they lost their crops, livestock, employment and other livelihood opportunities. In the absence of an established system of safety nets to deal with the drought crisis, human suffering and incidence of poverty in the affected areas has

increased significantly. In order to mitigate the effects of the drought and assess requirements and needs of the regions to avert large-scale human sufferings, the government has implemented Drought Mitigation Program to provide a systematic thrust to rehabilitate drought stricken areas through short, medium and long-term schemes. These schemes, spread over all the provinces, will assist in sustained recovery of the people who were exposed to severe adverse effects of drought by restoring and improving productive capacity and the livelihoods and incomes and invoke better preparedness in future. However, progress on the implementation of the program is slow. Lack of capacities to manage the program at the district level and casualness at levels of government has delayed the proper implementation of the program, and thereby, relief to the affected areas and population. Preliminary data show that despite transfer of financial resources to the program the bureaucratic conduct of approval and other formalities have slowed down the implementation of the program.

i) Permanent Rehabilitation Program of the Poor

This programe is about rehabilitation of *Mustahiqeen* (deserving people), with *Zakat* assistance for enabling them to set up their own means of livings/small trade, suitable to their qualification, skill and local conditions. The proposed package for Rehabilitation is aimed at providing enhanced and adequate financial assistance from *Zakat* fund to *Mustahiqeen* who are willing to become self-reliant and useful citizens of the country. The Central *Zakat* Council has approved the categories for rehabilitation grant to *Mustahiqeen*. In order to implement the program in a transparent manner, institutional support at levels has been established, which will identify *Mustahiqeen* as per laid down criteria and implement and monitor the program. Table 8 provides details on this:

j) Food Support Program

The coverage of the food support program benefited to 2.2 million poorest households in 2001-02 with monthly income of maximum Rs. 2,000 (Table 9). Cash support of Rs. 2,000 is provided to them through biannual installments.

Table 8. Zakat rehabilitation program 2001-02.

Package	Brief Description	Amount per Mustahiq (Thousand Rupees)	Allocation (Billion Rupees)
Package A	For shops/business for illiterate Mushtiqeen	10-35	
Package B	For small business in neighborhood for Mushtiqeen with at least primary education	10	
Package C	For Skilled Mushtiqeen with middle level of education	10	
Package D	For skilled Mushtiqeen with matriculation	15-35	
Package E	For semi-skilled Mushtiqeen without any consideration of education	10-25	
Total:			1.8

A system of means testing has been adopted for identification of beneficiaries by linking the program with the *'Zakat System'* where records of *Mustahiqeen* are developed through extensive participation.

Table 9. Food support program 2000-02.

	Disbursement (Billion Rupees)		No. of Beneficiaries	
	2000-01	2001-02	2000-01	2001-02
Pakistan	1.14	2.20	1,136,546	2,200,916
Punjab	0.59	1.09	591,126	1,089,736
Sindh	0.26	0.48	256,708	478,495
NWFP	0.18	0.42	182,511	425,918
Baluchistan	0.05	0.09	44,864	90,670
ICT/NA/AJK	0.06	0.12	61,337	116,097

k) Tawana Pakistan Program

The nutritional status of Pakistani children, particularly girls is lowest than in most countries, including Sub-Saharan Africa and East Asia and Pacific. The nutrition indicators such as low birth weight babies (25 percent), low weight for height (wasted) (nine percent), low weight for age (stunted) (50 percent) and low weight for age (under weight) at 38 percent suggest that additional resources are needed urgently to improve the current situation. The Tawana Pakistan Project is being implemented as a Nutrition Package for school-going girls (five to nine years) in 26 High Poverty district all over the country.

The project will be implemented by Pakistan Bait-ul-mal to benefit 500,000 girl students in 5,000 Girls Primary Schools by providing meals for 25 days per month for 10 months per year with supplements of vitamins/micro-nutrients. On implementation the project is likely to improve nutritional status of girls in primary schools as well as in the community; increase enrollment and sustain attendance of girls; create awareness towards better living concepts in the community particularly on public health and nutrition; devolve responsibility to the beneficiary for ownership and sustainability of the program and reduce gender gap in school enrollment. On completion, the project will result in 18 percent greater weight gain for age, 10 percent height gain for age, 100 percent increase in girls enrollment in primary schools in target districts and decrease student drop out rates by 30 percent.

B. Non Profit Organizations Programs

a) The Organizations Pilot Project (OPP)

Dr Akhtar Hameed Khan, the pioneer of the Comilla and Daudzai rural development projects, moved to Orangi to show that community participation works to the benefit of the poor, both rural and urban. The OPP started in 1980 in shanty town of Karachi called Orangi comprising about a million squatters. The program included a people's financed and managed Low-cost Sanitation Program, a Housing Program, a Basic Health and Family Planning Program, a Program for supervised Credit for Small Family Enterprises Units, an Education Program; and a Rural Development Program in the

villages around Karachi. The research and extension approach that Dr. Khan adopted for the OPP had been applied only to rural development.

b) The Agha Khan Rural Support Program (AKRSP)

Based on the spirit of Comilla, Daudzai and OPP, the AKRSP was pioneered by Shoaib Sultan Khan in late 1982 in the Northern Areas of Pakistan. It focuses on income generation activities in collaboration with government departments, elected bodies, national and international development agencies and commercial institutions. AKRSP acts as a catalyst for rural development, organizing resources so that local institutional structures are gradually developed to sustain the process of development. Its acknowledged success and wide replication has won it the status of the best-practice example of rural poverty reduction program through community participation.

The entry point of the AKRSP was productive physical infrastructure and the key principle was to organize the community into village organizations to demonstrate that the diseconomies of small-scale could be effectively overcome through collective action by the whole community. Regular savings by all members were seen as an essential element in the discipline of community-based management. Once the village organization had learned by practice the empowerment flowing from organizing in accord with these principles, the community could take up further tasks for its own sustainable development. The idea of a support organization, providing technical and social guidance to village organizations, was crucial to the success of this approach.

Between 1982-91, productive physical infrastructure significantly increased cropped area and access to credit enabled effective input application, which led to the doubling of real household income.

With mature village organizations and savings exceeding immediate community credit needs, the future direction of the AKRSP is a subject of research. At the center of the debate lies the role of the support organization. Meanwhile, the message is spreading. The major adaptations include Balochistan Rural Support Program, Sarhad Rural Support Corporation, National Rural Support Program, and more recently, Punjab Rural Support Program.

At the local area level, AKRSP has helped develop local NGOs and other development organizations charged with yet broader sets of functions including helping build capacity of smaller village institutions, operating and managing social sector facilities, and protecting and enhancing common property resources. Capacity building services provided to these NGOs include intensive trainings in management, financial accounting, proposal development, and fund raising; linking them to possible funding sources; and exposure visits and workshops for their enhanced sensitization and awareness.

c) National Rural Support Program (NRSP)

NRSP was established in 1992 to set up a countrywide program for poverty alleviation. The program aims at setting up a network of grassroot organizations through social mobilization. NRSP's strategy is to 'harness peoples potential to help themselves' for which NRSP provides social guidance to the organized communities.

Social mobilization is the core of NRSP's philosophy. It is based on the concept that the community is the centre of all development activities. It is only informed and enlarged community members who can plan and undertake sustainable grassroots developments.

NRSP extends micro credit to the poor who do not have tangible collateral. In order to facilitate the community organizations and its members in the repayment of their loans in difficult times, NRSP encourages them to generate a matching saving before requesting NRSP for a loan. However, in order to ensure that this does not discourage the poorest community organization members, NRSP has set flexible ceilings for such mandatory savings. NRSP facilitates the community organizations in developing new enterprises or improving the existing ones through its vocational training program and natural resource management program. As part of the VIP, the community organization members also receive training in business development and financial management.

d) Enhancing Indigenous Philanthropy

Experience of the past 20 years shows that there has been substantial increase in private voluntary initiatives in the social fields in Pakistan. A well-developed network of organizations supported principally by local giving addresses a broad spectrum of social development needs including health, education, community development and shelter. The impressiveness of the aggregate individual and corporate sector giving of Rs. 70 billion in 1998 is substantially higher as compared to government expenditure on social protection programs in that year. The current individual and corporate sector philanthropists giving, which are largely used for consumption support need to be reformed to move into social investment to rehabilitate poor, the disabled and marginalized to sustainable livelihood.

Social Investment: The indigenous philanthropy philosophy recognizes that a society's capacity to shift from relief to development – from charity to social investing – is closely related to the credibility and effectiveness of philanthropy-receiving institutions. The disadvantaged and marginalized and delivery of social services. The government support mechanism is also under going transformation from control and regulation to facilitation to mobilize individual and corporate philanthropy contributions as social investment for improvement in the quality of life of the poor.

Establishment of institutions by developing partnership of the government with citizen sector and the corporate sector will help philanthropy receiving organizations to be more effective to mobilize and divert these resources for social sector development through their relationships with the philanthropy giving organizations, whose support can both provide finance and build capacity. Increasing public and private partnership is likely to help use individual and corporate giving of around Rs. 70 billion in 1998 (Table 10) for increasing the level of social sector investment.

Table 10: Aggregate giving by individuals in 1998.

	Rupees Billion	%
Volunteering	29.4	41
Zakat Money	13.7	20
Non-Zakat Money	16.0	23
Gifts-in-Kind	11.3	16
Total	70.4	100

Source: Aga Khan Development Network. 2000. Philanthropy in Pakistan: A Report of The Initiative on Indigenous Philanthropy, Islamabad: August, p.45

Rural Development and Poverty Reduction Strategy

Poverty is multidimensional; therefore, poverty reduction efforts have to be multi-targeted. The rural development and poverty reduction strategy should aim priority actions, policies and sectoral focus encompassing economic, social, political and institutional factors. The instruments for achievement of this strategy should be: a) revival of the economy to create productive employment opportunities for the rural poor through use of labor intensive technologies, b) physical assets creation for the poor; c) human resource development; d) social protection system to reduce vulnerability, and e) development of institutional capacities.

The revival of the economy is the primary source for rural poverty reduction. Rural poverty reduction generally benefits from labor-intensive approaches. Employment-intensive policies, technologies and institutions help economic growth and poverty reduction (IFAD 2001). Targeting poor directly to increase crop and non-crop agricultural productivity is essential for overall economic growth and sustainable reduction in poverty.

Non-crop agriculture also has a significant poverty alleviation role. For the development of non-crop agriculture land requirement is small and potential return is high. For non-crop agriculture, several policy measures and legislative support are important: i) commercial poultry, beef and diary farms could be promoted, ii) development of fisheries is an important source of additional household income and employment. Fish production in inland water and sea waters can be expanded using good management, quality control and adopting improved technologies, and iii) the development of planned agro-forestry household not only for supplementary household income but for needs for fuel, food, livestock and other activities.

Rural poverty is mainly the manifestation of lack of assets. Lack of assets limit opportunities for the poor household to generate income, get a gainful employment and have a better quality of life. Limited or no access to assets multiply sufferings of the poor households and increase their vulnerability in periods of crisis. Assets empower the rural poor by increasing their incomes, and provide protection from natural and financial shocks. The rural development strategy should, therefore, create sustainable means of living to reflect the complex range of assets and activities on which people depend for their livelihood (Cristina 1983; Norton and Foster 2001; Chambers and Conway 1992).

Human development is an essential component of poverty reduction efforts. Lack of access to social assets in terms of deficient skills, basic services – (education, health, nutrition, reproductive health, water supply and sanitation) and social exclusion are the major constraint in reducing poverty in rural areas. The poverty reduction strategy must improve health, nutrition and schooling facilities for the poor.

The poorest of the poor, the disadvantaged and marginalized facing extreme poverty need a social protection system to provide them access to instruments to mitigate and cope with shocks that affect their well being and ability to break the vicious circle of poverty. Strengthening the institutional capacities of rural institutions is necessary for economic reasons (e.g. productive and allocative efficiency), equity reasons and ensuring good governance.

Conclusion

Poverty in Pakistan is mainly rural phenomena. Poverty reduction efforts, therefore, should focus on the development of rural areas and improving the farm and non-farm activities.

Public policy on rural development lacks coherent long-term strategy. Investment decisions are ad hoc and failed to address the problem of rural poverty and improvement in socio-economic well being of rural people. In the falling resource environment, it is important that available resources are used in an efficient manner.

Agriculture assumes a considerably important role in stimulating growth and creating a growth structure leading to alleviation of poverty and human well being. A high agriculture growth creates synergies for diversification of the rural economy and improvements in non–farm activities. Focus of poverty reduction in rural areas should be on increasing the agricultural production by providing necessary support in terms of assets, development of rural infrastructure, broadening of small credit facilities and development of an incentive system to help poor farmers to compete.

Community based rural development is the most effective way to reduce poverty. Collective community actions promote efficient allocation of scarce resources in a manner more responsive to the needs of the poor. Community participation in development activities can greatly enhance the quality of life in rural areas and poverty reduction.

Ownership of assets safeguards the poor households against extreme poverty. Minimizing biases against rural people, the poor and women to access to land necessary to improve their well being and come out from poverty trap and acquiring human assets, especially education and health should be reduced.

Rural credit markets needs substantial improvements. Efforts at the government level, private sector and civil society level need to be intensified.

Strengthening the institutional capacities of rural institutions is necessary for economic reasons (e.g. productive and allocative efficiency), equity reasons and ensuring good governance.

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POVERTY ISSUE AND POLICIES FOR ITS ALLEVIATION: A NEED TO REDIRECT THE FOCUS OF PLANNING STRATEGIES

Mahboob Ellahi[1]

Abstract

A pragmatic approach towards poverty alleviation in Pakistan was adopted in 1960s with Dr. Mahboob-ul-Haq's notion that '*take care of GNP and it will take care of poverty itself*'. A reversal of this philosophy was advocated by the Haq school of thought in 1980s addressing poverty as core issue in development planning. The new millennium is marked by a two-pronged policy, through the I-PRSP, to combat poverty and revive economic growth. The *first policy package* emphasized a boost in agriculture by combining inputs, services, infrastructural development and institutional support. The improved seeds, fertilizers and plant protection materials increased manifold, while irrigation water increased more than two-fold along with a massive tractorization. The *second policy package,* inter alia, enjoyed a shift over to value added commodities through textile industry. It appears that the process of technical breakthrough was not tailored in accordance with a wide range of factors operating in the international scenario. More precisely, pricing signals of the international market were not responded to by adjustment in output.

Pakistan has a turnover of about US$ 20 billion (Rs. 1200 billion) in international trade. Thus, focus of this study is to describe over time impacts of international prices on the domestic ones. It also aims to analyze the effects of sectoral support and domestic policies on crop production, domestic economy and general welfare. In January 1982, one US dollar was worth Rs. 9.91, which climbed up to Rs. 67 per US dollar till September 11, 2001 with a u-turn to a current level of Rs. 58 per US dollar. Since then, the export prices in US dollar have shown a declining trend. Hence, the year 1981-82 being on the borderline of policy changes is a reference point for this study. The major crops, such as wheat, cotton, rice and sugarcane, account for about two-third of agricultural output and a major share of Pakistan's international trade. In view of time and space limitations, scope of the study is narrowed down to these crops and labor wages. The analysis demonstrated that a heavy reliance on traditional commodities pushed export prices down due to pouring excessive supplies into export market. Hence, it is recommended that export/production of traditional commodities should be adjusted and accompanied by a shift over to non-traditional ones.

Introduction

In the historical perspective, poverty problem and policies for its alleviation have always been duly addressed in the process of economic development. Efforts were initiated after independence but a pragmatic approach was adopted in the second Five Year Plan 1960-65 (Government of Pakistan 1960). The philosophy adopted during

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1960s was Dr. Mahboob-ul-Haq's notion, 'take care of the gross national product (GNP) and it will take care of poverty itself'. Its reversal was advocated by the Haq school of thought in the 1980s to address poverty as a core issue in policies for economic development. Currently, a two-pronged policy is designed to combat poverty and revive economic growth through an Interim Poverty Reduction strategy (I-PRSP).

An understanding of poverty issue is crucial to devise policies for its alleviation. Historically, Pakistan's rural population declined from 82.2 percent in 1951 (Government of Pakistan 1955 and Census of Pakistan 1951) to 67.4 percent in 1998 (Government of Pakistan 2001 and Census Report of Pakistan 1998). This indicates differences in socio-economic scenario and employment opportunities between rural and urban areas. The Gini-coefficient, a measure of income inequality, varied from 0.31 (1987-88) to 0.41 (1996-97) for rural areas, while for urban ones it ranged from 0.35 (1985-86) to 0.42 (1992-93) showing severity of poverty problem in the former. In totality, poverty increased from 29.2 percent in 1993-94 to 32.2 percent in 1998-99 (Government of Pakistan 2001).

As quoted in the Economic Survey 2001-2002, the highest income group comprising 20 percent of population accounted for about 42 percent of income in 1969-70 and 49.4 percent in 1996-97. The middle-income group comprising 60 percent of population shared 50.2 percent of total income in 1969-70, which declined to 43.6 percent in 1996-97. The picture is worse if considered separately for rural and urban areas as shown by Gini-coefficient varying from 0.31 to 0.41 in rural and from 0.35 to 0.42 in urban areas. The temporal increase in income share commanded by a minority group (20 percent) is strong evidence that the poverty problem has been aggravating over the passage of time.

Agriculture's share in gross domestic products (GDP) declined from 52.5 percent in 1950-51 to 24 percent in 2001-02 (Economic Survey 2001-2002), while that in employment declined from 65.3 percent in 1951 (Census of Pakistan 1951) to 48.4 percent in 2000 (Labor Force Survey 2000). However, agriculture still remains a major driving force for economic growth (Hussain 2003). The employment shares of construction, public utilities, transport and commercial activities increased from 10 percent in 1951 to 25 percent in 2000 leading to changed dimensions of poverty.

The five priorities comprising improved seeds, chemical fertilizers, plant protection materials, tubewells and tractors were introduced during 1960s (Naqvi et al. 1989) for an increase in production. The first three priorities increased manifold growing at eight to ten percent per annum compound. Irrigation, at farm gate, increased more than twofold. The number of tractors increased from 157,310 during 1983-84 to 252,861 in 1993-94, (Pakistan Censuses of Agricultural Machinery 1984 and 1994) showing an increase of five percent per annum compound. In addition, custom hire market for rental services made tractors scale-neutral (Chaudhry et al. 1985).

Due to a technological breakthrough, several changes took place in crop production, labor wages and employment. Other factors included land and tenancy reforms, work programs, overseas labor market, agro-based industries, change in occupational structure, etc. All these worked in different dimensions to increase income and employment in rural setup. For example, bio-chemical and hydrological technologies are labor augmenting, while tractorization causes labor displacement. Land and tenancy reforms were aimed to increase production through redistribution of land and security of

tenure but did not succeed in changing status quo (Naqvi et al. 1987). It increased self-cultivation and eviction of tenants (Naqvi et al. 1986), who became agricultural laborers. Skilled artisans and unskilled labor moved to Middle East labor market. Net result was reduction in agricultural employment and increased poverty.

This study defines poverty, discusses policies for its elimination, followed by focus, methods of data analysis, conclusions and policy recommendations to add a new dimension to the Pakistan Rural Support Program (PRSP).

The Concept and Measurement of Poverty

It is well recognized that poverty results from multiple factors such as lack of access to food, water, sanitation, education, health and other physical and social facilities. Therefore, magnitude of poverty varies according to the definition used. Measures of poverty may include per capita income and its distribution, calorie-based income and Gini-coefficient. International Fund for Agricultural Development (2000) and World Bank (2001) use US $ 1 and US $ 2 per day as criteria for poverty.

According to Economic Survey 2001-02, poverty line draws at an income providing 2250 calories per person, i.e. 2450 and 2150 in rural and urban areas, respectively. Population percentage below this level is provided in Annex I and depicted in Figure 1[2]. Poor population increased from about 40 percent in 1963-64 to about 47 percent in 1969-70. It reduced in 1970s and 1980s and then increased in 1990s. In the regional context, rural poverty has been higher than that in urban areas.

Data on Gini-coefficient, a measure of income distribution, are given in Annexes II and III and depicted in Figure 2 separately for Pakistan and rural-urban areas. Its zero value is perfect equality and otherwise for one. It reduced in mid 1960s and 1980s, but increased in 1970s and 1990s. Share of middle-income group reduced from 50 percent in 1960s to 44 percent in 1990s and transferred to the high-income group. Income share of the latter is higher in urban areas as compared to rural ones.

Public Policies for Poverty Alleviation

The generation of income and employment is a basic requirement for poverty alleviation. The planned efforts initiated in the first Five-Year Plan 1955-60 (Government of Pakistan 1957) by introducing the Village, Agricultural and Industrial Development (Village AID) Program. It consisted of developing socio-economic infrastructure by using public funds to complement local labor and skills. In the second Five Year Plan 1960-65 (Government of Pakistan 1960), Village AID was replaced with the Rural Works Program in 1963-64 (Government of Pakistan 1965) and continued till completion of the third Five Year Plan 1965-70. The Rural Works Program was replaced with the People Works and the Integrated Rural Development Programs in 1972.

In the 5th (1978-83) and the 6th (1983-88) Five Year Plans (Government of Pakistan 1978 and 1984) emphasis was shifted to rural development and transformation through a package of inputs and services and loans for small-scale industries. Due to paucity of data, it is difficult to assess employment effects of these programs. However, envisaged

[2] All figures are provided at the end of the paper.

targets could not be met due to reduced resource availability and low utilization of funds (Qureshi and Ghani 1989).

The agricultural development was initiated by introducing Green Revolution technologies in mid 1960s, which led to development of agro-based industries providing employment to skilled and unskilled workers. Their total employees comprised two percent of rural labor (Qureshi and Malik 1971). About 75 percent of these were unpaid family helpers. At the same time, non-farm activities provided employment, such as white-collar jobs, personal businesses, skilled works, and construction works in metropolitan areas and commercial activities.

Government's current policy, under the I-PRSP, is to undertake an equitable and broad-based economic growth. Its core principles are (i) triggering economic growth, (ii) good governance, (iii) activities for income generation, (iv) social sector reforms, and (v) reducing vulnerability to shocks.

Poverty is not solely an outcome of economic issues but it results due to ill governance as well. Hence, this issue is addressed in the economic, political and social scenarios through an effective partnership among the public-private sectors and civil society. Tangible measures, in this respect, include improving transparency and accountability for an efficient delivery of services and a better life for the poor. Main ingredients of the governance reforms are devolution of powers, reforms in the civil services, and access to justice and financial transparency. Also, efforts are made to remove macro economic imbalances for economic stabilization. Reform agenda relates to five areas i.e. tax, expenditure management, prudent monetary policy, external adjustment and debt management.

Cost of housing is a substantial part of the expenditure made by a household. Therefore, a very high priority is attached to housing and related issues. The steps taken include regularization of the *katchi abadis*, which enable the government to institutionally provide basic services such as water, sanitation, basic health and education facilities. In rural areas, access to agricultural land is a substantial contribution in improving the economic conditions. In addition to providing an access to land, government has accorded a very high priority to the provision of micro-credit facilities and other institutional support, marketing of farm output through provision of better infrastructure.

During 2001-02, more than 43,000 acres of state land were distributed among about 21,00 beneficiaries. The government established Pakistan Poverty Alleviation Fund (PPAF) in addition to the existing institutions, such as Agricultural Development Bank of Pakistan, the First Women Bank and the National Rural Support Program, for extending credit facilities to supplement financial resources required by the small enterprises. PPAF was set up with an endowment fund of $100 million provided by the international donors. As a result, Rs. 365 million in 35 districts of the country were advanced through NGOs to the poor community. In addition, another US$ 35 million are available and expected to be utilized by the end of 2003. In the PPAF, allocation is made for physical infrastructure such as drinking water, sanitation and works proposed for severely affected draught areas and maintaining equity in the distribution of funds. In addition, the government has established Khushali Bank to support the on going activities of NGOs and the rural support programme (RSPs), which are already advancing micro-credit for sustaining small businesses in the rural areas.

The development of human capital is vital to trigger economic growth. Pakistan's performance in education, health, etc., is very poor as seen from lower level of adult literacy, low life expectancy and high maternal mortality. Over and above are lacking the facilities for clean drinking water and sanitation. The government's policy is to develop the social services through a consultative mechanism to ensure that such services are demand driven with local participation. The additional requirements are to be assessed by public-private partnership for human resource development.

The provision of *zakat* and *usher* is not only to fulfill basic needs but also to help the poor by enabling them to establish small-scale businesses for self-reliance. The Food Support Program is extended to 1.2 million households. A sum of Rs. 15 billion was provided by Federal Government under Poverty Alleviation Program during 2001-02. Skills under this program were identified through community participation. The program had dual objectives i.e. provision of jobs and development of essential infrastructure to gear economic activity and generate income and employment for poor segments. The cost of schemes is kept in the bracket of Rs. 0.05 million to Rs. 5.0 million per scheme in the rural areas, while the maximum ceiling in urban areas amounts to Rs. 8.0 million. The schemes are designed to ensure consultation with local NGOs, civil society and public institutions.

An institutional mechanism is developed to monitor implementation, undertake evaluation and impact assessment of PRSP to ensure effective use of funds at the federal and provincial levels.

The Study Focus

It is established that the major poverty pockets lie in the rural areas (Hirashima 2001). Thus, focus of this study is to describe dimension of the issue with respect to rural scenario. Efforts, commencing with the Report of Food and Agriculture Commission (Government of Pakistan 1959) to the I-PRSP, emphasized a boost in farm output through various combinations of inputs, services, infrastructural development and institutional support. An outcome of these policies is visible in an over time productivity enhancement (Hirashima 2001). However, ultimate objective of increased welfare and reduction in poverty is enhanced fairly than previously. This requires an analysis of issues, which emerged at the national and global scenarios. There is a wide range of issues (Hussain, 2003) adversely leaving an impact on poverty. The level of farm output and its pricing are major determinants of the farm income and levers to fight back the poverty problem.

Pricing setup in the international market plays a vital role in determining the domestic prices and general welfare. Pakistan's import-export turnover of about US$ 20 billion has a substantial impact on the domestic economy. Exchange parity is a link between international and domestic prices of export commodities and imports. Thus, focus of this study is to describe over time impact of international prices on the domestic ones and labor wages. At the time of delinking Pakistan rupee from the US dollar in January 1982, one US dollar was worth rupee 9.91. Since then, it climbed up to about Rs. 67 per US dollar till September 11, 2001 and then decreased to 58. The international prices, in US dollars, of our exports showed a declining trend since 1981-82 warranting its consideration as a reference point for this study. The major crops, such as wheat, cotton, rice and sugarcane, account for about two-third of agricultural output and a major share

of Pakistan's trade in the international market (Economic Survey 2001-02). In view of the limitations of time and space, scope of the study is narrowed down to these crops and labor wages.

Methodological Considerations

The main considerations for empirical analysis are over time variations in physical quantities of crop prices. More precisely, area, yield and production, quantum of exports and wages are considered. These are related to each other and determine the quantities and prices/wages thereof.

Statistics for major crops are presented in Annex IV. For a temporal comparison, and data was converted into indices using 1981-82 the year as a base. The indices and average annual growth rates for area and yield are depicted in figures 3 and 3-A, respectively. The domestic support prices, in both local currency and US dollars, for wheat, rice (clean), sugarcane and cotton (lint), are set out in Annexes V and VI, respectively, which are depicted in Figure 4 along with their average annual rates of increase in Figure 4-A. There are multiple prices for cotton (lint), rice (clean) and sugarcane, while a single price prevails for wheat. For cotton (lint), a support price applicable for the most commonly grown varieties, such as B-557, F-149, Niab-78 and CIM-109, is used. In case of sugarcane, basmati and IRRI-6 (FAQ), support prices applicable for Punjab are used. The quantum of exports for basmati, IRRI-6 and cotton (lint) and their export prices are set out in Annex VII. The data for cotton product, i.e. yarn, thread, cloth and cotton waste are given in Annex VIII. The indices of rice and cotton (lint) are graphically displayed in Figure 5 and those for cotton products are depicted in Figure 6. The average annual rates of increase in quantities, prices and export earnings are displayed in Figure 7. A comparison of the traditional and non-traditional commodities with respect to price setting is provided in Figure 8. Data on daily wages for unskilled labor separately for urban areas (an average of daily wages in Lahore, Karachi, Peshawar, Quetta and Rawalpindi/Islamabad (Economic and Survey 2001-02) and rural areas of Pakistan (Monthly Statistical Bulletin of the Federal Bureau of Statistics) are provided in Annex IX. The indices of these data and average annual rates of increase are plotted in figures 9 and 10, respectively.

The average annual growth rates for different variables are based on data for 21 years (1981-82 to 2001-02), which may be estimated by using the following equation:

$$Pn/P1 = (1+r)n, \quad (1)$$

Where:

P_1 = initial value of the variable in year 1,
Pn = terminal value of the variable in year n, and
R = growth rate per annum.

To account for a complete variation over the said time period, 'n' is replaced by 't' (a trend variable ranging from 1 to 21) and the amended equation, in a log-linear form, becomes:

$$\ln(Pt/P1) = t \ln(1+r) + et,. \quad (2)$$

Where:

et, is an error term, with conventional properties of a zero mean, constant variance, serial independence and zero covariance with the explanatory variable.

Empirical Analysis

The analysis consisted of diagrammatic presentations and compound growth rates for overtime trends in crop yields, area, production, domestic prices, export quantities and prices followed by implications for wages. The variable-specific growth rates are also picturized for analysis.

Production and Prices of Major Crops

The data on area, yield, production and domestic support prices, both in Pakistani rupees and US dollars, are presented in Annexes IV and V, respectively. The average annual growth rates in area, yield and production of the selected crops are presented in Table 1, while indices thereof and relevant growth rates are depicted in figures 3 and 3-A, respectively.

Table 1: Average annual growth rates for major crops percent per annum.

Crops	Area	Yield	Production
Wheat	0.77	1.89	2.70 (70%)
Rice	0.71	0.21	0.91 (23%)
Sugarcane	0.06	1.01	1.07 (94%)
Cotton	1.74	3.52	5.33 (66%)

Note: Figures in parentheses are shares of yield in growth rate of total production.

It is seen from Table 1 that average annual growth rates of about 3 and 5 percent were observed for wheat and cotton, respectively. About 70 percent of this increase was contributed by yield. The production of both rice and sugarcane, requiring an intensive use of irrigation and other inputs, exhibited one percent average annual growth rate. It seems that a relatively smaller increase in production may be related to their greater requirements of irrigation as compared to wheat and cotton. The impact of technology, in case of sugarcane, seems predominant as more than 90 percent of increase in its production came from yield enhancement. For rice, however, a relatively smaller contribution of yield in the production is not very encouraging.

The relationships noted above are also reflected in crop-wise indices for area and yield depicted in Figure 3 and growth rates in Figure 3-A. It seems that technology played a vital role in boosting production mainly by yield enhancement. Further, it is noteworthy that increase in production of wheat and cotton, with low irrigation requirements, has been much higher than rice and sugarcane.

The results provided in Table 2, along with the indices and growth rates depicted in Figures 4 and 4-A, respectively, reveal that the rates of increase in domestic support prices in Pakistani rupees have been in the range of 7 to 8 percent per annum compound. The sectoral support was provided in the interest of self-sufficiency in food and to generate exportable surplus. If support prices are measured in US dollars, it may be noted that there has been a decline of about 1 to 2 percent per annum compound. This is due to a faster devaluation of Pakistani rupee as compared to US dollar, which is estimated to be around 9.12 percent per annum compound. However, if the sectoral

support was not in vogue and prices were to adjust as per international price variations, the situation would have been worse.

Table 2: Average annual rates of increase in support prices percent per annum.

Crops	Price	
	Rs./ 40 Kgs.	US $/ 40 Kgs.
Wheat	8.14	- 0.98
Rice (Clean)		
i) Basmati	7.60	-1.52
ii) IRRI-6 (FAQ)	7.51	-1.61
Sugarcane	7.25	- 1.87
Cotton (Lint)	7.48	- 1.64

Note: The growth rates are worked out from the historical data.

Analysis of Export Commodities

Table 3 indicates that export prices of basmati and IRRI-6 declined to about 3 percent per annum compound. Thus, to maintain the level of export earnings, the quantities exported registered an increase of about 3 percent per annum compound. In other words, had the quantities exported not been increased proportionately, the export earnings would have declined, and if the quantities exported in 1981-82 were maintained, there would have been a drastic decline in the export earnings (Figures 5 to 7). More precisely, given the price regime of 1981-82, the additional export quantities above the level of 1981-82 were exported at zero prices.

In case of cotton, domestic industries were promoted for the production of yarn, thread and cloth. Therefore, lint exports registered a decline of more than 6 percent per annum compound and a marginal decline in its export price. The export of yarn and thread experienced a decline of more than 11 percent per annum, but a marginal improvement in export prices restricted decline in their export earnings to about 10 percent per annum. Cotton cloth and its price increased by about 5 and 2.5 percent per annum, respectively. Due to growth in textile industry, there was a substantial cotton waste, which was poured into the international market registering a growth of about 30 percent per annum, but a decline in its price was noted. On the whole, increase in export earnings resulted only from basmati, cotton cloth and cotton waste, while the rest showed declining trends.

Table 3: Average annual growth rate of export quantities, prices and export earnings percent per annum.

Commodities	Quantity exported	Export price	Export earnings
Rice (Clean)			
i) Basmati	3.61	-2.61	1.00
ii) IRRI-6 (FAQ)	3.06	-3.12	-0.06
Cotton			
i) Lint	-6.50	-0.61	-7.11
ii) Yarn	-11.14	0.22	-10.92
iii) Thread	-11.32	2.22	-9.10
iv) Cloth	5.30	2.42	7.72
v) Waste	29.30	-2.52	26.78

Note: The growth rates are worked out from the historical data

An overall picture of the scenario is provided in the upper part of Figure 8. It shows that a heavy reliance on traditional commodities pushes export prices down even below the equilibrium level but commodity supply in export market exceeds the supply curve (Qs). The supply curve represents marginal cost and the export should be restricted to a point where it is intersected by price. If this principle is not adhered to, it results into an uneconomic production, which calls for reduction in the export/production of the traditional commodities through adjustment in the production process.

The lower part of Figure 8 relates to a situation for non-traditional commodities commanding a price higher than the equilibrium level determined by the interaction between demand (Qs) and supply (Qd) forces. The producers have an option to expand production up to the intersection of supply curve by on going price, but the available avenues are not explored and the result is unnecessary deficit. If production expands, there is a tendency for pushing down prices to the equilibrium level.

Analysis of Labor Wages

The unskilled rural labor is casually employed during peak workload periods in the crop sub-sector. The seasonal nature of work for the conventional crops, with a few peaks and many toughs, has implications for wages and employment. On the other hand, seasonality in urban unskilled jobs is not discernable and same is the case for its wages. Thus, the analysis of rural wages may not help to precisely understand the extent of rural poverty as compared with that for the urban scenario.

The over time rural and urban wages are presented in Annex IX and average annual increase therein is provided in Table 4. Nominal wages for unskilled labor in both rural and urban areas increased to about 8 percent per annum, but in terms of US dollars, it declined by about one percent per annum. The over time trend and average annual increase in wages, depicted in figures 9 and 10, respectively, provide a clear picture at a glance. There are two salient observations. First, over time wage increase as compared favourably with the support prices; and second, shocks from export prices were absorbed by the latter, but wage decline in US dollars led to a compounded poverty problem.

Table 4: Average annual increase in wages for unskilled labor percent per annum.

Type of Labor	Wages	
	Rs. Per day	US $ per day
Urban Labor	7.80	- 1.32
Rural Labor	8.32	-0.80

Note: The growth rates are worked out from historical data.

Conclusions and Policy Recommendations

The analysis showed that poverty in general and rural poverty in particular has aggravated despite sectoral support and growth-oriented policies. It is a well recognized fact that poverty is not only influenced by the local conditions but also affected by economic atmosphere across the international borders. Another salient feature of growth-oriented policies is a heavy reliance on traditional commodities beyond the limits permitted by economic principles. As a result, real prices/wages have declined and led to an aggravated poverty problem and reduction in general welfare.

However, if the quantum of commodities included in a production mix is adjusted in accordance with the economic principles, factor incomes may go up and help in reducing the poverty level. A salient example of this phenomenon is a shift over to the production of fruits, vegetables, beef, mutton, dairy products, livestock, poultry, fisheries, etc. This may help not only to raise the labor wages, but also to smooth up the seasonal nature of employment in the rural areas. Further, it may help in checking the exodus of labor to urban areas, indirectly reducing burden on the urban sector and accompanied by a rise in the level of urban wages as well.

The empirical analysis presented in this study suggests that quantum of production in the agricultural and non-agricultural sectors needs adjustment to ensure a rise in real factor income to improve the general welfare. It may safely be suggested that the production process may involve reallocation of available resources to the non-traditional commodities through an expert consultative mechanism. It may also be argued that the production level of these commodities should be determined carefully to ensure increase in real wages to promote general welfare. In the light of changing economic atmosphere, it may be suggested that the process of shift over may not be limited to the crop sub-sector only but should also focus on other sub-sectors such as livestock, poultry, fisheries, etc. A similar type of re adjustment in the production mix is also required to ensure a reasonable balance in the general welfare between the rural and urban communities.

Figure 1.a Rural and Urban Household Gini-coefficient.

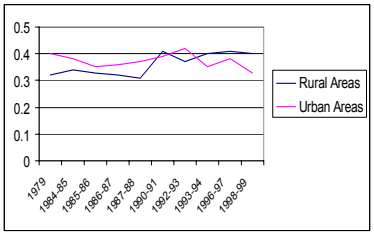


Figure 1.b Household Gini-coefficient.

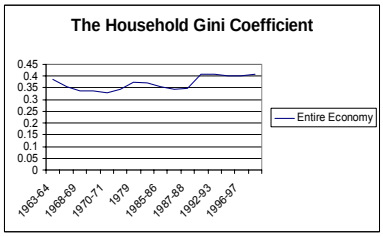


Figure 2. Percentage of Population below Poverty Line.

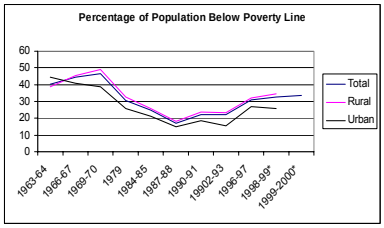


Figure 3. Indices of Area and Yield of Major Crops.

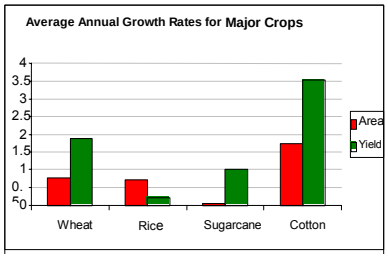


Figure 3.a Indices of Area and Yield of Wheat.

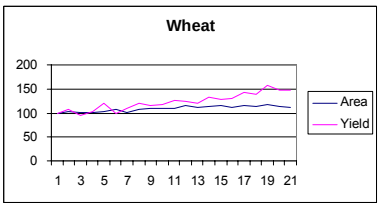


Figure 3.b Indices of Area and Yield of Rice.

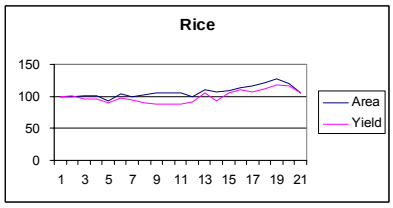


Figure 3.c Indices of Area and Yield of Sugarcane.

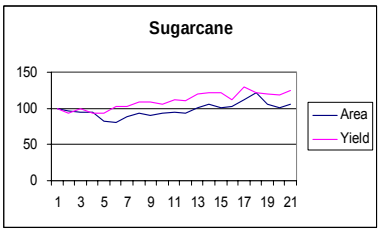


Figure 3.d Indices of Area and Yield of Cotton.

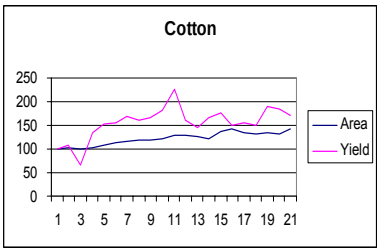


Figure 4. Indices of Domestic Prices of Major Crops in Pak Rs. and US Dollars.

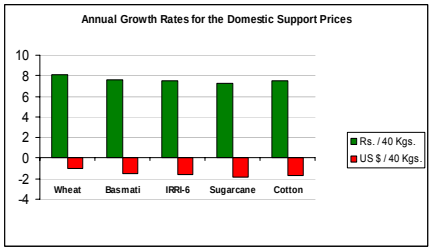


Figure 4.a Indices of Domestic Prices of Wheat.

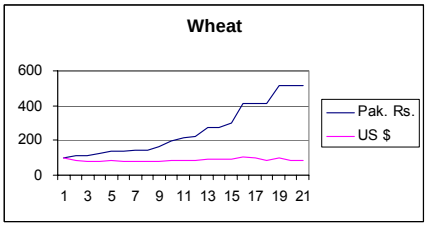


Figure 4.b Indices of Domestic Prices of Basmati Rice.

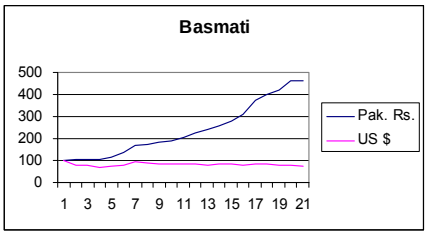


Figure 4.c Indices of Domestic Prices of IRRI Rice.

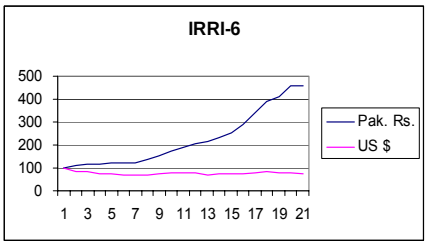


Figure 4.d Indices of Domestic Prices of Sugarcane.

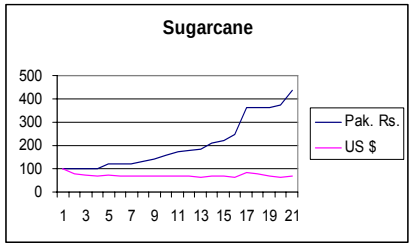


Figure 4.e Indices of Domestic Prices of Cotton.

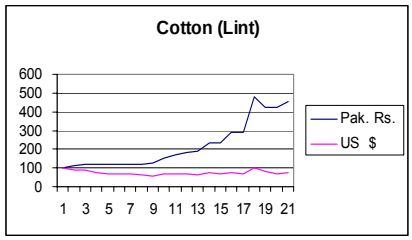


Figure 5.a Indices of Export Quantities & Prices of Basmati Rice.

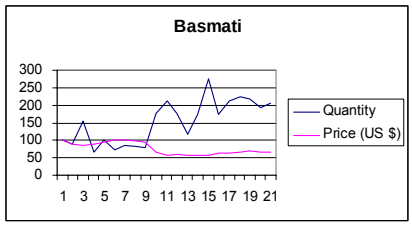


Figure 5.b Indices of Export Quantities & Prices of Rice IRRI-6.

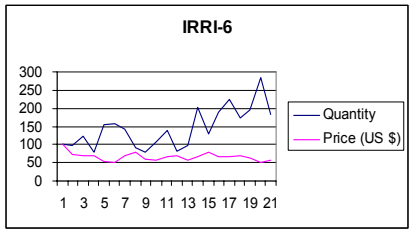


Figure 5.c Indices of Export Quantities & Prices of Cotton.

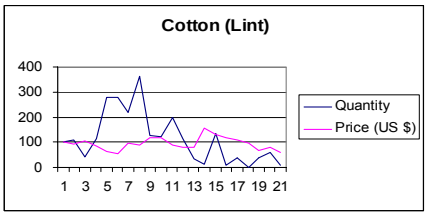


Figure 6.a Indices of Export Quantities & Export Prices of Cotton Yarn.

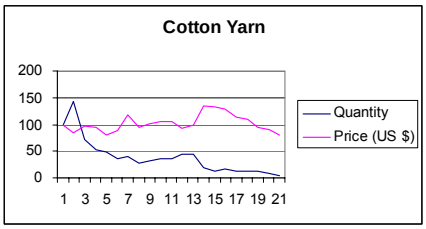


Figure 6.b Indices of Export Quantities & Prices of Cotton Thread.

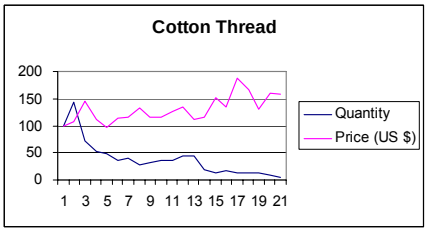


Figure 6.c Indices of Export Quantities & Prices of Cotton Cloth.

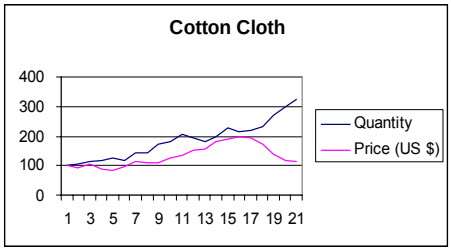


Figure 6.d Indices of Export Quantities & Prices of Cotton Waste.

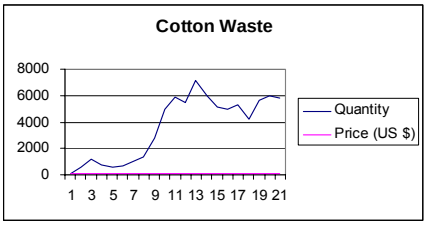


Figure 7. Annual Growth Rates for Export Earnings.

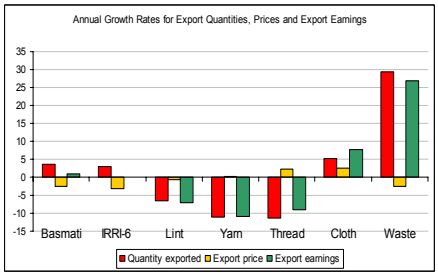
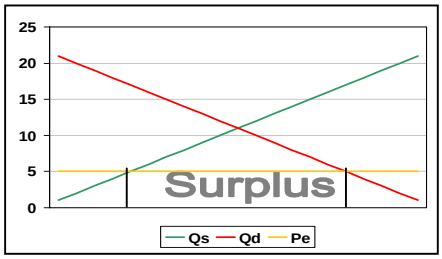


Figure 8. Pricing Setup for Traditional and Non-Traditional Commodities.

Traditional Commodities



Non-Traditional Commodities

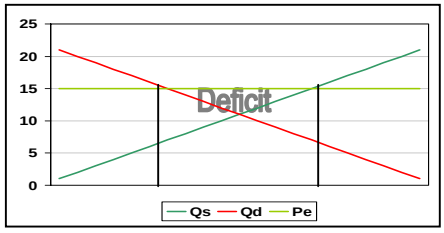


Figure 9. Indices of Wages in Pak Rs. and US Dollars in Urban & Rural Areas.

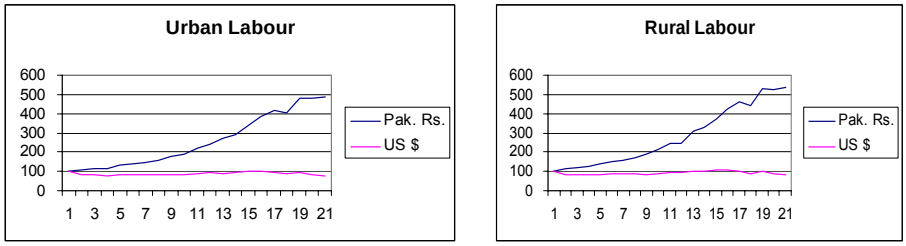
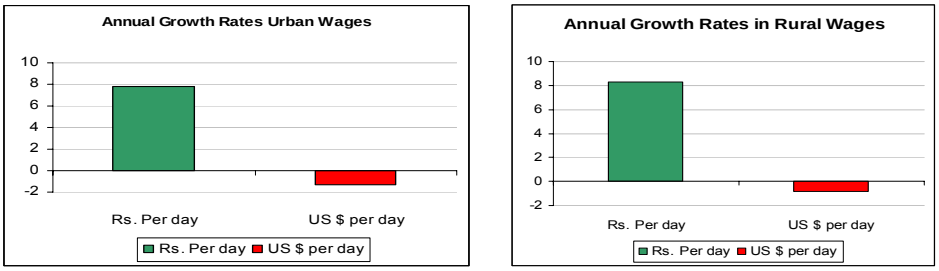


Figure 10. Annual Growth Rates in Pak Rs. and US Dollars in Urban & Rural Areas.



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SOCIAL MOBILIZATION – A MEANS FOR REDUCTION OF POVERTY

Muhammad Amjad Saqib[1]

Poverty and Its Causes

Rural areas in Pakistan are reservoir of poverty. Low production, low prices, low incomes, low wages, little savings and unemployment has plunged the rural population deeper into debt and destitution. Small farmer, in particular, is handicapped in the exploiting environment. He is constrained by the scale of his operations from acquiring resources and marketing outputs. Small landholding also handicaps rapid improvements in technology and income. The landless tenants and the non-farm labor are caught in a swamp of poverty, marginalized from the mainstream and often hidden from the public eye.

An objective analysis of the rural poor would indicate that they are differentiated with respect to socio-economic conditions, agro-ecological situations and religio-cultural patterns. However, they also have certain commonalities like landlessness or small subsistence holding, isolation from the main economy, unorganized and leaderless. They lack capital and have no access to credit and marketable skills. These elements essentially translate into lack of capacity of the rural poor to change their own lot. Over the past decade, governments have taken various initiatives to ameliorate this situation. However, despite allocation of large sums of capital and organizational efforts little has been achieved on the ground. This failure can be attributed to adaptation of the development paradigm alien to the region, utilitarianism, sectoral imbalance, conventional top-down strategies, adhocism, inequitable distribution of assets, inaccessibility to technological innovations, lack of rural productive infrastructure, over exploitation of natural resources, inadequate development of the social sector, the use of development resources as political patronage and viewing the poor as a liability to be shunned, ignored and disregarded.

An Acceptable Solution

What is the solution then to reduce poverty? Should these million of people continue to groan under poverty for all times to come? Of course not. One solution, held for many decades, to the problem of small scales of operation was collectivization of the kind implemented in China and the former Soviet Union. The other one practiced in the capitalist world envisages rapid transformation of agriculture into a corporate system. People, however, fear that neither suits the rural poor of the third world, especially South Asia. A solution is needed that preserves the private ownership of land and at the same time calls for the pooling of resources and their cooperative management at the village level. This is neither a new proposal, nor a revolutionary one. But it does address itself to the needs of the small farmers in ways that lead to the permanent improvements in the small landholders' position in society. In simple words, this idea underscores the need for a combination of principles and implementation methods, which have been

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employed successfully to organize the rural poor around their interests and service these rural organizations in a permanent and profitable manner. This theoretical framework is extracted from the experience of countries with flourishing smallholder agricultural sector. These are the principles of Raiffeissen used with success in the institutionally based development of German agriculture. The same principles were pursued by the Japanese. In the period after the Second World War, these principles of village organization have been adopted with encouraging results both in Taiwan and Korea. In Pakistan, these ideas were first made the basis of rural development effort by Dr. Akhter Hameed Khan, when he initiated the Comilla Project in 1959.

Social Mobilization – A New Paradigm

This new paradigm, which envisages integrated rural development and poverty alleviation through participatory approach, is centered around the concept of social mobilization. This entails that the first step for poverty alleviation has to be mobilization of the poor in order to enable them to participate directly and efficiently in the decisions that affect their lives and prospects. Social mobilization means social organization, capacity building, capital formation and linking the rural community with service delivery institutions. Experience of the past has led to the conclusion that this conceptual package must be related to the reality on the ground, if capacity of the poor to be created for fulfilling their potential. Following four elements provide foundations to the concept of social mobilization:

Social Organization

First element of the conceptual package relates to the need to bring the rural poor into an organized fold. This is the key, if the rural poor's capacity for improvement is to be created and nurtured.

Human Resource Development

Upgrading of the human skills of the poor such as managerial productive and cooperative skills is essential to enable them to make the best use of available resources. The traditional knowledge of the poor needs to be built so that new profitable opportunities can be realized. The focus of Human Resource Development (HRD) initiatives has to encompass both human and technical skills, with emphasis on the former.

Capital Formation

Generation of the capital by the poor, through the discipline of savings, is the third important element of the conceptual package. Capital is power. Without it, the poor can never hope to be self-reliant.

Development of the Linkages

Once the people are organized, their capacity is built and capital base is expanded, they need to be linked with public and private sector to have improved access to all kinds of services. This constitutes fourth pillar of conceptual package of social mobilization.

This conceptual package though has been built on the foundations of time-tested principles, yet it requires an environment conducive enough to materialize this package into reality. The basic pre-requisite for such an environment include:

1. Willingness of the people
2. Availability of leadership at the grass root level
3. Presence of a support organization

Importance of a Support Organization

There is no denying that willingness and sincere leadership are essential requirements for participatory development. However, the need of a support organization for implementing the conceptual package is central. The participation development program can only be effectively implemented, if these are led by an autonomous support structure, committed to the creation of a participatory village level institutional framework. The traditional approach of establishing a large number of specialized agencies (for training, credit, input supplies and extension) for reaching the poor has failed because they were hampered in their effectiveness by the absence of strong and broad institutional base at the village level. Unfortunately, creation of a village level institutional framework does not fall in the purview of any government agencies. Therefore, the proposed Rural Support Program (RSP) has to take the lead in the creation, promotion and support of effective and disciplined community organizations to manage rural development. Wherever possible, existing or proposed organizations of the communities should be used or incorporated into this effort provided they are willing to operate in accordance with the principles and terms of partnership offered by the Rural Support Program (RSP).

Pro-poor Interventions – What Do RSPs Do?

Against this backdrop and in order to achieve overall objectives of rural development, the RSPs have to respond for a wide range of activities, which include:

1. Create, promote and support effective and disciplined community organizations to manage rural development, incorporating existing organizations at the village level wherever possible.
2. Serve as a flexible catalyst to assist in the identification of opportunities to promote equitable and sustainable development patterns and drawing in the resources (technical assistance, training financial and so on) to enable local people to make full use of these opportunities.
3. Act as a training organization to provide a wide range of local skills to villagers in managerial and practical subjects. The purpose of this training is to increase the capacity of local people to manage more effectively their resources for sustainable and productive development.
4. Work to link community organizations with government agencies, NGOs, donors and private businesses that can provide services (extension, training, marketing, finance and so on) to support rural development.
5. Give special emphasis to the evolution of responsible credit behaviour through the encouragement of the regular savings, group management and repayment of loans.
6. Work with community organizations and relevant government agencies to create plans and programs for the sustainable management of natural resources in the area in which it operates.

7. Whenever necessary to the above functions, undertake limited technical and socio-economic research to support and assess its programs. The RSPs would seek to develop a network of collaborating institutions, both national and international, to participate in this research effort.
8. Pay particular attention, consistent with prevailing cultural and socio-economic factors, to the opportunities and needs for involving women in rural development.
9. Serve as a catalyst to community organizations with those agencies that provide social services parallel to the major emphasis on income generating activities.
10. Eventually aim to replace itself and its functions with entirely local institutions.

RSPs in Pakistan

Presently, there are seven RSPs working in the country. These include Aga Khan Rural Support Program (AKRSP), the pioneer in this field; Surhad Rural Support Program (SRSP); National Rural Support Program (NRSP); Ghazi Barotha Tariaqiati Idara (GBTI); Punjab Rural Support Program (PRSP); and Balochistan Rural Support Program (BRSP). Success of social mobilization as a new paradigm in community development can be assessed from the fact that such programs are in vogue in every province of the country. Table 1 enlists various RSPs in Pakistan.

Table 1: Rural support programme in Pakistan.

Name of RSP	Presence in	Date of start-up
AKRSP	NWFP/NAC	1983
SRRSP	NWFP	1989
NRSP	National, AJK	1992
GBTI	NWFP, Punjab	1995
LPRP	NWFP	1997
PRSP	Punjab	1998
BRSP	Balochistan	2001

Program Package

The program package offered by RSPs is a portfolio of needs and development priorities of any given community. RSPs believe that it is the people who should decide what kind of services or interventions they require. RSPs do not go to the community with any preconceived agenda. However, in general, usual interventions include micro finance, skill enhancement, building physical infrastructure, improving natural resource management with special emphasis on agriculture and providing social services like education, health, population welfare and sanitation.

Cumulative achievements of all RSPs as of December 2002 provide a credible evidence for the success of this approach:

Activity	**Progress**
Community Organizations Formed (Broad-based, decentralized and homogenous group of men & women)	38,559
Membership	904,801
Savings (Rs. in million)	903.294
Activists trained	385,243
Credit disbursed (Rs. in million)	7,046.022
Credit beneficiaries	12,279
Productive Physical Infrastructure (PPI) Schemes	38,410
PPI beneficiary households	744,823
Cost of PPI Schemes (Rs. in million)	2,833.452
Share of local community (minimum)	20%
Community schools established	371
Students enrolled	19,735

Conclusion

Poverty is a multi-dimensional concept, hence its solution needs a diverse and multi-pronged approach. Economic development, social uplift, and good governance are few of the plausible strategies. This, however, is not sufficient if not accompanied by equity and participation of the poorest of the poor. The process of social mobilization as adopted by RSPs ensure that the poorest of the poor and those who are marginalized and live below poverty line are brought to an organized fold to have an improved access to all the above mentioned efforts. This, as mentioned earlier, can only be achieved by fostering a framework of gross root institutions in the villages and harnessing potential of the poor.

TARGETING FOOD SECURITY: REDUCING POVERTY THROUGH IRRIGATED AGRICULTURE

Asad Sarwar Qureshi and Mujeeb Akhtar[1]

Abstract

Rapidly increasing trends of poverty, particularly in South Asia, have emerged as a major threat to the economic development of this region. Currently, over 500 million South Asians live in absolute poverty, while over 300 million are chronically malnourished. In Pakistan, vulnerable population of 45 million makes 25 percent of those living in poverty due to economic downturn. Although food production in the region has gained momentum during the past decade (per capita dietary energy supply in South Asia has increased), the incidence of poverty and absolute number of under-nourished people in South Asia has gone up. This means that crisis of food insecurity in the region is mostly related to low access rather than low availability. The major reasons for this low access are poor targeting policies of the government and inefficient public distribution system. Therefore, to ensure food security, the government should improve accessibility and distribution of food to poor, particularly those in far-flung areas.

Three quarters of the world's total irrigated area is in developing countries where smallholder agriculture still predominates. No wonder, then, that increased agricultural production is considered a key to poverty reduction in many developing countries. Irrigated agriculture is regarded to be vehicle for the provision of basic needs and reduction in vulnerability to food insecurity. Irrigation development can bring a range of potential benefits at regional and national level. Therefore, by advances in irrigation management, better understanding of the environment in which poor people live, right choices of irrigation technologies, better defining production functions and creating profitable markets can make a significant contribution to crop production and poverty reduction. This paper discusses illusions in different poverty estimates and introduces a framework to increase regional food security. The paper is also aimed at finding the ways to reduce poverty through improving irrigated agriculture.

Introduction

The existence of widespread poverty in the modest of global prosperity is undeniably the most serious challenge confronting the world today. It is an inescapable fact that at the start of the 21st century, almost one fifth of human population or 1.2 billion people subsist on less than $1 a day. Around one third of the populations in the developing countries have a life expectancy of barley 40 years. About 800 million people do not have access to enough food and basic needs, and over 2 billion people cannot enjoy balanced diet. Majority of the world's poor are in Asia and sub-Sahara Africa. Out of 49 least developed nations, 34 are in Africa and nine in Asia. South Asia is one of the worst poverty hit regions with 44 percent people living below poverty line. Highest poverty in South Asia is recorded in Bangladesh where 45 percent people are living below poverty line, and lowest in India with 26 percent poor (Figure 1) (ADB 2002). Pakistan stands

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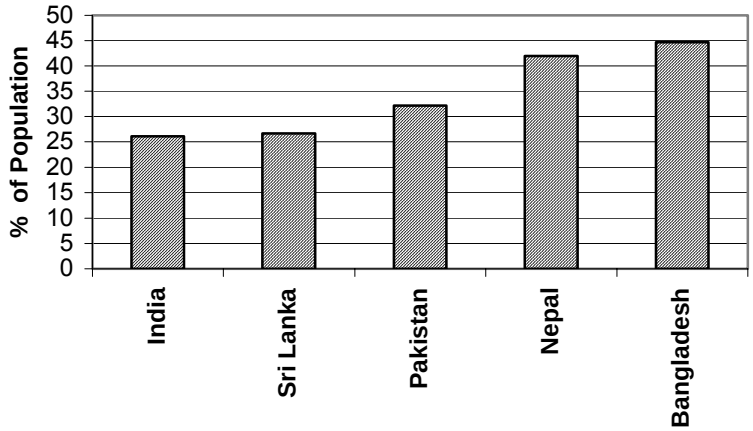
somewhere in the middle with 32 percent people affected by poverty. In Afghanistan, 3-4 million people are affected by poverty and other 8-12 million are under threat of famine and starvation (Qureshi 2002).

Figure 1: Incidence of poverty in South Asia.



Defining Poverty

Poverty is a complex and multi-dimensional phenomenon, which goes beyond the notion of income, and encompasses social, economic and political deprivations. Lack of such opportunities limits the abilities of the poor to secure gainful employment and bring about an improvement in their lives (GoP 2002). Poverty has different meanings for different people. Traditionally, poverty has been defined in terms of income and consumptions. The worst kind of poverty is where people do not have access to food and water to fulfill their basic physical needs. Another kind of poverty is where people may have more or less enough food but do not have access to basic needs such as adequate clean water for sanitation, health services, clothes, housing and education.

New approaches recognize complexity and multi-dimensional nature of poverty. Amartya Sen defined poverty as the absence of the capability to lead a full life, which include many things and not merely an adequate consumption. Mother Teresa considered a person poor if he is deprived of love from the community at large (Vaidyanathan 2002).

A person regarded poor according to one measure may not be poor in terms of another. Obviously, there are different dimensions to poverty and their level of importance would vary according to one's inclinations, and also for what purpose the information is used. For the statistician, this presents a dilemma, namely, how to quantify these different dimensions into meaningful categories. The answers to these questions depend upon the concept of well being (Vaidyanathan 2002). Well being is peace of mind, good health, safety, freedom of choice and action, dependable livelihood and a steady source of income, and above all, enough food.

There are essentially four main concepts of well being found in the literature on poverty: (World Bank 1993; Ravaillon 1994; World Bank 2001):

1. Well being is dependent upon the individual having enough resources or capacity to meet the basic needs.
2. Well being of the individual depends on the relative situation of the individual vis-à-vis others in the community. Here, the focus is on the inequality in income, consumption, or other attributes in the population.
3. Well being of an individual is dependent upon the vulnerability of the individual to risk of not meeting his/her basic needs in the present or in future.
4. Well being is subjective, based on the individual's perception whether he is meeting his basic needs or considers himself as poor.

Vaidyanathan (2002) indicated that the underlying notion is that *a person is poor when he/she does not attain the minimum level of well being set by the society.* The minimum level is the poverty line. These concepts of well being can be applied to different dimensions of well being - consumption, income, education, other basic needs, and end up having numerous thresholds of poverty and numerous poverty measures. By determining individual's consumption, income, education, etc., and comparing them with defined threshold values, a person is regarded to be poor if he falls short in these parameters. Depending upon the parameter used and the threshold value adopted, the number of poor will differ. Depending upon the notion of well being adopted we get different poverty lines, for example the following:

Absolute Poverty Line is based on a normative value such as one dollar a day or the cost of the minimum requirements of food items (food poverty line) or the minimum requirements of food and non-food items (general poverty line) (Ravallion 1994; Foster et al. 1984; Moser 1996; Streeten 1994; Grootaert 1983; Grootaert 1988).

Relative Poverty Line is based on the distribution of income or consumption fixing the poverty line as a proportion (usually 40 or 50 percent) of the mean or median income or consumption (Bilsborrow 1994).

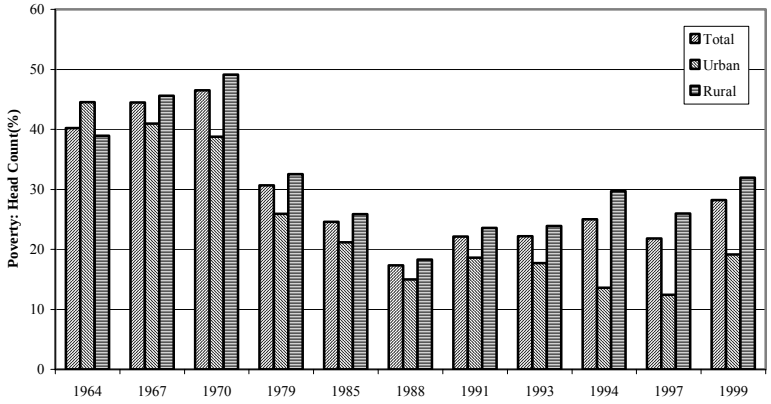
Subjective Poverty Line is based on the respondents' perception of their living standards and what they think as the absolute minimum standard of living, below which they regard themselves poor. This can be done by the construction of a poverty index using a range of qualitative and quantitative indicators (Hatch and Frederick 1998; Chung et al. 1997; Filmer and Pritchett 1998; Filmer and Pritchett 1999). The indicators can easily be adjusted to local conditions. The housing index focuses on a single dimension of poverty. To provide a complete picture, indicators should be drawn from at least four areas: human resource, housing, food security and household assets (UNDP 2000).

These three approaches for defining poverty are being applied in different countries depending upon their preferences, purpose for which the analysis is made, availability of data, etc. (Vaidyanathan 2002). Poverty lines are generally drawn in absolute and/or in relative terms in Pakistan. Both of these measures are useful in their own right, but for comparison over the time, the absolute measure is more appropriate for the developing countries like Pakistan since it shows the extent to which deprivation of the poor is alleviated. The relative measures, on the other hand, shows position of an individual relative to the other and it is not possible to compare poverty level over time or across regions or counties (Arif 2002).

Current Poverty Status in Pakistan

Poverty in Pakistan, as is the case with most countries, is linked to overall growth performance of the economy. Periods of substantial and sustained poverty reduction – in Pakistan's case, notably, the late 1980s – also happen to be periods of sustained growth. Figure 2 clearly shows the historical trend of increasing in poverty in Pakistan (GoP 2002). On the other hand, uneven growth in the last decade has led to volatility, and on balance, stagnation of poverty measured in consumption terms. Most importantly, even when growth has occurred, resulting in reductions of income or consumption poverty, the gains have not translated into commensurate increases in capability, as measured by indicators of human development. Pakistan has poor health, education and fertility indicators for its level of per capita income. Moreover, comparing Pakistan with countries that grew at about the same rate (regardless of initial income level), it is evident that other moderate growers achieved more social progress than Pakistan for a given amount of growth. The failure to develop human capital, which can be described as a social gap as far as Pakistan is concerned, is one of the likely reasons for the slow-down in growth and poverty reduction in the 1990s. The ability to achieve sustainable growth and poverty reduction in future will, thus, require the addressing of shortcomings in human development, including the institutional factors that contribute to these failings (World Bank 2002).

Figure 2: Historical trend of poverty in Pakistan.



Poverty Estimations in Pakistan: Illusions and Realities

Calorie Based Estimations

The most commonly used measure, the consumption aggregate, is defined as the monetary value of all food and non-food goods and services consumed by the households (Deaton and Zaidi 1998). It includes the value of goods and services received in kind. Non-food goods include clothing, footwear, housing and utilities, education, and imputed use-value of durable goods. The Planning Commission of Pakistan has decided that the official poverty line (National Poverty Line) for Pakistan will be estimated on 2350 calories per adult equivalent per day. This is based on an

adult equivalent intake of 2150 calories in the urban areas and 2450 calories in the rural areas. Based on this, the poverty line for Pakistan for 1999 has been defined at Rs. 670 per capita per month (ADB 2002). This specification appears to be on the low side when compared with the assumptions used in all the earlier poverty measurement studies in Pakistan; or the physical energy requirements of a Pakistani male, particularly of a rural resident; or the assumptions used in the food-based poverty lines of other South Asian or East Asian countries (Nadeem 2002).

No doubt, consistent use of the official poverty line will be an effective tool for monitoring poverty trends in future, and as such, there is an urgent need to examine the methodology and the caloric requirement before making it a benchmark for subsequent surveys. We may note that several recent studies on poverty levels for the 1990s (e.g., Amjad and Kemal 1997; Jafri 1999; Qureshi and Arif 2001; Jamal and Ghaus-Pasha 2000) have used poverty lines based on caloric norms different from the norms adopted in the official poverty line. Differences in results and some controversial remakes in constructing poverty line are given below:

Effect of Caloric Norms on Poverty Estimates

The basic question is how does the caloric norms affect the poverty estimates? The Federal Bureau of Statistics estimated poverty for the year 1998-99 using 2550, 2350 and 2150 caloric intakes criteria. The incidence of poverty based on 2550 caloric intake was 32.2 percent; it declined to 30.6 percent for lower caloric norms of 2350. It declined further to 28.2 percent for 2150 calories. This shows that change in average intake by 100 calories affect the poverty estimates by roughly 1.0 percent (Arif 2002). Table 1 summarizes the criterion used in different studies to estimate poverty in Pakistan based on the various calorie norms used (Arif 2002).

Table 1: Methodologies used in recent poverty lines.

Sources	Calorie Norms Used			Type of Data Used	Type of Poverty Line
	National	Rural	Urban		
Amjad & Kemal (1997)	2550	2550	2550	Grouped (secondary)	Basic Needs
Jamal and Ghause-Pasha (2000)	---	2550	2230	Primary	Basic Needs
Jafri (1999)	---	2450	2150	Primary	Basic Needs
Qureshi & Arif (2001)	---	2550	2295	Primary	Basic Needs
FBS (2001)2	2550	2550	2550	Primary	Basic Needs
FBS (2001)	2150	2150	2150	Primary	Basic Needs
Planning Commission (Official Poverty Line)	2350	2450	2150	Primary	Basic Needs

Figure 3 shows a typical example of how poverty estimates for different studies using different criteria could vary for the same year (Amjad and Kemal 1997; Ali and Tahir 1999; Jafri 1999; World Bank 2000 as quote by Arif and Munir (2001); Arif 2002). All

[2] Federal Bureau of Statistics reported the poverty estimates on 2150 & 2550 calories during 1992/93 to 1998/99.

these studies used basic needs approach to determine the trends in poverty. The caloric intake level used by these studies is given in Table 2.

The illusions about poverty estimates continue to persist in other studies. Arif (2002) reported that there was two percent increase in poverty (from 27.4 % to 29.6%) during 1993-94 to 1996-97, whereas Federal Bureau Statistics (2001) noted a three percent decrease in poverty (from 25.0% to 21.8%) for the same period (Figure 4). Interestingly, both studies have used the same criteria of 2550 calories.

Figure 3: Comparisons of various studies for the construction of poverty line in Pakistan.

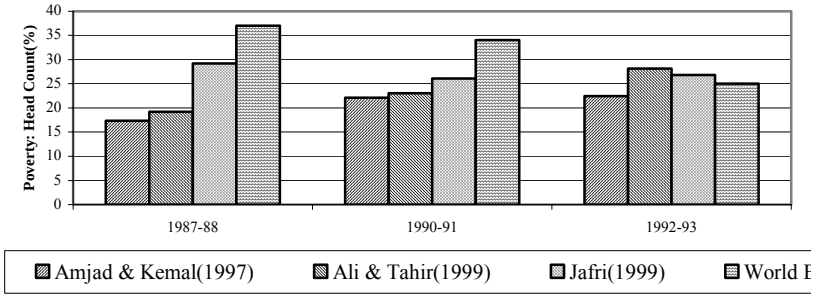
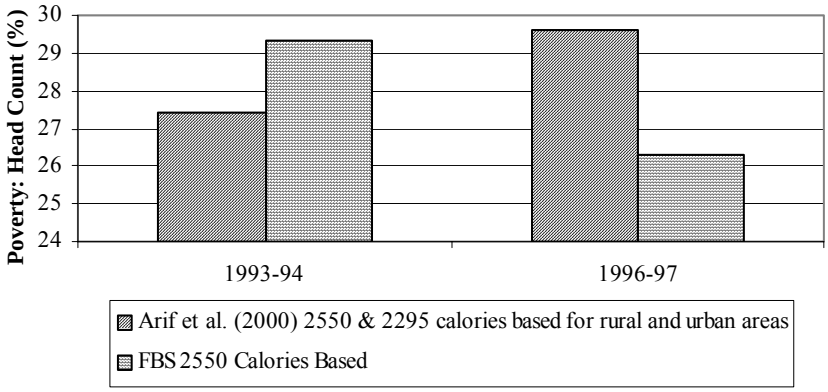


Table 2: Caloric norms used for the poverty lines in Pakistan.

Sources	Caloric Norms used for the study		
	National Level	Rural Level	Urban Level
Amjad & Kemal (1997)	2550	2550	2550
Ali & Tahir (1999)	2550	--	--
Jafri (1999)	2354	2450	2150
World Bank (2000)	2450	--	---

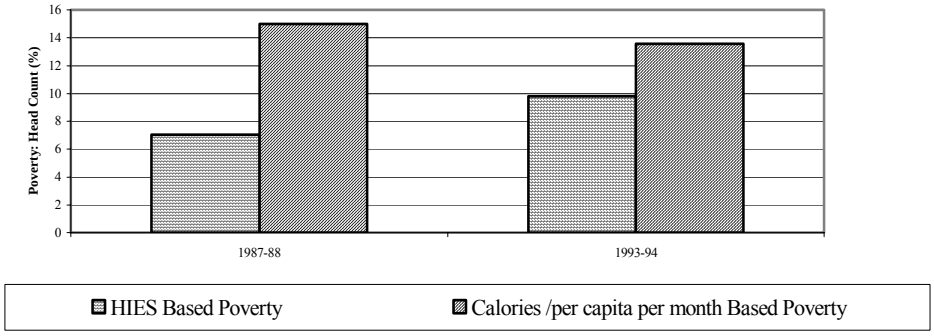
Figure 4: Illusions in poverty trend in Pakistan.



Comparison of Food and Non-food Estimations

Non-food based poverty was first developed by Orshansky (1965) and was discussed by Watts (1968), and Huppi and Ravallion (1991). Pakistan Institute of Development Economics (PIDE) conducted non-food based poverty survey, based on Household Integrated Economic Survey (HIES), to examine the structure of poverty by principal sector of employment and how the profiles changed during 1987-88 to 1993-94 (Haq and Bhatti 2002). A non-food share in total consumption expenditure was taken as a cut-off point. A significant variation was found between the foods and non-food poverty lines. Figure 5 compares the results of food and non-food based poverty estimates in urban area of Pakistan for the year 19987-88 and 1993-94. The results indicate that non-food based poverty estimates are substantially lower than food based poverty estimates. This difference was about seven percent for 19987-88 and three percent for 1993-94. These differences clearly indicate the need to revisit poverty estimation criterion and methodologies in order to get true picture of poverty in Pakistan. This data is absolutely essential to do long term planning and formulation of effective policies for the reduction of poverty in Pakistan.

Figure 5: Differences of poverty estimates based on the food and non-food poverty in urban areas of Pakistan.



How Irrigated Agriculture Can Reduce Poverty

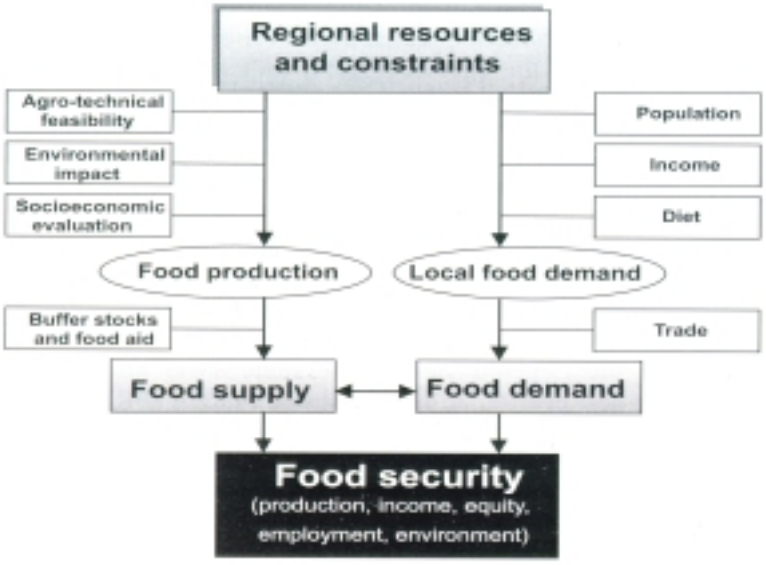
Irrigated agriculture is a vehicle for the provision of basic needs and the reduction of vulnerability to food security. Analysis of information in Asia shows that irrigation has helped in increasing the most crop yields by 100-400 percent (FAO 1996). This has continued to decrease food prices. These reductions have had a positive impact on the real increases of the urban and rural poor, who spend a large proportion of their income on basic food stuff.

For sustainable rural development and to enhance food security, food production should be increased in a sustainable way. This will involve education initiatives, utilization of economic incentives and the development of appropriate and new technologies, thus ensuring stable supplies of nutritionally adequate food, employment and income generation and natural resources management and environmental protection (UNCED 1992).

The development of irrigated agriculture brings a range of potential benefits at regional and national level. It contributes to economic growth by generating export crops, reducing imports and thus saving foreign exchange and increasing home food supplies, which may lead to lower prices. Irrigated agriculture contributes in income increase from production and employment, so that families can have access to schooling, health and welfare services.

Figure 6 describes the key elements for assessing food security. Food security is basically governed by the balance between food demand and supply, both of which are primarily governed by the biophysical and socio-economic resources and constraints of the region. Food demand is a function of population size, its income and the diet used by the average person. On the other hand, regional food production depends on the agro-technical feasibility of various land use types considering the regional resources and constraints. In combination with environmental impact assessment and socio-economic possibilities, gross food production is assessed. Together with food stock and possible food aid, net food supply can be determined (Aggarwal et al. 2001).

Figure 6. Perational steps for sustainable food security in Pakistan.



Ensuring Food Security

An abundance of food at low prices in the world markets does not ensure food security at the country or household level, nor does it help countries to purchase imports to supplement national food supplies (World Bank 1996). The poor tend to spend a high proportion of their income, perhaps 50-80 percent, on food consumption and water (Lipton 1983; World Food Program 1995). Hunger and poverty are, therefore, closely linked. In order to alleviate poverty, poor people need adequate means to obtain food in the quantities and qualities needed for healthy life and generate access to skills, technology, markets and productive resources such as land and capital.

Over the past 25 years, there has been progress in improving the living standards of the people in developing countries. However, even today when the world is producing enough food to provide every person with more than 2700 calories per day, there are still over 800 million people in the developing world who suffer from malnutrition. Severe inequality in land and income distribution prevents the poor from reaping the full benefits of food availability (IPTRID 1999).

Although the overall per capita dietary energy supply in South Asia has increased from 2330 calories to 2400 calories per day, the absolute number of malnourished people has gone up. Currently, over 300 million people are chronically malnourished. The crises of food insecurity in this region are related to low access rather than low availability (HDC 2002).

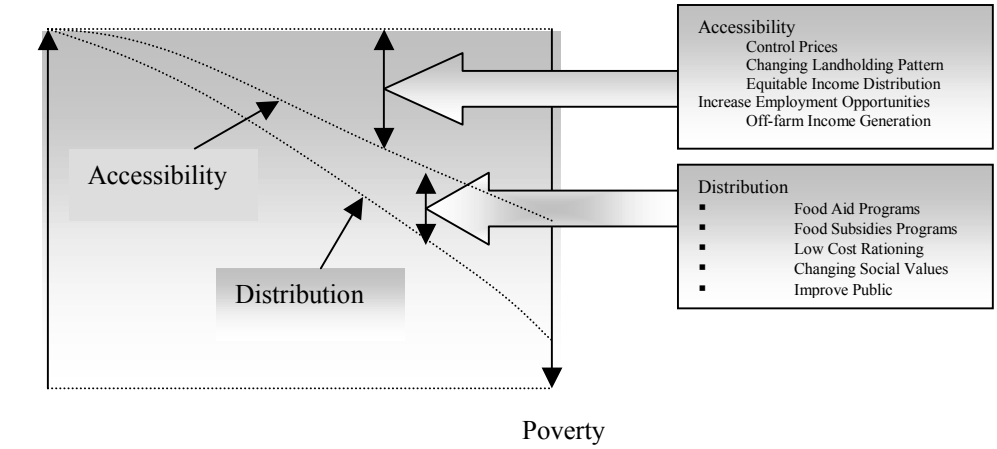
Availability of food for domestic consumption is also affected by food losses that occur during handling and storage processes. For instance, in Nepal, around 10-30 percent cereals, fruits and vegetables are lost during the handling and storage process (HDC 2002). In Pakistan, this percentage falls between 10-20 percent. Controlling these field losses can significantly contribute to the food availability to the rural households.

Abundant food does not automatically mean people have access to it as well. Access to adequate food depends upon household income and food prices. For instance, in India and Pakistan, despite an increase in the total food availability from 1980 to 1999, the incidence of poverty has gone up, and in recent years, it has reached the alarming level. At present, about one third of the households in Pakistan are living below the income poverty line and are thus unable to meet their minimal nutritional requirements (HDC 2002). The access to adequate food for all segments of the population also depends upon the pattern of landholdings, income distribution and employment opportunities (Figure 7).

An efficient distribution of food is as important as its production. At the national level, distribution system must be efficient in delivering food items to poor in far-flung areas. Even in the presence of excess supply, inefficient distribution among different segments of the society may lead to inadequate consumption and undernourishment. The basic food distribution system in South Asia is considered highly inefficient (HDC 2002).

In order to secure adequate food for the low-income groups, the governments in South Asia should encourage food aid, food subsidies and low cost ration programs. These programs have not been very successful in the past due to their cost and wrong targeting. The price supports and regulations mostly favored consumers and harmed producers, which depressed the production of domestic food.

Figure 7: Poverty reduction trend with food accessibility and distribution.



The intra-household food security in South Asia is usually dictated by traditions, with women eating last and the least amount of food that is available to a household. The gender disparity in access to good food is evident from the fact that about 550 million women live below the poverty line (60 % of the world's rural population). This represents a 50 percent increase for women over the past 20 years, as compared with a 30 percent increase for men (IFPRI 1995). The gender bias in access to food is mostly due to perceived differences in social and economic benefits that families desired from boys and girls.

In the end, some interventions are reminded here, which can help the smallest producers to improve their livelihoods and contribute towards future food production. Continued investments and extending participatory approach in irrigation will be central to future food production. India, for example, has not faced a serious famine since the early 1960s (IPTRID 1999). Strategy to investment in irrigation was key element to increase food production and maintain stable food prices. Furthermore, the involvement of small-scale farmer's support is needed to improve management and institutional structures so that poor smallholders benefit from reliable water supplies. Moreover, the initiatives that involve the landless gaining access to the benefits of irrigation require greater exposure. New concentrations of the poor in peri-urban areas and regions where water resources are scarce and risk-prone need to be targeted. The challenge will be to make the technology affordable and easy to maintain and operate through which equitable water distribution system especially in difficult and marginal areas, where the poorest live need much more attention in order to alleviate poverty.

Conclusion

Consistent use of the official poverty line (National Poverty Line in terms of food i.e. 2350 calorie intake) will be an effective tool for monitoring poverty trends in future, and thus, there is an urgent need to examine the methodology (agreed criterion) and the caloric requirement before making it a benchmark for subsequent surveys in order to avoid further illusions.

Irrigated agriculture is a vehicle for the reduction of vulnerability to food security. For sustainable food security, food production should be increased in a sustainable way. This can be achieved through the involvement of small-scale farmers and by the promotion and adoption of affordable agricultural technologies in the crop production function and also by creating profitable agricultural markets.

In order to alleviate poverty, we have to gain self-sufficiency in food. Abundant food does not automatically mean people have access as well. Access to adequate food depends upon household income and food prices (assured price stability), and equity in food distribution could be achieved through food supplies in far-flung areas, food deficit districts, and through food distribution schemes.

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MITIGATING THE EFFECTS OF DROUGHT THROUGH TRADITIONAL AND MODERN WATER SUPPLY SYSTEMS IN BALOCHISTAN

Virginia Appell and M. Saleem Baluch[1]

Introduction

This paper analyzes the relationship between drought and poverty in Turbat, southwestern Balochistan[2]. Balochistan borders eastern Iran and southwestern Afghanistan areas, which have also been severely affected by the drought. To convey an idea of the magnitude of the problems caused by the drought, the paper first outlines some of the effects of the drought on Pakistan. It then moves to an intensive study of the karez, an ancient water system that has made survival and prosperity possible in the perennially arid region of Balochistan[3].

The *karez* warrants attention because it has provided sustained supplies of water to communities for hundreds of years. The focal argument of the case study is that this traditional, community-based method of harvesting, transporting and utilizing water should be restored to full functionality. Although karez restoration is not a *panacea*, it offers the best chance of restoring economically marginal communities to a condition in which livelihood sustainability can be achieved and future vulnerabilities reduced. The question is how to ensure that the karez are restored effectively, and also how to ensure that the karez is integrated into a comprehensive plan of drought mitigation and prevention.

Drought is defined differently, and has different effects, in each of Pakistan's agro-ecological zones. As one expert has put it, " … drought is a relative, rather than absolute condition that should be defined for each region".[4] These specificities must be taken into account when analyzing the effects of drought, establishing drought mitigation efforts and planning for drought in the future.

1Consultants, Monitoring, Evaluation and Research Section, National Rural Support Programme

2A number of people have given generously of their time and resources in the preparation of this case study. These include Mr. Akhter Hussain, NRSP's Regional Programme Manger in Turbat, Usman Qazi, who allowed us to include data from his study of two districts close to Quetta and our colleagues in NRSP's Monitoring, Evaluation and Research Section, who helped in numerous ways.

3 Wilson (2002) describes the spread of the *karez*, called a *qanat* in North Africa where they originated, westward to Spain and the New World, and eastward to Iran, Afghanistan and Balochistan. He notes that the problems currently facing South West Asia have recurred throughout history. With sufficient rains, water delivered through the *karez* has provided prosperity, through agriculture, livestock and trade, to large and stable populations. However, throughout history, the over-use of water, coupled with periodic droughts, has sometimes reduced economies and populations to almost nothing.

[4] Environment Foundation Balochistan

Although drought is essentially a climatically induced phenomenon, its actual effects in a given eco-zone, and the viability of responses to it, will be mediated by ecological, social and infrastructural factors, as well as by the relevance, efficacy and timeliness of responses from governments, NGOs and the private sector.

Vulnerability to drought exists on a continuum in Pakistan. The basic eco-agricultural distinction in terms of normal rainfall is between irrigated[5] and *barani* (rain-fed) areas. A further distinction differentiates semi-arid from arid areas, and desert areas from semi-arid. All have suffered from the drought, as the graphs in the extended version of this paper make evident.

The following figures give an idea of the scale of the problem:

In a normal year, some 32 million acre feet (MAF) of water from the Indus river flows into the sea. This was reduced to 2-5 MAF in three years preceding 2001. Extreme drought conditions and global warming are cited as the reasons for the decrease. (Irrigation Department GoB). Increasing water shortages are predicted: in 2000, the shortfall was 40 MAF – this will reach 108 MAF in 2015, if present rates of water use continue6.

"Total rainfall in Balochistan and Sindh in 2001 was 50-60 percent below average", according to the Ten Year Perspective Development Plan 2001-11.

Drought is a conceptually and operationally complex phenomenon. In addition to the climatic factors, communities' history of coping with reduced rainfall, people's settlement patterns and economies (e.g. degrees of reliance on agriculture, livestock and horticulture for subsistence) will affect their ability to respond to drought. The nature of the mechanisms they have adopted over the years in response to drought is also important. People's access to power structures (political, governmental, community and household) will also affect their ability to respond. For these reasons, a close examination of a specific region yields insights not available otherwise.

The drought has severely taxed the capacities of communities in all eco-agri zones to sustain themselves economically, ecologically and socially. The current drought reveals the stark effects of many years of increasing demand due to rapid population increases, enhanced demand for water-intensive cash crops, and increasing technological capacity to access water.

It must also be said that the drought reveals some degree of active and passive mismanagement, lack of foresight and poor governance in water resources management. Restoring eco-systems, infrastructures and communities to a state of health will require the kind of concerted approaches and interventions, which have not been evident so far. Qazi states the problem well when he says that the lack of a shared vision about the

[5]Pakistan has one of the world's most extensive irrigation systems. Unfortunately, its maintenance has not kept pace with the demand for water. Wastage through leaks and silting is also a problem. According to the Irrigation Department, Government of Balochistan "the Indus river and its tributaries provide about 147 MAF of water during the flood season. Of this, nearly 106 MAF is available for agriculture … 32 MAF flows into the sea, and over 8.6 MAF is [lost to] evaporation and seepage losses". Irrigation Department, Government of Balochistan. 2001

[6] Comments on Draft Framework for National Water Policy prepared by the Ministry of Water and Power, Government of Pakistan, April 2001, p.3.

nature and magnitude of the problem and longer term sustainability of the resource, amongst the various stakeholders, has prevented the formulation and implementation of an appropriate strategy to arrest the process of rapid degradation and eventual depletion of the resource.

The actual shortage of water is only part of the problem. The over-use of irrigation water and fertilizers has resulted in hundreds of thousands of hectares of land being taken out of production through salination. Cash cropping, while providing good returns, typically requires large amount of water, and contributes to resource depletion. Wastage by urban elites, tubewell owners and industries, is also part of the overall problem. Despite the length and severity of the present drought, many people still do not conceptualize water as a finite resource that needs to be conserved. The idea that the ability to pay for water somehow guarantees the supply of water is part of the problem. As a man in Turbat said: "The rich wash their vehicles with sweet water but water is not available for the poor to drink. Are we not human beings? What are the facilities for poor? Nothing! Look at my clothes, I have not taken a bath for the last month and many times we do not wash our face. We are human beings. We need basic life necessities."

The Government of Pakistan has identified the following lengthy list of 'Sectoral Issues' that it considers critical to water management and, by extension, drought mitigation[7]:

- lack of water storage facilities
- inefficient use of water, some of it leading to waterlogging and salinity
- non-availability of irrigation water and/or its timely delivery
- excessive pumping of water
- inadequate operation and management (O&M) funding and poor cost recovery
- water pollution (effluents entering the water supply)
- inequitable water distribution
- lack of private sector participation in water sector
- deteriorating institutional capacities of key water sector institutions
- absence of integrated river basin development and management approach
- poor and isolated implementation of flood sector schemes
- poor linkages among water, agriculture and rural development policies and strategies
- interest burden during construction
- inadequate reflection of poverty alleviation issues and gender concerns

This list of shortfalls and impediments is alarming for the scale and depth of structural problems and inadequacies that it reveals. It is also the case that an equally lengthy list of imaginative and potentially effective strategies is included in the Ten Year Perspective Development Plan. However, it remains to be seen that to what extent these strategies are implemented.

The economic costs of drought and mismanagement are manifested in lost income, lost livelihoods, reduced crop yields, livestock losses and the cost of relief. The complement of these costs is the lack of growth and development arising from reduction in Human Development Indicators and the loss of opportunities for advancing the state of human and economic development.

[7] Government of Pakistan, Planning Commission, September 2001.

In the year 2001, the macro-economic impacts of drought on Pakistan's economy were starkly clear. According to a United Nations report[8],"The State Bank has calculated the effect of the drought to the tune of $927 million in the third quarter. As a result … the anticipated GDP growth rate of 4.5 percent will not be achieved, rather, the GDP growth rate will fall to less than 3 percent". The report goes on to note Pakistan's dependence on agriculture, and the resultant "increase on imports thus adversely affecting the Balance of Trade of the country." Furthermore, the drought reduces the country's ability to produce electricity, meaning that oil must be purchased for this purpose (IBID). This fact alone has caused an additional loss of nearly $1.2 billion (IBID).

According to figures presented by the Chief (Environment) Planning Division, Government of Pakistan, the overall economic impact of the drought in 2001 was a reduction in real GDP growth from a projected 4.8 percent to an actual 2.6 percent in 2000–2001. This means that governments and international donor agencies must reserve large amounts of revenue and development funds for drought relief and mitigation. It essentially means that drought and its direct and indirect effects have impeded every aspect of economic growth.

The full social costs of the current drought will never be completely known. Some communities have been forced to disband altogether, as they migrate in search of fodder for their animals or paid work for adults. Children have been forced to leave school to help support their families. Families have been disrupted as male members have left in search of work. Elderly parents have been forced to beg. The effects of short-term and long-term malnutrition on infants, children, women and men will be felt for years to come.

Drought and Poverty

Those who are already poor are the most vulnerable to the effects of drought. They have few resources for subsistence and fewer resources or assets to sustain households through the shocks that drought entails. Their social support systems are dominated by people who are also poor, and therefore, unable to help except in limited ways. Many of the poor are rendered dependent on shopkeepers, middlemen, local influential people and the government, when their limited social safety systems are exhausted.

Drought also forces more people into poverty and debt as their resource and asset bases shrink. This is especially alarming given that some 35-40 percent of the total population, and even higher percentages of rural populations, are already living below the national poverty line (Human Development in South Asia Report 2000).

When poverty and malnutrition co-exist with lack of water, poor to non-existent sanitation and polluted water supplies, the health situation enters a crisis. When gender biases are considered, it is evident (a) that the health situation in Balochistan has reached this level of crisis, and (b) poor women are particularly vulnerable.

There are also, what might be called, technological costs of drought. Here the best example is the tubewells that provide artificial and unsustainable prosperity, while contributing to lowering the watertable. Anecdotal evidence of this was provided during a site visit to the Noshki area in Balochistan by the Relief Commissioner in 2000. It was

[8] Drought Update No. 12, 8 June 2001 www.un.org.pk/drought/rcreport12.htm

estimated that a single tubewell pumped out 600–800 gallons of water per hour, and that the pumps ran 24 hours a day.

Drought in Balochistan

Drought is a recurrent feature in Balochistan but the current drought has lasted longer than most (7 years in the hardest hit places). 'Negligible' amounts of snowfall in the early 1990s[9] were a harbinger of the current crisis.

Balochistan is Pakistan's poorest province. 85 percent of the population of 7 million live in rural areas and depend on agriculture and livestock for their livelihood. The province has an annual population growth rate of 2.8 percent. Communication and transportation infrastructures are minimal outside Quetta and few other towns. Of the entire area of Balochistan (34.720 Mha), 58.6 percent is non-arable, forests cover 5 percent, 6.5 percent is lying fallow, and the 'net sown' area is only 4.8 percent (1.528 Mha). The area classified as 'culturable waste' (waterlogged, saline, or un-irrigated for 2-3 years, but potentially reclaimable) amounts to 25.10 percent of the total[10].

As of October 1999, the following amount of water (in MAF) was available in Balochistan[11]. It is abundantly clear that flood water amounts greatly exceed those of perennial water supplies.

	Available	Utilized	Balance
Surface Water (Indus)			
Perennial	3.87	3.049	0.821
Flood	2.5	-------	2.5
Surface Water (flood runoff)	10	3	7
Groundwater	0.87	0.49	0.38
Total	17.24	6.539	10.701

According to the Social and Economic Development Ranking of Districts of Pakistan[12], of the 25 districts in Balochistan, only one (Quetta) is ranked high in both social sector and economic development; three districts (Sibi, Ziarat and Lasbela) ranked high in economic and low in social sector development; none ranked low in economic and high in social sector development, and the remaining 21 of Balochistan's districts are ranked as low in both economic and social sector development. 92 percent of the population of Balochistan reside in districts categorised by low economic and social development (IBID: 38). "The Government of Balochistan had declared 22 out of 26 districts calamity stricken due to the prevailing drought situation" (Qazi).

The Balochistan Board of Revenue figures for the year 2000 indicate how devastating the province-wide effects of the drought were then:

- no crops could be grown on 95,506 hectares of land

[9] IBID

[10] Agricultural Statistics of Balochistan, 1996-97, in *Brief on Development Activities of Irrigation and Power Department.*

[11] Brief on Development Activities of Irrigation and Power Department, 2002, citing the *Balochistan Conservation Strategy 1999.*

[12] Social Policy and Development Centre, 1998.

- wheat sown on 17,200 hectares produced no crop at all
- 60% of range lands produced nothing
- 10 million animals (mostly sheep and goats) died
- 250,000 livestock farmers were rendered destitute

The situation in 2002 was even worse, as there had been no substantial rainfall since those figures were published.

The current drought has devastated entire eco-system as water supplies for human use, agriculture, livestock, wildlife and vegetation recede or vanish altogether. By all accounts, the amount of available groundwater in Balochistan is decreasing every year. According to one source, in Balochistan underground aquifers are dropping at 3.5 metres annually and will be extinguished in 15 years[13]. Another source claims that the rate of depletion is accelerating from 0.75 feet per year prior to 1989 to the present rate of 3 to 5 feet annually[14].

Groundwater levels are being reduced at an increasing rate: " … in the decade from 1983 to 1993, the amount of potential groundwater in Balochistan decreased from 936 million cubic meters per year to 619 million cubic meters per year". The same source says that "depletion of groundwater estimates for the period 1989-96 indicates a continuous decline of [the] watertable from 0.2 to 3.5 meters per year".

A number of the pathogens that flourish in a drought - for example when animal corpses decay on the surface or when they contaminate water supplies - have been identified in Balochistan. There is no comprehensive data on the depth of diseases associated with poverty (TB for instance) or those related to poor sanitation and lack of potable water. However, sources[15] note that some life-threatening viral diseases, such as viral hepatitis and, alarmingly, Crimean-Congo haemorrhagic fever have also broken out in some of the drought-affected areas of Balochistan.

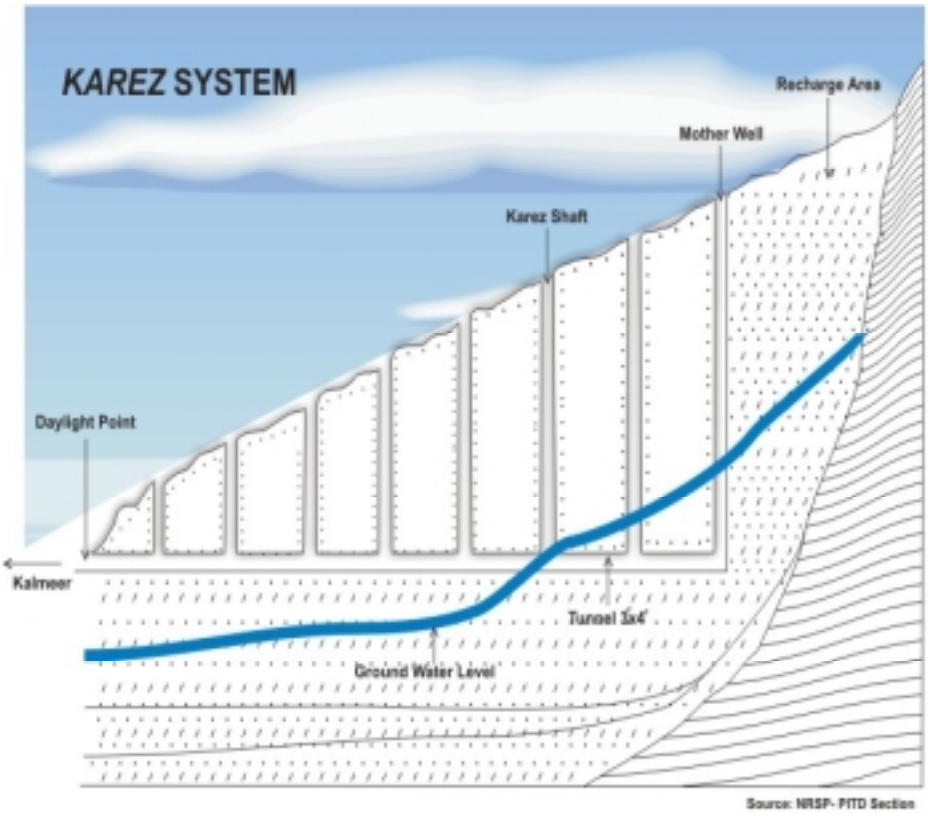
Nutrition level in poor men, women and children is inadequate in normal times; drought reduces the availability of food and compromises its quality. Maternal and infant mortality and morbidity rates rise, as do stunting and wastage. The effects of diseases which are not otherwise life threatening are intensified by malnutrition. A study by experts from UNDP, carried out from 16 to 21 April 2001, found that some 36 percent of the people they surveyed were suffering from malnutrition, as measured by Body Mass Index (BMI) figures. This figure is all the more dismal, as it is stated to be 'no worse than the national average'. This study also notes that the absence of data, and the inability to correlate co-existent factors, such as drought and poverty, makes analysis difficult.

The Karez

In 1996-97, karez irrigation accounted for nine percent (78,550 ha) of all irrigated land in Balochistan. This figure is a reduction of 62 percent from the 1971-72 figure of 208,000 hectares (43%). The karez is a traditional, egalitarian system of water, land and

[13]Pakistan 12/10/02 and Irrigation Department Balochistan 2001.
[14] M.E. Khan, *The News,* Internet Edition, Wed. July 24 2002.
[15]Non-Food Assesment of Drought: Balochistan and Sindh

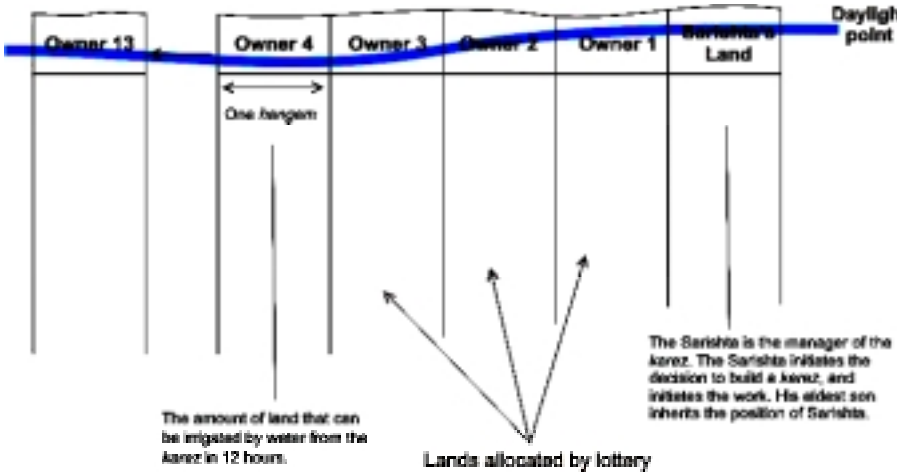
labor distribution and management. A karez consists of a series of hand-dug wells and tunnels that collect rain and groundwater and discharge it onto farmers' fields (see Figure 1). In an area entirely dependent on rainwater, and with very little capacity for surface-level water harvesting and storage, the karez is the primary water-harvesting mechanism available to the poor.



The advantage of the karez is that it delivers water year-round, even in years when rainfall is below average. According to some of the residents of Turbat, when the current drought began, the karez continued to deliver enough water to meet people's needs for about two years. Clearly there are limits to this capacity, but the karez offers a far more conservation-focused method than the tubewells which contribute to lowering the watertable, encourage wasteful water use and operate at the expense of the poor, in that they reduce the amount of water available to the karez.

The land closest to the 'daylight point' is owned by the manager (*sarishta)* and the remainder is divided by lottery.

Figure 2: Shows the distribution of land irrigated by the karez outflow.



90 year old Abdul Rehman, a valued source of knowledge on the karez, had this to say about the karez that when a new Karez is to be dug, local, knowledgeable people assess the direction on the basis of the amount of land to be cultivated, the elevation of the nearby mountains and the direction of water flow in the streams. A well is dug at the centre of the proposed course. If water is found, digging of more wells upward toward the hills and down towards the fields begins. Normally it takes 2-3 years to dig a karez. For a new karez, approval from the AC/DC or concerned authorities is sought.

There are usually 80–100 partners on each karez. Usually a sarishta is also the head of the village, *biraderi* or tribe. So he is relatively better in terms of financial position as well as his moral and political position. If the karez partners are not satisfied with his performance, they can replace him. However, based on his (and his father's forefathers') services for the karez, he enjoys half the facilities. There has been a change in the role of a sarishta. Previously, he was a very important person who was also involved in resolving social and political conflicts. Now he is considered important only for karez work. Previously, he could fine anyone who did not work on the karez. This fine was usually in kind. If a partner did not participate in karez work, he had to pay some portion of his date production. Previously, people were more interested in karez work. Now due to changes in life facilities, they think it is very hard work.

Despite the perennially arid conditions the fact that only 5-6 percent of the land in the area is arable, the deposits of alluvial soil irrigated by the output from the karez are capable of producing high yields if sufficient water is available. Per hectare production of many crops equals or exceeds than in canal-irrigated areas in other parts of Pakistan. This is the case for staples such as dates, rice, sorghum, pulses, onions, garlic and some vegetables, as well as grapes and pomegranates (NRSP Turbat Annual Report 2001). The date palms, capable of producing ten tons per hectare in good conditions, could also form the basis of a revitalized economy, if sufficient water were available (IBID). However, the drought has severely damaged even the hardy date palms, as the survey results described below makes clear.

Case Study: The Role of Karez Rehabilitation in Restoring Sustainable Economies and Communities in South Western Balochistan

In 2002, the Global Water Partnership commissioned the National Rural Support Program (NRSP) to conduct a small-scale study of the relationship between drought and poverty in drought-affected areas in Pakistan. NRSP has a reliable base of information, a record of involvement in water-management here and elsewhere in the country, and the institutional capacity, in concert with its partners, (Pakistan Poverty Alleviation Fund, for example) to affect some of the drought and poverty alleviation measures necessary. For example, funding is in place to expand the karez rehabilitation initiatives in the area. In the next two years, NRSP plans to rehabilitate another 60 karez annually, with funding from the Pakistan Poverty Alleviation Program.

Turbat ranks 86th of 94 districts in the country according to the Social and Economic Development Ranking of Districts in Pakistan in economic development and 92nd in terms of social sector activities[16]. Thus, it is not the worst-off district; nor is it the worst affected by drought. However, it has suffered greatly, as the case study shows.

The arid climate, harsh terrain and lack of transportation and communication infrastructure mean that life can be difficult here at the best of times. The word Turbat means 'grave', in eloquent testimony to the difficulties of sustaining life here. Temperatures can reach 50 degrees in summer. The average annual rainfall "varies from 50 to 150 millimeters in southern and western Balochistan and the annual potential evapo-transpiration exceeds rainfall throughout the year in many basins or sub-basins"[17].

The journey from Turbat to Karachi takes over 12 hours. Many services, including health and education services, are unavailable or available only intermittently. These factors contribute to the difficulties of establishing long-term improvements and make it difficult to plan and deliver relief. Outside the few urban and peri-urban areas, there is almost no employment, which not land or resource based. Literacy rates, especially among women, is extremely low.

The economy of Turbat depends on trade, agriculture and livestock. Some 80 percent of the population depends on farming and livestock[18.] Remittances and savings from money earned while working abroad are also important. Trade across the Iranian border flourished for many years and made some families prosperous. However, this means of livelihood vanished when the events of September 2001 led to the border being closed.

From 1960s to 1980s, many men from Turbat and southern Balochistan went to work in the Gulf states. At one time, up to 30 percent of households had a family member working in the Gulf. These men sent their wages home and many bought a share in a karez when they returned. A few invested in tubewells, but very few could afford to do

[16] Social and Economic Development Ranking of Districts of Pakistan. Social Policy and Development Centre, Karachi, Table 4.
[17](Board of Revenue, Balochistan).
[18]Drought Hit Communities of Mekran Division, Balochistan: Brief on Crisis Situation in the Drought Hit Areas. Commissioner, Mekran Division. May 2000.

this. Also, the karez met their needs for irrigation water. Some new karez were built with these earnings but most of the investment was in karez extension.

A flood devastated Mekran division (adjacent to Turbat) in 1998, with the total damage (lives lost, houses destroyed, agricultural losses) estimated at Rs. 10,30,00,000 (10 crore, 30 lakhs). Communities are now coping with the after-effects of the flood and severe drought.

The flood caused extensive damage to the karez, filling the tunnels and wells with silt and debris. Economic distinctions determined the kinds of responses made to the drought: the relatively affluent were able to clean and repair their karez quickly, and also, restore the supply of water. Deciding against collective effort to rehabilitate the karez, some families installed tubewells, increasing the number already in existence. Thus, the flood created a widespread demand for massive rehabilitation of the karezes but majority of the villagers – most of whom were poor - were unable to muster the economic resources for this. Some were able to buy water from the tubewell owners, which made them reluctant to rehabilitate their karezes. Some of the poor expected government grants for karez rehabilitation but these did not materialise.

Now, all of the effects of the previous years - high population growth rate, increasing demand for groundwater and climatic changes - have culminated in a desperate situation.

Case Study Methodology

A household survey was conducted, covering 108 households in 10 villages. All respondents belong to NRSP-organised Community Organisations (COs). In addition to the household survey, information was collected through interviews with a small number of District Government officials, a former Minister of Agriculture, the District Nazim and a number of councillors and community members. Several sarishtas, who recalled the time when the karez were functioning at full capacity, were also interviewed. Focus group discussions were also held.

The interviews provided a window on the contemporary social organisation of water supplies and land use in the area. They also provided retrospective and current understanding of water supply issues, and a sense of local people's perceptions of the most effective means of restoring water supplies to the area.

75 responses to the household survey were from men and 33 from women. Women were asked to explain the specific impacts they had faced because of the drought, but only a small number responded to that. However, a number of interviews with women did elicit some useful statements about the effects of the drought. These are described below.

Of the 108 households surveyed, 107 were landowners, owning an average of 12 dagars (1 dagar = approximately ½ acre[19)] of land. Landholding size ranges from 1-64 dagars. 72 families owned land in one piece, while the fields of 32 households were spread out. 68 families had inherited their land while 39 families had purchased it.

[19] A *dagar* is not a fixed amount of land: its size varies according to local criteria of land availability and crop yields.

All 107 respondents were members of a karez–i.e. they owned a share of the land irrigated by a karez; they had contributed cash and/or labor to building or extending a karez and depended on the output of karez-irrigated agriculture for the majority of their household income and subsistence. 77 respondents ranked this drought as 'the worst ever' and another 27 ranked it as 'very bad'.

Karez Infrastructure

The average length of the karez, owned by the households surveyed, was 4 kilometers (The range is 1 Km to 9 Km). The average depth of the mother wells was 54 feet (range: 9 – 96 feet). Well depth was measured in a man's height (i.e. six feet). 89 of 108 respondents reported that there was some water in the wells, although 59 said there was far less water than they required.

72 households had contributed cash to karez building/maintenance or extension, with an average expenditure of Rs 4,284 per household (range Rs 30,000 to Rs 300). However, only 36 households reported contributing labor to karez maintenance. This was partly because the above-ground labor was arduous, and the underground labor required was quite specialised. 93 households reported using karez water only for flood irrigation. i.e. they utilised no other technologies for carrying or distributing karez water to the fields.

The average value attributed to the land by the owners was Rs. 748,250 (80 responses), although these values were not necessarily congruent with market prices, in the absence of a viable market. The fact that only four families reported that they had sold land or water rights in the last five years also indicates the lack of a viable market. All the respondents mentioned that they would take up other work if they could sell their land.

Most respondents were living as one would expect, in extended families, which constitutes the social safety net for most people. Average family size is 15 (range = 3 to 43). The largest family in the survey had 50 members. Many families had a large number of dependent children (i.e. under 10 years of age). Only one household had no male members.

Speaking about the effects of current drought the respondents said that this was the worst drought with no rain in the last 4-5 years. The livestock has diminished by disease. People were dependent on cutting down and selling types to buy items for daily use. Before drought, they could sell fodder, vegetables and other crops in Turbat but now they were buying fodder from rich people near Turbat who had installed tubewells. Also, they were getting drinking water from a well which was 150 feet deep. A 180 foot deep well was also being dug, but water was not suitable for drinking purposes. The pond near the mosque, which they used for washing clothes and bathing, was always full round the year but since drought it was dry.

Sources and Amount of Income

The average reported monthly household income[20] (103 ha) was Rs 6,210, derived from the sources listed in the following table.

Reported sources of household income (averages)		
Source	Avg. value per response (Rs)	No. of Responses
Crops (excluding dates) per season)	10,350	40
Daily wages (per month)	3,021	14
Trading (per month)	3,933	9
Service/employment (per month)	13,210	36
Date production (per season)	26,403	70
Other sources[21] (annual)	133,265	34

Remittances from family members working abroad or, in a few cases, in Karachi, supported 34 households. These provided the highest proportion of income, as the above table shows.

Dates were the most valuable item produced by the farmers in the survey, providing the highest yields and highest income per maund (40 Kg). 106 households in the survey owned date palms, owning an average of 278 trees. (Range = 20-2000 trees). Of the two households who did not own date palms, one was sharecropper and the other did not respond to the relevant questions. A household owning 2,000 trees was facing economic ruin. The head of this household was one of the people who had returned from Dubai and purchased land and a share in a karez. The family owned 20 dagars of land, on which they reported raising some vegetables, in addition to dates. They said that drought had lasted for seven years and their income had been reduced to zero because of it. In 1998, each of their trees yielded 50 maunds (2,000 Kg) of dates but in 2002 they yield was nothing.

Date production has both consumption and cash value. Amongst 105 households, an average of 48 maunds were sold and 16 maunds consumed. The average annual income (70 households reporting) from dates was Rs. 26,403, with the range of income being Rs 800 to Rs 300,000.

The drought has reduced the yield of every crop, in some cases to almost nothing, as the following table makes clear.

Source	Average Yields Reported		
	1998	2002	% Decrease
Dates (maunds)	77	34	56%
Wheat (maunds)	30	3	90%
Fodder (dagars)	92	75	18%
Pulses (maunds)	11	1	91%
Vegetables (maunds)	19	2	89%

[20]Legal activities, and excluding barter/in-kind exchange

[21]The majority of this category comes from remittances

Some households reported zero yields in their crops: of 81 respondents who grew dates and reported yields in 1998, 7 (9%) reported that their date palms produced nothing at all in 2002. Since dates are an extremely important cash crop in Turbat, this is particularly significant, and has negative implications for restoring the area's productivity.

Some of the very poor people had begun eating koosh, the inner edible portion of the date palm. The koosh from one tree provides a single meal for half a dozen people. The average value of a date palm, two to three years ago, was Rs. 1,000, but now there is no market for the wood and the trees are dying.

Reported Health Effects

Both women and men consider running water better for health than standing water. The water flowing in the karez is filtered through the soil, which is thought to kill bacteria. Water standing in a well is thought to cause health problems. For example, many people in Dagari Kahan village have kidney problems, which they attribute to well water.

Previously, all human waste flowed into the fields or was disposed off away from the village, where it became a natural fertilizer. Now, however, some human waste is placed outside the houses, leading to bad smell and air pollution. Similarly, people have begun to wash their clothes and bathe within their houses, thus increasing the amount of wastewater. This is creating sanitation problems, and in some villages, the streets are full of wastewater and human and animal waste.

Specific Effects of the Drought on Women

Unfortunately, women's reluctance to be interviewed, even by other women, coupled with the assumption that knowledge about assets was the domain of men, limited the number of women's responses in the survey. Other than discussing the problem of inadequate water supplies and the problems caused by water-related concerns, majority of women's responses concerned selling their animals and jewellery to pay doctors and buy medicines. The sale of other assets was not reported.

Lack of food, poor nutrition and poor sanitation typically resulted in decreased resistance to diseases and increasing rates of miscarriage. Slight increases in miscarriage rates were reported in Turbat, although this finding probably does not accurately reflect the situation because of the reluctance of women to be interviewed. It is also possible that these issues were not articulated in the relatively brief time, which the interviewers had to spend with respondents. A number of women did cite increased difficulties in meeting the needs of sick household members because the drought had reduced their income and asset base.

Before drought, women in Turbat used water from the karez for every purpose: drinking, bathing, washing clothes and so on. They had access, day or night, to the karez water that flowed through their lands. It was counter to their privacy and dignity to use water from tubewells. With drought, however, it was no longer possible to rely on karez water. Some of the tubewell owners had begun to harass or abuse the women verbally, which caused conflict between families. The result was that some women were being accused of having a 'bad character' i.e. behaving immorally with a tubewell owner. Once blamed for this, a woman might be judged negatively for the rest of her life in her community.

Another problem was reported that the women had to wait until the tubewell owners ran the motor. In a very few cases, the tubewell owners had physically punished the women for using their water. Except for a very few comparatively rich families, all of the women were facing these problems.

The drought increased the installation of motorised pumps in the houses for drinking water. Very poor women fetched water from homes of their neighbours who had these pumps, but if they ran out of water late at night, then they were sometimes verbally abused by the owners when they replenished their supply. Some electric motor owners too take advantage of the situation and demanded free labor from women. It was again both insulting and caused their reputation to suffer.

The need to carry water increased women's labor. When a karez was in good order, they did not have to carry water but now due to drought, the situation has changed. On average, a woman was carrying more than 200 litres of water every day, which created enormous burden on her time and physical capacities.

When asked to comment on water problems, especially lack of water, women made the following stark and eloquent statements:

- They have no water and are facing great difficulty. The livestock is dying. Women alone are totally responsible for fetching water from a well more than 200 feet deep, located about half a kilometre from their houses.
- The supply water comes after 15 days for only 10-20 minutes and the quality is poor. Some private tanker owners sell water but the women have to fetch water from the airport tap located more than 2 kilometers from their houses. In many houses, there is only one woman responsible for fetching water as her daughters are grown up and cannot be sent out of the house for fetching water, the reason being someone may accuse the young girls of immoral behaviour with men.
- Women have no option except to fetch water. In such communities, even if men do nothing the whole day and sit in the house, they do not fetch water. It takes more than one hour to bring about 10 litres of water and they have to make five or more journeys every day.
- Where the poor should go? Should they die? There is no water for the poor. The rich can get water easily but it is difficult for the poor, particularly women.
- Wherever these women go to fetch water, they are told there is no water. The women are busy all day fetching water and can not do anything else. There is no electricity, no water, and no food. When the poor women come to fetch water, the officials abuse and push them away.

Previously, water was available in the houses through piped water supply scheme. Now women are compelled to go out of their homes by 9 am to fetch water and do not return till 3 in afternoon. Then they cook and do all the other household work. Men are always out of the house and in their absence and the women are responsible for looking after the house. Sometimes men are away for weeks and months at a time, looking for work.

Coping Mechanisms

Households responded to the drought and attempted to marshal financial resources, in different ways, according to their financial and social abilities. For example, 70

respondents had installed supplemental water supplies. 25 had installed tubewells at an average cost of Rs. 41,000; 12 had installed electric motors on existing wells to draw water from deeper in the ground, at an average cost of Rs 4,827; and 33 had dug new wells, with an average cost of Rs 300, for household and animal use.

Some of the hand dug wells were extremely deep and women reported great difficulty in drawing water from as far as 200 feet below the surface. The wells had the positive effect of saving some women the indignity of being accosted by tubewell owners, which many women reported, and of saving women the arduous journey in search of water every day. However, it required great expenditure of energy to draw the water. Especially when women are weakened by pregnancy or by lack of food, drawing water exerts a tremendous physical burden.

Many respondents reported they had been forced to purchase drinking water. This imposed tremendous difficulties on the poor, as the following examples indicate.

- The private water tanker owners charged more than Rs.50 for one day's water. This was enough only for drinking and cooking and not washing or bathing. A women's husband earned nearly Rs. 70 per day if daily wage work was available. If not, then they had nothing. In such a situation, how could they spend money on water?
- There was no water supply. The water tanker charged Rs.2 per gallon. Many households needed at least 25 gallons every day for drinking and cooking.

Although migration is a common response to the effects of drought around the world, only 12 of 96 respondents in Turbat reported that family members had migrated in search of work as a result of the current drought. However, since migration for work is a normal event here, it is possible that respondents did not connect this specifically with the drought. It is also likely that most of the migration would have taken place earlier in the current drought. Those people who had moved in search of pasture were not included in the survey.

It is often the case that severe shortfalls, and the kinds of conditions resulting from drought and proto-famine situations, lead to conflict.[22] According to many respondents, Turbat was formerly a place where people trusted each other and crimes were almost unheard of. Now, social stresses resulting from the drought have increased; incidents of theft, robbery and smuggling of food and drugs were reported. One example is the theft of wood: some people cut down the remaining trees to sell wood.

It is evident from the Turbat survey and from other sources that a new category of poor people is created by drought. Although some of the people surveyed were at one time relatively secure financially, many had now reduced almost to destitution after five years of unremitting drought. Some people, especially the elderly and the chronically poor, were now forced to beg for food.

There were some people who were able to have invested money and other resources – some saved, others borrowed - in attempting to provide water for agricultural, livestock and household use, but many of them have passed the limits of those resources. Their

[22] There is a body of academic literature on coping strategies in time of drought and famine. Amartya Sen, for example, has written extensively on the subject.

land is exhausted, and soils have been rendered infertile. Their livestock holdings are reduced to almost nothing. Even when the rains return, they will have no resources with which to build up their asset bases. Families will 'recover' to different degrees from the loss of productive members. The after effects of illness suffered as a result of drought can also be very costly.

It would be shortsighted to imagine that once rainfall resumes at 'normal' level, the problem of drought would be over. It will probably require several crop cycles to restore the soil to full fertility and restore yields to optimum levels. For the very poor, it will take several years of hard work to restore household finances to sustainable levels and re-build economic and human resource such as livestock and agricultural assets.

Devising Effective and Integrated Responses to Drought: Doing More with Less

The point has been made in numerous studies that drought and its related effects have an impact on every aspect of natural and social environments. It is equally clear that drought requires integrated responses that account for as many aspects of the situation as feasible. Although expertise is necessarily discipline-specific - focusing on health, agriculture, technologies, and on poverty itself - the expertise must be brought into a common forum so that the effects of drought can be addressed and comprehensive responses implemented. Each of these complex issues, and the interactions between them, must be taken into account in a comprehensive response to drought.

Karez Rehabilitation

Rehabilitating the karez is a significant means of restoring the water supply to communities, once rainfall returns to normal. An important consideration in karez rehabilitation is that the infrastructure and decisions concerning its upkeep and the allocation of water and land remains in the hands of karez members. This essentially integrates the social and economic systems with each other, which helps to ensure that sustainable commitments are made and maintained.

At present, close to 400 karez are supplying irrigation water to almost 40 percent of the cultivated area in Turbat. During the last decade, nearly 200 karez were restored (i.e.new wells dug, and channels deepened and lengthened) by government departments, the National Rural Support Program and other NGOs working in the area. As of July 2002, NRSP and its community organisations (COs) had rehabilitated 112 karez in Turbat, benefiting over 13,000 households. Funding for NRSP's efforts came primarily from UNDP, the Pakistan Poverty Alleviation Fund, and contributions of labor and cash from the COs. The combined budget for the 112 karez was Rs. 21.5 million. Of this, the COs contributed Rs. 7.5 million, which is 35 percent of the total (NRSP-PPAF Annual Report 2002). Government of Balochistan is also engaged in karez reconstruction and rehabilitation. Karez rehabilitation is supplemented by the installation of hand-pumps, drinking water supply schemes and sanitation schemes.

The Government of Balochistan has spent Rs 40 million extending and improving 100 karez in Balochistan. Most of these, 23 in all, located in Turbat/Panjgur, were

rehabilitated at a cost of Rs. 8.28 million[23]. The government has also recently built a number of water storage bunds, which are linked to the karez system[24].

Efforts must be made to increase the efficiency of the karez rehabilitation process. The rehabilitation methods used at present are extremely time-consuming, as all work above and below ground is done with very basic implementations and technologies.

Integrated water conservation strategies must be devised, once the rainfall resumes. This should begin with the collection and storage of every drop of rainwater in household cisterns, wells and check dams. Reforestation to hold the soil in place and to generate humidity where a water supply does exist will also be necessary. Developing alternative methods of drawing water, perhaps including such innovations as solar rather than diesel or petrol pumps[25] will contribute to minimizing the amount of non-renewable fuels required to draw water.

Research is needed on growing crops that do not require large quantity of water, hold the soil in place and would be appropriate for subsistence and marketing in southern Balochistan. Some of the work done in barani areas here in Pakistan and elsewhere in South Asia could usefully be extrapolated for this purpose.

Using water more efficiently is clearly necessary. One means to this end, that is relevant to the karez as well as to other domains, is the introduction of water delivery mechanisms including "modern irrigation application techniques (trickle, sprinkle, etc.) that have potential to improve water distribution and … efficiency"[26]. The overarching point, as it relates to the karez, is that any new technology, which has the potential to conserve supplies and increase outputs, should be tailored to the karez-supplied irrigation. Methods of making such systems financially attractive to farmers and available to the poorer farmers will need to be devised and implemented.

Conservation, i.e. maximizing water usage and reducing water losses, must be the key to a stable and sustainable effort to ensure that the effects of future droughts are less devastating. The conservation of every resource utilised for subsistence and cash cropping must be encouraged through public awareness campaigns and enlightened policies that reward efforts to conserve water and impose negative sanctions on those who waste it. It should be made clear to farmers that the water used for crops has a cost that should be factored in to the market price.

All of these potential actions will require a skillful integration of social, scientific and technological research and action. Commitment by government (i.e. 'political will', the commitment of resources, and good governance) is also critical. To put it another way, the knowledge that, although periods of drought vary in severity and frequency, water shortages are a recurrent feature in many parts of Pakistan must be incorporated into all development and resource-use planning and policies.

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[23]Irrigation Department Government of Balochistan

[24]Mirani Dam Project Report, WAPDA, August 2001.

[25]A solar pump has been installed by NRSP staff in the Fateh Jang district of Punjab. Although these are expensive at present, it should be possible to lower the cost if a large scale programme is implemented.

[26]Comments on Draft Framework for National Water Policy Prepared by the Ministry of Water and Power, Government of Pakistan, April 2001, p.7.

Part of a long-term, integrated response, i.e. 'management' in the widest and best sense, should include analysis of successful efforts to integrate social, economic, scientific and scholarly research in other parts of South Asia as well as in Pakistan itself.

It seems inevitable that the effects of water shortage will increase in the foreseeable future because of the effects of at least 20 years of over-extraction for subsistence crops, livestock and industry, coupled with increased demand to meet human needs. Projected increases in temperature due to global warming will also have an effect. It is also the case that each successive occurrence of drought makes it harder to respond in human, financial and political terms, to the next occurrence, as resources are diminished.

The need for an integrated response requires that local, regional, provincial and federal policies be integrated with – or at least congruent with - each other. It also requires the optimizing of all water-use practices including water harvesting and storage techniques and small and medium scale irrigation mechanisms. Efforts to reduce water wastage and schemes for re-using water could also be integrated into mitigation efforts. Some of the initiatives devised by NGOs, including the National Rural Support Program, in educating farmers and household members on water conservation strategies will be useful here.

The need for accurate meteorological data, both local and regional, is critically important for understanding longitudinal climatic trends, and for predicting normal and abnormal rainfall patterns.

Wilson's study (2002) points out that communities have flourished in the fertile deposits of alluvial soil found throughout North Africa, the Middle East and Pakistan, for thousands of years. Some of these fertile areas have enabled the existence of large populations and indeed entire civilizations. Many, however, have not been sustainable, usually because of climatic factors (typically increased aridity) combined with pressures on water supplies and water-delivery technologies that have outstripped the available water supply.

It is tempting to think that current, sophisticated technological capacities to access water will provide solutions to the problem of water supply in Balochistan i.e. a technological and scientific response to the drought will suffice. However, as the recent situation and its effects demonstrate, comprehensive, far-sighted and integrated water supply management systems – systems that also take careful account of local people's knowledge and skills - must be implemented, if southern Balochistan is not to enter the historical record as one of the 'failed' examples of community survival.

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PRO-POOR INTERVENTION STRATEGIES IN IRRIGATED AGRICULTURE: A CASE STUDY ON NRSP

Rashid Bajwa[1]

Abstract

Declining growth rates, fiscal imbalances and weak social security nets have led to the worsening of the poverty situation in Pakistan, with more people experiencing both absolute and relative poverty. The National Rural Support Program (NRSP) forms a bridge between the rural poor, the majority of whom depend entirely on agriculture for subsistence and income, and the Government agencies and departments responsible for water-delivery infrastructure and management. This paper gives a list of NRSP's interventions in the water sector, all of which are focused on minimizing water losses and improving agricultural productivity for the rural poor. The paper presents the case for 'social mobilisation' as a critically important tool in the establishment of efficient and sustainable responses to water problems. Case studies provide examples of the effectiveness of these interventions.

Introduction

Pakistan's economy in the 1990s was marked by a declining growth rate, fiscal imbalances and weak social security nets. This led to the worsening of the poverty situation, with more people experiencing absolute and relative poverty. According to official sources, the number of people below the poverty line rose from 18 million in 1987/88 to 45 million in 1998/99.

One important indicator of poverty is the incidence of food poverty. The food poverty line is defined on the basis of a minimum calorie requirement for active participation in economic activity[2]. At the national level, the incidence of food poverty was approximately 33 percent in 1998-99, which means that about one-third of all households were living below the food poverty line and unable to meet their nutritional requirements. The incidence of food poverty was even higher in rural areas, at about 35 percent. The incidence of food poverty increased from 24 percent in 1993–94 to 33 percent in 1998-99. This development coincided with the precipitous decline in the economic growth rate (from 6.1% in the 1980s to 4.6% in the 1990s) indicating a close connection between economic growth and poverty incidence. The impact of the decline in the growth rate on poverty was more severe in rural areas (a 5.4% increase) than in urban areas (a 1.4% increase).

In Pakistan, the incidence of food poverty is very closely related to the physical and managerial infrastructure of irrigated agriculture. The extended drought, which has devastated large areas of rural Pakistan, is also a factor. The irrigation sector continues to be challenged with adverse demand/supply ratios. In addition, supply deficiency or apparent resource depletion exists because of poor innovations on the part of both the

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[2] Pakistan Human Condition Report 2002

formal and informal sectors in developing new and efficient water strategies in irrigation.

However, beyond food poverty, one observes a disturbing paradox in recent developments. This is the 'existence of pervasive malnutrition in a world of abundant food supplies'[3]. Growth in global food production has more or less kept pace with growth in population. However, commodity prices have shown a spectacular decline as a result of productivity gains, according to IFPRI & WRI reports[4]. Agriculture provides more than 43 percent of jobs in the labor market with irrigated agriculture playing a predominant role. Declining agriculture prices, therefore, have a direct effect on incomes, and affordability rather than availability becomes the core issue.

The Pakistan picture also seems to follow these global trends. Pakistan has emerged as a 'food secure' country at the macro level. However, it has also emerged as a highly 'food insecure' country at the household level. Food insecurity at this level has increased since 1992-93. Incomes and food prices are two essential elements in determining the affordability of food by poor households. According to Qureshi and Khan[5] (2002), 'balancing the government budget at the cost of unbalancing the life of the absolute poor is not only bad politics, it is bad economics as well. Helping the hungry to survive and be active members of the labor force is a good investment in people in the long run'.

According to Alderman[6] (2001), poverty is primarily a rural phenomenon and approximately 75 percent of the poor reside in rural areas. This has important implications for both public policy and the design of strategies for poverty reduction. For Pakistan, irrigated agriculture offers the largest share of jobs in the country and will continue to do so in the foreseeable future. Technological interventions, therefore, will be needed, and investments must be made to improve the management of water quantity and quality within a watershed management context (upstream-downstream demand components), as well as investments in the development of additional water resources. In addition, the issue of poverty will need to be addressed in a holistic and multifaceted manner.

It is vitally necessary to take a fresh look at traditional crop cycles, and include processing and marketing as part of the crop cycle ('from crop to the plate'). We would also look at the needs of everyone involved in this extended production cycle, from labor (throughout the entire crop cycle) to middlemen, processors and marketing agencies and firms. We would also need to address the needs of the farmer as the hub of all these activities and see how his/her income can be increased, in both the on-and off-farm sectors. In addition, we would also need to consider addressing his/her need for basic services such as education and health, the lack of which make rural men and women particularly vulnerable to poverty shocks.

The major concern is how best to address these issues and devise, in response, a holistic and multi-sectoral strategy for poverty alleviation in irrigated agriculture. The hypothesis is that no single agency has the capability to address these multi-sectoral

[3] Rural Development Strategy, 2003. The World Bank Group
[4] IFPRI & WRI, 2001
[5] Pakistan Human Condition Report p. 164
[6] Rural Development Strategy, 2003. The World Bank Group

issues under one umbrella. Clearly there is a role for all stakeholders including all tiers of the government, support organizations like the Rural Support Programs, relevant NGOs and the huge untapped private agriculture processing sector, as well as donors. Has this worked anywhere in Pakistan? The case study of the National Rural Support Program, the largest NGO in Pakistan[7] is presented here as evidence of how the rural poor in the irrigated areas of Pakistan have been able to come out of the economic, food and opportunity poverty which they face.

Social Mobilization

NRSP, in implementing its strategy of 'harnessing the people's potential' and invoking the sense of motivation and self-help among rural men and women, plays a leading role in the reduction of rural poverty. NRSP's approach has as its central theme, "social mobilization": NRSP stands on the pillars of identifying the rural poor, organizing them into properly functioning bodies, marshalling local resources and building people's capacities to become involved in the development of their own communities.

The difference between NRSP's methodology and that of traditional development programs is the realization that the 'household is the last unit and indeed the engine of development' as opposed to the traditional view of taking the village as the smallest unit of development. This concept and the practice that follows from it offer an entirely new development paradigm. Social mobilization is the foundation of that paradigm.

Social mobilization is the process of organizing rural men and women into groups, called Community Organizations (COs) for the purpose of identifying and prioritizing their own development opportunities. The foundation of NRSP's approach and method is that only informed and engaged community members, acting for the common good, can plan and undertake sustainable community development. The CO is a forum for marshalling resources, for good governance, and transparent and accountable operations. There are currently 18,154 COs, of which 1,289 are Water Users' Associations. The CO membership, countrywide, is 372,800.

The social mobilization process begins with a series of dialogues with community members. The next stage is Situation Analysis, which provides a comprehensive profile of the area's demography, economic and employment data, institutions, ecology, physical and communication infrastructure and the agricultural economy. A 'Poverty Profile' is then conducted, in which villagers are asked to categorize their households' economic status. This gives NRSP a good idea of the scale of the poverty in the area.

The end product of NRSP's social mobilization is a 'Micro Investment Plan' that threads in all the stakeholders, and defines the role of each one in working together for poverty reduction. It factors in the role of water resource development and management and its integration in poverty reduction, but looks beyond it. According to Khan 2003[8], the support organization (e.g. NRSP) acts as a catalyst in the process of development of the Community Organization (CO): it extends technical and material assistance according to the expressed needs of the rural poor to enhance their capacity to become self-reliant. More specifically, the Support Organization focuses on preventing losses of

[7] Human Development in South Asia 2002. Mahbub ul haq Human Development Centre p.90
[8] The RSPs in Pakistan: Methods of Assessment of Cost and Impact. Mahmood Hasan Khan, 2003

crops, animals and people; it increases the productivity of natural resources and enterprises; it reduces people's dependence on external service systems; and it enables physical and social capital formation. NRSP has not limited its support to income generation or production activities of the rural community. Instead, it has adopted a broader approach which includes small commercial enterprises, social sector services and infrastructure development.

Portfolio of Opportunities:
The Micro Investment Plan

Levels	Plans Identified	Interventions
Household	Income Generation	- Line of Credit - Training
Group	Land Improvement Joint Enterprises Collective Supplies	- Line of Credit - Training - Technical Assistance and Marketing
Village	Social Sector Needs: -- Drinking water -- Sanitation -- Other small infrastructure -- Health & Family Planning	- Productive Linkages

A recent study (Khan 2001) has estimated the economic impact of NRSP's activities on rural households[9]. The results show that partnership with NRSP over time has had a positive impact on member households of COs in terms of their total and farm income, total expenditure, savings, consumer durable goods, and number of children in school. Khan's study shows, for example, that the annual household income would be lower by 7.5 percent where this program was not available to a household. The program has been able to increase the incomes of its clients by about 50 percent in real terms over a six-year period. What is perhaps more important, but not quantifiable, is that the support program has mobilized, through the COs, the latent energies and resources of individuals and communities enabling them to overcome many constraints.

The work done by NRSP in developing water resources for agriculture, in both subsistence and cash crops is detailed in Section 2.

[9] A detailed description of this method and its use in different contexts is given by Mahmood Hasan Khan, *Community Organisations and Rural Development: Experience in Pakistan*, *op.cit*., Chapter 7.

Water for Agriculture

Along with the right soil conditions, good agri-inputs and appropriate cropping technologies, the development of agriculture primarily depends on enough water available at the right time in the crop cycle. In case of sufficient precipitation, the water requirement is fulfilled without any additional requirement of irrigation water. However, irrigation becomes critically important when rainwater is either insufficient for the growth of crops or does not fall at the required time. In Pakistan, the majority of agricultural land is dependent on one form of irrigation or another.

The water schemes supplementing the agriculture and irrigation systems are of paramount importance for optimal agriculture output. Pakistan's irrigation system is one of the best systems in the world in terms of its efficiency. However, in recent years the efficacy of the existing system has been compromised, in part because of expanded cropping areas (much of it not supported by the expansion of irrigation) coupled with improper maintenance. The agriculture sector is the economic backbone for a country like Pakistan, with 65 percent of the population living in the rural areas. In this regard innovations are critically important for the agri-sector to the extent that they enhance the rural economy.

The sources of water for irrigation and agriculture purposes may be divided into two broad categories: surface water and groundwater. The working of different agri / irrigation schemes facilitating the supply of water to the agriculture sector and supporting the irrigation system operative in different regions of Pakistan are discussed below.

Surface Water

Surface water sources include rivers, canals, lakes and natural and artificial reservoirs. The water schemes supporting the agriculture sector derived from the surface water resources in Pakistan include the following

The Karez

The karez system is mainly used in Baluchistan, where it serves the dual aim of supplying water for irrigation and drinking purposes. The karez system consists of wells and underground water channels. In this system, two or more 'mother wells' (some reaching a depth of 200 ft.) are constructed to reach the aquifer zone. Discrete aquifers are then interconnected through a horizontal channel in such a way that yield of each well augments that of the other wells. The slope of the channel all along the alignment is maintained so that at the outlet point it facilitates irrigation through gravity flow. At the outlet point, a karez can discharge water at the rate of 0.25 to 0.75 cusecs.

NRSP has contributed to the improvement, extension and rehabilitation of the karez system, particularly in the Turbat region, as the following example shows.

Case Study 1. A karez in Peerani Lomb, District Turbat is a good example of the benefits that can accrue when people's potential is harnessed through social mobilisation. The villagers of Sari Kahan entered into agreement with NRSP to rehabilitate an old karez that had been non-functional for fifteen years. The lack of water meant that the village's agricultural system was suffering, with thousands of date

trees withering. Most of the rehabilitation work undertaken previously had been damaged beyond repair in the 1998 floods. Only a few well-to-do people in the village could afford to irrigate their land through tubewells but this was very expensive and it resulted in lowering of the watertable.

When the villagers formed a CO to work with NRSP, its first priority was the rehabilitation of the karez. The cost was estimated to be Rs. 418,000. NRSP facilitated the project by getting a UNDP grant of Rs. 182,000 and the villagers contributed the remainder. They also contributed their labor to the construction work and were completely responsible for supervising the work. Their personal supervision ensured that the work was of the highest quality. Since the successful completion of the karez an additional 85 acres of land has come under cultivation, greatly increasing the productivity and value of economic activity. In absolute terms, the amount involved is quite small but it has helped to solve the problems of an entire village.

Watercourses / Irrigation Channels

Watercourses and channels are the secondary source of water used mainly for irrigation. The primary sources of these channels are link canals, although in the absence of a link canal rivers act as the main water source. The watercourses may be further categorized as *pucca* (lined) and *katcha* (unlined earthen) channels. These channels are associated with the problems of silting, scouring, and leakage. The *pucca* water channels are more effective in providing water because the interior lining prevents water losses (especially common in areas with sandy soils) and protects against waterlogging. Earthen embankments protect the land from overflows and periodic floods. The conveyance capacity of a watercourse/irrigation channel ranges from 1-3 cusecs. (3- 4 cusecs of water is allocated to irrigate 1,000 acres in canal-irrigated areas).

NRSP has utilised its own resources and collaborated with UNDP in developing, improving and lining watercourses/channels in Attock, Chakwal and Khushab.

Case Study 2: Conflict Resolution and Increased Productivity Through Water-Delivery CPls. Villages Katha and Misral are neighbouring villages located at the foot of the Katha Range in Khushab district. Both villages access water from a stream emanating from natural springs in the Katha Mountains. Over the years, the villagers had adopted a system of conveying water to a central point and sharing it according to elaborately laid down riparian rights. However, on more than one occasion there was a disruption of water due to flood or drought. Since the channel was essentially a temporary one, constant repairs requiring resources from both villages were required to keep it operational. Needless to say, water sharing was a source of tension between the villages.

In April 1993, a CO was formed with a membership of 23 persons. When the CO approached NRSP for assistance in finding a permanent solution to this problem, NRSP's technical team proposed that a channel be built which would convey water from its source in an aqueduct and divide water equally for the two villages. Realising the importance of the project, the villagers immediately agreed to its construction and committed themselves to contributing approximately 30 percent of the costs.

The watercourse was constructed in two phases. In the first, NRSP provided technical support in preparing project estimates and technical drawings. Funding was provided by (Trust for Voluntary Organization) TVO. The second phase was fully supported by NRSP and PPAF, both technically and financially. The total length of the

watercourse/aqueduct is close to 6,400 feet. The CO members have contributed approximately Rs. 400,000 out of the total cost of Rs. 1.4 million.

This project has demonstrated the value of joint action. It has resulted in social cohesion amongst the villagers and is providing direct benefits to over 280 families with a population of nearly 2,000 persons. Due to the constant availability of water there has been a steady increase in agriculture production, especially of vegetables, increasing the income of the families living in the village.

Case Study 3: Preventing Water Losses and Increasing Productivity in Khushab. In the Khushab and Bhakkar districts of the Punjab, the loss of irrigation water in the sandy soil is a pressing problem. Water pumped from tubewells seeps from unlined watercourses before it reaches the fields. Some estimates place the loss at close to 40 percent of the total. Time and money are lost as fuel and electricity costs increase, and returns diminish as cultivation areas are reduced and per acre yields decline.

In order to overcome this problem, NRSP devised a scheme for brick-lining watercourses, and providing prefabricated concrete water outlets at designated points. More than 45 households have benefited from each scheme. The schemes have been a boon for this area. Farmers are now able to cultivate more land with the same amount of water and the savings have meant increased incomes and more ecologically sustainable agricultural practices. There are many other direct benefits of these schemes:

- The farmers save diesel or electricity (in case of tubewell irrigation) costs.
- The command area of a minor canal or tubewell has increased. It is estimated that the 35 brick-lining projects have brought an additional 700 acres under irrigation.
- The water-carrying capacity of the channels has increased.
- Soil productivity has increased due to the timely availability of water.
- Late sowing has been eliminated, since farmers do not have to wait their turn to receive water.
- Social cohesion has greatly increased among those who contribute to the project and share its benefits.

Mini/Mud Dams and Check Dams

Mini dams and check dams are earthen structures used to store water either accumulated during the rainy season or supplied from the link canal. The stored water is used for irrigation, and acts as a backup or emergency supply in times of shortage.

NRSP has facilitated the construction of numerous mini dams and check dams in Attock, Badin and Rawalakot.

Water Harvesting Structures

In hilly areas, where annual rainfall is as high as 1500milli meters, local residents construct rainwater harvesting structures for irrigation, livestock and household purposes. The average cost of these structures is Rs. 50,000/-. Some of these structures, which are usually in the form of large tanks, are also used for fish farming. Each structure contains enough water to irrigate about 20 kanals, typically used to cultivate vegetable and cereal crops. These structures are environmentally beneficial, as they control surface run-off, soil erosion and silting.

It is seldom possible to depend entirely on these water supplies but they are valuable where and when water from conventional sources is scarce. The current method of water collection and storage is relatively unsophisticated, but with improvements, the quality and quantity of water, and the system of delivery can be made more reliable and productive.

NRSP has collaborated with UNDP in the construction of these water harvesting structures through linkages with the Northern Resource Management Project, AJK in Kotli, Hajera, and Rawalakot.

Sprinkle Irrigation

This method, which may use either surface or groundwater, is used to ensure the uniform application of water in a number of situations: sandy soils, irregular terrain and areas endangered by waterlogging. Its use is limited to situations where the water requirement is relatively small, so is mainly used for horticulture rather than for cropping. This method saves water and reduces the application of fertilizers. One sprinkler has a coverage area of 50 square feet. Water is applied through three methods:

1. Central pivot system: water is sprinkled by rotation from a central pivot.
2. Fixed pipe system: water is sprinkled through the rotation of pipes.
3. Portable system: the sprinkler is mounted on a trolley, which allows water to be delivered where it is needed.

NRSP has facilitated the use of sprinkler irrigation through linkages with ABAD and the Water Management Department in Chakwal. NRSP has also developed a model of sprinkle irrigation in Noorpur Thal, Khushab.

Groundwater

Groundwater may be drawn through lift irrigation, open wells, infiltration galleries and natural springs. In this regard, the groundwater schemes supplementing the agriculture / irrigation system of Pakistan are as follows:

Lift Irrigation

In lift irrigation a number of techniques are used to lift underground water from shallow and deeper strata of the earth. These are:

Tubewells

Tubewells lift water from deep below the earth, sometimes as far as 200-300 feet. Tubewells are used for irrigation and drinking purposes, as water from deep aquifers is usually free of bacteria. If the level of dissolved solids is also within acceptable limits, then groundwater is an ideal source for community water supply systems. The yield of a tubewell ranges from 0.25-0.5 cusecs, meaning that water from a single tubewell can irrigate as much as 600 acres.

A properly designed and constructed tubewell can give long and trouble free service. Pumps and electric motors manufactured in Pakistan can meet most of the design requirements for community water supplies. However, the maintenance cost of these systems is high due to motor and pump failure and fuel cost. NRSP has contributed

finance and expertise in the installation of tubewells in the Islamabad Capital Territory, Attock, Chakwal, Khusab, and D.G. Khan.

Peter Engine

The working of a 'Peter Engine' is similar to that of the tubewell, but it draws water from sources closer to the surface (typically 30-150 feet). The majority of Peter Engines have been installed by NRSP through its credit policy in the Islamabad Capital Territory, Chakwal, Attock, Rawalpindi, Rawalakot, Khushab and Badin.

Hydra Ram Pump

This method of lift irrigation is not in common practice because it requires an ideal location and a natural slope to facilitate its operation. However, in the right circumstances, a hydra ram pump meets the water requirements of one or two households. The method involves water falling some 20-30 feet under gravity action, then being lifted by a small pump. The advantages are twofold: the water's energy is dissipated and erosion is minimized, thus ensuring a smooth flow of water onto the fields.

NRSP has tried the method in Rawalpindi Region at Attock and Chakwal, but so far has considered it only relatively successful, as the costs incurred were judged to be greater than the benefits accrued. However, the potential exists for further development.

Turbine. In some places a turbine is the most efficient method of lifting water, which is then used for irrigation purposes. NRSP has installed turbines in Rawalpindi and Rawalakot regions.

Wells for Irrigation. Where dug wells are in common use, these are also used for irrigation. NRSP has helped in the construction of these wells through linkages with government organizations such as ABAD in Attock and Islamabad Capital Territory.

Conclusion

It is clear that integrated responses are required, if the problems of water availability, quality, timeliness and cost are to be addressed in a sustainable manner, and if rural poverty is to be alleviated in a structural and sustainable manner. NRSP's approach to poverty alleviation, based on social mobilisation, focused on community-identified and prioritized needs and opportunities, and with productive linkages in place between government and private-sector actors, is demonstrably able to provide such an effective and integrated response.

CLOSING SESSION

RECOMMENDATIONS OF DISCUSSION GROUPS

The workshop delegates agreed on the following recommendations at the end of the workshop:

- Poverty is a very complex and multidimensional phenomenon, which needs interventions on many fronts including physical assets, social and economic assets, safety nets and governance.
- There is a need to create conditions in which the poor are either given or enabled to acquire the assets and enabling environment to get returns from those assets.
- Significant gap between actual and potential productivity levels exists, which calls for enhancing land and water productivity because enormous potential exists to increase agricultural productivity in Pakistan.
- Key to enhance productivity is to improve access to production inputs (water and other inputs), marketing system, and delivery of services. This could be achieved by creating effective institutions/institutional mechanisms.
- Crop forecasting mechanisms should be developed in a way that the latest information would be available to the farmers and other stakeholders on regular basis.
- Integrated land and water resources management (ILWRM) could be done through community participation with public sector playing an important role as enabler, facilitator and regulator.
- Institutional reforms with pro-poor strategies are needed in irrigation water sector.
- Integrated services provision (ISP) by the private sector with public sector playing an important role as enabler, facilitator and regulator is required.
- Try innovative and targeted pro-poor investments in irrigation water sector.
- Develop clear water policy and incorporate poverty concerns. Policy guidelines need to be based on research-based knowledge.
- Replicate IMT experience in other canal commands with strong regulatory backup.
- The irrigation sector financing should be based on full O&M cost recovery with pro-poor water charging strategy (i.e. according to location and farm size).
- Integrated management of surface water and groundwater should be made through canal water reallocation and conjunctive use of water.
- Implementation of groundwater regulatory framework should be implemented in true spirit.
- Specific cropping patterns and agricultural technologies should be recommended based on scientific knowledge of the canal command areas.
- The recommendations of change in cropping patterns should be based on crop diversification, high value crops (including non-conventional crops) and resource conservation practices.
- Targeted investments in irrigation infrastructure are recommended for the development, improvement and rehabilitation of surface water supplies and groundwater development.

ANNEX

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