Poverty Environment Nexus in Pakistan

UNDP
Pakistan

POVERTY ENVIRONMENT NEXUS IN PAKISTAN

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Cover Pictures:

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Foreground 2:	Mini-dam constructed by a Community Organization, Lachi
Foreground 3:	In-sanitation in Rawalpindi
Foreground 4:	Salt-affected land, Pindi Bhattian

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FOREWORD

Pakistan - a country of enormous natural and human resources - faces several environmental challenges such as deforestation, water logging and salinity, soil erosion, water and air pollution. This creates difficulties which affect the poor in two ways, firstly it prevents them from investing in conservation of natural resources which is the source of their incomes and secondly, it forces them to interact less profitably with the degraded environment.

Problems such as water shortages, climate changes, degradation of land prone to salinity and drought, scarcity of fuel-wood and building timber sometime push the poor into an impasse, as they traditionally have little access to the institutions.

It is not possible to address such challenges without strong policy support, public sector investment, human resource development and capacity building of environment related agencies. The Government of Pakistan has developed a Poverty Reduction Strategy, which covers an array of actions to be taken to increase the income levels of the poor. Macro-economic and social policies, aimed at poverty alleviation would definitely have beneficial environmental impact as well. The Strategy when fully implemented will help alleviate poverty and consequently conserve natural resources to ensure long-term sustainable environment and economic gains.

The present study highlights important success stories, which have unmasked the vicious cycle of the poverty-environment nexus and established innovative ways to address it. This document details the reasons behind the increasing poverty and environmental degradation and the factors that most affect it. Reversing these trends is important and must be done in a manner that causes least disturbance to the communities. There is little doubt that income improvement through community participation complemented by training in environment friendly methodologies that are generally cost effective, is the best way forward.

This study not only identifies the dynamics of the poverty environment nexus in Pakistan but also suggests the ways and means to resolve the important issues, as understanding the dynamics of a problem is the first step towards finding a solution. I congratulate the authors for producing such a valuable document which is likely to initiate further dialogue and will set a stage for initiating substantive projects that address poverty and environment issues simultaneously.

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ACRONYMS

ADBP	Agricultural Development Bank of Pakistan
AJK	Azad & Jammu Kashmir
AusAID	Australian AID
BAP	Biodiversity Action Plan
BOD	Biological Oxygen Demand
CCA	Canal Command Area
CLA	Corporate Law Authority
CMO	Carbon Mono Oxide
CNG	Compressed Natural Gas
CO_2	Carbon Dioxide
DFID	Department for International Development Fund
EIA	Environment Impact Assessment
EPA	Environment Protection Agency
FWCs	Family Welfare Centers
G.T Road	Grand Trunk Road
GCA	Gross Commanded Area
GTZ	German Technical Cooperation
Ha	Hectares
HPI	Human Poverty Index
IDA	International Development Agency
IFAD	International Fund For Agricultural Development
IPEL	Industrial Pollution and Environmental Laws
IPM	Integrated Pest Management
ISO	International Standardization Organization
LIFE	Local Initiative Facility for Urban Environment
LNG	Liquefied Natural Gas
LPG	Liquid Petroleum Gas
MAF	Million Acre Feet
MVET	Mobile Vehicle Emission Testing
NCS	National Conservation Strategy
NEAP	National Environment Action Plan
NEQS	National Environment Quality Standards
NIZs	National Industrial Zones
NOC	No Objection Certificate
NWFP	North West Frontier Province of Pakistan
PEPA	Pakistan Environment Protection Act, 1997
PEPC	Pakistan Environment Protection Council
PHCs	Primary Health Centers
ppm	Parts per million
PRSP	Poverty Reduction Strategy Paper
PSDF	Provincial Sustainable Development Fund
PSI	Productive and Social Infrastructure
PTAC	Pesticides Technical Advisory Committee
RH	Rural Health
SAPAP	South Asia Poverty Alleviation Program
SCARP	Salinity Control and Reclamation Project
SME	Small and Medium Enterprise
SPM	Suspended Particulate Matter
Sq. Km	Square Kilometer
S.R.O	Statutory Regulatory Order
SS	Suspended Solids
TBAs	Traditional Birth Attendance
TDS	Total Dissolved Solids
TDS	Total Dissolved Salts
UNESCO	United Nations Education, Scientific and Cultural Organization
USAID	United States Agency for International Development
VETS	Vehicle Emission Testing Station

EXECUTIVE SUMMARY

The annual cost of environmental degradation in the country is about 4.3% of the GDP

Pakistan is blessed with tremendous human and natural resources, which if used carefully can advance human development. However, Pakistan faces many problems such as poverty, lack of access to basic services, low literacy rate, gender disparities, environmental degradation and above all, high indebtedness.

According to the Population Association of Pakistan's Statistical Profile 2002, the country's population is 142.5 million with 2.1% growth rate. Pakistan ranks 135 out of 174 on the Human Development Index and 115 out of 174 on the Gender-Related Development Index [1]. According to the Human Development Report 1999, it ranks 101 out of 102 on Gender Empowerment Measure and 52 out of 58 on Humane Governance Index[2].

Pakistan is confronted with a number of environmental threats which are also linked with poverty, such as degradation of natural resources, industrial and vehicular pollution, pollution of marine environment, degradation of human health, etc. Summarizing in monetary terms, the annual cost of environmental degradation in the country is about 4.3% of the GDP (US $ 4.3 billion) which is equivalent to almost half of Pakistan's export earnings [3].

Pakistan has a total land area of approximately 88.2 million hectares, of which about 20 million hectares are used for agriculture, while some 3 million hectares are forests and rangelands. The main causes of reduced land productivity are shortage of irrigation water, wind erosion, salinity and sodicity, waterlogging, flooding and loss of organic matter. According to the Pakistan National Conservation Strategy (NCS) [4], 17% of the surveyed soils (which include most of the soils used for agriculture, forestry or ranching) are affected by water erosion, 7.6% by wind erosion, 8.6% by salinity and sodicity, another 8.6% by flooding and ponding; and a full 96% suffer from less-than-adequate organic matter. These problems often occur simultaneously and produce synergistic impacts on agricultural productivity which is evident in the form of almost static crop yields during the last few decades.

The farmers are aware of these problems but are unable to add supplements into their soils due to lack of financial resources, rather they are

1 UNDP. 2000. Human Development Report. UNDP, New York.

2 UNDP. 1999. Human Development Report. UNDP, New York.

3 Da Silva, Y. and M. Qizilbash. 1998. Environmental evaluation and accounting: the case of Pakistan's forests. SDPI Working Paper No. 29. SDPI, Islamabad.

4 IUCN and Ministry of Environment and Urban Affairs. 1992. National Conservation Strategy. Ministry of Environment and Urban Affairs, Govt. of Pakistan, Islamabad.

bound to burn crop residues and animal droppings[5] as there is scarcity of fuel-wood and natural gas. The high cost of electricity is also unaffordable for the poor farmers. In fact, the poor performance of the agriculture sector is the principal cause of migration of farm workers to cities.

Approximately 175 billion cubic meters of water enters the Indus Basin annually. Of this, 128 billion cubic meters is diverted for irrigation purposes at the canal heads while the remaining water flows to the sea. It is estimated that about 50% water is lost in transit from canals to fields and 25% because of inefficient irrigation techniques.

The total water off-take of the Indus basin 30 years ago was 1,600 cubic meters per capita. Today it is about 1,269 cubic meters (UNDP, 2000). If the population continues to increase at the current rate and efforts are not made to improve irrigation efficiency and rainwater harvesting; then the per capita availability of water will fall below the minimum required threshold of 1,000 cubic meters per capita and Pakistan will fall in the category of desert countries [6].

Pakistan currently lacks the necessary storage capacity, in part because of heavy silting of reservoirs which is a result of degradation of watersheds. The country has regularly experienced critical water shortages resulting in power blackouts (main power source is hydroelectric) and also inadequate supplies of irrigation water for the winter crop-growing season. The shortage of irrigation water is one of the main factors preventing the nation from attaining food self-sufficiency.

Approximately 5.2% of the total landmass[7] of Pakistan is under some kind of forest cover. Between 1974 and 1985, timber supplies from state forests declined by 45%, in part because of the reduced forest area. The loss to forests occurred at a rate of 0.4% from 1981 through 1984. Now it has decreased to 0.2% per annum. This figure translates into the destruction of 7,000 to 9,000 ha of forested land every year. Today, Pakistan imports about 30% of the timber it uses.

Efforts for afforestation and watershed management have not kept pace with the increasing demand for timber and excessive cutting and overgrazing. The heavy deforestation stems from a number of factors. During the colonial and post-independence periods, entrepreneurs commercially exploited large forest tracts to meet the demands of a growing rural and urban population. With the development of canals, hundreds of thousands of hectares of riverine, scrub and forestland in the Indus plains were cleared for agriculture. Energy demand has also increased pressure on the forests. The annual consumption of wood during 1998 was 51.289 million cubic meters and by the year 2013 it is likely to increase to 67.028 million cubic meters (80% urban and 20% rural). With the increase in population, further increase in wood consumption is hardly surprising.

The consequences of forest exploitation include soil erosion and sedimentation, desertification of once-productive upland areas, silting up of waterways in plains thus making them more prone to flooding, and marked scarcities of fuel-wood and building timber which creates an economic burden on low-income communities.

Resource capture opportunities often prompt a migration of

Slow progress in agricultural sector and lack of alternate employment opportunities are mainly responsible for large scale rural to urban migration

[5] Ideally to be returned to the soil as manure.

[6] Banuri, T. 1994. On-farm water management: Whose job is it? How best can it be done? In: Water and community (ed. C. Inayatullah). SDPI, Islamabad. Pp: 213-216.

[7] Federal Bureau of Statistics, Government of the Pakistan, Islamabad, 1998.

dispossessed inhabitants from affected areas in search of a better life. Receiving areas whether rural or urban are ecologically vulnerable and are further degraded as incoming migrants place an additional stress on existing resources. According to the 1981 census, of the 5.92 million persons who had migrated within the country, 87.6% moved from rural to urban areas, while only 12.4% moved in the opposite direction. Over 50% of them permanently settled in cities. The chief factors responsible for such migration were slow progress in the agriculture sector, low crop yields, lack of alternate employment opportunities and environmental degradation due to waterlogging/salinity, deforestation and desertification.

Because of their exposure to polluted water, the poor are more prone to adverse health impacts

The large rural influx has, in turn, contributed to the overburdening of urban infrastructure and services. There has not only been a rapid decline in the quality and availability of basic urban resources and amenities, such as housing, potable water, transportation, electricity, gas, drainage and sewage but also a mushrooming of katchi abadis (squatter settlements), often located on the most marginal lands. Today, squatter settlements account for about 25 to 30% of Pakistan's overall urban population. The municipal institutions do not have sufficient resources and technical capacity to accommodate the needs of increasing urban population.

Unfortunately, none of the cities in Pakistan has a sewer water treatment plant - all of it either stays in the streets due to lack of proper drainage infrastructure or goes to waterways. Likewise, only a fraction of the solid waste is collected and disposed off properly. The incidence of diseases related to insanitation and unsafe drinking water, like diarrhea, hepatitis, etc., is on the rise.

The poor are more prone to the adverse health impacts. This is both because of their greater exposure to polluted water, as well as the lack of health facilities to deal with them. Unavailability of adequate nutrition, lack of education and overcrowded housing increase their vulnerability to diseases. Low-income neighborhoods mushroom around industrial areas, where exposure to air pollution is high. The poor also work long hours in factories in unsafe conditions; women and children, in particular, are vulnerable as they are exposed to dust and chemical inhalations in household industries producing carpets, textile and leather goods. Poor communities are the most exposed to auto-emission and other toxic fumes, as they tend to live close to the main trunk roads.

Vehicular pollution in highly congested urban centers where movement of air is minimal is a major environmental problem, leading to human health hazards and also contributing to global warming. The problem is two-fold: firstly, the vehicle population is increasing constantly and secondly old model automobiles which have completed their lifetime are in use as people lack enough resources to buy new ones and the country cannot afford to spend foreign exchange for this purpose. Such automobiles are not only energy inefficient but also emit more hazardous gases than the standards established by the auto-industry. The pedestrians and children are the ones who suffer the most because of proximity to the exhaust.

As the price of diesel in the local market is about 50% less than that of gasoline, conversion of gasoline engines to diesel is a common practice. The air pollution due to diesel engines is very high. Thus there is a link of poverty with the degradation of urban environment.

Untreated effluent contaminates water bodies and makes water unfit both for human consumption and aquatic life. Similarly, smoke emissions from factory stacks and disposal of industrial waste is a serious threat to the atmosphere, soils and health of nearby inhabitants who are generally poor.

The use of solar and wind energy and energy efficient appliances is a remote idea in Pakistan. On the other hand, people pay high amounts of charges on account of consumption of electricity and natural gas (mainly fuel). They are not familiar with the concept of energy conservation which is also evident by the energy inefficient building designs and energy inefficient appliances. Thus there is a tremendous scope of conservation of energy by creating awareness about the use of energy efficient techniques and appliances and solar energy. These interventions would lead to conservation of non-renewable sources of energy and savings at the household level.

The paper documents nine case studies showing the vicious cycle of the poverty-environment nexus. These include water crisis in Balochistan; degradation of rangelands; degradation of juniper forests; sodicity and salinity; plant nutrient mining; use of pesticides; degradation of forests and watersheds; emergence of slums in urban centers; and industrial pollution. Learning from these case studies, causes of increasing poverty and environmental degradation have been identified. These are broadly grouped as: (i) increasing human and livestock population; (ii) stagnant agricultural growth and rural to urban resource transfer; (iii) climate change and shift in cropping pattern; (iv) lack of capital and access to technology; and (v) weak governance.

The present research has documented that how the poor communities have been trapped in the vicious cycle of the poverty-environment nexus. Rather one-step forward is poverty-environment-health nexus. The natural resources have been and still are being utilized at a growing rate. Partly this is due to the fact that the government and people do not have enough capital to invest in the conservation of environment and switch over to eco-friendly technologies, and partly due to lack of government's capacity to implement rules and regulations. The matter is further compounded due to increasing human and livestock population which places a great pressure on natural resources. Lastly, in the past few years, drought has increased the problem exponentially. The dryland areas have become deserts, resulting in the perishing of millions of livestock heads and increased poverty. The plains of Punjab, which used to be suffering from water-logging, are now facing the problem of salinity: In the absence of freshwater, farms have gone out of production and fish farms have dried up. This paper documents several case studies proving that the poverty-environment nexus is prevalent in the country.

In the urban sector, poor communities are suffering because of health problems due to insanitation, industrial and vehicular pollution. The poor have to invest more on their health compared to rich. This paper gives a comprehensive review of the extent of industrial pollution, and examines government policies and their implementation status.

The vicious cycle of poverty-environment nexus could be broken through redistribution of economic opportunities and empowerment of communities. This is where participatory community based development programs appear as a most effective entry point for reversing the existing trends.

The report gives an account of the success stories from 27 projects in both urban and rural sectors whereby it has been demonstrated that it is possible to help in generating incomes and reducing poverty by adopting environment friendly technologies. In this regard, all the stakeholders, namely, communities, NGOs, private sector and the government need to continuously play their roles effectively.

The key conclusions and policy options emerging from the

Government and people do not have enough capital to invest in the conservation of environment and switch over to eco-friendly technologies

analysis are (i) integrated approaches work best; (ii) institutional resistance is a greatest barrier to sustainability of collaborative ventures; (iii) policies should be developed in consultation with the people; (iv) local people should be involved in afforestation, deforestation, protection, harvesting, and selling of forest products; (v) user rights and security of tenure should clearly be provided; (vi) sustainable land use planning be undertaken; and (vii) data on cover, condition and density of the forests, be generated, on regular basis.

The government has taken positive steps and developed a Poverty Reduction Strategy, which covers an array of actions to be taken to increase the income levels of the poor. The drivers include:

Environmental degradation concerns require macro - economic, social and environmental policy interventions

- Economic reforms for rapid economic growth.
- Physical asset creation; programs of land allocation, credit, Zakat and Usher for capital formation 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.
- Social asset creation; creation of social assets by ensuring cost-effective provisions (public or private) of basic needs of the poor i.e., access to education; health; nutrition; water supply and sanitation. This is for human and social capital formation for the poor through a participatory process involving the poor and civil society.
- Social safety net; for the chronic or transitionally vulnerable groups, this will provide adequate supplementary transfers to ensure satisfaction of basic needs, i.e., food, shelter, etc.
- Governance; improved efficiency in the public and corporate sectors to provide rule of law and improve the efficiency of service delivery.

The government has also prepared a 3-Year Rolling Poverty Reduction Plan and a 10-Year Perspective Plan. Addressing environmental degradation and conservation concerns require macro-economic and social, as well as specific environmental policy interventions. Macro-economic and social policies, aimed at poverty alleviation have beneficial environmental impacts as well. Thus the key actions identified relate to income re-distributions, provision of social services, promotion of rural infrastructure, employment promotion and provision of credit to the rural and urban poor. The strategy given in the above plans, if implemented in its true spirit, will help alleviate poverty and consequently save natural resources.

1.0

INTRODUCTION

Rapid population growth and degradation of a nation's environmental resources may impair its economy, disrupt its social relations, and destabilize its political system. These stresses can cause civil or even international strife. Today, such conflicts are likely to appear in certain parts of the developing world where growing populations with rising expectations struggle to sustain themselves on a dwindling resource base.

Some commentators view Pakistan as increasingly vulnerable to environmentally induced conflicts. They argue that with a population growth rate that ranks amongst the highest counts in the world; a declining resource base and growing evidence of societal strife, environmental and demographic stresses are already destabilizing Pakistan (see Annex I for environmental facts). However, in the past there has been no adequate investigation of whether and how population growth and scarcities of renewable resources, such as cropland, forests, and freshwater (which are referred here as "environmental scarcities"), contribute to the intensity and extent of unrest within Pakistan. The provincial debate over freshwater resources and movement of wheat flour (from Punjab to NWFP and Sindh) are extreme examples. Encroachment of poor communities over state land in urban areas, rights of people on the use of forest resources, resisting the inflow of industrial or household sewage in the streets or agricultural lands, etc., are issues of daily life. Roughly half of the crimes in rural areas occur because of violation of rights on the usage of irrigation water.

The poor are mainly dependent on natural resources and virtually have no resources to invest in their conservation. For instance, the soils are not adequately fertilized, high efficiency irrigation techniques are not used to conserve water, rangelands are overgrazed to produce flocks of livestock and forests are degraded while extracting timber, fuelwood and grass which consequently depletes capacity of water reservoirs due to siltation. Once the ecosystems are degraded, they cannot sustain the human and livestock population which results in reduced income of the already poor people, thus leading to widespread poverty. In urban centers, the poor have to spend more on below standard housing and face health hazards due to lack of safe drinking water, sanitation and exposure to industrial and air pollution. The pooled effect of these factors is reduced life span, loss of income due to lost job-days because of illnesses and increased expenses on health care. Again the poor remain in the poverty trap. The vicious cycle of poverty-environment nexus is further explained in Fig. 1.

The poor are mainly dependent on natural resources and virtually have no resources to invest in their conservation

In reality, the poverty-environment nexus is formed through redistribution of economic resources from vulnerable sections of society to the power holding elite due to monopolistic control exercised by these groups over productive and mainly non-reproducible natural resources, constituting the natural capital of a society. Monopolistic control enables power holding groups to: (i) transfer the cost of environmental pollution and degradation to weaker, disorganized, disenfranchised and marginalized groups, sexes and

communities, and (ii) earn above normal profits by paying very low prices for accessing natural resources which do not reflect their natural scarcity and take undue share of natural capital in public domain due to non-availability of effective legal protection and poor governance.

The conflicts in the urban sector are more evident. Environmental scarcity is now a major contributor to: (i) the rapid expansion of the urban population; and, (ii) to the growing inability of the state to meet the demands (food, water, energy, etc) of growing population. The arrival of millions of Afghan refugees in NWFP and Balochsitan has exerted an enormous ecological pressure on forests and rangeland. Furthermore, the service delivery system, particularly in Peshawar, has greatly been affected because of refugees. Within the Pakistani urban context in general, chance of competition among rival groups has risen, struggles over scarce urban resources have mounted, and grievances have proliferated.

Poverty breeds fatalism which leads to acceptance of a given situation rather than a desire and resultant efforts to change it

Poverty, it is presumed, imposes short time horizons. Poor people, simply put, eat into their savings and borrow whenever possible. In terms of land use, this means overgrazing of pastures, shortening of fallow periods and a reluctance to invest in land improvements where returns occur after a long gestation period. A related presumption - one with stronger empirical grounds - is that poor people are more risk averse. This is not an innate trait but one which stems from relegation to marginal areas which are already experiencing high levels of degradation and where future outcomes are uncertain; consequently there is a tendency to mine resources unsustainably. Also, the poor face greater constraints in managing their risks, with few assets and limited access to credit and insurance. A more doubtful conjecture is that poverty breeds fatalism which leads to acceptance of a given situation rather than a desire and resultant efforts to change it.

Furthermore, the behavioral link between poverty and the environment cannot be isolated from other exogenous influences such as institutional and market failures. Power, wealth and greed, often accompanied by institutional paralysis and the market's inability to monetize costs of degradation, act in concert with poverty to create resource stress. A term which encapsulates all these elements is 'resource capture'.

Degradation is self-correcting, as in the long run it will induce the development of new agricultural and resource management processes. However, the time lost in restoration of the environment could be as long as of its generation. Furthermore, such examples usually come up from the urban rather than rural areas.

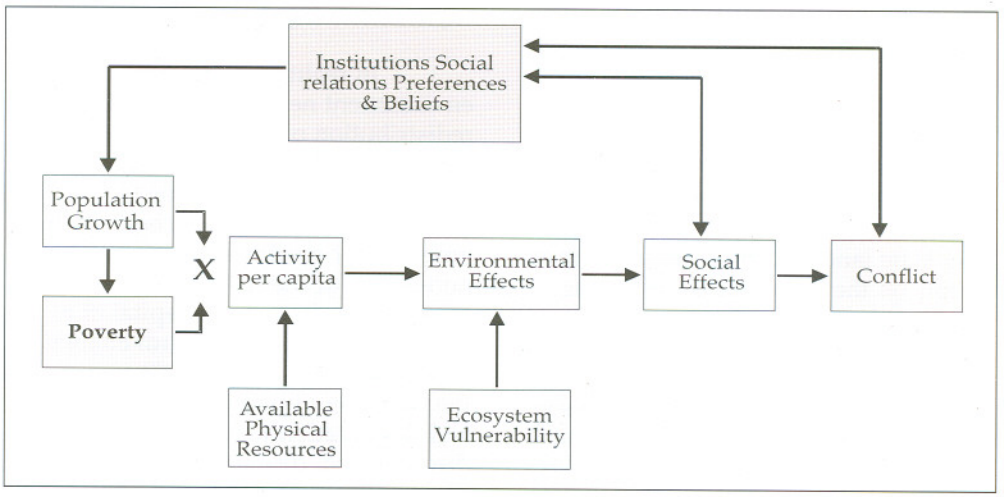


Fig. 1. Poverty-Environment Nexus Leading to Social Effects and Conflicts on Environmental Scarcities[8]

[8] Gizewski, P. and Homer-Dixon, T. 1996. Environmental Scarcity and Violent Conflict: The Case of Pakistan, Occasional Paper, Project on Environment, Population and Security, Washington, D.C.

2.0

POPULATION, POVERTY AND DEVELOPMENT

Population and development are intrinsically interrelated as progress in any component can catalyze improvements in others. According to the Population Association of Pakistan's Statistical Profile 2002, the country's population is 142.5 million with 2.1% growth rate. Fertility and mortality, the two decisive factors underlying the growth of population, are estimated at a crude birth rate of 30.2 per thousand and a crude death rate of 8.3 per thousand during the same year. Pakistan is currently adding about three million people to its population each year.

As in other rapidly growing countries, Pakistan population is young: 41% under age 15. The large (over 24%) adolescent population (age 15-24) would soon be entering their married life and contributing to the population growth for several decades to come. This constitutes the population momentum, which is influenced by past fertility patterns. Another striking change that has occurred is the growing proportion of the urban population. While the total population of the intercensal period 1981-98 has been growing at about 2.61%, urban population has grown even faster at about 3.5% per year. The rapid population growth can also be viewed from a simple measure of population density.

Pakistan's GDP growth rate was 6% in the 1980s, with the population growing at around 3%, there was more than 2% increase in the per capita income. However, during the 1981-2000 period it is recognized that population growth has eroded two-thirds of the growth in income. It is generally stated that whilst poverty is the root cause of high fertility, the common outcome of the latter is poverty. Therefore, the population growth rate has to fall sharply in order to significantly increase the growth in per capita income and also to decrease the level of poverty which has increased from 17.3% in 1987-88 to 33.5% in 1999-2000.

A rapid growth of slums in urban areas has been witnessed, most of these lack basic amenities such as water supply, electricity and adequate social services. The rise in poverty can be attributed to low rate of economic growth, implying a slow increase in per capita income, rising unemployment, stagnation in real wages. Furthermore, low savings and a low investment environment have strong linkages with low employment generation. At the same time low savings has resulted in high national borrowing, which has raised the debt burden. This has set the vicious cycle of borrowing and debt servicing, which consumes a major chunk of the available resources - only leaving negligible amounts for investment in social sectors. Pakistan, a semi-arid country with only one third of the area being arable, faces the problem of land fragmentation due to an increasing population along with a decline in productivity. Rapid population growth also contributes to environmental degradation and depletion of natural resources.

Population growth rate has to fall sharply in order to increase the per capita income

At the micro level, the impact of poverty is more obvious. Poorer families, especially women and marginalized groups bear the burden of a large number of children with

fewer resources, further adding to the spiral of poverty and deterioration in the status of women. Income poverty leads to pressures on food consumption, which adversely affects caloric intakes and increases malnutrition in poorer families, thereby contributing to high levels of infant and maternal morbidity and mortality. It is estimated that about 40% of Pakistan's children being under nourished and under-weight, posses impaired ability to actively contribute in socio-economic development. Similarly, 45% women of childbearing age (15-49) suffer from malnutrition. All these factors reinforce high fertility and low economic productivity which in turn perpetuate poverty.

The flip side of the coin is a look at Pakistan's economy, which for a number of reasons is in a state of stagnation. In the fiscal year 2001-2002, GDP was reported to be 2.6% and the population growth rate for the same period was 2.2%. Juxtaposing the two numbers means that income per head of the population increased by 0.4%. One consequence of such a small increase is the known sharp rise in poverty.

Economic growth has failed to trickle down to the poor at a substantial scale

Another aspect of poverty is that the economic growth has failed to trickle down to the poor at a substantial scale. The missing link is the lack of adequate growth in the social and governance indicators; and the inadequate attention paid to environmental indicators (air, water, forest, soil, watersheds). This means that while economic growth is necessary for poverty reduction, poverty reduction itself is necessary for sustained growth defined in terms of social and environmental sustainability. Pakistan's "Human Deprivation Profile" is given in Table 1. About 30% of Pakistan's population is below the food poverty line defined as not able to incur the food expenditure needed to achieve the minimum required level of caloric intake (2150 calories/day). In terms of the broader "Human Poverty Index" – the percentage of the population below the line is about 50%. These estimates may be contested – but it would be safe to say that a "significant" proportion of Pakistan's population is afflicted by the debilitating effects of poverty – and does not have adequate levels of food, basic needs and opportunities.

In a country league (South Asia) comparison (Table 2), Pakistan's human deprivation indicators are awfully low. Pakistan has the highest rates of infant mortality, under 5 years mortality and fertility rate. It is second from the bottom in its performance on female literacy. Worse even, Pakistan has left about 40% of the children either to starve or search their food from the kitchen wastes lying at garbage heaps. The malnourishment at that tender age can stunt mental growth permanently.

Table 2 presents the status of a larger set of countries on the Human Poverty Index. The data in this table is for the late 1990s and showing some progress in comparison with the data in Table 1 for the mid 1990s. It also gives the performance of East Asian countries. Among the South Asian countries, Sri Lanka has done best on social indicators. Korea and Malaysia are almost at the level of developed countries and they accomplished their remarkable transformation in the short period of a single generation. In 1960, Korea's per capita income was equal to that of Pakistan and Korean officials used to come to Pakistan to learn from its development experience. Pakistan could, at the eve of the 21st century, try to reach by 2025, the current Korean level of human development. Given the advances in information technology, it is possible to increase Pakistani productivity at the rates achieved by Korea or China during the later part of the 20th century.

The government, through the Poverty Reduction Strategy Paper (PRSP), is pursuing a two-pronged strategy in order to address the issue of deprivation. On the one hand, the government is introducing policies

Table 1. Pakistan's Human Deprivation Profile

♦ Population below Food Poverty Line (Million)	45
♦ Population below the Povzerty Line defined by HPI (Million)	72
♦ Illiterate adults (million)	52
♦ Illiterate female adults (Million)	30
♦ Malnourished children under five (%)	38
♦ Under 5 mortality rate (per 1000 live births)	136
♦ Infant mortality rate (per 1000 live births)	95
♦ Fertility rate (%)	5

Table 2. Comparative Human Poverty Indicators of Selected Countries

Country	Human Poverty Index (%) (1997)	Adult Illiteracy Rate (%) 15 years older (1997)	Female Illiteracy Rate (%) (Age 15-24 years) (1997)	Children under 5 who are under weight (%) 1990-98	Children under 5 who are wasting (%) 1990-98	People not expected to survive to age 15 (%) (1997)	People not expected to survive to age 40 (%) (1997)
Egypt	33	47	41	12	6	7	10
Tunisia	23	33	15	9	4	4	8
Bangladesh	44	61	63	56	18	13	21
China	19	17	4	16	-	5	8
India	36	47	44	53	18	11	16
Indonesia	28	15	4	34	13	7	13
Iran	20	27	10	16	7	6	10
Korea	-	3	0	-	-	2	5
Malaysia	14	14	3	19	-	2	5
Nepal	52	62	62	47	11	14	23
Pakistan	50	50	75	38	-	12	15
Philippines	16	5	2	28	6	5	9
Sri Lanka	20	9	4	34	14	2	5
Thailand	19	5	2	19	6	4	11
Turkey	17	17	8	10	-	7	10

that increase economic opportunities for the poor; empower them; and, provide access to physical assets and social facilities like education, health, water supply and sanitation with a system of safety net to protect them.

On the other hand, an effective fertility moderation program has to be pursued and sustained for a period of time to achieve replacement level fertility, which ultimately would lead to population stabilization.

3.0

EXPLOITATION OF NATURAL RESOURCES

3.1. Land

Pakistan comprises 88.2 million hectares of land, of which 73% (79.61 million ha) has been surveyed and reported. Of this area, 37% is cultivable, 43% is unavailable for cultivation (this includes mountains, rivers, deserts and urban areas), and approximately 6% is forest [9]. Thirty-two percent of land area is considered as rangelands. Sixty-five percent of Pakistan's population is rural and economically dependent on agricultural lands, rangelands and forests.

The average annual growth rate of major crops declined from 3.34% during the 1980s to 2.38% during the 1990s

Irrigated land supplies over 90% of agricultural production, while agriculture in turn fulfills most of the country's food requirements, contributes 26% of GDP and employs 54% of the labor force. Agriculture is also a source of raw materials for major domestic industries particularly cotton products, which account for 80% of the value of exports.

The area, production and yield of various crops is given in Annex 2, which clearly indicates that the increase in agricultural production is mainly due to increase in area, rather than increase in crop yields (see also case study on pesticides- Section 5.6.). The Government's agricultural pricing policy is the main driver for area under a given crop.

The level and pattern of output growth in the crop sector during the 1990's when viewed in a longer-term perspective suggest the emergence of institutional constraints to sustainability, such as irrigation water and related soil degradation. The average annual growth rate of major crops declined from 3.34% during the 1980s to 2.38% during the 1990s (Table 3). At the same time, the frequency of negative growth in some of the major crops during the last 17 years has been significantly higher than in the preceding two decades. If wheat is considered, which is by far the largest of the major crops (over 30% value added in major crops), it is evident that average annual growth rates have been steadily declining since the onset of the "Green Revolution", from the high point of 7.42% in the 1960's to 2.33% in the 1990's. Underlying the decline in the growth of wheat output is a steady decline in the growth of wheat yield per hectare: from 4.38% in the decade of 1960's to 1.81% in the 1990's (Table 4). The frequency of years in which an absolute decline in wheat yield per hectare occurred was 7 in the period

Table 3. Average Annual Growth Rate of Major Crops* (1980-97)

Period	1980-81 to 1989-90	1990-91-1996-97
Average annual growth	3.34%	2.38%

*Note: * At constant 1980-81 factor cost*
Source: Federal Bureau of Statistics, Government of Pakistan
Calculations: Akmal Hussain

[9] Federal Bureau of Statistics, Government of the Pakistan, Islamabad, 1998.

Table 4. Wheat: Average Annual Growth Rate of Output and Yield / acre and the Frequency of Negative Yield Increase, 1960 to 1996

Period	Average annual growth rate of output (percent)	Average annual growth rate of yield / acre (percent)	Frequency of negative yield increase (compared to previous year)
1960-61 to 1969-70	7.42	438	3
1970-71 to 1979-80	4.43	318	2
1980-81 to 1989-90	330	206	4
1990-91 to1996-97	233	181	3

Source: Economic Survey of Pakistan, Government of the Pakistan, Finance Division, Islamabad, 1997-98
Calculations: Akmal Hussain

1980 to 1997, compared to 5 in the preceding two decades.

Under conditions of declining input productivity, when higher input use per acre is required to maintain yields, small farmers with fewer resources are likely to suffer a greater than average decline in yields, compared to large farmers. At the same time, due to lack of savings to fall back on, they are relatively more vulnerable to bad harvests under conditions of unstable growth. Consequently, slower and unstable growth may be accompanied by a tendency for growing inequality in rural income distribution, poverty and unemployment.

Underlying the phenomenon of a gradual deceleration of growth and increased frequency of negative growth years may be the emergence of a number of institutional constraints, the two most important ones being (i) reduced water availability due to deterioration in the canal irrigation system, and (ii) degradation of soils due to depleting soil nutrients and soil erosion associated with improper agricultural practices.

Furthermore, practices such as double cropping, increase in labor productivity, and better technical inputs (such as new grains) can boost agricultural output. But a number of forces have combined to prevent the realization of the country's full agricultural potential. These include poor water management practices (which restrict double-cropping), a system of absentee landlords, the fragmentation of landholdings, the reduction in farm size from generation to generation as farming populations rise, poor access to agricultural capital, poor technology transfer to farmers, and a lack of information concerning the use of agricultural inputs, such as fertilizers and pesticides. The heavy use of fertilizers particularly during the 1960s and 1970s, has also left soils deficient in a number of nutrients essential to plant growth.

Heavy use of fertilizers during the 1960s and 1970s has left soils deficient in essential nutrients

3.2. Water

An arid and semi-arid country, Pakistan's water sources have always been limited. A finely balanced system of water management for irrigation, electricity, and industry has been developed. The system is shaped in part by the Indus Waters Treaty. Signed in 1960 by India and Pakistan following long-standing water disputes, the treaty gives Pakistan control over the Indus and its Western tributaries including the Jhelum and Chenab, while India controls the Ravi, Beas, and Sutlej branches in the East. The treaty also allowed Pakistan to construct two large storage and hydroelectric dams: the Tarbela on the Indus and the Mangla on the Jhelum, as well as a system of smaller dams, inter river-canals, and irrigation canals. This irrigation network now services

Box 1
Water Resource Access in Bannu

Bannu is one of the smaller districts of the NWFP, situated in the dryland plains and hilly region suited to growing wheat and other crops. It depends upon irrigated flow from rivers such as the Kurram and Gambila which flow from watersheds in Afghanistan. An extensive investment in water infrastructure has been made over a long time period, but many users enjoy only limited benefits, or at times, none at all: partly because of the way water rights were allocated in a permanent fashion in 1905. The irrigation infrastructure is in rough shape. The Baran Reservoir has lost 60% of its capacity due to siltation. Many canals are filled with sand and gravel. The upstream watersheds are a major worry because the lands in the tribal areas and Afghanistan, once heavily forested, are now denuded and the areas have little capacity to store water. Conflict over water is common in Bannu.

about 16 percent of the country and is one of the largest among such systems in the world. As much as 65 percent of agricultural land is irrigated, accounting for about 90 percent of the country's food and fiber production.

Of the 128 billion cubic meters of water, about 50% is lost to seepage and evaporation from canals

Approximately 175 billion cubic meters of water enters the Indus Basin annually. Of this, 128 billion cubic meters is diverted for irrigation purposes to the canal heads, while the remaining water flows to the sea. Although this flow to the sea is needed to maintain a viable river ecosystem, especially in the Indus estuary, experts agree that much of it could be stored for irrigation. Yet, Pakistan currently lacks the necessary storage capacity, in part because of heavy silting of reservoirs. The absence of this water is one of the factors preventing the nation from attaining food self-sufficiency.

The existing irrigation system is also highly inefficient. Of the 128 billion cubic meters diverted for irrigation, about 50% is lost to seepage and evaporation from canals and watercourses and 25% in the field due to flood irrigation. This loss is a major cause of waterlogging and salinity of soils in the Indus Basin. Vertical pumping systems used for drainage are proving unsustainable: the recycled water contains chemicals that produce sodicity and reduce the life of pumping machines and deteriorates soil quality. The major problems of Pakistan's irrigation system are:

1. Water scarcity due to inadequate reservoir capacity: In view of the fact that Pakistan's rivers are highly seasonal (85% of annual flows are in the summer season); adequate reservoir capacity in its irrigation system to store seasonal waters is lacking. Consequently, cropping intensity is exceptionally low (for instance, out of 16 million hectares of irrigated land only 5.7% million hectares are double cropped). Due to siltation the storage capacity of Mangla and Tarbela dams has been reduced considerably. The Warsak reservoir has become a riverbed and its storage capacity is zero, because of heavy deforestation that has occurred in Afghanistan.

2. Low delivery efficiency of irrigation: Due to over use and poor maintenance, the average delivery efficiency is only 25 to 40% from the canal head to root zone, with most of the losses occurring in the watercourses. The huge loss of surface water is a major factor in creating waterlogging and salinity. A significant proportion of the water lost through such seepage from the irrigation system flows into saline groundwater reservoirs thereby making it impossible for re-use by tubewell irrigation. Since Pakistan's agriculture depends almost completely on irrigation, in the face of increasing shortages of water in the future, improvement in the delivery efficiency of irrigation is crucial to sustaining agricultural production.

3. Inequitable distribution of irrigation water: Contrary to the original design of the irrigation delivery system, in reality, water does not reach users at the tail end of the system. This is to a large extent due to reduced carrying capacity of canals resulting from inadequate maintenance. Illegal pumping from canals adds to the inequality of distribution.

4. Problem of drainage, waterlogging and salinity: The flat topography of the Indus Plain and the associated lack of natural drainage channels, semi-arid climate and porous soils combine to create a surface drainage problem. This problem is compounded by construction of roads, railways and flood embankments which obstruct natural drainage flows. Irrigation without adequate drainage in such an environment, inevitably leads to rising water tables resulting in salinity and waterlogging. During the 1960s a number of Salinity Control and Reclamation Projects (SCARPs) were undertaken. Despite these efforts, about 30% of the Gross Commanded Area (GCA) was waterlogged (until two years ago) and 14% was salt affected. The drainage practices have a negative impact on aquatic biodiversity (see Box 1). Thanks to the present drought for the last three consecutive years, waterlogging is no more a problem in the country but salinity (in the absence of freshwater) has become worse. The farmers are unable to grow anything on salt-affected lands.

5. Inadequate operation and maintenance of the irrigation system: Pakistan's irrigation and drainage systems have been deteriorating because of deferred maintenance associated with budgetary constraints and declining administrative capability. The gap between the operations and maintenance expenditure requirements and recoveries through water charges has been increasing, and has now reached 57% for Pakistan as a whole and over 80% for NWFP and Balochistan.

6. Ground-water mining: Beyond the Indus Basin, sharp drops in the water tables of underground aquifers - from 15 centimeters to over 60 centimeters, per year - are occurring in a number of areas due to increasing installation of tube-wells. The water table in the Northern Basin of the Quetta Valley is falling at a high rate of 200 cm per annum, while the Southern Basin has registered a yearly decline of 60 cm. The groundwater table in Lahore is falling at a rate of 30 cm per year in the central part of the city due to excessive withdrawals by a growing urban population.

Pakistan's irrigation and drainage systems have been deteriorating because of deferred maintenance

7. Water pollution: An inadequate sewage treatment infrastructure adds to problems. Many of Pakistan's rivers are now badly polluted with domestic sewage and industrial waste. A recent study of the Kabul River (near Peshawar) reveals that parts of the river and some of its tributaries have become open sewers. Much of this polluted river water is used for drinking and irrigation. In fact, inadequate drinking water represents a long-standing and serious problem in several parts of the country. It is increasingly common to see people in many parts of the country walking for kilometers to fill a container with water.

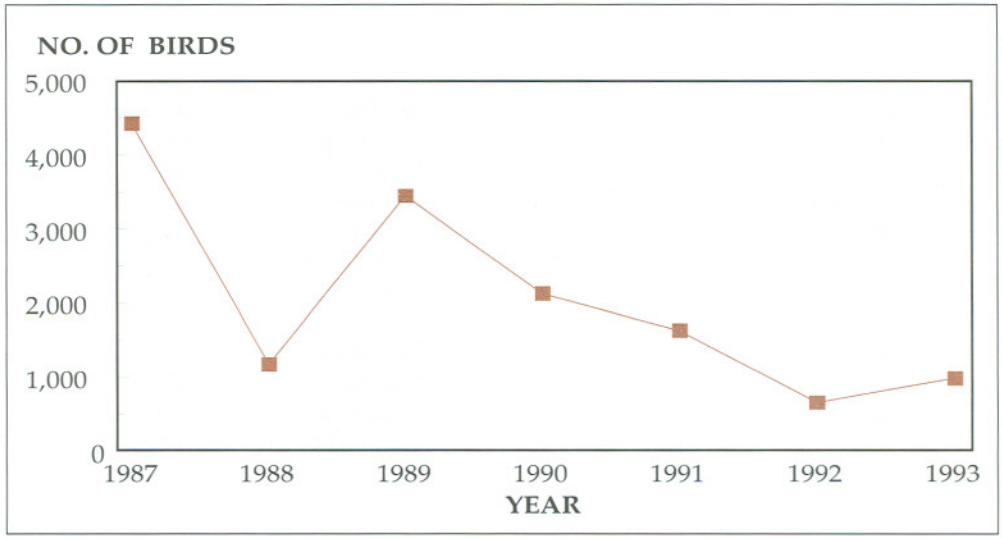
The matter becomes even more complex when sewage and industrial wastewater is used for irrigation purposes, particularly for vegetables. This water is affluent with heavy metals, which deposit in the soil, vegetables and certainly human bodies. In a recent study conducted by the

Box 2

Gamaghar Lake

Gamaghar lake is 3 km from Chunian and about 35 km from Lahore. It is a shallow, brakish lake surrounded by marshes on the plains between the rivers Sutlej and Ravi. The lake is fed by agricultural run-off and seepage from neighboring fields and by occasional flooding from the Sutlej river. There was a time when Gamaghar and other wetlands around Lahore harbored a large variety of migrant waterfowl from Russia, Siberia and the Central Asian states in the winter. It was a winter refuge for a large variety of waders. Extensive irrigation, without any arrangements for drainage, resulted in high levels of waterlogging and salinity in the agricultural areas with repercussions on the socio-economic conditions of the farmers. To overcome this, Water and Power Development Authority (WAPDA) launched a massive drainage programme to rehabilitate waterlogged areas by lowering the groundwater table. Waterlogged land in Chunian was drained of excess water mainly by two drains dug in 1977 and 1979. Though these measures reduced the extent of waterlogged land, the natural ponds and dhands, like Gamaghar lake, Mian di Nuli, Mohammadi Pur, Chaki Gera and Khajoor Wala, were also drained in the process. These wetlands are privately owned either by individuals or entire villages, who were more than happy to add to their lands. Hunting has also had a detrimental effect on the fauna of Gamaghar. Because of declining waterfowl habitat, there is a greater hunting pressure on Gamaghar. Just 10 to 15 years ago, there used to be so many birds visiting Gamaghar that if a person were to clap his hands nearby, birds would fly in all directions turning the sky black, and the area would be covered by their shade. But such is not the case now. The rare species, greylag goose (Anser anser), ruddy shelduck (Tandorma ferruginea), mallard (Anas platyrhynchos) and white-eyed pochard have not been observed of late. Common species of waterfowl such as northern pintail (Anas acuta), common teal (Anas crecca) and shoveler (Anas platyrhynchos) are still to be found but in much fewer numbers (Sheikh, 1994).

According to the Punjab Wildlife Research Center, Faisalabad study, species, like, Eurasian pigeon (Anas penelope), mallard and white spoon bill (Platalea leucorodia) seen in 1987-88 have never been seen again. In a sample, the total number of waterfowls (23 species) found in this lake were 4,408 in 1987 and in 1993 this number declined to 970.



Source: Inayatullah, C. 1997. Biodiversity: its conservation and sustainable use. In Green Economics, SDPI, Islamabad, pp. 157-180.

International Water Management Institute [10] in Haroonabad, where wastewater is used for irrigation purposes, it was found that the water contained far more faecal oviform bacteria and helminth eggs than the level determined acceptable by World Health Organization (WHO). In the farmer community exposed to wastewater near Haroonabad, the prevalence of diarrhoeal diseases and hookworm infections was very high. The prevalence of these diseases was especially high among male farm workers as this group was highly exposed to wastewater, as they did a lot of work in the fields manually and barefoot. Among the children of these farmers, the prevalence of diarrhoeal diseases and hookworm was also higher than in the control population. For crop consumers the chance to acquire a hookworm infection was even greater.

3.3. Forests and Biodiversity

Afforestation and deforestation are much debated issues in Pakistan, partly because of definitional differences, methodological disputes and political agendas. In the past almost all of the NWFP was forested. Similar to many other parts of the world, however, the NWFP has also witnessed a dramatic decrease in forest cover in the past century. According to a 1988 study by the World Resources Institute (WRI) and the International Institute for Environment and Development (IIED), Pakistan's forest cover declined by 52% from 1880 to 1980. The main remaining forest cover is within the NWFP and the Northern Areas.

Over the past 75 years, forests have decreased from 14.2 percent to 5.2 percent (4.57 million hectares) of Pakistan's total land area, with less than 3 percent currently under tree cover. Official statistics suggest that there has been a 27% increase in forest area between 1980-81 and 1996-97. However, various other sources suggest that Pakistan has been deforesting its small area of forests by 2.9% to 3.1% and that woody biomass may be decreasing between 4% to 6% per year [11]. Between 1974 and 1985, timber supplies from state forests declined by 45 percent, in part because of reduced forest area. The total loss of forest occurred at a rate of 0.4 percent from 1981 through 1984 and has now decreased to 0.2 percent per annum. This figure translates into the destruction of 7,000 to 9,000 hectares of forested land every year. Today, Pakistan imports about 30 percent of the timber it uses. In general, deforestation is perceived to be a major problem in Pakistan, partly because of its implications for biodiversity loss and because of poor people's dependence on forests.

The total loss of forest occurred at a rate of 0.4 percent from 1981 through 1984

Deforestation continues principally because of the contentious issue of forest rights. In state owned forests the proceeds from them are split 40/60, with private interests receiving the larger proportion. But who exactly benefits? It is generally said that about 90% of forest rights are under dispute. This is partly because of the way forest rights were traditionally assigned. Princes or warlords ruled areas such as Dir and in principle owned the forests and assigned rights as they saw fit. On the ground, this often led to a very complicated situation. Typically, for example, villages were ringed by irrigated arable land, non-irrigated arable land, and a common grazing area. Overtime, landowners and their tenants developed claims to the trees in each of these areas, claims that often were disputed by other landowners and their tenants, and confused by the

[10] Feenstra, S., R. Hussain and W. van der Hoek. 2000. Health risks of irrigation with untreated urban wastewater in the southern Punjab, Pakistan. International Water Management Institute, Lahore. 13pp.

[11] Banuri, T. and S. R. Khan. 2000. Biodiversity Action Plan. Government of Pakistan, Islamabad.

actions of the prince. When the Pakistan's forests were re-classified into reserve, protected and communal zones, the traditional system, already quite unstable, was disturbed even further. The logging ban has added to the problem as the competition to acquire rights over windfall trees has become heated. Dir has experienced a raid on centuries old forest resulting in steady loss of trees. Social forestry practices in the 1980s and the logging ban in effect from 1993 to 1999 appear to have been ineffective in reversing this trend.

The impact of Afghan refugees on forests was, and continues to be, enormous. In the past some 200 camps were established in NWFP to accommodate between three and four million Afghanis. The refugees, most of whom were farmers, flooded into an ecologically marginal land where scant natural resources provided little more than a subsistence living to the people already there. The massive influx of people, which literally doubled the population of some regions and cities, and their livestock, placed tremendous pressure on both ecosystems and infrastructure. Some of the refugees in heavily forested areas (Hazara division) proved to be a great peril to the forest cover because it was quickly decimated for fuel and shelter.

Water drainage schemes and agricultural intensification are the chief contributors to water - related biodiversity loss

The biodiversity loss in Pakistan is not restricted to forest loss. Wetlands, freshwater and marine species losses are also significant. Water drainage schemes and agricultural intensification are the chief contributors to water related biodiversity loss. The Biodiversity Action Plan (1998) identifies ten critically threatened ecosystems in Pakistan. These are: Indus delta and coastal wetlands, Indus river and wetlands, Chagi desert, the Balochistan junipers forest, Chilgoza forests in the Suleiman range, Balochistan subtropical forests, Balochistan rivers, tropical deciduous forests in the Himalayan foothills, temperate Himalayan forests and trans-Himalayan Alps and plateau. These fragile ecosystems need special attention of Pakistan's policy makers and forestry officials.

Overall, 80% of Pakistan's rangelands are estimated to be degraded[12] (NCS, 1992). The degradation is most severe, even irreversible, in Balochistan. Rangeland degradation is mainly attributed to overstocking and overgrazing of livestock.

[12] Ministry of Environment and IUCN. 1992. National Conservation Strategy. Ministry of Environment, Government of Pakistan, Islamabad.

4.0

DEGRADATION OF THE URBAN ENVIRONMENT

The urban environmental problems are categorized in five main groups, namely, (i) industrial wastewater pollution, (ii) domestic wastewater pollution, (iii) motor vehicle emissions, (iv) urban and industrial air pollution, and (v) marine and coastal zone pollution (Fig. 2).

Pakistan's northern and southern parts are connected through two major corridors, one on the right bank of river Indus and the other on left bank. The right bank corridor, called Indus Super Highway, mostly passes through hilly terrain and the left bank corridor is called Grand Trunk Road (GT-road) or the National Highway. Most of the major urban centers are situated on GT-road, and almost 80 percent of industrial growth has occurred in the major cities, e.g., Karachi, Hyderabad, Multan, Lahore, Gujranwala, Rawalpindi and Peshawar. Other cities, e.g., Faisalabad, Sialkot and Kasur, which are of industrial importance, are connected to GT-road through link roads. The only significant industrial complex that is of importance in Balochistan is the Hub area immediately adjacent to Karachi. All of these major urban centers are located on riverbanks. Most of the industrial development that has taken place does not have adequate controls for emissions. This contributes to urban air pollution problems. At the same time untreated industrial effluents are discharged to the rivers and other streams. The river network is such that all these highly toxic chemical discharges eventually reach the Arabian Sea and all the coastal waters in close vicinity of the Indus Delta and Karachi are heavily polluted.

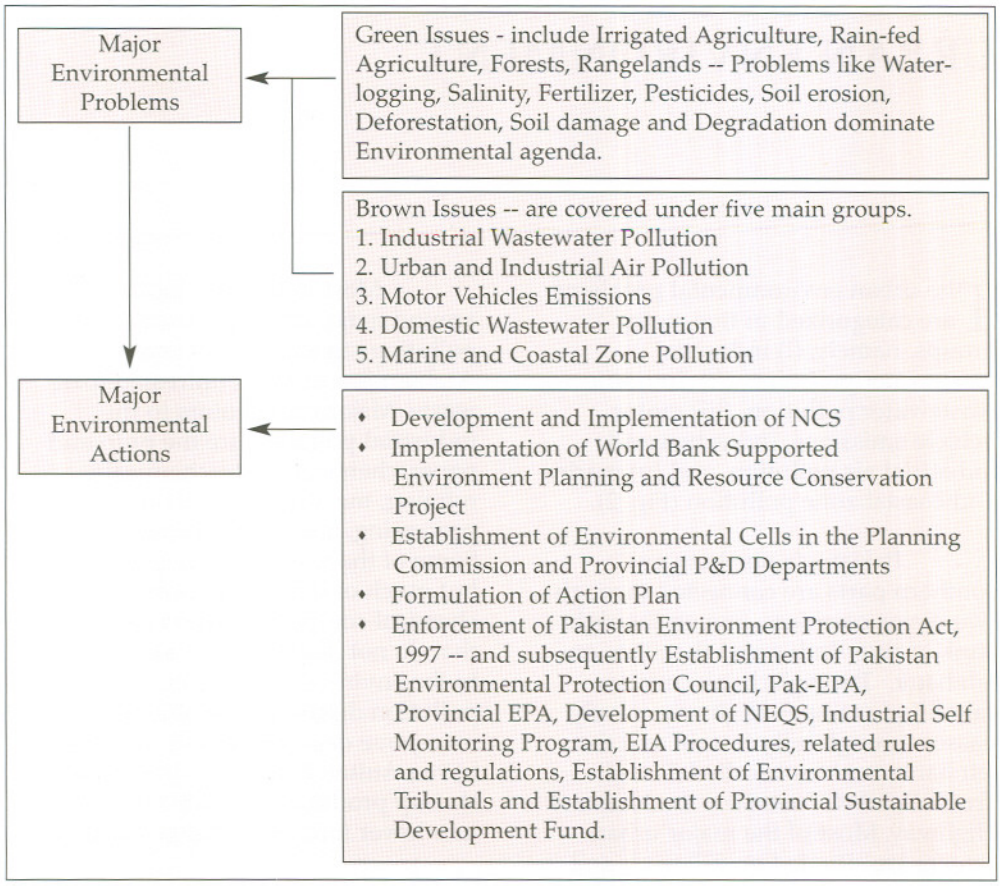
Most industries, located around major cities, are increasingly polluting streams, rivers and the Arabian Sea through untreated toxic waste. Major contributors to the industrial pollution are the pulp and paper, chemicals, petrochemicals, refining, metalworking, food processing, and textile industries. Some of the waste is biodegradable, but much of it is in the form of chemical compounds (heavy metals) that do not degrade and cause damage to the environment. The industrial pollution discharges combined with mangrove destruction and over fishing have resulted in a sharp decrease in shrimp production, which translates into lower foreign exchange earnings.

In Karachi alone more than 6,000 industrial enterprises, some 60 percent of the country's industry, are located along the coastal belt. With the exception of only a few units, most of the industries discharge their untreated effluent containing heavy metals and their compounds, detergents, lubricating oils, chlorine and various organic and inorganic toxic compounds into the sewers or directly into the Lyari River, the Malir River, and adjacent creeks leading to the Arabian Sea.

In the North West Frontier Province (NWFP), industrial units are mainly clustered around Peshawar, such as Jamrud Industrial Estate and industrial clusters on Kohat road and Charsadda road. Out of 40 major units, only two have wastewater treatment facilities while others discharge their effluent into tributaries of the Indus River, mainly the Kabul River.

Most of the industrial development that has taken place does not have adequate controls for emissions

Fig. 2. Pakistan's Environmental Issues and Policy Response



Systematic and comprehensive data on the discharge of water pollutants by industrial sources do not exist

In Punjab too, the industries located in Lahore and Kala-Shah-Kaku Industrial Estate, including chemical industries, tanneries, textile plants, steel re-rolling mills and others, discharge effluents containing hydrochloric acid and high levels of organic matter into drains and streams discharging into the Ravi River. In addition, the small and medium-scale enterprise (SME) sector, particularly industries in two triangles Lahore-Sheikhupura-Faisalabad and Lahore-Gujranwala-Sialkot, generate a significant pollution load that also finds its way into the streams. More than 250 industrial units in Faisalabad discharge high levels of solids, heavy metals, aromatic dyes, inorganic salts, and organic materials directly into the municipal sewers and open-surface drains, ultimately leading to Ravi River. Discharge from the industries in Sialkot area generally reaches the Chenab River, while from Kasur, where the major tanneries of Pakistan are located, it is disposed off through the Pandoki drain into the Sutlej River. Ground water pollution is often permanent, in that it may take hundreds or even thousands of years for pollutants such as toxic metals from tanneries to be flushed out of a contaminated aquifer.

Unfortunately, systematic and comprehensive data on the discharge of water pollutants by industrial sources do not exist. The best overview that was available for use in this study dates from 1988 and covers only a handful of industrial establishments in several areas in Pakistan (Table 5). If the data are to be believed, most of the units were discharging wastewater that would have been in violation of the National Environmental Quality Standards (NEQS) for Suspended Solids (SS) and Biological Oxygen Demand (BOD). Table 6 indicates toxic substance concentrations in effluent from a sample of industries in Karachi.

Table 5. Water Pollutant Effluents From Industries of Pakistan

S. No.	Name of The Industry	pH Value	SS mg/l	BOD mg/l	lbs. BOD per day
	NEQS	6-10	150	1	None
	Karachi				
1	Ahmed Food Industries	6.0	220	1780	20
2	A.G. Fisheries	7.3	4420	11080	-
3	Burma Oil Mills	7.6	1160	4300	9270
4	Adamjee Textile Mills	10.3	1390	5530	750
5	Dadabhoy Paper Mills	7.0	10	130	1930
6	Karachi Tannery	4.1	1140	6780	60
7	Indus Alkalies	9.2	3560	2240	-
8	Buxley paints Ltd.	2.1	10	8080	-
9	Karachi Shipyard	2.1	290	30	-
10	Javedan Cement	6.3	7740	50	-
	Multan				
1	Pak Arab Fertilizer Limited	8.3	2200	250	5280
2	Shaikh Fazal Rehman and Sons	6.8	470	600	7210
3	Khawaja Tanneries	7.9	3800	470	90
4	Alpha Industries	10.5	3380	530	30
5	Colony Textile Mills	8.0	610	230	6650
	Faisalabad				
1	The Lyallpur Dairy Farm	5.1	3140	1790	360
2	Army Welfare Fodd Industries	7.6	690	260	900
3	Crescent Sugar Mills Distillery	3.8	2980	1300	3100
4	The Lyallpur Chemical & Fertilizer Ltd.	3.9	560	30	80
5	Crescent Textile Mills	7.4	280	510	2000
	Kala Shah Kaku				
1	Kohnoor Oil Mills	8.0	680	530	11400
2	Ravi Rayon Mills Ltd.	5.8	900	830	4870
3	National/W. Pakistan Tanneries	6.7	1970	590	1410
4	Ittehad Chemicals	9.0	150	290	3950
5	Lasani Steel Mills	7.8	50	190	20
6	Govt. Weaving and Finishing Center, Shahdara	7.8	1720	450	300
7	P. Leiner & Sons Chemical and Food (Pak) Ltd.	6.5	1600	390	4200

S. No.	Name of The Industry	pH Value	SS mg/l	BOD mg/l	lbs. BOD per day
	NEQS	6-10	150	1	None
	Peshawar				
1	Sarhad Fruit and Vegetable Products	7.3	4420	11080	-
2	Khazana Sugar Mills	7.6	1160	4300	9270
3	Makk Beverage & Mineral Waters	10.3	1390	5530	750
4	New Frontier Punjab Tanneries	7.0	10	130	1930
	Nowshera				
1	Associated Industries Ltd.	7.4	840	140	2400
2	Colony Sarhad Textile Mills	11.7	5830	480	480
3	Adamjee Paper and Board Mills	6.7	21100	930	34900
4	Sarhad Development Authority Leather Factory	7.6	1690	840	10
5	Adamjee Chemical Industries	2.0	4040	1020	7660

Source: "Environmental Profile of Pakistan".Prepared by Government of Pakistan (Environment & Urban Affairs Division), Islamabad and reprinted by USAID in December 1988.

Institutional failure in implementing the National Environmental Quality Standards (NEQS) is the main factor behind air pollution

Water quality in Pakistan is generally poor and is believed to have worsened dramatically because of pollution from industrial, municipal, and agricultural sources. A recent survey by the Environmental Protection Division, Government of Punjab, revealed that even under the WHO's relaxed guidelines, water from 10 out of the 11 surface samples and 2 out of the 4 groundwater samples was chemically unfit for human consumption.

The primary emission sources relating to both consumption and production of energy are vehicles, industries, oil and coal fired power plants, brick kilns, household fuel consumption and agriculture. The key factors contributing to increasing air pollution are lack of awareness about potential health impacts, rapid population growth, the high rate of urbanization, an inefficient and diesel based private transport system and institutional failure in implementing the National Environmental Quality Standards (NEQS).

The discharge of air pollutants has increased significantly over the past 20 years as is evident from Table 7. Looking at the industrial sector alone, the emissions of CO_2 increased by a factor of four and emissions from the industrial sector now account for about one-third of total CO_2 emissions in the country. Emissions of SO_2 from the industrial sector increased by a factor of 500 over the same period and now account for about one-half of the total SO_2 emissions, though in the global context, Pakistan's contribution in terms of gaseous emissions is negligible.

Automobile sources alone contribute significantly to the degradation of ambient air quality. In this category, diesel vehicles emit 2.8 times more SO_2 and 5.8 times more suspended particulate matter (SPM) over the same distance as gasoline engines. The vehicle fleet is increasing at the rate of 10 percent a year, the increase being concentrated in urban areas[13]. As a result, the emission loads

[13] World Bank report by Mr. Bouzaher, 1998

Table 6. Toxic Substance Concentrations in Effluent from Industries in Karachi

Industry	Copper	Cadmium	Zinc	Nickle	Lead
	(milligrams per liter)				
Suggested Standards*	1,000	0.100	5.000	1.000	0.500
Food Processing	0.430	0.028	0.024	0.270	0.320
Oil Mills	0.027	0.028	2.187	0.648	0.480
Beverage	0.090	0.035	2.060	0.407	0.035
Textile	0.020	0.045	5.320	0.514	1.800
	0.300	0.153	7.000	1.142	0.660
Tannery	0.138	0.028	0.220	1.180	
Chemical Alkali					
Paint Manufacture	0.065	0.940	0.480	0.203	3.880
Karachi Shipyard	0.280	0.100	1,342.500	0.740	11.750
Cement	0.330	0.330	2.660	1.000	0.790

Source: Nature, Power, People: Citizens' Report on Sustainable Development, 1995 by SDPI Based on EC report to E&UAD

Table 7. Estimated Air Pollutants by Sector (Thousand tons)

Sector	1977/78			1987/88			1997/98		
	CO_2	SO_2	NO_X	CO_2	SO_2	NO_X	CO_2	SO_2	NO_X
Industry	12,300	19	N.A.	26,700	423	N.A.	53,400	982	N.A.
Transport	7, 100	52	N.A.	10,300	57	N.A.	19,000	105	N.A.
Power	3,600	4	3	11,200	95	10	53,100	996	76
Domestic	16,600	5	N.A.	24,100	16	N.A.	40,000	40	N.A.
Agriculture	850	5	N.A.	4,500	28	N.A.	6,400	40	N.A.
Commercial	1,700	11	N.A.	2,600	13	N.A.	4,300	25	N.A.
	42,150	96	3	79,400	632	10	176,200	2,188	76

Source: NCS Sector Paper on Energy *Note: N.A.: not applicable*

per kilometer traveled are high, reflecting high vehicle densities and low speeds. In Lahore city vehicles are the dominant emissions source, contributing about 96 percent of CO_2, 76 percent NO_2 and 28 percent of suspended particulate matter (SPM) [14].

Data about the ambient impact of industrial and other source emissions in Pakistan are scarce. The most recent published data show high levels of air pollutants, usually exceeding WHO standards, around industrial complexes (Table 8).

Traditionally, air pollution was considered to be an urban phenomenon. More recently, with the expansion of industry in the rural areas, penetration of transport into rural areas and the growth of brick

[14] Sustainable Policy Development Institute (SDPI): "Nature, Power, People: Citizen Report on Sustainable Development", Islamabad, 1995

Table 8. Ambient Air Pollution Data from Selected Sites

	Site	Ozone ppb	SO_2 Ppb	CO_2 Ppm	NO_2 ppb	Nox Ppb	Meth ppm	NME TH ppm	PM10 mg/m3	TSP mg/m3
Lahore (June 1996)	Road Side	39.2	4.2	3.8	13.5	43.5	3.6	0.3	465	780
	Residential	27.4	2.3	2.1	7.4	21.3	4.7	0.1	210	470
	Industrial	34.4	3.1	2.7	11.4	24.5	4.1	0.2	290	585
	Sub- urban/rural	31.2	1.6	0.9	5.2	8.9	4.3	0.1	260	440
Faisalabad (August 1996)	Road Side	31.6	6.8	2.9	8.2	38.9	4.1	0.3	490	870
	Residential	22.2	4.2	2.0	6.3	17.3	3.6	0.1	330	560
	Industrial	26.7	5.5	3.0	7.1	30.2	3.3	0.2	440	685
	Sub-urban/rural	24.3	2.3	0.9	5.6	8.1	4.8	0.1	185	290
D.G. Khan (December 1996)	Road Side	19.7	2.6	1.4	5.7	14.5	2.8	0.2	750	1240
	Residential	16.9	2.1	1.2	4.5	12.6	2.1	0.1	413	810
	Sub-urban/rural	18.0	1.2	0.6	3.6	7.1	3.6	0.1	790	1350

Source: Federal Bureau of Statistics – 1999, Compendium on Environmental Statistics of Pakistan 1998, Islamabad

Table 9. Major Industries of Pakistan Identified with Type of Potential Pollutants

Major Sectors	Location	Potential Pollutants
Chemicals	Karachi, Lahore	Sulfuric and Nitric Acids, Ammonia, Fluorocarbons
Pesticides	Karachi, Lahore	Organohalogens, Organophosphates, other toxic organic, Arsenic
Textiles	Karachi, Lahore, Faisalabad	Hydrochloric, Sulfuric acids, High BOD (organic content), dyes, various organic chemicals and detergents.
Pharmaceuticals	Karachi,Lahore, Quetta	Ammonia, Acids, Zinc
Leather Tanning	Karachi,Lahore, Sialkot, Kasur	Heavy Metals (Chromium, etc.), various organic chemicals, acids, high BOD.
Food Processing	Karachi, Lahore, Quetta, Peshawar	Ammonia, Sulfur dioxide
Cement	Karachi, Lahore, Peshawar	Alkaline, limestone dust
Electrical/Electronics	Karachi, Lahore, Gujranwala, Gujrat	Fluorocarbons, heavy metals (cadmium, nickel, selenium)
Glass/Ceramics	Karachi, Lahore, Peshawar	Arsenic, Fluorine
Petroleum Refining	Karachi, Multan, Rawalpindi	Phenols, sulfides, oily residues, ammonia
Pulp and Paper Board	Karachi, Lahore	Merceptans (organic sulfides), high BOD, and organic solids, mercury

Source: "National Environmental Policy of Pakistan, June 1999".

kilns, air pollution is speedily becoming a rural problem as well. In addition, rural areas are increasingly being turned into peri-urban areas and it would be difficult to find an uninhabited stretch of more than five miles along the GT-road between Lahore and Islamabad. To all intents and purposes, such areas have become urbanized, with the accompanied environmental problems.

Table 9 summarizes the information on industrial pollution by sector and location. The bulk of the industrial production is in cotton and textile products; although leather, cement, paper, board and chemicals have also grown quite steadily. In 1970-71, 62 percent of the industrial value added came from three groups: textile, tobacco, and food and beverages. By 1990-91, this share had fallen to below 50 percent, while chemicals, petroleum products, and machinery contributed over 40 percent.

In many ways, water pollution and land degradation from municipal wastes is Pakistan's most visible and important environmental problem. The growth rate of the urban population has consistently been higher than that of rural areas, and while it has slowed down during the 1981-98 period, it is still 3.5% per annum. The result is that the share of the population living in urban areas has increased from 22.5% in 1961 to 32.5% in 1998. In 1981, only three cities (Karachi, Lahore and Faisalabad) had more than 1 million people. By 1998, this number had risen to 7 cities, with an 8th just under one million. The number of cities with over 200,000 people has doubled, from 12 in 1981 to 23 in 1998. In many ways, this is a more disturbing trend, because these "intermediate" cities lack the basic municipal structure or the market expertise to handle the rapidly growing waste volumes.

In intermediate and large cities, solid waste per person is produced between 0.3 and 0.6 kg per day, of which 7-10% is non-biodegradable (plastic, metal, glass) while between 30% and 35% is organic waste (food waste, animal waste, leaves and grass). The major source of water pollution and waterborne diseases are the solid and liquid excreta and kitchen and wastewater. The National Conservation Strategy (NCS) reports that 12.5 million tones of waste are produced in the country per year, corresponding to a biological oxygen demand of 2,265 tons per day. Of this, 30% is produced in urban areas, and 70% in rural areas. Likewise, some 2,122 million gallons of sewage is being thrown in water bodies every day. Although there are plans to set up sewage treatment plants (STS) in major cities (Islamabad, Karachi, Lahore, Faisalabad, Hyderabad, Peshawar, Quetta, Sukkur and Kasur); only two, one in Lahore and the other in Mardan are functional[15].

Among urban areas, per capita generation of solid waste is highest in Karachi followed by Hyderabad and Peshawar, estimated at respectively 0.613 kg; 0.563 and 0.489 kg of waste every day. On average about 30% of the waste is organic material (food and animal waste, leaves, grass and wood), and another third to a half consists of fine particles.

While specific data on waste treatment and disposal are not available, the NCS estimates that only 52% of the urban waste is deposited into sewers and remaining is deposited "on the roadside, into waterways, or incorporated in solid waste. In reality the bulk of this, and indeed even that purportedly collected by municipal agencies, is in fact collected and recycled by the formal sector. If this were not the case, the cities would have drowned in the 12.5 million tons of waste produced every year.

The principal sources of urban air pollution are domestic, industrial, power production and vehicle emissions. While emissions from the industrial and power sectors are considered relatively localized, domestic emissions from burned fuels and refuses are very poorly known but are generally considered to pose important health risks, particularly to the poor.

The principal sources of urban air pollution are domestic, industrial, power production and vehicle emissions

The major source of lead exposure to children is from motor

[15] Gillani, N. A. 2001. Supplement to the framework for action for achieving the Pakistan Water Vision 2025: Civil Society Response to Framework for Action. Pakistan Water Partnership, Islamabad.

vehicle exhausts that use lead as an anti-knock agent in gasoline products to boost their octane ratings. It has been estimated that 80% to 90% of airborne lead contamination in urban areas of different regions of the world is derived from leaded gasoline used in motor vehicles [16]. While at present there are various sources of lead exposure to children in Pakistan and other regions of the South Asian subcontinent, such as lead battery facilities, lead pipes, paints and certain types of cooking utensils, tinned goods and cosmetic products, the major source of lead exposure is from gasoline products [17].

The above analysis indicates that degradation of the urban environment in the country is occurring at a rapid rate which has negative consequences for human health. Unfortunately, data on the pollution load and human health is not easily available.

Poor communities are most exposed to auto-emissions and other toxic fumes, as they tend to live close to the main trunk roads

Impact on the Poor

The poor are most exposed to air and water pollution, and least able to protect themselves. Of the estimated 2.7 million deaths each year from air pollution, 2.2 million are from indoor pollution, and 80% of the victims are the rural poor in developing countries. Smoke from fuel wood is more dangerous to health than tobacco smoke but every day women have to spend hours cooking over smoky fires. Leaded petrol, used more in developing and transition economies than in industrial countries, is crippling human health, permanently impairing the development of children's brains. In Bangkok, up to 70,000 children are reported to be at risk of losing four or more IQ points because of high lead emissions. In Latin America, around 15 million children under two years of age are at similar risk.

A study conducted by the Agha Khan University in Karachi in 2000 indicated that of the 400 blood samples (3-5 years old) collected in this study in four different regions of Karachi and surrounding areas, 80% had blood lead concentration levels greater than the 10 micrograms/decilitre, with 21% in excess of 20 micrograms/decilitre (median blood level of lead 13.88 micrograms/decilitre). Since half of the sampled population of children resided in areas between 25 and 100 kilometre from the city centre, the above data is an underestimation of health risk to children who reside in the heavily trafficked region of Karachi. Any child's blood level above 10 micrograms/decliliter is harmful to the normal intellectual development of a child. An earlier study of blood lead levels in Karachi published ten years ago showed a mean lead concentration of 37.4 micrograms/decliliter, irrespective of where the children resided or attended school [18]. According to WHO guidelines a concentration of 10 micrograms/decilitre increase in blood level is associated with 2.5 point decrease in the IQ of exposed children.

Low income neighborhoods mushroom around industrial areas and power plants, where exposure to air pollution is high. The poor also work long hours in factories in unsafe conditions; in particular, women and children are the most vulnerable, exposed to dust and chemical inhalations in sweatshops and household industries producing textile items, carpets and leather goods. Traffic congestion and the resulting vehicular emissions are becoming an increasingly serious problem in the big cities. Poor communities are most exposed to auto-emissions and other toxic fumes, as they tend to live close to the main trunk roads. High auto-emissions are also linked to affordability; the poor cannot afford to travel in vehicles using cleaner but more expensive fuels. Pakistan's response to environmental issues is briefly described in Fig. 2 and discussed in detail with comments and suggestions in Section 8.0.

[16] Eliminating a Silent Threat, World Bank Support for the Global Phaseout of Lead from Gasoline, May 1990.

[17] A Call for Action on the Prevention and Treatment of Lead Poisoning in Developing Countries, November 1999.

[18] Manser, et al. 1990. Journal of Pakistan Medical Association, 40: 150-154.

5.0

POVERTY-ENVIRONMENT NEXUS: CASE STUDIES

5.1. Water Crisis in Balochistan

The huge land resources of Balochistan cover an area of 347,000 sq. km, which constitutes 44% of Pakistan. The average annual rainfall varies from 50 mm in the lowest west up to over 400 mm in the eastern part of the province. Rainfall, the only source of water supply, is generally too eratic and meager. Due to its arid to semi-arid environment water is scarce resource for a major part of the province. The floodwater is of short duration and passes quickly down stream without giving much benefit to the area. On some occasions, on its way down the slope, the farmers divert this water to their farms for flood irrigation.

In fact, water is the critical resource for increasing irrigated agriculture in Balochistan. The total irrigation water available on a sustainable basis is about 8.7 MAF annually, which comprise 0.8 MAF from groundwater, 3.9 MAF perennial Indus flow and 1.8 MAF flood Indus flow. Estimates of floodwater runoff from the major rivers arising within Balochistan vary considerably and may total about 2.2 MAF for an average year. A census revealed that there were 1,803 natural springs, 493 karezes (underground canals), 132 streams and canals and 76 Persian wheels in the province.

Exploitation of Groundwater Resources

Agriculture in Balochistan is the major and most important sector of water use. About 75% people of the province are dependent on agriculture and livestock. This sector employs about 65% of the work force. Orchards contribute to the provincial economy more than any other crop, as the climatic conditions in the upland of the province are highly suitable for growing high quality fruits like apples, grapes, pomegranates, almonds, plums, apricots and cherries. The production of orchards per land unit fetches 3 to 4 times more income when compared to the conventional grain and vegetable crops. The large expansion in orchard crops has resulted in orchards becoming the most important crop in Balochistan, accounting for 56% of the total value of crop production (Rs. 38,776 million in 1995/96) in the province. Once investment for the growing of orchards has been made, the farmers become bound to arrange for water from all possible sources. Instead of increasing irrigation efficiency due to lack of finances and access to high efficiency irrigation techniques, the growers' efforts are focused on increasing water quantity (flood irrigation).

Traditionally, orchard crops are largely irrigated with water from rivers, karezes or springs. However, with rural electrification and construction of roads, tubewell irrigation quickly became dominant. By 1996-97, about 21,000 tubewells had been installed in Balochistan irrigating about 235,000 ha (25% of the total irrigated area of 928,000 ha). Shallow wells, karezes and springs accounted for 91,500 ha of irrigated area (10%). In the 1970s, dug-well and tubewells were operating mainly with electric (fewer cases) or diesel pumps. However, the number of wells increased dramatically with the

introduction of the National Electricity Grid System in the 1970s (Table 10). The highest number of tubewells are in Pishin Lora and Nari basins (mainly orchard growing areas). Sharp drops in the watertable of underground aquifers (15 centimeters to over 60 cm per annum) are occurring in a number of areas. In the Pishin-Lora water basin, the average abstraction of water is 52 cubic ft/second whereas the recharge rate is 35% less than the abstraction rate, meaning that the groundwater reserves are being depleted. Despite the severe consequences of groundwater depletion (discussed in the following paragraphs), additional tubewells are being installed. In the Pishin sub-basin, local reports indicate that as many as eight new tubewells are being installed each day. There is no indication that groundwater mining is slowing.

Box 3

Poverty-Prosperity-Groundwater Mining-Poverty

Gul Mohammad from Bangulzai tribe of the Baloch ethnic group is a resident of Dinnar Khan village in Mastung district. His extended household consists of twenty-three people with only three pairs of earning hands. Twenty years ago, this family used to live in Mastung as laborers when they thought of starting agriculture on their ancestral lands. Gul Mohammad sold his motorcycle and shifted to Dinnar Khan with his wife and children. He invested the cash from the sale of motorcycle into land preparation. After an initial good response from his agricultural activity, he called his brother to the village and started agriculture on his own lands as well as on the lands of their relatives on tenancy. The high wheat produce and sale of surplus in the market during the first five years also motivated his relatives to shift to the village and start agriculture.

A tubewell was installed in 1993 by the Public Health Engineering Department for drinking water and one of Gul Mohammad's brothers was employed in it. The villagers also used the water from the tubewell for agriculture. After establishment of orchards, the household started rearing livestock. Gul Mohammad extended credit to his relatives from his increased income which they repaid after getting returns on investment in livestock. Those five years were the best in his life. He spent Rs. 50,000 on his brother's marriage.

In 1997 the ground water level decreased and the tubewell started operating erratically. The household stopped sowing annual crops to concentrate water on orchards. The tubewell completely dried up in 1998. As a result, all the orchards also dried up. Then the absence of rain did not allow any rainfed wheat cultivation. The livestock population had also dropped significantly due to the non-availability of fodder. The household cut down all their orchards and sold the wood in the market.

From the proceeds of this sale they started a small provision store in the village. During the drought period 1999 and 2000 people could not pay the prices of even household goods and obtained the items on credit from him. This left him with very meager amounts by the end of the month. At the moment he does not save more than 100 or 200 rupees per month from his shop.

Shrinking of production base coupled with large family size has affected health and nutrition of the household members. They have switched to raw sugar (gurr) from white sugar and reduced the consumption of nutrition items. Only two of the children are studying in school now a day. Ref: Social Assessment Study on Water Scarcity in Balochistan, Area Development Program Balochistan, 2000.

Table 10. Number of Pumping Points in Balochistan from 1974 to 1999

Year	Number of Wells		
	Private Sector	Public Sector	Total
1974-75	4,262	73	4,335
1993-94	15,382	921	16,303
1998-99	20,346	2,110	22,456

Source: Agricultural Statistics of Balochsitan, 1981, 1993-94 and 1998-99

Drought

In Balochistan, less than normal rainfall, for 3 consecutive years (1999-2001) has caused complete drying off of surface water resources and has decreased water output from springs and tubewells. This has also caused the watertable to drop in most of the valleys. Approximately 1.5 million people have suffered the consequences of drought. The number of affected livestock is estimated at around 10 million (mostly sheep and goats), representing nearly one-third of the total heads of animals in the province. About 8% of the livestock have starved to death, with an equal number weakened or succumbed to diseases.

The effects of drought and groundwater mining that have appeared in Balochistan clearly demonstrate an explicit case of the poverty-environment nexus. The major livelihood of communities in arid areas is livestock whose increasing numbers have negatively impacted on rangelands and watershed ecosystems which could not sustain the increasing livestock and human population. With the perishing of millions of heads of livestock and loss to infrastructure (abandoned homes, farms, etc., as the population moved out from the drought stricken areas), the communities have fallen back in the poverty trap.

Effects of drought and Groundwater Mining

In general, the extent of poverty in Balochistan is high as compared to other provinces. However, development of agriculture, especially promotion of the fruits and vegetables in the area, and development of the livestock industry in parallel, brought a major change in the lifestyle of people: they were moving towards prosperity now. In a way, over-utilization of resource and groundwater mining, coupled with low rainfall resulted in the drying up of drinking wells, orchards, failure of cereal crops and death of millions of livestock, thus leading to an environmental disaster and forcing people back again into the poverty trap. Some of the effects as observed are summarized below:

The effects of drought and groundwater mining that have appeared in Balochistan clearly demonstrate an explicit case of the poverty-environment nexus

- The Pashin-Lora basin and the Loaralai sub-basin are in deficit of re-charge. The abstraction of groundwater far exceeds the recharge to the basin. The Zhob, Nari River, Hamun-Lora and Kachhi basins have limited development potential. Basins in the districts of Loralai and Ziarat, are also in deficit, with no further development potential. A number of studies have estimated that the deficit in the Quetta sub-basin is about 26 million cubic meters a year and that the aquifer storage will be exhausted in 20 years.
- The immediate effect of groundwater exploitation is the lowering of watertable (0.5 to 3 meters per year depending on the geology of the affected area and the extraction rates) and drying up of wells (Table 11). As a result to meet with the ever-increasing demand of water for their orchards, farmers

have started digging deeper into the aquifers. In the absence of any monitoring system it is not possible to determine the equilibrium position in the aquifer. This blind race of tapping lower aquifers has resulted in excess groundwater extraction.

- The water scarcity problem was aggravated further by severe

Box 4

Prosperity-Drought-Poverty

Khudai Dad lives in Nali Sir village in Qila Saifullah. He hails from Alizai tribe. He has an extended household of 37 people comprising his mother, four brothers and their wives, 21 children including ten boys and eleven girls. This household has been solely dependent on rainfed agriculture and livestock keeping. Because of a joint family, their landholding is larger than other families in the village. Kudai Dad's family used to grow wheat, sorghum and pulses on their lands. The annual production used to be quite profitable, as they would sell a sizeable quantity of surplus produce to the shopkeepers in Qila Saifullah town to purchase other items of day-to-day use. Initially, they used oxen to plough their lands. It occurred to Khudai Dad that if they would save some money to purchase a tractor, they would be able to increase the area under cultivation. After discussing the idea with his brothers, they started saving money and bought a tractor in 1994. The arrival of the tractor caused a significant increase in the household income. From the saving of that year, Kudai Dad bought a milling machine and attached it to his tractor. He thought that his mobile mill will cater to the demand of flour milling in Nali Sir as well as the nearby villages and will help him earn additional income. Khudai Dad thus became a small entrepreneur. Soon, this investment started paying dividends and it became a profitable business. In the harvesting season, Khudai Dad would go to nearby villages and stay there for several days to sell his services as a mobile miller. At that time his monthly income, after deduction of expenditure, used to be in excess of Rs. 22,000 per month. In terms of livestock, the household had about four hundred animals. They recall those days as a time of great comfort. They used to enjoy all the amenities, which one can think of in a village. Food items such as milk, ghee, butter, meat and wheat, etc., were available in ample quantity. A lot of money was spent on marriages and other social gatherings. Khudai Dad paid Rs. 150,000 as bride money for his brother. Five of their children were studying in the village school and two in Qila Saifullah town.

The well being of the family began to be affected with the start of drought in 1998. No crops were produced in the area in 1999, so the milling enterprise came to a halt. Khudai Dad and his brother started working as waged laborers. Two of them are now working in coal-mines in Loralai district. One works as a laborer in Qila Saifullah and Khudai Dad himself works as a tenant in vegetable orchards in a far away village. The payment of wages is also erratic and they have to go without money for many weeks sometimes. The paucity of income has started showing ill effects on the health and nutrition of the family members. Since the drought has caused a severe decline in the fodder availability, distress sale of some livestock on extremely low prices was followed by malnutrition-induced epidemics in the animals and the flock was largely wiped out. Three of the elder male children were withdrawn from education in 2000 to be employed as laborers.

They term these times as the hardest times of their lives but have not yet considered selling the tractor and the mill. They were waiting for the rains to gather up the shattered pieces of their livelihood. Selling the tractor and the mill will be their last resort. Ref: Social Assessment Study on Water Scarcity in Balochistan, Area Development Program Balochistan, 2000.

Table 11. Drying up of Groundwater Monitoring Wells in Pishin-Lora Basin

Area/Sub-Basin	Total Monitoring Points		Wells dried up
	Year 1996	Year 2000	
Quetta North	33	24	9
Quetta South	11	9	2
Pishin	49	27	22
Mangocher	4	2	2
Mastung	32	20	12

Sources: Bureau of Water Resources

drought for three consecutive years (1998-2000). The impact of water scarcity on fruit orchards was tremendous. There were cases where either no or little fruition (vegetative growth present but the quality or quantity of fruit was very low) was observed. Drying of trees (vegetative cover of the trees was gone but signs of life, presence of sap under the bark still exist; and death of trees (dried wood altogether) was also visible. In a recent study conducted by the Area Development Program Balochsitan in 21 villages[19] in Pishin-Lora basin during 2000 indicated that in 85% of the villages orchards in 1998 produced no fruit; and in 1999 some 71% trees dried up. Further, in 27% villages cutting off the trees was reported to save the remaining living trees. The problem aggravated further and in 2000, 73% villages cutting down of dead trees was reported. The failure of fruit crop means joblessness for hundreds and thousands of farm workers as well as those employed in the transportation industry because fruit is mainly transported to other parts of the country.

- Even if the trees are re-planted, it means a loss of at least 5-years of time that is taken from planting of the trees to its fruit bearing stage.
- The sale of assets was also reported, as a frequent phenomenon to generate cash to meet urgent household needs. The sale of possessions (jewelry, watches, fire arms and domestic items) was reported in 82% of villages in 1999 and 94% villages in 2000. The sale of productive assets (land, livestock, forest trees, agricultural implements, farm machinery, sewing machines, etc.) was reported in 41% villages in 1999 and in 35% villages in 2000. The sale of assets was further compounded by the fact that the farmers were refused loans by lenders.
- Migration was another coping mechanism observed in the distress-stricken communities. There are both "pull" and "push" factors which accentuate it. "Push" factors include scarcity of sources of livelihood such as water, fodder and employment. "Pull" factors include labor demand in other areas and availability of fodder and water for animals. In Qila Saifullah, migration was reported in 90% of the villages. The percentage of households migrating from villages ranged between 5 to 54% of total households per village. The reasons stated by the villagers for migration are labor (60%), grazing (20%), skilled labor (10%) and tenancy (5%). In Mastung, migration occurred in 80% of the villages in the study area.

[19] Dasht valley in Mastung, Muslim Bagh and Pitao valleys in Qila Saifullah. 10 villages in Mastung and 11 in Qila Saifullah (30 households per village).

On the average 21% of households per village migrated ranging from 11 to 48% (average 21%) of household per village. The reasons for migration include labor (87%) and grazing (13%).

- There was also a shift in primary economic activities of resident households as a result of scarcity of water. In Qila Saifullah before acute water shortage (prior to 1998) some 80% farmers were engaged in agriculture and 7% in labor activities. During the water scarcity period, the shift was in favor of labor (from 7 to 32%) and abandoning of agriculture (80 to 38%). In Mastung, the shift from agriculture was from 68 to 6% and in labor from 9 to 42%. These figures indicate abandoning of agriculture by the farmers and moving towards off-farm labor for survival.
- As the womenfolk are engaged in fetching water for the household, they were seriously affected. In Qila Saifullah district, the incidence of increased toil for fetching water from far away places because of drying up of nearby water sources was reported in 36% of the villages. In case of Mastung, it was 60%. In 10 villages in Qila Saifullah, women reported an increase in the incidence of miscarriages because of physical weakness and excessive domestic labor. Around 107 such cases were recorded during the last three years in the villages surveyed in Qila Saifullah district. Around 92 cases of miscarriage due to similar conditions were reported in 7 villages in Mastung district.
- Reduction/de-stocking of livestock (cases where 80% or more of the village livestock population was wiped out) occurred in 33% of villages during 1998; in 90% of villages in 1999 and in 48% of villages in 2000. Reduction of livestock because of hunger and selling at meager prices was reported in 52% villages in 2000.
- Reduction in staple food, nutrition items and substitution with inferior items was reported in 33%, 57% and 66% villages, respectively in 2000. In the year 1999, access to routine medical treatment was reduced to 23% and further declined to 14% in 2000. The switch over to traditional herbal medicine was reported in 9% of villages during 1999 and in 47% villages during 2000. The percentage of population which reported no clothes or shoes was 38%, 64% and 79%, respectively in 1998, 1999 and 2000. The dropout from schools due to increased demand for labor, mainly to fetch water and firewood from far away places increased from 5% in 1998 to 66% in 2000. Among these dropouts, 71% dropouts were for labor and 29% because of lack of affordability.
- The main annual crops grown in Qila Saifullah and Mastung are wheat, sorghum, vegetables and alfalfa. There was a small decrease in cropped area in 1998 while 10% villages reported no crop at all. In the year 2000, all the villages reported no annual crop production because of no rainfall.

Causes of Groundwater Mining

- The concession of flat rate for the use of electric power is a source of uncontrolled exploitation of groundwater in different basins. This concession to the farmers has a very negative affect on the limited groundwater resources as the farmers continue to irrigate their orchards even during the winter period when no irrigation is required. This practice had been in vogue due to flat electricity tariff.
- The rights to access the aquifer stays with the individuals (any owner of land can install a tubewell) and it is not unfortunately treated as "social property". However, federal and provincial legislation exists to license the abstraction of groundwater

(particularly in Quetta, Mastung, Mangochar and Pishin) and to enforce payment of electricity bills. The main issue is political will and the ability to enforce it.

- On the other hand, Quetta and its surrounding area falling in Pishin Lora basin are under heavy stress due to increased consumption of groundwater for domestic and agriculture use. The city limits are expanding rapidly with increased consumption of water. The major source of water for the city is the sub-surface aquifer. The piedmont slopes of Quetta valley are considered to be the major zones of recharge for the valley. But rapid urbanization in Quetta has resulted in occupation of piedmont slopes by residential colonies and other civil structures, thus reducing the total recharge area.
- At the top of it, the "Golden Tubewell Scheme" launched by the political government has encouraged the groundwater-mining.
- High-efficiency irrigation techniques (drip and bubbler irrigation) have great potential in the area but unfortunately the farmers have no access to technology, servicing facilities and credit. There is a lack of understanding among government agencies about the importance of private sector for promoting high-efficiency irrigation techniques.
- Lack of information and reliable data is the major constraint in estimation, scientific planning and sustainable development of water resources.

5.2. Degradation of Rangelands

Livestock as a sub-sector of the agricultural sector, contributes significantly to the economy and health of the nation. Overall, livestock contributes some 30% of the GDP generated by the agriculture sector. It has vital income distribution consequences as its activities provide 10-25% of the income for small farmers and landless livestock producers. Since partition, growth in the grazing livestock populations of Pakistan has been dramatic (2% per annum).

The poverty-environment nexus regarding rangelands is prevalent in Balochistan. Until two decades back, livestock had remained the mainstay of Balochistan's economy, accounting for about 30% of the Gross Provincial Product. Currently, however, agriculture especially horticulture, has taken over and is now estimated to contribute up to 35%. Over the years, the growth rate in livestock has been steadily increasing in the province maintaining its share in GNP to remain constant at 7.5%. Out of the total 34.7 million hectare (Mha) area of Balochistan, rangeland cover 32.3 million ha (93%). Agriculture is practiced on about 6% of the total area of the Province. Rangelands are presently supporting around 20 million heads of livestock, mostly dominated by sheep and goats. The Nomadic livestock population is 10 to 12%. Since centuries, rangelands in Balochistan are traditionally grazed by Baloch, Pushtoon and Brahvi pastorlists including Afghan nomads (with some Afghan refugees) who are utilizing range areas for grazing and fuel wood purposes. Rangelands provide the bulk requirement of feed for the small stock and fuelwood requirement of the rural communities. However, agriculture waste and fodder generated on irrigated land and as inter/under cropping in orchards are meeting some 20 to 40% feed requirement of cattle and other large ruminants [20].

Rangelands are present by supporting around 20 million heads of livestock

Out of the 32.3 million Mha area under rangeland, 21 Mha (65%) is considered grazing land, producing good to poor grazing, 9.8% Mha is

[20] UNDP Area Development Program Balochistan, UNDP Pakistan.

unproductive and 1.6 Mha is considered inaccessible. These rangelands could be broadly divided into Northern Zone (13.2 Mha or 38% of Province), and the Southern zone (21 Mha). The former zone receives higher precipitation and supports 76.5% of the total livestock, while the latter receives less precipitation and thus supports only 23.5% of the livestock. The vegetation structure in Balochistan consists of deserts, steppes, savannahs and sparse woods.

The estimated productivity of the rangelands varies from less than 30 kg/year Dry Matter (DM) to over 280 kg/ha/year of DM, however, the potential productivity ranges from 1 to 2.5 tons/ha. Accordingly the overall carrying capacity of the rangelands is from 2 to 3 ha/ewe [21]. Further, in a recent survey in Sinjawi (district Loaralai), it was found that on average 250 kg per ha of wood shrubs are annually collected for fuelwood from the rangelands. The situation is the same or even worse in other areas of Balochistan as fuelwood availability is limited. In fact grazing and cutting of bushes and trees for fuel and timber has already crossed the threshold levels of sustainability.

In the case of rangelands, the poverty-environment nexus is quite evident. There is a strong tendency for the number of animals to be increased to the maximum that can be reared with the fodder available. The additional numbers are in fact regarded as insurance replacements for those that do not survive. These animals, however, are but pale shadows of what is desired, since they tend to be in poor health. Thus the livestock sector is caught in a self-perpetuating and reinforcing downward cycle: the numbers of livestock are high because many are sick; they are sick because they are poorly fed; they are poorly fed because they are too numerous. Overstocking is quite substantial, especially on the migratory routes, it is considered to be about 6 times the carrying capacity. Likewise, the increasing human population is putting a great deal of

Box 5

Firewood Usage in Pakistan

Firewood makes up a lion's share in household fuel requirements, both in rural as well as urban areas of Pakistan. In rural areas, more than 91% households use firewood and consume about 6.7 kg/day/household. In urban areas, 52% household use firewood at the rate of 6.5 kg/day/household. Firewood is consumed mainly for cooking and water heating. Its use remains relatively independent of household income in rural areas.

Availability seems to encourage both firewood collection and consumption. The highest proportion of firewood collecting households is located in rural Sindh, where there is ready access to riverain forests, followed by the forested areas of NWFP. Households collect most of their firewood from private land, except in Balochistan, where the main supply areas are common land.

Collected firewood is generally of poor quality, and comprises of leaves, twigs, shrubs, and sometimes even roots, and these rarely come from full tree lopping (except in cities). Households which purchase firewood, however, use better quality wood. On an average, a rural household spends over 700 person-hours annually for their firewood needs. This requires them to travel an average distance of 1.78 km, and around 60% of the effort is contributed by women and children. Firewood is an expensive fuel in terms of delivered energy for cooking.

[21] An ewe weighing 33 kg with lamb of age 3 months consuming 330 kg dry matter forage per year

pressure on rangelands for fuel-wood as there is no other alternative energy source. The evident diminishing range resource in the vicinity of rural inhabitation due to collection of fuelwood and continuous grazing by the sedentary agro-pastorals is resulting in the extinction of wood shrubs and other palatable species, which has a negative impact on indigenous flora and fauna.

Furthermore, the Afghan refugees, their livestock and the sedentary agro-pastorals with their livestock have made a tremendous impact on rangelands, by uprooting the forest trees, range bushes and over-grazing. The rangelands have become so fragile that these cannot absorb any more environmental shock, e.g., the drought and overstocking. Desertification is highly conspicuous as about 70% of the mountain slopes are virtually barren. Traveling from Dalbundin to Tuftan, there are hundreds of miles of virtually barren land without a single blade of grass. The mountains of Mekran are another striking example of such desertified land.

5.3. Degradation of Juniper Forests

Balochistan has one of the largest areas of juniper forests in the world. These cover approximately 141,000 ha. The most extensive (86,000 ha) and best-known examples are found in the Ziarat and Zargoon hills. They occur at elevations between 1,980-3,350 meters. Growing conditions are harsh. Annual precipitation averages 328 mm and falls mostly as snow. The forests are quite open, depending on site condition. Trees are very slow growing. Consequently, these forests are believed to be among the oldest in the world.

The local communities use juniper in several ways: fuelwood, roofing material, farm and house boundaries as there is no other fast growing plant species found in the area. The people do not have access to natural gas, and, of course, they cannot afford to pay the electricity bills, as they are extremely resource poor. Thus they are bound to harvest juniper. In fact, these forests have been declared as endangered by the government. Diminishing of these forests is likely to lead an environmental disaster as well as extinction of the species as this is the only largest collection of forest in the world, which has been declared as heritage site by the United Nations Educational, Scientific and Cultural Organization (UNESCO).

5.4. Salinity and Sodicity

Salinity and sodicity are the soil degradation processes associated with irrigation. The greatest incidence, therefore, occurs in the Sindh and Punjab: 2.1 million ha and 2.6 million ha respectively. Salinity has two major sources:

- When the water-table rises in cultivated land to within a meter of the surface, capillary action moves water to the ground surface; if it is not transpired by plants, the water evaporates, leaving salts behind. This occurs regularly in areas fallowed. In uncultivated, barren land, a water-table within 2 meters can cause salinity in the soil.
- The application of irrigation water that has high values of total dissolved solids (TDS), sodium adsorption ratio, or residual sodium carbonate would make the soils either saline or sodic. The mechanism here is the evaporation of applied water, leaving behind the solids that it contains.

Canal water in the Indus Basin contains little TDS (140 ppm) at the rim stations. Even near the Indus mouth a serious salinity problem does not arise from the application of canal water (243 ppm near Kotri). With groundwater, however, even that identified as sweet or fresh (TDS less than 1,000 ppm), the problem can be

serious and gets progressively worse as TDS approach the hazardous level of 3,000 ppm.

In the Canal Command Area (CCA), 13.6 million ha of soil have been surveyed. The total saline areas is 3.2 million ha, or 23.3% of the total CCA. The severely saline areas (1.94 million ha) are found on Class VII and VIII soils. They were never, nor should they be, put to arable cultivation.

Within the cultivated area, 144,600 ha of saline/sodic soils are located on Class IV agricultural land. The inherent fertility of these lands is so low that cultivation yields little benefit (National Commission of Agriculture). There are 251,900 ha of saline soils on Class III lands, these soils have inherently low yields but could be improved by good management, along with substantial inputs of capital. On Class II soils, 80,000 ha were identified as slightly saline. This is where the heart of the salinity/sodicity problem lies.

The marginally saline lands can also be recovered by the addition of sulfuric acid

The hypothesis here is that poverty is created by degradation of land due to salinity. The reasons are:

- Irrigation with canal water used to help leach down the excessive salts thus helping in keeping up fertility. However, for the last 5 years the country is facing serious canal water shortages. This coupled with the drive of the government to supply water at the tail ends of canals has deprived Class II soils from adequate water supply. In this scenario the farmers are bound to use the underground saline water to grow something from their soils which leads to salinity. Although no survey has been conducted to document the extent of good soils being surrendered to salinity, it is believed that thousands of farmers are facing serious declining agricultural production.
- The soils can be recovered from salinity by the addition of soil amendments; such as gypsum but the poor (landholders of 1-2 acres) do not have adequate finances to afford the cost of gypsum.
- The addition of organic matter (farm-yard manure, animal-dung) can also help promote the soil bacterial activities which consequently help in bringing changes in soil physics thus resulting in leaching of the excess salts. Contrary to this, in the rural areas, people do not have access to natural gas and the cost of electricity cannot be afforded, thus they are bound to use animal-dung and farm-refuse as fuel. Consequently the soils remain deprived of important nutrients.
- The marginally saline lands can also be recovered by the addition of sulfuric acid. A small assembly which goes with the tubewell water costs Rs. 300,000 can generate sulfuric acid and mix that with the tubewell water to neutralize the salts. However, the poor again remain deprived from this technology because of lack of information as well as credit to purchase the assembly.
- Another alternative is to grow plant species which are salt-tolerant and have high growth rate (for instance eucalyptus). Unfortunately, the market value of such trees is very low (less than 10 dollars per tree) and the poor are reluctant to surrender their soils for fairly a long period of time to grow low-profit trees. Ultimately they tend to use underground saline water to grow something from their fields. Thus they remain in the vicious cycle of poverty-environment.

Salinity has highly adverse social and economic effects on communities in Pakistan, causing poor living standards in affected areas, health problems for humans and animals, the crumbling of mud and brick houses and difficulties in transport. Many people are forced to

migrate to other areas, as the opportunities of livelihoods decline in salt-affected areas [22].

5.5. Plant Nutrient Mining

Organic matter has a number of important roles to play in soils, both in their physical structure and as a medium for biological processes. First, it helps soil to retain moisture and nutrients by absorbing water readily and releasing it slowly. It plays a prominent role in maintaining soils structure, thereby facilitating root aeration and nitrogen fixation. Organic matter also helps soil to maintain tilth, which provides support to roots and permits them to penetrate the soil.

But it is the biological medium that organic matter makes its greatest contribution to soil productivity. Soils are living entities and, their purely mineral content contains nutrients, but they are not available to plants until the soil microorganisms process them into a usable form. The addition of organic matter helps maintain the population of these microorganisms, which also plays a beneficial role in combating some plant diseases.

Pakistan's soils are extremely under-provided with organic matter. Only 4% of the large number of samples surveyed in the Punjab exhibited moderate to adequate levels of organic matter, otherwise, all of the nation's soils may reasonably be characterized as deficient in organic matter, and therefore subject to yield reductions. The precise extent to which this situation reduces the productivity is unknown but the importance of organic matter to the nitrogen, carbon, and sulfur nutrient cycles suggest a pervasive debilitating effect. Low levels of organic matter contribute to all the problems that Pakistan's soils experience: poor structure and tilth, slow water penetration, poor moisture retention, and inadequate levels of colloidal material for efficient chemical exchanges and microbial activity.

During the Green Revolution, farmers believed that they could replace organic matter with inorganic fertilizer, whereas plants required balanced nutrition. The initial doses of nitrogen fertilizers gave rise to a rapid increase in productivity. However, this had the effect of "draining" other macro and micro-nutrients rather quickly from Pakistan's generally saline and calcareous soils. To date all provinces show a negative nitrogen balance, although in Punjab the deficit is declining. Over the last decade, phosphate balances were negative; they did not change significantly in Punjab but worsened in the other three provinces. In 1985-86, the level of deficit was highest in Punjab. However, in 1995-96 they were all fairly similar, the deficit in Sindh being highest. Taking an average deficit of 8 kg/ha, this could be compensated by 35-40 kg/ha of phosphate fertilizers, in contrast to the national overall average application rate of 1998-99 of 22 kg/ha. In all the provinces Potash and micronutrients balances deteriorated over the decade [23].

Pakistan's soils are extremely under-provided with organic matter

Organic matter can be supplied to the soil by a variety of management practices, such as incorporating agricultural residues, green manuring, and farmyard manure. Unfortunately, such beneficial practices are not widespread. Indeed, a particularly pernicious and widespread practice is the burning of agricultural residues in situ rather than incorporating them into the soil. This, of course, preserves some of the mineral nutrients, but the most important element of the residues - organic matter - is lost when crop

[22] Qureshi, R. H. and E. g. Barrett-Lennard. 1998. Saline agriculture for irrigated land in Pakistan: a handbook. Australian Centre for International Agricultural Research, Canberra.

[23] Ahmad, N. 2000. Integrated plan nutrition management in Pakistan: status and opportunities. In: Proceedings of symposium on Integrated Plant Nutrition Management. National Fertilizer Development Centre, Islamabad. pp 18-39.

residues are burned. Burning merely contributes to air pollution.

There are severe hidden reasons of not considering the option of using crop residues as organic matter. These are:

- The crop residues (wheat, rice and barley straws, rice husk, stalks of maize, sorghum, millet, straws of pulses, oil seeds, etc.) are used as roughage for animals. The estimated production of wheat straw is 24 million tones, rice straw 8 million tones, barley straw 0.34 million tones, maize, sorghum and millet stalk 6.6 million tones. The production of pulses and oilseed straw is 3.42 million tones [24]. The total roughage production is about 80% of the requirement. Thus like high deficiency of concentrates there is a high deficiency of required roughages. The deficiency of green fodder is 56.5%. As there is a shortage of fodder in general and giving supplemental feed to the animals is not a practice in Pakistan, the farmers use residues as animal feed. Further, it is also sold to supplement income.

- As mentioned earlier the rural populace do not have access to natural gas and cheap electricity as a source of energy, therefore, the crop residues (including stubbles of various crops, fallen leaves of trees,

Box 6

Wasting Valuable Soil Conditioners

One-third of the dung produced annually in Pakistan is consumed as fuel. Its use as fuel is concentrated in the rural areas, though it continues to be a significant fuel in cities as well (the rural and urban distribution of dung-using households is 69.4% and 27.27%, respectively). Cattle ownership is directly linked with the use of dung as fuel, and also determines whether it is collected or purchased. Dung cakes are rarely used alone and are often combined with other fuels, mainly firewood, to improve combustion and to save the later. Only the low-income households in both rural and urban areas use dung alone (in urban areas particularly, it is the non-availability of other fuels for collection that make dung use so prevalent).

The highest proportion of households using dung cakes as fuel are in the Punjab followed by NWFP and Sindh. Balochistan has the lowest percentage of dung users. Sindh ranks first for quantity of dung as compared to substitute fuels. Dung cake is the cheapest fuel in financial terms and in terms of effort needed to collect it. A rural household usually spends about 253 person-hours per year to collect its dung need, with about 93% of effort contributed by women.

Rural farming households consider dung to be of greater value as fertilizer rather than as fuel, and use half of this dung as fuel nevertheless. The use of dung as fuel raises broader issues not directly related to the energy sector, but relevant to the agricultural sector and the environment. Burning dung prevents its use as manure, the use of which enhances agricultural productivity and soil health. To compensate for this loss farmers are compelled to resort to more use of chemical fertilizers.

[24] Malik, S. Z. 1999. Livestock sector of Pakistan: an overview with special reference to Punjab. In Regional Conference on Successful and Sustainable Livestock Organizations. Livestock and Dairy Development Department Punjab, Pakistan & GTZ, Germany. 17 pp.

dried leaves of sugarcane, rice husk, etc.) and animal dung are used as fuel. Hardly one-fourth of animal droppings are available to use as organic sources [25].

Again here seems to be the poverty-environment link. Because of lack of financial resources as well as physical access to cheaper sources of energy, the farmers are compelled to use every kind of plant material and nothing goes back to the soils as organic matter. Consequently, the soils become less productive physically as well as chemically which then turns into reduced crop yield, thus the poor remain in poverty trap.

5.6. Pesticides

5.6.1. Cotton Crop Failures- An Assessment of Damage to National Economy

Cotton is cultivated on more than 30 million hectares in 80 countries. In Pakistan alone, it is grown on approximately 2.8 million hectares out of a total cropped area of 20 million hectares. About one third of all the industrial labor in the country is employed in cotton-based industries. It accounts for more than 50 percent of the foreign exchange earning and 23.87 percent to GDP.

The national average yield (lint) of Pakistan is 557 kg/ha (1994-95) whereas the potential yield (demonstrated on experimental stations and farmers field under strict supervision of agricultural experts) is 1400 kg/ha suggesting a gap of 66 percent between the potential and actual yields. Should this gap be bridged, then annual cotton production would rise to 17 million bales. The current requirement of the domestic textile industry is about 8 million bales suggesting that the potential export surplus is as high as 9 million bales which is worth a total of US $ 2.7 billion.

In 1991-92, cotton production reached a peak of 12.8 million bales, after which it has declined by over a third (Table 12). The reason for the decline was an outbreak of cotton

Table 12. Change in Area, Production and Yield of Cotton since 1991-92

Year	Area		Production		Yield	
	Million ha	% change	Million bales	% change	kg/ha	% change
1991-92	2.8355		12.8222		769	
1992-93	2.8359	0.00	9.0538	-29.39	543	-29.39
1993-94	2.8046	-0.11	8.0411	-37.29	488	-36.54
1994-95	2.6528	-6.44	8.6971	-32.17	557	-27.57
1995-96	2.997	5.69	10.587	-17.43	601	-21.85
1996-97	3.148	11.02	9.374	-26.89	506	-34.20
1997-98	2.959	4.35	9.183	-28.38	528	-31.34
1998-99	2.922	3.05	8.790	-31.44	512	-33.42
1999-00	2.983	5.20	11.240	-12.34	641	-16.65

Source:
Agri. Statistics of Pakistan, Ministry of Food, Agriculture & Livestock, Islamabad.
Economic Survey of Pakistan, Government of Pakistan, Finance Division, Islamabad.
Various Press Reports of Pakistan Cotton Committee, Ministry of Food, Agriculture & Livestock, Islamabad.

[25] Ahmad, N. 2000. Integrated plant nutrition management in Pakistan: status and opportunities. In Proceedings of symposium on "Integrated plan nutrition management". National Fertilizer Development Centre, Islamabad. Pp: 18-37.

whitefly and leafcurl virus. The inability of pesticides to control whitefly (consequently leaf curl virus) and bollworms resulted in additional use of pesticides. In 1993, the farmers used as many as 13 sprays of pesticides per season but failed to control the pest attack. During this year, the crop production declined by 29.39% as compared to 1991-92 season in which 12.8 million bales of lint were produced. The estimated loss to the economy was around US $ 1.5 billion. Majority of textile mills had to be closed due to non-availability of the raw material. Closure of the textile mills had severe socio-economic repercussions.

Due to crop failures the area under cotton cultivation declined further in 1993-94. However, in 1995-96, this area increased again, presumably because of a revised cotton import/export policy, including assurance of international prices to growers.

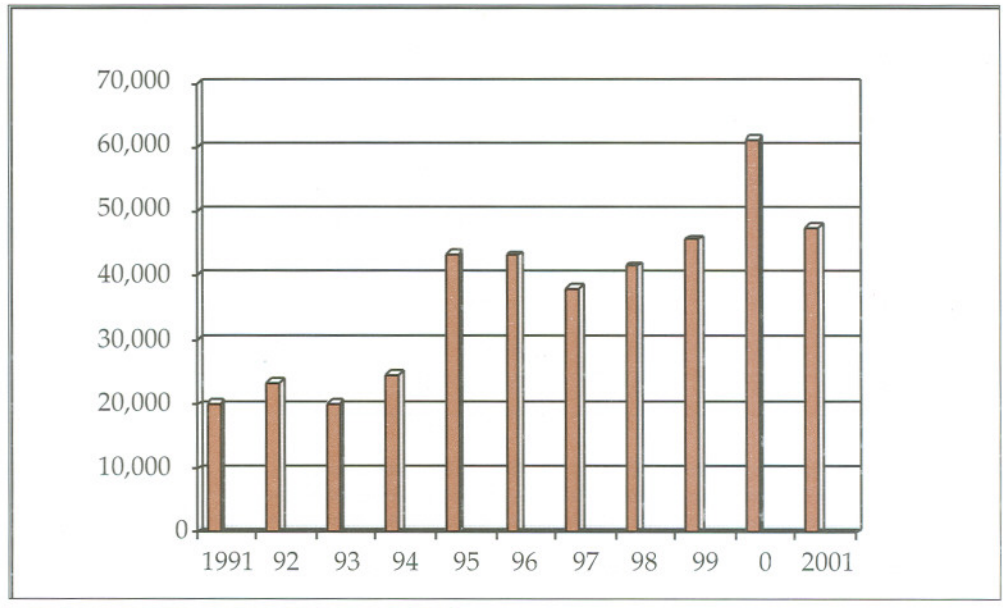
Extensive use of pesticides has failed to control pests and have become ineffective

The decline in yield is up to 36 percent from 1991-92, suggesting not only a loss of natural resources but also revenue losses [26] of US $ 1.1 to 1.35 billions from 1992-93 through 1996-97, respectively. The above analysis indicates that: (i) the potential of cotton production is much higher than the actual production; (ii) recent increases in production have taken place because of the increase in planted area and not in yields; (iii) cotton production is unpredictable; and (iv) pesticides have lost efficacy in the face of pest attack.

5.6.2. Pesticides

Since 1980, there has been a drastic increase in the use of pesticides (Fig. 3) rising from a negligible figure to 23, 212 metric tons (valued as Rs. 7,423 million) in 1994 and 47,592 metric tons in 1999. At present, 86 pesticide companies are registered with the Ministry of Food and Agriculture. Of the total, about 65 percent of the pesticides are used on cotton. In the cotton belt, 6-10 sprays are made in every season (July to October). However, the increasing use of pesticides has led to the development of resistance in the whitefly and bollworm.

Fig. 3. Annual Consumption of Pesticides in Pakistan (metric tons)



[26] Cotton lint only.

Extensive use of pesticides (mainly pyrethroids and organophosphates) during the 1980s has changed the cotton complex. These pesticides have failed to control the pests in the field and have become ineffective. This suggests that pest problems will continue to increase, leading to an increased use of pesticides, and continued change in pest complex. The status of various pesticides regarding their effectiveness is given below:

5.6.2.1. Cypermethrin

Cypermethrin is the top selling compound in Pakistan. It is a synthetic pyrethroid and is sold under its generic name as well as 27 different trade names by 43 companies. It is also sold as a mixture with chlorpyriphos, methamidophos, dimethoate, monocrotophos, profenophos, mephosfolan and endosulfan. The total sale of this compound, alone as well as in mixtures is Rs. 2,387 million (about 21 percent of the total pesticide and 40 percent of the total sale value). Studies conducted at the Central Cotton Research Institute (CCRI), Multan show that the American bollworm has developed moderate to high level of resistance to cypermethrin (26- to 168-fold)[27]. The resistance was recorded in populations from the Himalayas in the north to the coast in the south along a 1200 km length cross section of Pakistan. Likewise, studies conducted by the UK scientists at the Rothamsted Agricultural Experiment Station, Herts[28] , with the Pakistani strain of whitefly have indicated that it has developed a high level of resistance (300-fold) to this pesticide.

5.6.2.2. Monocrotophos

After cypermethrin, monocrotophos (organophosphate) is the highest selling pesticide. It is sold under 15 different trade names by 14 companies, besides 10 companies who sell it under its generic name. It is also sold as a mixture with cypermethrin under 4 trade names by 4 companies. The total sale of monocrotophos per annum is Rs. 693 million (about 18% of total pesticide sale). Studies at CCRI concluded that American bollworm has developed resistance against monocrotophos at a moderate to very high level (19- to 720-fold). Furthermore, cotton whitefly has also developed resistance against monocrotophos from moderate to high level (20- to 139-fold).

5.6.2.3. Methamidophos

Methamidophos belongs to organophosphate group. It is sold under 35 trade names by 28 companies. In addition, it is also sold under generic name by 34 companies. The total sale of this pesticide is of Rs. 364 million singly and 295 million in mixture with other chemicals (11% of the total sale value). No data are available about the level of resistance in American bollworm against this compound, however, whitefly has developed a high level of resistance (40- to 492-fold) against it.

Bollworm has developed moderate to high level of resistance to cypermethrin

5.6.2.4. Chlorpyriphos

Chlorpyriphos is also an organophosphate insecticide. In Pakistan, it is sold singly by 2 companies as well as in a mixture with cypermethrin, and dimethoate. The statistics about its sale are not available. Studies conducted at CCRI indicated that all the field strains of American bollworm have developed a low level of resistance against chlorpyriphos (2- to 8-fold).

5.6.2.5. Endosulfan

Endosulfan belongs to chlorinated hydrocarbon group. It is sold under 14 trade names singly by 11 chemical companies. It is also sold as a mixture with cypermethrin and dimethoate. Sale statistics for endosulfan alone are not available.

[27] Ahmad, M., A. I. Arif and Z. Ahmad. 1995. Monitoring insecticide resistance of Helicoverpa armigera (Lepidoptera: Noctuidae) in Pakistan. J. Econ. Entomol. 88: 771-776.

[28] Carill, M., D. Johnston, K. Gorman and I. Denholm. 1994. Insecticide resistance in Bemisia tabaci from Pakistan. Brighton Crop Protection Conference: 431-440.

Box 7

Pesticides Brand Damage

CYPERMETHRIN: Popular brand names are: Akocyper, Arrivo, Bulletin, Card Bush, Cheeta, Cymbush, Cyperkil, Grand, Hunter, Jovithrin, Kingfeng, Lianzi, Lucky, Lylin. Metherthrin, Nurelle, Peskil, Polytrin, Pyreth, Ripcord, Sanma, Sherpa, Sinozine,
Spyrto, Sunmerin, Ustad, Ya Ti.

ENDOSULFAN: Popular brand names are: Drexel, Endon, Fezdion, Hektionex, Hexasulfan, Marvel, Nufa, Protodan, Rotky, Sialan, Sunendo, Thillix, Thiodan, Thioluxan.

MONOCROTOPHOS: Popular brand names are: Agricron, Apadrin, Asomono, Azodrin, Goldstar, Jianpai, Kozoo, Lu Hu, Miyao, Monophos, Nok-out, Nuofeng, Nuvacron, Quigiang, Suncrotophos.

METHAMIDOPHOS: Popular brand names are: Asomido, Calarich, Chaser, Dragon & Lion, Edron, Estrella, Feng Ye (Golden Leaf), Freg, Grip, Hasaron, Jiaanlin, Jiangmen, Master, Methaphos, Monitor, Morter, Multiphos, New Lake, Nuratron, Pandaphos, Patrolin, Piron, Quantum, Sannong, Shangnong, Shiyao, Sundaphos, Sundah, Tamaron, Themanitar, Tianjin, Tianshiphos, Traraphos, Trend, Xinyi.

CYFLUTHRIN: Brand name- Bathroid.

Pesticides residues in soil, ground water and food items pose a serious threat to environment and human health

However, the total sale of chlorinated hydrocarbons in Pakistan is about Rs. 189 million (3.17% of the total value). The American bollworm and whitefly have also developed resistance against endosulfan (36- and 22-fold, respectively).

5.6.2.6. Profenophos

Profenophos belongs to the organophosphate group. It is sold by one company under one trade name. According to the CCRI and Rothamsted study a resistance of 9- to 13-fold has been found in American bollworm and 56-fold in whitefly.

5.6.2.7. Thiodicarb

Thiodicarb belongs to carbamate group. Sale statistics for thiodicarb alone are not available, however, the total sale of carbamates in Pakistan is of Rs. 216 million (3.61% of the total sale). It is sold by one company under one trade name. A low level of tolerance (3- to 14-fold) in American bollworm has been found against thiodicarb.

5.6.2.8. Cyfluthrin

Cyfluthrin is sold alone as well as a mixture with methamidophos. Studies conducted at the Rothamsted, UK have shown that Pakistani whiteflies are 2000 times more tolerant to this pesticide.

The above analysis clearly indicates that both the key pests namely, American bollworm and cotton whitefly, which are responsible for downfall of cotton crops, have developed resistance against the most commonly used pesticides. No work is being conducted in Pakistan to evaluate the level of resistance in other pests (cotton and other crops) against the commonly used pesticides.

5.6.3. Pesticides Damage to Environment and Human Health

The pesticides pose serious environmental risks, especially if not used properly. These leave residues in

soil, groundwater, all parts of plants, edible oil and seedcake lead to a loss of biodiversity (killing of soil fauna, pollinators, parasites, predators, birds, etc.); and also pose health risks to workers involved in pesticides handling and application. About 200,000 low-quality (efficiency only 26%) knapsack sprayers are sold every year in the country. Of these, about 50,000 are made locally. Pesticide leakage from the sprayer tanks and nozzles of the sub-standard spray machines is common which effects non-target organisms besides being a health hazard for humans.

In Pakistan, little work has been done on the effects of pesticides on non-target organisms and pesticide residues in the environment. Studies conducted at Samundari (cotton growing area, near Faisalabad) during 1991-92 indicated that groundwater (10-13 m) contained concentrations of monochrotophos in the range of 0.04-0.06 ppm, cyhalothrin range from traces to 0.0002 ppm, and endrin in the range of 0.0001 to 0.0002 ppm. Similarly, in the top soil (upto 30 cm deep) monochrotophos was found upto 0.1932 ppm and dimethoate upto 0.3858 ppm. The organochlorines were found in the lower 50-75 cm layers of the soil (concentration upto 0.0096 ppm). While these amounts are within the limits set by WHO, these indicate need for continuous monitoring of pesticides residues in soil and groundwater.

Ideally the empty pesticide containers should be collected from the farmers and incinerated, however, no such mechanism is yet in place in the country. The Agriculture Department and pesticide companies recommend that the containers should be buried in the soil, which is also not an environmentally sound practice as the pesticides leach down and pollute groundwater, in addition to polluting the soil. Over 90% of the farmers just throw away the empty containers that are a constant threat to the environment. These containers are collected by scavengers and sold in open market for reuse or recycling.

The consequences of indiscriminate and improper pesticide usage on human health are severe but not regularly monitored. Only the severe cases of poisoning or death are reported in the hospitals. In 1992, a study was conducted by WHO to monitor the acetylcholinestrase (AChE) levels in male cotton workers. Of the 33 workers, 51% had AChE enzyme inhibition of 12.5 to 50%, 37% had enzyme inhibition of 50-87.5% and only 12% were out of danger. Likewise, of the 88 female cotton pickers, 74% had AChE inhibition of 12.5-50%, 25% had enzyme inhibition of 37-87.5% and only 1% were out of danger. In Pakistan, cotton is normally picked by children and female workers (many of whom are lactating) meaning that slow poisoning is prevalent into this group.

There is almost negligible information available about the pesticide residues in food items. During the year 1992, some 250 samples of cottonseed were analyzed by the Federal Pesticide Laboratory in Karachi. Out of the tested samples, 179 (71%) were found contaminated with pesticides. Of these, 39% samples had pesticide residues above the WHO recommended level. About 60% of the oil requirements of the nation are met from cottonseed oil, which means that the poisonous residues are also passing in human bodies

5.6.4. Failure of Integrated Pest Management (IPM) Projects

Although considerable funds have been provided by the government to various institutions for the development and implementation of IPM, no significant progress has been achieved in its dissemination. This is evident by the increasing sale of pesticides and the liberalization of pesticide registration and importation laws in the country. The reasons are: (i) insufficient technical knowledge, with only a few IPM researchers with postgraduate degrees, which limits the

Table 13. Impact of Pest Control Policies on Poverty and Environment

Policy	Impact
High support prices of cotton	♦ Maximum farm area allocated to cotton, promoting monoculture, and in turn, pest problems.
Visual forecasting of crop and pest development	♦ Inaccurate forecasts leading to: • Market instability resulting in inefficient trade, socio-economic stress. • Unpredictable damage to crop due to pests.
Support for chemical pesticides	♦ Degraded ecosystem, leading to: • Inefficient pest control. esidues in soil, groundwater, cotton seed-oil and seed-cake. • Loss of biodiversity. • Development of resistance against pests. • Health hazards.
Poor research and extension services	♦ 66% reduction in actual yield. ♦ Farmers earn little out of more area, thus land and water resources and other inputs like, seed, fertilizer, pesticides, etc. are wasted. ♦ Soil fertility is being reduced over time.
Lack of Monitoring Agricultural Pesticides Act, 1971	♦ Adulterated pesticides in the market. ♦ Labels in foreign languages pose human health risks and poor pest control. ♦ Ineffective pesticides not banned.
Liberalization of pesticide import laws in 1995	Liberalization of pesticide import laws in 1995

scope for IPM experimentation; (ii) agro-ecosystem complexity, which requires context-specific technologies rather than blanket approaches; (iii) a weak extension sector, which limits the avenues for disseminating information about IPM; (iv) lack of awareness of environmental consequences of pesticides; (v) inappropriate credit and subsidy schemes, which favor agro-chemicals; (vi) influential agrochemical companies which stimulate demand for their products; and (vii) language barriers among farmers, scientists and extension agents

5.6.5. Policy Impacts

The relationship between government policies in this area and environmental and social impacts is given Table 13.

The Agricultural Pesticides Act of 1971 clearly states that the government can cancel the registration of any pesticide, which is no longer effective against the target pests. The flare up of cotton whitefly and consequently of leafcurl virus since 1992-93 was caused by the extensive use of pyrethroids to control bollworms. However, as has been

demonstrated by a number of international research institutions, and as is well known to pesticide companies and plant protection authorities, the use of pyrethroids results in an increase in reproductive potential of whitefly [29]. Furthermore, the use of pre-mixed insecticides also contribute to the development of resistance to several compounds.

Scientists of Rothamsted Agricultural Experiment Station, UK collected the whiteflies from Pakistan and tested them against the commonly used pesticides. The conclusions published in 1994 clearly indicated that the pesticides do not kill whiteflies in the laboratory as well as in greenhouse tests. Further, research conducted by the Cotton Research Institute, Multan has also demonstrated that the commonly used pesticides are ineffective against whiteflies and American bollworm. The experience of 1996-97, showed conclusively the ineffectiveness of pesticides over a vast area.

Unfortunately, the concerned authorities have not taken any serious notice of this ineffectiveness. Furthermore, the Pesticides Technical Advisory Committee (APTAC), which is dominated by the representatives of pesticide companies, allowed the use of methamidophos, dimethoate and monocrotophos (all ineffective) for sometime [30].

5.6.6. The Poverty-Environment-Health Nexus

The above analysis clearly indicates a poverty-environment-health nexus. The evidences are as follows:

- There is no alternative to pesticides use, therefore, the farmers are bound to use pesticides. As they do not have access to credit, the purchase is based on credit from pesticides dealers who sell the products of their choice (usually of inferior quality).

The farmers do not have much choice to choose the pesticides, as the market is flooded with the same compounds being sold under various brand names

Box 8

Pesticides Usage- The Indian Experience

In Warangal where cotton was introduced 20 years ago, out of total 80 so far 26 cotton growers have committed suicide due to their crop failure. The cash crop promised profits so glittering that farmers called it "white gold". More than 25,000 acres in the same district are now under cotton, nearly a quarter of all the arable land. Though most holdings are just two to three acres, they represent the marginal farmer's hopes of breaking free subsistence. In the last four years cotton has lost its luster. Unlike, tobacco, cotton has no government price support. Increased yields drove prices down and the crop was prone to pestilence and diseases. But the farmers were persistent. They used fertilizers and pesticides in doses the manufacturers could never have imagined. Merchants gave them the poisons on credit and extracted interest rates as high as 36%. However, their way of life was already precarious when calamity struck in last November: "Spodoptera litura", a fat caterpillar about an inch long that attacks in the darkness. According to Mr. C. Cheralu, a plant scientist at Warangal district's agricultural research station "I have never seen such devastation. They were crawling on the roads .... People scooped them up by handfuls from the fields. They were everywhere, they were an army".

Farmers were so terrified by the caterpillars that they sprayed their fields with toxic chemicals every other day, instead of the two recommended doses a season. They also got

[29] Johnson, M. W. et al. 1982. Whiteflies cause problems for southern growers. California agriculture 36 (9/10): 24-26.

[30] Minutes of the 30th Meeting of the Agricultural Pesticides Advisory Committee, Sep. 16, 1996, Ministry of Food, Agriculture & Livestock, Islamabad.

their wives and children to roll pellets of the chemicals Methomyl into jiggery and rice bran to make them more enticing to the insects. The farmers, most illiterates, used no protective clothing or other safety measures. L. Jalapathi Rao, the research station's director said over 200,000 liters of Methomyl had been sold in the district in few months. The average farmer had spent about Rs. 6,000 an acre on it.

That, however, did not work. The caterpillars became resistant and when they had eaten cotton, they attacked pulses and other vegetables, leaving farmers with the prospect of no income at all. The tale of a small grower Ravi reflects the miseries of the small growers. In Kamaram village, the mother and young widow of Ravi Nellutia, aged 25, recounted his final days. "This year the crops were a total zero", Ravi's mother, Mollamma Nellutia said. He would say he had spent so much on pesticides, we were so much in debt that he could not see a way out ….. he could not sleep". Ravi borrowed from the pesticides merchants and moneylenders until his debt reached 200,000 rupees - a huge sum against his two acres. On December 16, he doused his field a final time and drank from the sprayer. His wife found him in the field, writhing and frothing at the mouth. He died hours later. In this way, 50 small growers committed suicide when their crop failed. They were left alone not only to fight the menace of caterpillar but face the exploitation of both the moneylenders and multinationals pesticides companies, too.

Now when the general elections are being held in India, state government of Chandrrabubu Naidu is under sever criticism that it left the farmers to their despair. Last month Mr. Naiadu promised 100,000 rupees to each dead man's family. His critics say he has merely turned the farmers' misery into election fodder. Later the government said it was asking more funds from New Delhi to add the 400 million rupees it has allocated for re-spraying toward off a new outbreak, and to keep farmers afloat until harvesting ends in March. District research station director, Dr. Rao believes that the caterpillar could have been controlled if the government had intervened earlier by teaching farmers non-chemical pest control methods and by persuading them to diversify. However, not even Mr. Reddy, who expects further devastation, can envisage a livelihood for local farmers entirely without cotton. "Cotton has to stay….. but farmers have to change their way of cultivating", he said. Thus, the small growers of India met a sorry end and were plundered by moneylenders and multinational firms who were interested only in their profit.

Now the question is: during this entire tragic event what type of role government heads, research stations directors, farm scientists, moneylenders and pesticides firms played? Out of these parties not a single one came to rescue the small cotton growers. Rather the said caterpillar attack led to a "lucrative" and "desired" increase in the selling of pesticides and moneylenders business. Despite the fact that the pesticides firms knew that their brands could not control the attack, they continued to sell their products to earn profits. "It's a crime indeed", one expert remarked.

The high degree of profitability in the business of pesticides stimulates pesticide companies to sell their products in as much high quantities as possible. This short-term market strategy (due to resistance development) is neither useful for the chemical companies, nor for the farmers or the country as a whole. Pest management requires a collective effort by the farmers, chemical companies and regulatory agencies. As pests are common to many or all the farms in the area, individual farmers have little incentive to control resistance. The collective action of farmers can only be undertaken, if the pest control activities are administered and properly coordinated by a regulatory agency having updated technical backup support. The Daily Dawn, March 16, 1998

- The farmers do not have much choice to choose the pesticides, as the market is flooded with the same compounds being sold under various brand names.
- Due to failure of crops, the farmers loose their investments made in the form of land rent, water, fertilizers, pesticides, seed and labor, thus they remain in poverty trap.

- The pesticides damage human health and environment which further leads to poverty

Pakistani small farmers could learn lesson from the fate of their Indian counterparts. First, the small growers should get together and try to form a pressure group to force both public and private sector to do something for the improvement of their crops through research and fair pricing of inputs and outputs. Second, if the growers are unable to do so due to illiteracy, government must motivate them to do so as it is in the best interest of the growers, national economy and multinationals.

5.7. Degradation of Forests and Watersheds

Deforestation and the related problem of rangeland degradation has extremely complex origins and attributes. It is impossible to delink the different factors responsible for such degradation, as some are causally related, others occur simultaneously – with most contributing to the downward spiralling nexus of degradation and poverty.

As legally defined by the government, areas designated as "forests" include both natural and plantation forests, as well as areas with closed forest cover and open cover; the definition even includes some territory with little tree cover. Clearer are the designations of "production" and "protected" areas described in the Forest Act of 1927. Production forests are used mainly for the direct material products of their growth. They have a high tree density and, in most instances, a closed tree canopy. They represent the chief source of timber and currently make up 27.6 percent of total forest area. Protected areas are largely intended to guard against soil erosion and today account for a 72.4 percent of total forest area. Such distinctions have nonetheless done little to prevent the decline of forest areas generally. Over the past 75 years, forests have decreased from 14.2 percent to 5.2 percent (4.57 million hectares) of Pakistan's total land area, with less than 3 percent currently under tree cover. Closed cover forests account for under 1 million hectares. Efforts at afforestation and watershed management have not kept pace with increased demand for timber and

During the colonial and the post independence periods, entrepreneurs took over and commercially exploited large forest tracts to meet the energy demands

Box 9

Forest Disputes in DIR

Forests in Dir Districts are being eliminated through over harvesting and illegal practices. Although the forests in this valley are vitally important for the range of environmental services, such as flood control -that is essential for agricultural and other activities, Dir has experienced a rapid and steady loss of old grown forest. Social forestry practices in the 1980's and the logging ban effect from 1993 to 1999 appear to have been ineffective in reversing this trend. Forest rights are complex and contentious issue. Currently, the government owns all the trees in Dir. Proceeds are split, with private interest receiving the large portion. According to one official, about 90% of forests rights are under dispute.

The trends in Dir are deeply alarming. Although the forest officials seem well informed and well-meaning, they are woefully under-funded. The region is economically depressed and has felt the full brunt of rapid population growth due to high birth rates and the influx of Afghan refugees. Dir is also one of the areas of the NWFP that appears most susceptible to religious extremism. Finally, the legal system will not be able to resolve disputes over forest rights rapidly enough to offset conflict. Even it does accelerate its judicial process, decisions may not be regarded as valid by heavily armed people who believe they have strong historical entitlements regardless of what a court determines.

excessive cutting and overgrazing. Between 1974 and 1985, timber supplies from state forests declined by 45 percent, in part because of reduced forest area. The total loss of forest occurred at a rate of 0.4 percent from 1981 through 1984 and has now decreased to 0.2 percent per annum. This figure translates into the destruction of 7,000 to 9,000 hectares of forested land every year. Today, Pakistan imports about 30 percent of the timber it uses.

The heavy deforestation stems from a number of factors. During both the colonial and the post independence periods, entrepreneurs took over and commercially exploited large forest tracts to meet the demands of a growing rural and urban population. With the development of canals, hundreds of thousands of hectares of riverine, scrub, and forestland in the Indus plains were cleared for agriculture. Energy demand also has increased pressure on the forests. Wood currently meets approximately one half of national energy requirements. Annual consumption in 1998 was about 19.70 million cubic meters which rose to 30.66 million cubic meters by the year 2000. According to the 1980 housing census, approximately 70 percent of all households in Pakistan relied upon wood for cooking and heating, with dependence reaching 80 percent in rural areas. Given continuing high population growth, reports of a further rise in timber demand for cooking and heating are hardly surprising.

The legal and administrative precedents for forest management were laid down in the forestry acts, introduced by the British in the mid-nineteenth century. Driven by the need to protect their commercial interests, these acts, namely the Hazara Forest Conservancy Rules in 1857 and the Forest Act of 1865 declared all forests the property of the government. As a result, existing community rights to forest resources became proscribed. Initially, all forests were declared reserve forests. Right holders were allowed to cut trees, collect fuelwood and clear land with permission of the Deputy Commissioner, while grazing was freely allowed. Non-right holders had to pay a tax for similar privileges. Recognizing that communities would not take comfortably to their free access being circumscribed in this fashion, the concessions were increased. The amended Hazara Forest Regulation Act was enacted in 1873, creating a new category, the 'guzara (community)' forest. Although, ostensibly, returning large tracts of forest, grazing and waste land back to the communities, the management of 'guzara' lands continued to reside with the forest department, which, furthermore, extracted senior age for any proceeds generated through sales of forest products [31].

This form of colonial governance was effective only in so far as the administration did not misuse its powers and community needs were relatively limited. The top down, non-participatory approach drove a wedge between communities and their birthright by denying them a say in their management and subjecting them to legal process, which was often, arbitrary. The unprecedented levels of degradation that the country is experiencing currently, partly has its roots in colonial past.

The post-independence period has witnessed a further acceleration of the economic and social transformations underway in the

[31] A hybrid category, the 'protected' forest also emerged. Communities were allowed open access to resources in these forests, except for specific uses proscribed by the government. This was essentially intended to arrest the growing trend towards encroachments. .

colonial era. The commercialization of agriculture, industrial growth and the demographic explosion continue to exert relentless pressure on the stock of natural capital. Land use changes have occurred on a large scale across the country in the form of irrigation engineering, large dam construction, draining of wetlands, clearing of land for agriculture, industry, mining, roads and settlements. Forest and river ecosystems, already under threat during the colonial period, have begun to lose their self-sustaining capabilities. The physical threats to the environment have been further exacerbated by the collapse of traditional social structures, as people move in search of better economic opportunities while losing touch with their roots and traditions. A combination of poverty, diversified economic opportunities and the increased commercial value of natural resources (timber, fuelwood, medicinal plants, and edibles) have encouraged resource overuse rather than conservation.

Some 200 camps of Afghan refugees were established in the NWFP. This massive influx of the people, which literally doubled the population of some regions and cities and their livestock, placed tremendous pressure on both ecosystems and infrastructure. Anecdotal evidence suggests that settling some of the refugees in heavily forested areas proved to be a great mistake as forest cover was quickly decimated for fuel and shelter.

Although as many as half the refugees have returned, at least 1.6 million (about 7% of the population of the NWFP) remain. There are good reasons to be concerned that the remaining refugees may never leave. This poses a serious long-term problem whether it is the effort to integrate them into Pakistani society or to prepare them for the workforce. Avoiding conflict will be very difficult because currently vulnerability exceeds capacity with a tendency to grow further.

The negative consequences of uncontrolled forest exploitation are ever more obvious. They include serious soil erosion and sedimentation, desertification of once-productive upland areas, the silting up of waterways in the plains (making them more prone to flooding), marked scarcities of fuelwood and building timber (creating an economic burden on low-income communities). The decline in tree cover has already resulted in a large reduction in watershed and reservoir efficiency. Except for a small headpond with daily storage capacity, Pakistan's important Warsak Reservoir - built in 1960 - is now completely silted up. The water's silt burden has caused serious wear on all rotating parts of the reservoir's hydroelectric generating station, and the main powerhouse structure is suffering from alkali-aggregate reaction.

Efforts at watershed management should lengthen the life of more recent projects, such as the Mangla and Tarbela Reservoirs; yet reports indicate that even in these cases sedimentation is occurring at a rate which could render them inoperative in as little as forty years. These processes have major implications for the availability of water for irrigation and power generation. Indeed, some experts predict large deficits of water and electricity in the future with considerable impact on agriculture and the economy. According to the World Bank, while less than 10 percent of Pakistan's hydroelectric potential has actually been exploited, further development is heavily constrained by silting. Nevertheless, projected stagnation in growth of natural gas supplies - Pakistan's chief energy

Forest and river ecosystems, already under threat during the colonial period, have begun to lose their self-sustaining capabilities

source - is likely to heighten demand for electricity. Energy supplies have been growing at 7.2 percent per year, while demand is increasing at 8.3 percent annually and the country has already experienced serious load shedding due to electricity shortfalls.

The effects of flooding are even more salient. Floods have not only caused loss of life and property but also serious damage to irrigation networks, crops, transportation and communication systems, and utilities. Between 1973 and 1978, a succession of floods in Punjab and Sindh affected over 12 million people and over 8 million hectares of land and destroyed an estimated 70 percent of the total standing crop. More recently, in 1992, landslides, accelerated soil erosion, and large quantities of felled, unclaimed timber moving down the Kunhar, Siran, Daur, and Jhelum Rivers in Hazara resulted in widespread destruction of lives and infrastructure. According to a report prepared by the SUNGI Development Foundation, the felled timber destroyed approximately 30 to 35 water mills on the banks of the Kunhar River in the Kaghan Valley demolished bridges used as links between remote villages and commercial centers damaged much needed sources of irrigation, and wiped out precious agricultural land. Overall, Pakistan's Economic Survey reported devastating floods as a chief cause of a 3.9 percent drop in agricultural output for fiscal 1992-93. Direct losses from flooding were estimated at Rs. 40 million (approximately US$1.5 million) for that year.

Between 1973 and 1978, a succession of floods in Punjab and Sindh affected over 12 million people and over 8 million hectares of land and destroyed an estimated 70 percent of the total standing crop

5.8. Slums in Urban Centers

The underlying causes of establishment of slums (katch abadis) in urban centers and consequent degradation of the urban environment are discussed in Section 4.0. The main issue related to poverty-environment nexus in urban slums is the handling of sewage water and liquid waste. A study by UNDP on Nallah Lai in 1997 in Rawalpindi found that the 'nallah' has become a dumping ground for the factory owners, scavengers and other people living around it [32]. The choking of Nallah Lai resulted in flash flood in 2001, inflicting greatest loss to the

Box 10

Flash Flood in Rawalpindi

Nallah Lai passes through the Rawalpindi city and its catchments area is Islamabad. Once a stream, it has become a dumping place for the city solid waste. The problem is further compounded by the illegal establishment of squatter settlements around its banks. During July 2001, due to heavy rains in Rawalpindi and Islamabad, an outrageous flood appeared in the Nallah, inflicting considerable damage to the poor living in the squatter settlements. According to the official sources 64 persons died, 500 houses swept away on both sides of the Nallah, 1,000 houses were damaged, 90 carcasses of cattle found and another 2,000 cattle were missing. Some 29 vehicles were also missing. As the flood spread in the city, the stockiest and wholesale dealers dealing with rice, wheat, medicine and tea, etc., were ruined as their godowns and basements were swept with rain. According to the All Punjab Chemist Association, medicines worth of Rs. 500 million were damaged in the medical market- Bhore Bazar. (The Nation, 28 July 2001).

[32] UNDP, Solid and Liquid Waste Management Practices in the Settlements Around Nallah Lai, Islamabad, 1997..

poor, (see Box) and now the Government is considering to re-locate the settlements and restore the Nallah to its original dimensions.

Further, usually untreated waste is loosely covered with soil in dumping places, which tends to absorb moisture, contaminate the underground water that is used for drinking purposes. Municipal waste also contains left over food, which attracts animals and insects. This is another source of communicable disease, affecting scavengers who pick recyclable and reusable waste from dumping sites. As these people live in congested (usually one-room) houses, the diseases are easily passed on to other members of the family. Medical waste and toxic waste of factories, which is not treated separately during collection and disposal is another medium of disease. Residual waste which scavengers are unable to sell (torn plastic bags, pieces of tires and cloth) is used as fuel producing harmful emissions. Burning, a common method of getting rid of accumulated waste produces toxic gaseous emissions, which affects poor living in close proximity.

The commonly found bacterial organisms in polluted water are salmonella, e.coli (including faecal), staphylococci and klebsiella. The resulting infectious and non-infectious water-borne diseases are diarrhea, dysentery, cholera, helminthiasis, enteric fever and pneumonia.

The ill-planned agglomeration of squatter settlements makes waste collection a difficult problem, even when civic amenities are extended to these areas. The housing density and narrow winding streets do not allow vehicles to pass through. Non-reusable/recyclable material which is not collected by scavengers continues accumulating. The wind and rain spreads it around, which produce unpleasant odors and contaminates the water. The basic notion of poverty implies one's inability to settle in those areas, which promise to provide access to those sources of production that makes a respectable livelihood possible. The poor are forced to live in kachi abadis (squatter settlements) without civic services – such facilities are not their priority any way, nor they can afford to have safe sanitation and arrange waste disposal at their own expense. When such services are extended to these areas by public agencies, they tend to be inadequate and with unaffordable operation and maintenance costs.

Global over-consumption is responsible for the rapid accumulation of solid waste in its many forms. Some of its manifestations are the increasing use of disposable goods, growing number of vehicles (waste oil and other parts), proliferation of industrial units and hospitals/clinics, the growth in packaging and advertisements, and the increasing circulation of newspapers, books and magazines. Developing countries, in particular, are institutionally ill-prepared to deal with the problem. In addition, the burden of the problem falls disproportionately on the poor, a consequence of municipal budgetary and planning constraints, as well as the concentration of limited facilities in the more affluent areas.

The existence of the poverty-environment nexus in the case of degraded urban environment is very simple to understand - the cycle is self-perpetuating: the poor live in katchi abadis because of poverty and unaffordable good living, their health expenditures increase as they live in katchi abadis and often get sick which pushes them into poverty. Further they remain with inadequate assets as their earnings are spent on building houses illegally, and the market value of the property do not rise as there is

The main issue related to poverty-environment nexus in urban slums is the handling of sewage water and liquid waste

Box 11

Air pollution, water pollution and diseases in Peshawar

In Peshawar, high birth and rural emigration rates, and the sudden appearance of half a million Afghan refugees have magnified environmental problems considerably. Peshawar has experienced a dramatic rise in air and water pollution as well as solid and liquid waste. Water borne diseases are wide spread causing 80% of stomach disorders and 40% of all deaths. Toxic gases and particulates form a dome over the city, largely due to inefficient motor vehicles and brick kilns fired by used oil and car tires.

Peshawar is a classic case of environmental degradation linked to human insecurity. The Afghan refugees population and many of the Pakistani people living in Peshawar are extremely poor and unable to afford environmentally sound lifestyles. They are vulnerable to all of the health problems associated with air and water pollution and have little capacity to treat and prevent these. There also appears to be growing resentment towards the 500,000 refugees and the environmental devastation they have caused.

Urban poor remain with inadequate assets as they lack security of tenure

no legal status and proper service delivery system in the squatter settlements. All these factors limit their capacity to obtain housing loans or any other form of credit so as to start any enterprise. Thus the poor remain in the vicious poverty trap. The health and productivity impacts are estimated at $1.5 - $2.0 billion per annum (3-5% of GDP) and are projected to reach 4-8% of GDP in 2010.

The poor are more prone to suffer adverse health impacts. This is both because of their greater exposure to polluted water, as well as the lack of health facilities to deal with them. Inadequate nutrition, lack of education and overcrowded housing – which if assured could improve coping capacity – increase vulnerability to disease. A telling statistic is that infant mortality continues to remain high while most demographic indicators have improved which is a result of infants' high rate of exposure to waterborne diseases. While pollution also has a generalized aspect, the better off are in a position to deal with it successfully given their access to household alternatives, such as periodic cleaning and lining of underground water tanks, water filters and mineral water.

The degradation of urban environment due to industrial and vehicular pollution is discussed in detail in Section 4.0. The major chemical contaminants are arsenic, asbestos, cadmium, chlorine, chromium, fluorides, lead, mercury, nitrates, calcium, oxalates, sodium and magnesium. The diseases commonly associated with such chemicals are cancer, impairment of central nervous system, gastro-intestinal disorders, liver necrosis, metabolic poisoning, neurological disturbances and hypertension. The poor have installed industries dealing with toxic chemicals in their homes and the entire family suffers.

6.0

ROOT CAUSES OF INCREASING POVERTY AND ENVIRONMENTAL DEGRADATION

Development and demography are key to understanding the linkages between environmental degradation and poverty. Considerable debate surrounds the question of whether affluence or poverty is more to blame for degradation. Essentially, degradation is rooted in unsustainable development processes, while poverty is an outcome of such development and the poor are the victims of degradation that such development engenders.

6.1. Increasing Population

Some distributional and social outcomes of policies have strained the carrying capacity of land and water by causing such resources to be used in an inefficient and exploitative manner. Population growth has exacerbated these impacts. It has accelerated rural-urban migration. In the NWFP rural populations have moved up into marginal lands, erosion prone hill areas, fragile semi-arid areas that have traditionally served pastoral groups and their herds. Consequently, low-quality pasture is now being used more intensively and pastorals herds are forced to graze post-harvest crop residues which should be used for fertilizing agricultural land. As resources come under pressure from increasing numbers of land-poor and landless rural people, traditional management and tenure and rights systems collapse. Thus, grazers' rights are being encroached upon and tree rights are subsumed under land rights leading to deforestation. Thus state lands are under constant threat from farmers, loggers and fuelwood collectors. The refugee influx in NWFP and Balochistan has aggravated the problem.

Another manifestation of rural population pressure is rural to urban migration, represented by the rate of urban population growth, presently in excess of 4%. Growing populations are straining the capacity of the urban environment to absorb the wastes and emissions they produce. In turn, the unassimilated pollutants emanating from poor sanitation, industrial, energy and transport emissions have exposed such populations to health hazards. The imbalanced development process tends to reinforce these trends.

6.2. Stagnant Agricultural Growth and Rural to Urban Resource Transfer

Overall, the agriculture sub-sectors grew at an average annual rate of about 3-4 percent during the past 50 years (Table 14). This increase was due to the expansion of cropped areas because of irrigation, farm mechanization and the increased use of quality inputs, such as hybrid varieties. In most years, growth was achieved through the expansion of production areas.

Between 1951/52 and 1997/98, the annual growth rate in the cropped areas was 1.37 percent as the area under crops grew from 12.34 to 23.04 million hectares. For the same period, the irrigated area increased from 8.21 to 18.00 million hectares. This pattern of growth is also evident from Annex 4 which decomposes growth in output in terms of changes in cropped area and yields for a few selected crops. The yield increases have been

Degradation is rooted in unsustainable development processes, while poverty is an outcome of such development and the poor are the victims of degradation

Table 14. Growth Rates in Agriculture by Sub-sectors

	1959/60-1970/71	1971/72-1979/80	1980/81-1989/90	1990/91-1999/2000
Agriculture	**4.68**	**2.61**	**4.12**	**4.41**
Major Crops*	6.07	2.19	3.32	3.50
Minor Crops	5.37	2.67	3.66	4.56
Live Stock	1.95	2.62	5.63	6.44
Fishing	8.58	1.25	5.43	3.55
Forestry	6.59	0.56	6.39	(-)7.7

dominant for wheat, rice and cotton in the periods when there were breakthroughs in the development of hybrid varieties (Annex 4).

Note: Major crops include wheat, rice, maize, barley, sorghum, millet, gram, cotton, sugarcane, rape and mustard seeds, tobacco and sesamum. Minor crops are chillies, fodders, potato, onion, other vegetable, fruits, sugarbeet, sunflower, soybean, mung, mash, red lentils, etc.

Annex 2 shows the area of production and yields for the more important crops for selected years. Except for oilseeds, the area and yields of all crops increased. Cotton yields fell in the 1990s due mainly to viral infestation. Yields per acre for all crops have shown only modest increases over long periods. The important exceptions have been the dramatic increases in cotton yields during the 1980s and wheat and rice yields in the second half of the 1960s.

There are large yield gaps between experimental conditions and farmers' fields as well as between traditional and progressive farmers, indicating potentials for increasing farm productivity (Table 15 and Annex 5). From 1959-1960, except for oilseeds, the area under all crops and their yields increased. However, the increases in yields per acre have been modest, except for the dramatic increases in cotton yields during the 1980s and wheat and rice yields in the second half of the 1960s Annex 2.

Table 15. Yields of Different Crops by Category of Farmers

Category of Farmer/Farm	Yield (t/ha)				
	Gram	Potato	Onion	Maize-Hybrid	Maize-Synthetic
Potential Yield	1.2-1.4	6.0	10.0-12.0	4.8-6.0	2.8
Progressive Farmers	0.8-1.0	4.0-4.8	8.0-9.0	3.2-4.4	2.2-2.4
Average Farmer	0.4-0.6	3.2	6.0-7.0	2.8-3.0	1.4
Traditional Farmer	0.12-0.24	2.0-2.4	3.2-4.0		0.8-1.0

Sources: Directorate of Pulses, Directorate of Vegetables Research, Faisalabad and Maize and Millets Research Institute, Yosafwala.

Table 16. Percent Annual Growth Rates in Total Factor Productivity among Various Cropping Systems in Pakistan, 1970/79 and 1980/89

System/region	1970-1979	1980-1989
Wheat-Cotton, Punjab	-0.62	0.01
Wheat-Maize, Punjab	0.42	-8.79
Wheat-Mixed, Punjab	-1.92	-1.53
Wheat-Rice, Punjab	-2.00	-2.90
All Punjab	-1.30	-0.80
All Sindh	-0.50	-1.70

Source: Ali, Mubarak and L. E. Velasco. 1993. Intensification induced resource degradation: the crop production sector in Pakistan. IRRI, Manila.

Notes:
1. The potential yield of gram is for irrigated conditions.
2. Traditional growers do not cultivate hybrid varieties of maize hence no assessment of their yield levels
3. Data for Onions cultivated as a single crop.

A better measure of crop area productivity is the changes in the total factor productivity in agriculture. This measure is computed by dividing index of production for all crops with an index of all inputs. Table 16 shows that total factor productivity was either stagnant or declined for major cropping systems since the mid-1970s. This decline is disturbing since improved technologies to increase crop production were already available.

Barter terms of trade indices for the agriculture sector improved in the 1990s. For most years, the major crops and the fishing sub-sectors faced adverse terms of trade (Annex 6). Despite the year to year fluctuations in the estimates for effective protection coefficient for four crops, the effect of policy distortions on output prices shows that agricultural producers (except sugarcane) have faced large disincentives (Table 17). To counter the adverse effects of low output prices, a system of input subsidies on irrigation water, fertilizer, seed, pesticides, machinery, electricity and credit was instituted. However, even after some of these inputs were reduced or eliminated in the 1990s, the government policies remained distorted.

An analysis of the domestic resource cost for different crops showed that Pakistan has a comparative advantage in cotton, wheat and Basmati rice and a disadvantage in sugarcane. The incentives given to farmers have,

Table 17. Effective Rates of Protection and Effective Protection Coefficients for Various Crops, 1991-1992 and1997-1998

Year	Effective Rates of Protection (%)				Effective Protection of Coefficients			
	Rice	Wheat	Cotton	Sugarcane	Rice	Wheat	Cotton	Sugarcane
1991-1992	-59	-46	-63	70	0.41	0.54	0.37	1.7
1997-1998	-66	-17	-34	23	0.34	0.83	0.66	1.3

Note: Rates and coefficients for 1991-1992 are taken from "Strategic Reforms for Agricultural Growth in Pakistan" by Rashid Faruqee, World Bank. Coefficients for 1997/98 are from "Agriculture and the WTO: case of Pakistan" by Dr. Sarfraz Khan Qureshi, 1999.

therefore, been distorted. The past pattern of resource allocation within agriculture has tended to move some resources to the cultivation of non-competitive crops. Table 18 presents an estimate of the resource transfers out of agriculture. The transfers are divided into direct transfers and total transfers. The total transfer includes the effect of the trade regime on the exchange rate. Although recent efforts have been exerted to stem the flow of resources out of the sector, recent data still show resource transfers from agriculture.

The investment rate in the country during 1980/81 to 1998/99 was not only low but has declined over time (from about 17 percent in 1980/81 to 15 percent in 1999/2000). The investment rate in agriculture has, however, declined marginally from 10.84 percent in 1980/81 to 10.27 percent in 1999/2000. But the nature of investment in agriculture exhibits considerable variation. For example, from a high 30.4 percent in 1995/99 the proportion of public investment in agricultural sector has fallen to 18.1 percent in 1999/2000. This uncertain nature of public investment is a cause of alarm.

Food security is linked to poverty because of the dependence on purchased food in both rural and urban areas

The relative share of development expenditure benefiting agriculture has also fallen over time. The decline in the development expenditure reflects both the budgetary constraints and a deliberate policy of reducing subsidies for agricultural inputs. The budgetary constraint was imposed to keep the overall fiscal deficit low in the face of rising current expenditure on account of high burden of servicing debt and defense expenditure. The slow-down in agriculture in the 1990s has had adverse implications for growth in rural income and employment. The implications for the incidence of poverty and food insecurity are serious

6.2.1. Poverty and its Linkages to Growth

Food security is linked to poverty because of the dependence on purchased food in both rural and urban areas. Hence, increase in poverty will continue with the increase in prices of food items which, in turn, will lead to greater food insecurity.

Poverty, food security and equity are all directly related to the rate of growth. In Pakistan, the economy grew at a relatively high rate during the 1980s, reducing the proportion of people below poverty line from 25.7% in 1979 to 17 percent in 1987-1988 (Table 19), despite high population growth. Economic growth since the early 1990s has slowed down considerably while the population growth rate remained high at about 2.7%. The proportion of people below poverty, during this period, has correspondingly gone up indicating a negative relationship between

Table 18. Transfer of Resources from Agriculture Due to Output and Input Price Interventions, 1984-1987

Category	(Billion of Rupees, 1985/86 prices)	
	Direct Transfers	Total Transfers
Output prices	9.8	-21.0
Input Prices	--2.6	-5.2
Net Transfers	7.2	15.8
Share of Agricultural GDP (percent)	6.4	13.6
Share of GDP (percent)	-1.6	3.4

Source: Food and Agriculture Organization. 2000. Policy and strategies for sustainable household food security and poverty alleviation, Islamabad.

Table 19. Household Income Distribution in Pakistan

Year	House Hold Gini-Coefficient	Hose Hold Income Shares			Ratio of Highest 20% to Lowest 20%	GDP Growth Rates
		Lowest 20%	Middle 60%	Highest 20%		
1963-64	0.386	6.4	48.3	45.3	7.1	6.5
1966-67	0.355	7.6	49.0	43.4	5.7	3.1
1968-69	0.336	8.2	49.8	42.0	5.1	6.5
1969-70	0.336	8	50.2	41.8	5.2	9.8
1970-71	0.330	8.4	50.1	41.5	4.9	1.2
1971-72	0.345	7.9	49.1	43.0	5.4	2.3
1979	0.373	7.4	47.6	45.0	6.1	5.5
1984-85	0.369	7.3	47.7	45.0	6.2	8.7
1985-86	0.355	7.6	48.4	44.0	5.8	6.4
1986-87	0.346	7.9	48.5	43.6	5.5	5.8
1987-88	0.348	8.0	48.3	43.7	5.5	6.4
1990-1991	0.407	5.7	45.0	49.3	8.6	5.6
1992-93	0.41	6.2	45.6	48.2	7.8	2.3
1993-94	0.40	9.2	51.6	40.2	4.4	4.51
1998-99	0.41	8.1	49.6	42.3	5.0	3.11

Source: Economic Survey of Pakistan. Government of Pakistan, Finance Division, Islamabad. 1998-1999

economic growth and the incidence of poverty. The 1970s appear to be an exception: there was relatively slow growth but poverty was sharply reduced. This was due to a massive exodus of its labor force to the oil-rich Arab countries. Remittances from these migrant workers, mostly from rural areas, reached a peak of about $2 billion per year.

The relationship between growth and poverty has also been observed in other countries. Based on Table 20, it can clearly be seen that poverty responds quite strongly to overall (per capita) economic growth.

The trends in income inequality have also closely followed the growth performance of the economy. During 1985-1988, Pakistan achieved a high growth (average of 6.2 percent) which was accompanied by falling income inequalities; the Gini-coefficient fell from 0.355 in 1985-1986 to 0.348 in 1987-1988. On the other hand, the relatively slower growth of the real GDP in 1990-1991, 1993-1994 and 1998-1999 was accompanied with rising income inequality; the Gini-coefficient rose from 0.407 in 1990-

Table 20. Response of Poverty Indicators to Per Capita GNP

	Period	Percentage Points Reduction in Poverty	Average Growth
East Asia & the Pacific (excluding China)	1987-1993	1.6	6.9
China	1987-1994	0.7	7.8

Source: Food and Agriculture Organization, Food Security and Poverty Alleviation in Asia: Lessons and Challenges. Bangkok: 1999

Table 21. Changes in the Degree of Income Inequality and Income of the Poor under Changing Economic Conditions

	Period of Growth (88 Countries)		Period of Decline (7 Countries)	
Indicator	Improved	Worsened	Improved	Worsened
Inequality	45	43	2	5
Income of Poor	77	11	2	5

Source: Deininger & Squire (1997) quoted in Food and Agriculture Organization. 1999. Food Security and Poverty' Alleviation in Asia: Lessons and Challenges.

1991 to 0.410 in 1998-1999. Table 19 reflects the behavior of the Gini-coefficient and growth rates of real GDP from 1963-1964 to 1998-1999.

Table 21 summarizes the global experience of 88 countries with episodes of growth in overall income and seven countries in a period of decline in overall incomes. During the period of expansion, a slightly greater number of countries recorded greater equality (45 cases) compared with those that showed worsened inequality. An overwhelming majority (77 cases) showed that income of the poor improved during the period of growth. But when the economy stagnated or contracted, the poor bore a greater burden with proportionate declines in their income being greater than those of the rich. The implication for Pakistan is quite clear: the recent stagnation in the growth rate needs to be reversed for both poverty reduction and improvement in income distribution. Thus the major challenge facing the country is the revival of growth

The revival of aggregate growth requires macro-economic stability as well as high agricultural growth, yet macro-level instability has been a major feature in Pakistan's economic history. The slow-down in the overall economic growth as well as in the crop sub-sector in agriculture has emerged as a major issue in the 1990s. The country has already launched major reform measures in collaboration with the International Monetary Fund and the World Bank to address major macro-imbalances of high fiscal and current account deficits and to raise savings rate for financing high investments than were achieved in the past. However, the revival of agricultural growth is the critical element to accelerate and stabilize the overall growth rate of agriculture.

As regards agriculture, the sources of growth have also changed. Past growth in the 1960s came largely from area expansion and seed-fertilizer-irrigation package. In the 1970s, intensification of water and fertilizer use contributed to growth while improved crop management and incentives played a significant role in the 1980s. However, there has not been any significant improvement in productivity growth and there are indications that it may have in fact stagnated due to resource degradation and inappropriate policies. Future growth has to come through the very challenging task of increasing farm productivity.

6.3. Climate Change and Shift in Cropping Patterns

Pakistan is located in South Asia at 24o to 37o north latitude, and 61o to 76o east longitude. Its physiographic diversity is visible in its high-altitude mountain ranges, its afforested zones, fertile plains, rocky plateaus, deserts and coastal areas. Temperatures range between 42o C in summer in the central arid plains and –26o C in winter in the northern mountainous areas. Precipitation varies from an annual average of over 1700 mm for the northeastern

mountains to a mere 30 mm in the south-western plains. Most of the annual precipitation occurs during the summer monsoon period from July to September. Smaller amounts of rainfall occur over winter, from eastward-moving extra-tropical depressions.

Meteorological data for the period 1931—90 show an inter-temporal increase of 0.5-1o C in annual mean temperatures across the country with the exception of the monsoon and southeastern coastal belts where temperatures decreased. The latest climatic change scenarios generated by general circulation models (GCMs) for arid and semi-arid Asia indicated that although area-averaged annual mean precipitation is projected to increase in most parts of Asia, a decline in summer precipitation is likely to over the central parts of arid and semi-arid Asia. This includes the Indo-Pakistan sub-continent almost entirely. Because the rainfall over this region is already low, severe water stress conditions - leading to expansion of deserts - are quite possible, with rises in surface air temperature and depletion of soil moisture. The largest reductions (precipitation reduced to <1 mm per day, 60% decline in soil moisture) are simulated in the arid regions of Pakistan. This is exactly what is happening in Pakistan in the form of drought.

According to its characteristics, drought may be divided into three types: meteorological, hydrological and agricultural. The meteorological drought occurs when rainfall is below 40% of the expected rainfall in any large area for an extended period of time. The hydrological drought occurs when there is a sustained deficit in surface runoff below normal conditions, leading to depletion of groundwater level. Agricultural drought occurs when rainfall, its amount and distribution, soil water reserves and evaporation losses combine to cause crop or livestock yields to diminish significantly. The results are low crop production, poor grazing conditions, low efficiency of farm labor and investments, decreased availability of fuel-wood, increased risk of desertification, and the associated social and economic consequences, including insecurity in food supplies.

Rainfall during 1998-2000 in Pakistan was greatly deficient. During these years the overall rainfall was significantly below normal. In Sindh and Balochistan, some of the areas received even less rainfall. This deficiency has caused severe drought conditions, crop failures and shortage of water in rivers and reservoirs and depletion of underground-water. The severity of drought reached its climax in low rainfall zones including most of Balochistan, southern parts of Sindh and southeastern parts of Punjab. The annual total rainfall ranged between 35 mm and 110 mm whereas the annual loss of moisture through evapo-transpiration was 200 mm. The mean annual rainfall failed to meet 75 to 90% of mean annual evaporation in these areas (Chaudhry, 2001) [33].

The El Nino 1997-98 and the subsequent La Nina since mid-1998, like other parts of the world, seriously affected Pakistan's weather cycle as well. Light to moderate drought impact had started appearing in 1997 summer which persisted with variable intensity till the early 1999. The situation was further aggravated due to well below normal rains in Balochistan, southern parts of Sindh and rainfed plains of Punjab and NWFP during 2000 summer and winter.

The surface and ground-water reservoirs were depleted which resulted in drying up of vegetation and orchards. Animals and human beings suffered from severe food and water shortage. Migration at large

[33] Chaudhry, Q. 2001. History's worst drought hit Pakistan. Farming Outlook. Vol. 1 (1): 23-27.

scale took place in search of food and water thus exerting extra pressure on the land and water resources of neighboring areas.

The climatological changes in Pakistan have shown visible impacts on rural communities, in terms of direct as well as indirect loss (failure to adjust to new demands of the climate). For instance, Sheikupura, Faisalabad, Sargodha districts in Punjab used to be cotton-growing areas back in early 1970s. However, these became rice-growing areas due to waterlogging and the cotton zone in Punjab became limited to the southern Punjab. In response to waterlogging, the poor communities mastered rice cultivation and fish farming. However, in the face of current water crisis, the fish farms have dried up and continuation of rice as an export commodity on profitable basis is in danger. Thus the climatic

Box 12

Drought 2000-01

Drought is believed to be the most dangerous environmental hazard. First, it is a "creeping" hazard, so-called because drought develops slowly and has a prolonged existence, sometimes over a period of many years. Second, droughts are not constrained to a particular tectonic or topographic setting and their impact can extend over large regions. Consequently, drought has similarities with long-term environmental degradation and it is often difficult to document where drought ends and human-induced desertification begins. Third, the impact of drought varies greatly between the developed and lesser-developed countries. Famine is the most serious outcome of drought in less developed countries.

History's worst drought conditions prevailed in most of Balochistan, Thar and Cholistan deserts during the winter of 1999 to winter 2001. Drought is an abnormal event, yet it is a natural recurring feature of Pakistan's environment. Pakistan experienced severe droughts in 1899, 1920 and 1935.

Real GDP growth during 2000-01, at around 2.6%, was adversely affected by the worst drought in the country's history. Though, many parts in Sindh and Balochistan had been experiencing drought like conditions for over two years, however the situation became worst during 2000-01 and engulfed the entire country. The continuing dry spell resulted in a severe shortage of water, which affected agricultural output and ended the year with a reversal in the rising trend of agricultural growth. With the result that for only the second time in the last decade, value added in the agricultural sector registered negative growth, at -2.5% as against +6.1% during the previous year. Though the higher base affect of monumental agricultural growth witnessed during 1999-00 was also at play during 2000-01, the magnitude of downturn in agricultural output was clearly a reflection of the drought, which resulted in a lower exportable agricultural surplus and thus a greater demand for agricultural imports.

The impact of drought was also felt on electricity and gas generation sector. Low levels of water in dams translated into lower hydel power generation that had to be partly compensated through higher furnace oil induced electricity generation. This meant, on the one hand, a lower contribution of electricity generation to overall GDP and on the other hand higher fuel imports than otherwise would have been needed. If the overall impact of drought is considered into account, real GDP would provisionally have grown by 4.8%, as against 2.6% that was achieved during 2000-01.

According to Social Policy and Development Centre, Pakistan lost Rs. 21.423 billion, including Rs. 8.869 billion in the agriculture sector due to drought conditions during year 2000-01

changes in one or the other way have been also responsible for increasing poverty and environmental degradation.

6.4. Lack of Capital and Access to Technology

The lack of capital and access to technology are considered to be the basic root-causes of poverty, in agricultural as well as industrial sector. An Asian Development Bank study found that there is a market of 3 to 4 billion US$ of micro-credit per annum, yet only a fraction of population is served by the micro-finance institutions. The Agricultural Information System is extremely weak and has been unable to transfer technology from research institutions to the farmers, the result is widening gap between the potential and actual crop yields. It is generally recognized that it takes more than 10 years for a variety to reach from the research institutions to the farmers. Further, only 20% of the quality seed requirements are met by the national institutions, others use low-quality seed kept as reserve at the farm.

The monitoring of natural resources on scientific lines is non-existent in the country. Remote sensing technologies are not regularly used for monitoring crops or vegetation. Unless this information is available, no planning could suit the current needs in the new climatic scenario.

Likewise, in the industrial sector huge investments are needed to convert the out-dated machinery with the one which is eco-friendly. Yet a limited know-how is available in the country to adopt the eco-friendly techniques.

6.5. Weak Governance

The resident Heads of the UN agencies in Pakistan after analysing the problems of Pakistan proclaimed: "If there is one development issue that is quintessentially the Pakistan's challenge, it is the issue of sound governance." [34] They also stressed, "a successful programme to address the issue of governance offers the solution the many of the other challenges… (addressing poverty, protecting the environment, creating employment, managing the economy, etc.)".

The World Bank's, Pakistan Economic Report 1999 also support above statement by suggesting: "improving governance is a prerequisite for everything else. There is a lack of analytical basis in the formulation of policies. The most stubborn problem in Pakistan's macroeconomic and structural reforms is the long-term failure of fiscal revenues to rise as a share of GDP. Failure to mobilize adequate revenues has particularly hurt the provinces, with adverse implications for expenditures on social services. Poor governance has also led to inefficient use of public funds/goods, including on capital projects outside the discipline of the budget and planning process; inadequate public sector spending on physical and social infrastructure; and the legacy of using the civil service as a primary employer. This leads to weakening of administration and lowering of morale in government, making it more difficult to reduce poverty, carry out the public's business or implement needed reforms….."

In summary, the effects of poor governance include: policy ineffectiveness; social, political, ethnic, and religious conflict, instability and insecurity; environmental degradation; human and social costs (such as illiteracy, high morbidity and mortality and unmanageable inequality); poor targeting (i.e., policies cannot be targeted to relevant social and economic groups because institutional performance is so poor); corruption;

If there is one development issue that is quintessentially the Pakistan's challenge, it is the issue of sound governance

[34] Pakistan in the 21st century: A Renewed Alliance

social frustration; stagnant economic growth; non-competitive economy; poverty; and erosion of government's legitimacy. The most vulnerable groups because of all the above factors are women and children. Primarily, women and children have to shoulder their men in earning livelihoods in days when they ought to rest or go to school. Women, in particular, have to travel miles and miles to fetch water for family needs, spend more time in collection of wood, etc. All these factors lead to weak bodies, which are prone to diseases.

It is a general agreement that in Pakistan, traditional institutions for the management of community resources and common problems have either become disintegrated or weak, which have adversely affected the resources and infrastructure. The weakening or elimination of traditional social control mechanisms has led to such phenomena as the overgrazing of rangelands and alpine pastures, desertification, destruction of forests in northern Pakistan and decaying irrigation infrastructure.

While traditional institutions for resource management have become weak; the new ones have not become effective

While traditional institutions for resource management have become weak; the new ones have not become effective. The crop forecasting and density of forests is done based on guess work (no use of satellite data), weather forecast models are not used to predict the weather, agricultural extension system is weak. Un-sustainable agricultural techniques are being practiced whereas research institutions are not actively engaged in making innovations to promote sustainable development. The development process is not target oriented. For instance, on-farm water management program was initiated to rehabilitate some 125,000 water-courses in the country. In 25 years, the program has only been able to rehabilitate some 22,000 water-courses (one watercourse per year), meaning that at least 100 years more are needed to rehabilitate the remaining water-courses. On the other hand, nature has taken over the control and in the present water crisis, the government and communities will have to rigorously work to save its agriculture and ensure food security. Likewise, the Plant Protection Department's weak capacity to regulate the use of pesticides, resulted in the indiscriminate use of pesticides on cotton, thus leading to the failure of cotton crop due to the development of resistance in insects against pesticides. Failure of the regulatory agencies to monitor groundwater depletion in Balochistan is leading to severe water crisis in the province and the entire city of Quetta is at risk of shortage of drinking water supply in future. The research institutions have failed to provide timely technology backup to the agricultural / industrial sectors. Ad-hoc decisions to increase crop production were made through agricultural support prices which negatively impacted the natural resources. More and more area has been brought under cultivation (rather than increasing production per acre) which has resulted in clearing of the natural vegetation, spreading water over vast areas (resulting in waterlogging and salinity) and thinly spreading the social and economic capital. The Environmental Protection Agency has been tasked to control pollution, yet its capacity to regularly monitor the air and water quality standards and to ensure compliance of NEQS is questionable. These are a few examples of the institutional failures which have led to environmental scarcities and poverty.

It is equally important to see why these institutional failures have arisen. Population has increased manifold burdening the effective working of institutions. The Government has remained unable to expand in capability at the same rate as the expansion in population. In the cities especially, rapid growth has far outstripped the capacity of existing government institutions to provide basic services. In the urban sector, ill-planned housing schemes have resulted in the mushrooming of squatter settlements having arrays of

economic and environmental problems. Even the newly planned cities, such as Islamabad have not addressed these issues properly resulting in appearance of squatter settlements in the high value areas. Many specialized agencies have been created by the Government including the local governments have been strengthened but little intervention has occurred that could qualify as institutional development at the village or neighborhood levels. The contribution of the private sector to environmental management in Pakistan is regrettably small. A few consulting firms are active, mainly in the fields of engineering and town planning but local expertise are limited in pollution control. Though some 56,000 [35] NGOs have been registered in the country, only a few dozen are active at the community level.

The contribution of the private sector to environmental management in Pakistan is regrettably small

[35] Daily "Nawa-I-Waqat, June 30, 2002.

7.0

REVERSING THE TRENDS

A study of this nature cannot hope to cover the length and breadth of projects, programs, and initiatives that address environment degradation and promote community welfare, therefore, a few projects have been selected to illustrate that there is always a hope for improvement and alternative ways to reach the goals of development.

7.1. Solid Waste Management

Three similar NGO initiatives in Karachi, Peshawar and Islamabad represent important breakthroughs in demonstrating how solid wastes can be recycled cost effectively while yielding economic benefits to the poor and enhancing awareness about the problem.

7.1.1. Safai Kamai Bank [36], Karachi

This project is managed by Gulbahao, a local NGO, and has been active for the past few years. The operating principles are simple. Safai Kamai banks are set up at strategic places with weighing machines and cash registers. People are encouraged to bring in their garbage (paper, plastic, glass, metals, etc.) which is then put in assorted bags. Prices are fixed by weight and checks are paid out which can be encashed at the nearest bank. A reasonable monthly sum can be earned in this way. Wet garbage (vegetables, fruit peels and food) is bought at the rate of Rs. 1.5/kg and run through a mincing machine and converted into compost called Thandi Meethi Khad literally mean: Cold, Sweet Fertilizer. Both the separated inorganic material and packaged compost is sold in the market.

7.1.2. Human Resource Development Center Program, Peshawar

The Human Resource Management and Development Center runs a program in Peshawar, with the objective of improving solid waste management and recycling, creating awareness regarding environmental impacts and enhancing the socio-economic condition of the young scavengers. The program provides health education to women and works towards strengthening relevant departments and local organizations. Land for compost has been obtained on lease with the help of the Environmental Protection Agency (EPA).

Project is implemented in five phases: a) area selection and preparation of area profile; b) community mobilization and awareness raising; c) enhancing socio-economic and literacy level of scavengers; d) converting various types of organic matter into compost; and v) building capacity of the relevant department and local organizations.

Households are provided with two colored bags, one for organic and the other for inorganic waste, and are collected twice a week. Organic waste is thrown in the compost pit while inorganic waste is sold to junk dealers on a monthly basis. Plastic bags are dumped at the main site. To ensure sustainability and cover administrative

[36] An Urdu Phrase, literally meaning that Waste is Gold

costs, each household is charged Rs. 15 a month.

In her weekly visit program, the female social organizer addresses three issues. One day is spent in instructing female community members on primary health and basic hygiene. On the next visit, the focus is on waste separation. The third visit is devoted to monitoring the community teacher. The male social organizer is responsible for leveling the ground, establishing a community-based organization in the area and motivating male members to monitor waste collection and disposition. He also, personally, oversees the work of scavengers.

In addition, other NGOs, community groups and relevant government departments (municipality workers, EPA, etc.) are being provided training on different aspects of the project to ensure maximum replication in other areas.

7.1.3. The Waste Busters Project, Karachi, Lahore, Islamabad

This is another local initiative aimed at providing livelihoods for scavengers and preserving the environment and mobilizing communities. The Waste Busters have their offices in Lahore, Karachi and Islamabad. Again, the operations are simple. Garbage disposal control zones are established and garbage bags distributed to households (Rs. 100/- for 26 bags). After sorting, organic matter is processed into compost where within six days time it is turned into organic fertilizer called "Green Force". Inorganic waste is transferred to various recycling facilities and is used for income generation in various industries. So far, the facilities for recycling are very basic but efforts are being made to upgrade them. Compared to the other two, this project is relatively more commercially oriented.

7.1.4. Solid Waste Management and Environment Enhancement Project (SWEEP)

The UNDP funded Solid Waste Management and Environment Enhancement Project (SWEEP) activated in August 1997, started its physical activities in January 1998 and reached completion in June 2001. The project's aim was to enhance the capacity and efficiency of Rawalpindi Municipal Corporation to design and implement a participatory solid waste management system and build the capacity of local communities to continue the activities at community level even after the closure of the project.

This project was developed pursuing a two-pronged strategy – mobilization of human resource and social capital development for attaining its objectives. Through human resource development, the project initiated the process of participatory development pulling together the resources of the Rawalpindi Municipality Corporation (RMC) and the citizens in order to bring about an attitudinal change from the conventional "supply driven" approach to a "demand driven" approach. While through social capital development, mechanisms and modalities were tapped to enhance the degree of trust, cooperation, dependability and interpersonal interactions between RMC and the communities.

From January 1999, the project gathered momentum and the process of community mobilization was expanded in 55 wards out of the total of 77. The project further expanded its activities in 75 wards in the year 2000-2001. The most important achievement of the project was effective advocacy campaign and the sustainability of the achieved results. The project not only significantly improved its operational capabilities but also its ownership both within RMC and amongst the community.

The SWEEP successfully extended social organization to 75 out of 77 wards of Rawalpindi

The project was successful in the implementation of its planned activities and was able to expand its process of community mobilization to more than 80% of the area targeted. The local communities actively participated in SWEEP and cooperated with the sanitation staff of RMC. Specifically, more than 84,500 households in the wards directly or indirectly collaborated with SWEEP. The local communities supervised and monitored the process of primary and secondary solid waste collection through 153 SWEEP Committees, 41 Community Organizations and 1,798 Lane Managers.

The community participated by contributing monetarily to the project as well. The contribution came to about Rs. 200,000 to 300,000 per month that was directly paid to sanitary workers by the households. Whereas the voluntary service charges were about Rs. 20 to 30 per household per month. The project was successful in achieving the target of forming Community Organizations (COs) and facilitating the development of a city level network of COs involved in solid waste management and integrated development initiatives.

Due to SWEEP, the understanding of participatory solid waste management has substantially increased

SWEEP induced community participation in city level planning and management that resulted in solid waste management improvements in the participating communities that led towards a better living environment and generated additional sources of income for low-income communities through waste segregation at source. The system of primary waste collection and segregation took shape due to the community and RMC's mutually agreed and planned actions.

Women were actively involved in the project. This is evident from the fact that the majority of Lane Managers were women – 1,120 Lane Managers were female out of a total of 1,798. Women organized 49, out of the total 153 SWEEP Committees, during the project. The active participation of women became a human resource asset for the project. This, no doubt, facilitated to a great extent, the fulfillment of the project objectives.

As the project was nationally executed, the implementing agency, Rawalpindi Municipal Corporation (RMC), being a local body was for the first time involved in a community based participatory project. The Administrator RMC, Chief Corporation Officer RMC and the Commissioner Rawalpindi Division took personal interest in the resolution of whatever difficulties were faced. During its life span, SWEEP was able to develop an effective liaison both at the grassroots and at higher administrative levels, with other line departments and institutions such as the Education Department, the Health Department, Pakistan Boys Scouts Association and Federal and Provincial Departments of Environment and Local Governments.

The project effectively carried out different "advocacy-awareness campaigns" to promote community participation in solid waste management. Awareness campaigns were comprised of multiple activities including 3 city-level and 24 ward-level walks, door to door campaigns called the "Dastak Campaign" involving more than 106 School Environment Clubs, a signature campaign on a 100 meter scroll of cloth, community dialogues, seminars, dissemination of educational material and school and mosque level awareness campaigns. The purpose of the advocacy campaigns was the promotion of an environment friendly attitude amongst all the stakeholders through enhanced participation, sense of ownership and sense of responsibility.

Due to SWEEP's achievements, the understanding of issues that affect successful implementation of community based solid waste management in urban areas has substantively increased. The success of SWEEP can be judged by the fact that it was not just Rawalpindi and RMC

that felt its impact. Other municipal authorities in the country showed strong interest in the project's outcomes and its replication in their respective areas.

7.2. Urban Improvement

7.2.1. NWFP Community Infrastructure Project

A nationwide Community Infrastructure Program (CIP) to improve the shelter conditions of low-income communities was initiated in 1990. The final report of Shelter for Low-income Communities Infrastructure Project for NWFP recommended an investment plan including a major project for improving the living conditions of low-income communities through rehabilitation and development of basic amenities. On the basis of the pilot activities in Tehkal Bala (Peshawar) and Ghaleygay (Swat), the project was appraised and accepted by the World Bank for financing a major proportion of its cost. The main activities of the project started in May 1996. Other donor agencies include IDA, SDC and UNICEF while the balance of about 35% is being met by the communities, individual households, local councils and the provincial government. The project objectives are:

- Upgrading the infrastructure and community development in the existing urban and rural low-income settlements.
- Promoting use of demand driven, participatory design procedures and affordable standards for infrastructure.
- Strengthening the ability of provincial and local governments to collaborate with communities to implement low-income infrastructure programs.
- Promoting sustainable arrangements for operation and maintenance of basic services.

The project has completed 5 years of implementation. The primary works in 47 out of the selected 55 sites and community works in 17 sites have been completed. Despite the constraints, the program had, in its first phase (55 sites), achieved overall 84% progress on physical works by February 2000.

Under the CIP expanded program, 25 additional sites and 10 deepening sites have been identified and prepared. The status/progress achieved on new and deepening sites of CIP is as follows:

- Community action plan with the new Community Based Organizations signed.
- Topographical survey of all sites completed.
- Design and infrastructure schemes completed.
- Project preparation for all individual schemes completed.
- 9 sub-projects have been approved.

The demonstrated success of CIP is owed to a number of factors. While the project is still undergoing its learning cycle, it has already established that:

- Communities - even the poorest ones - can and will pay where standards and service levels are based on their demands and are affordable.
- The community contracting and supervision lead to cost effective and better quality of infrastructure as compared to works carried out through the contractor. In the CIP, the community work has resulted in cost reductions of up to 35%.
- An investment in time to undertake a truly participatory approach is necessary to allow both for quality assured processes and community capacity building.
- The project implementation placed at divisional headquarters of NWFP

The community contracting and supervision lead to cost effective and better quality of infrastructure as compared to works carried out through the contractor

allows close supervision and monitoring of the project activities and prompt responsiveness to the communities needs.

- Regardless of the sophistication of the project design, community projects are ever living processes and potential changes in design during implementation should be considered as good signs of improvement.

7.2.2. Faisalabad Area Up-gradation Program

Being implemented with the financial and technical assistance of Department for International Development (DFID-UK), the Faisalabad Area Upgrading Project (FAUP) aims at improving the economic and social development of 240,000 people living in slums and katchi abadis of Faisalabad. Towards this end, it carried out interventions in basic education, small enterprise development, health and environmental care and infrastructure development.

The Faisalabad Development Authority (FDA) through a specially created Project Management Unit (PMU) is the implementing agency, the project adopts a participatory approach built on the establishment of grassroots level organizations called as Multi-purpose Community Organizations (MPCOs).

The FAUP strategy is based on:

- Working to establish community organizations with the skills, capacity and alliances to enable the poor women and the poorest who are most vulnerable and at risk to access their needs and rights.
- Demonstrating successful ways to improve the security and livelihoods of the poor including the poorest.
- Assisting the service providers to have the capacity to work with and respond to the demands of the poor.
- Creating an enabling environment through helping to establish a policy framework and mandate to ensure pro-poor focused urban development.
- Establishing structures, able to sustain and take forward urban poverty focused development and look towards supporting the emergence of a lead urban poverty reduction organization (with coordination, policy and advocacy roles) and the absorption of key functions back within line departments.

There are many innovations of the project but the main has to be that it is being implemented through government line departments using government institutions, procedures, rules and regulations. With its principal focus on the development of human resources and capacity building, the FAUP has achieved the formation of over 140 MPCOs, more than 50% of which have been female organizations. Its physical achievements so far include the execution of over 1,000 projects about half of which, costing 37% of the total cost of infrastructure projects, have been related to environmental sanitation (sewerage). The community contribution towards sanitation projects has been 50% of the total cost of the tertiary level infrastructure. To date, it is estimated that about 185,000 people residing in slums and katchi abadis and approximately 1.2 million people citywide have benefited from FAUP interventions.

Recently, the project has re-aligned itself to support the Government of Pakistan's Program of Devolution of Power to district level. FAUP, as a key member of the Divisional Committee for Awareness of Devolution of Power Plan in Faisalabad' has reached approximately 1.1 million people residing in katchi abadis and slum areas.

Experience from FAUP pilot areas has shown that unless

communities are mentally satisfied and secure with respect to their tenure, they will not seriously consider contributing towards the development of their respective areas. In Faisalabad, a city of about 2 million people, approximately 48% are living in slums and katchi abadis. Dwellers of katchi abadis are facing the threat that some day they might be thrown out of their occupied land. The communities living in these katchi abadis often put all their energies to save their occupancy of land rather than contribute their potential on productive matters.

FAUP through FDA has proved that social mobilization and organization is possible through government line departments. The project has demonstrated that security can only be achieved through the empowerment of communities.

FAUP has established that it is extremely important to integrate land and shelter policies with policies for reducing poverty and the aforementioned sectors particularly for people without shelter.

There have been cases where women and vulnerable groups have thought that they do not have the rights to purchase land. FAUP experience shows that this matter can be addressed mainly through raising awareness within communities of the fact that all citizens have equal rights as per the law.

FAUP has successfully demonstrated that an effective delivery mechanism can be established through partnerships between communities, government and or the private NGO sector. It has adequately demonstrated that it is possible to work through a government line department to establish equitable and working partnerships with community based organizations with the skills, capacity and alliances to enable the poor, the poorest and the most vulnerable to access their needs and rights.

7.2.3. Khuda ki Basti [37]

Khuda ki Basti, an appealing Urdu name meaning God's settlement, is a unique experiment in responding to the need of the poor for shelter in a speculative land market. In addition to Orangi Pilot Project (OPP), this is another best practice that was included in the Pakistan Nation report of 1996 in addition to OPP. It has again won a place in the current report owing to its consistent replication in several cities of the Sindh Province and its envisioned nationwide replication in the revived Katchi Abadis Regularization and Upgrading Program.

A city of 1.151 million, Hyderabad is the 6th largest city of Pakistan and second only to Karachi in the Sindh Province. Keeping in view the lessons learnt from successive failures of the conventional approach in making land and services accessible to low-income groups, the Hyderabad Development Authority (HDA) evolved an effective model in the form of Khuda ki Basti (KKB), incremental housing scheme to respond to the demonstrated needs of the shelterless in Hyderabad. Following are its salient features:

Integration of land and shelter policies with development is critical for reducing urban poverty

- The installments have been fixed at Rs. 100 (US$1.7) per month. The total price of fully serviced 80 sq.m plot works out to be Rs. 9,600 (US$160). In this way, the project will be fully self-financing without any element of subsidy from the government. The entry fee covers cost of land and charges of water supply provided through public stand posts. Speed and standard of development thus depend on installments and the financial risk of the public agency is minimized as the work is carried out on deposit basis and not on recovery basis.
- In principle, the inhabitants can

[37] 'Khuda Ki Basti' literally means settlement of God

decide for themselves to which facility they want to give priority to. On the other hand in order to quickly obtain certain facilities, the inhabitants of several blocks have accumulated funds far in excess of their due installments. Besides, standards prescribed pertain only to those items which cannot be changed later. Only the layout of the schemes is fixed and absolutely no standards are imposed otherwise as to the quality or plan of the houses.

- Although people receive possession and start living on the plot from the very outset, legally valid allotment orders are issued only when all installments have been paid. In this way, HDA has a means to cancel plots of those who leave the scheme. In such cases, the amount paid by them is refunded and the plot is assigned to another family.

Incremental development approach of Khuda Ki Basti is being replicated at many places

Achievements and Replication

- All plots in the original scheme at Hyderabad, KKB-1 and KKB-2 have been occupied and built upon basic services have also been provided.
- In 1996, HDA in collaboration with 'Saiban', a Pakistani NGO working towards shelter for low- income communities, organized workshops and training programs for the residents of KKB-1 and KKB-2 to mobilize them for taking over the affairs of these schemes.
- In 1997, health care, social forestry, education and income generating programs were launched in collaboration with different NGOs working in their respective fields in the project areas.
- In1998, consolidation of activities in KKB-1 and KKB-2, demarcation and survey of site for KKB-3 and meetings with different target groups were carried out.
- In 1999, the KKB-3 at Taisar Town Karachi was launched.
- By 2000, over 1,000 families were living in KKB-3 against the 1,700 plots available in the scheme. The services are being provided incrementally, 5 schools and 4 clinics have been established by the communities themselves.
- The incremental development approach adopted in Khuda ki Basti has successfully been replicated at Gharo (near Thatta) and two similar projects are in the offing at Taisar Town (KDA Scheme-45) and Baladia Town Karachi in collaboration with Malir Development Authority and Metropolitan Corporation, respectively.

Making affordable shelter accessible to the people who need it the most is the primary objective of KKB. This was made possible due to the following reasons:

- It is entirely self-financed: there is no element of subsidy; the entire cost of the developed plot is borne by the beneficiaries in easy installments spread over a period of eight years.
- It is simple in approach and all procedures are transparent; no lengthy paperwork is involved, no experts are needed; only 3-4 junior officials are able to manage the whole scheme.
- It is highly flexible from planning to execution, modification and adjustments can be made keeping in view the local conditions, only the basic concept need to be adhered to.
- HDA's site office provided all advisory services at the beneficiaries' doorstep, while most of the paperwork which is minimal and done right at the site. Though model house plans were provided to the allottees, the use of locally available material and self-employment in construction activities was encouraged in order to reduce costs.
- Inexpensive technology is used for construction of houses, keeping in view the local climatic conditions

and socio-economic status of the people. Dwellers are encouraged to innovate and improvise. Flexible planning and building control standards are used, no restrictions are imposed on autonomy to build.

- The beneficiaries (low-income communities) are protected against land speculators and middle-men by demarcating very large number of plots so that there is no premium on their sale, ownership documents are not issued unless the house is built, the allottee is living there and his share of development dues has been cleared.

7.2.4. Orangi Pilot Project (OPP)

One of the well-known efforts in urban poverty alleviation in Pakistan is the Orangi Pilot Project (OPP). OPP was included, second time, in the Pakistan's Istanbul+5 Report to share the experiences of its scaling up activities with the World Community.

OPP was established at Orangi, Karachi's largest "katchi abadi" in 1980. Following the subsequent development, OPP now consists of five autonomous institutions which are: OPP Research and Training Institute, Orangi Charitable Trust, Karachi Health and Social Development Association, Rural Development Trust and OPP Society which channels funds from the Infaq Foundation (a Pakistani Charity) to these institutions as well. The OPP considers itself a research institution whose objective is to analyze outstanding problems of Orangi and then through action research and extension education, discover viable solutions. These solution can then be applied with modifications where necessary, to other settlements and become part of state policies. The OPP does not fund development but by providing social and technical guidance it encourages the mobilization of local resources and the practice of cooperative action.

Orangi pilot project, developed viable solutions to urban problems through action research

<u>Salient Achievements</u>

- The OPP sanitation model has been replicated in 46 Karachi settlements and in seven Pakistani towns. The principles of the program are being applied to projects in Nepal, Central Asia and South Africa.
- The most successful replications have included Katchi Abadi Improvement in Sindh through Sindh Katchi Abadis Authority, the Lodhran Pilot Project and the Community Infrastructure Project (CIP) being implemented in NWFP through the World Bank.
- The micro-credit program has been replicated by 38 NGOs and CBOs outside the Karachi. Training has also been imparted to these organizations and the program has had a major influence on the concept of micro-credit bank being promoted by the Government of Pakistan.
- There are 7,256 lanes in Orangi containing 104,917 houses. Of these, 6,082 lanes containing 91,531 houses have built their sewage system. The houses have also built their latrines and 409 collector sewers have also been built. The people have invested Rs. 80.664 million (US$ 1.50 million) in this effort. Due to the sanitation and health program, infant mortality in those parts of Orangi that built their sanitation system in 1982, has fallen from 130 to less than 40 / thousand.
- The OPP's micro-credit program lends to people already running businesses. It also considers lending to people who wish to establish new businesses provided they are employed in those businesses. So far 6,921 units have benefited and Rs. 133,944 million (US$ 2.25 million) have been disbursed. Recovery rate is 92.34 percent. Mark up recovered at 18 percent per year is Rs. 24 million (US$ 0.44 million).
- The OPP school project identifies

youths who wish to open a school. A start up grant of Rs. 3,000-12,000 is provided to open a school in a rented room or shack. Upon its stabilizing, credit is provided for its expansion and construction of classrooms. So far 45 schools have been built in this manner that these employ 212 teachers and have 5,201 students.

- An OPP survey revealed that there were 647 private clinics in Orangi. In addition, there were Traditional Birth Attendants as well. Some 377 TBAs and 148 vaccinators have been trained. Links between the government health department and agencies have been established as a result of which 102 clinics now receive vaccines and 124 clinics receive family planning supplies.
- The OPP - Low Cost Housing Program provides technical assistance to build component-manufacturing yards so that they can mechanize their production, improve their products train, their staff and increase production. So far 57 yards have been mechanized due to which machine made blocks and roofing elements are being fabricated not only for Orangi but for the rest of Karachi as well.
- The OPP Education Program aims at improving and upgrading the physical conditions of private schools in Orangi. Due to the grants provided, 60 schools have become fully-functional and are educating 6,833 students.

Development is sustainable if local resources and technologies are effectively used

The greatest lesson learned through the OPP experience is the key to development: "with local resources and local technology, development is sustainable". This has been learnt through the efforts in shelter (mechanization of building component production), social development and eradication of poverty (OPP education and health programs), environment management (OPP sanitation program) economic development (OPP family enterprise economic and micro-credit program) and cooperation with international and national agencies.

7.2.5. Sariab Sanitation Project

Local Initiative Facility for Urban Environment (LIFE) was launched by UNDP at the Earth Summit in 1993 as a pilot project under Agenda-21. Based on the concept of 'local solutions for local problems', LIFE has been implemented in various towns of Pakistan, including Quetta. UNDP's local partner for Quetta was a local NGO called 'Taraqee Trust' (TT). In March 1999, TT signed a contract with UNDP/LIFE to promote 500 household latrines on self-help basis in Sariab area of Quetta.

The projects has faced some problems due to which its progress has been slow. Some of these problems and solutions to them were as follows:

- Another project was working in the same area and providing subsidies to households and communities for the construction of latrines and sewerage. Since TT was offering no subsidy, motivation amongst the target poor had to be built.
- In order to improve the existing traditional latrines at the household level, TT introduced San Plat (slab) which is used as a cover on existing traditional pits. These slabs were not available in the market as a result of which community members were facing difficulty in getting them. TT worked with the local factories and trained local masons and they were able to produce such slabs at local level.
- The majority of people living in the area were poor and could not afford to pay the price of slab in lump sum. Therefore, to solve the problem the sanitation program was introduced in TT's credit centers and women were especially motivated to borrow in order to have flush latrines in their houses.

- Training and workshops were arranged to train people in sanitation, health and hygiene to build motivation and understanding.

However, all 500 latrines have been built with a 10 percent cost recovery. People of Sariab are proud of having solved their sanitation problems without any financial support from the government or donors. Sariab Sanitation Project has demonstrated that if organized, trained and motivated, people in low-income communities can develop and successfully implement local solutions to the problems of their localities.

7.2.6. Program for the Improvement of Livelihoods in Urban Settlements (PLUS)

The PLUS program funded by UNDP was aimed at introducing and experimenting an alternative, integrated, effective, affordable and down-to-earth approach for improving the conditions of the predominantly low-income communities in selected urban areas of Punjab. Under PLUS, communities were encouraged to identify and act on priority areas of concern through initiatives, such as improving basic urban services, promoting employment and income generation, and increasing access to education, community health and shelter. PLUS involved target communities into the development process at all levels, from planning and designing of development activities, to evaluation in order to ensure that the project activities are demand-driven, affordable and in line with the perceived needs of the community.

PLUS has also strived to develop the skills of people to enable them to undertake/adopt various livelihood strategies and supplement their incomes. It has been assessed through various meetings and focus group discussions that educational levels were low and conventional education did not impart technical and vocational skills, which they need to avail income opportunities. To remedy this, PLUS, in consultation with the communities and stakeholders identified the vocational skill needs of the communities and imparted training on various aspects of livelihoods.

During the preparatory phase of 23 months, PLUS teams conducted rapid physical and social assessment surveys for 236 settlements in three cities (Gujranwala, Faisalabad and Multan). One of the poverty monitoring techniques used by PLUS was the preparation of area profiles for the slums and Katchi Abadis. The PLUS teams prepared 210 area profiles of un/under-serviced settlements in three cities.

Women took part in low-cost sanitation, education and health activities with great enthusiasm. Overall 95 meetings were convened with women in which over 1,900 women participated in PLUS selected settlements. They were trained and actively participating in technical surveys, cost estimation, mobilization, funds collection and supervision of the civil works. PLUS formed 28 female lane organizations with 1,900 members initially for the development of tertiary level sewerage system.

Overall more than 280 masons and activists were trained in the three cities. The masons are now capable to undertake mapping, developing excavation plans and construction of sanitation system, which has expanded their income opportunities. Some 335 women, and 112 Traditional Birth Attendants were trained on general and maternal health respectively. The PLUS teams have prepared 200 sketch maps and 61 detailed maps of infrastructure in the three cities that has helped to assess/monitor the improvement that has occurred in

access to sanitation and other services due to PLUS interventions. Perhaps the most important achievement of PLUS has been that through its sanitation-based interventions, it has helped to raise the value of property of the area – a most important factor that has helped improve the financial condition of the beneficiaries.

Impressed with the achievements of the PLUS, UNDP and Government have decided to expand it to further 8 cities in other provinces. The design of the program has been kept flexible to include more cities.

7.2.7. Pak-German Urban Industrial Environment Protection Program [38]

PLUS sanitation based approach has helped in raising property values in participating communities

Rapid increase in population and unplanned growth has resulted in serious degradation of the urban environment in NWFP. Consequently, the urban centers of NWFP are beset with a host of environmental problems including lack of adequate quantity and unsatisfactory quality of drinking water, lack of facilities for proper collection, treatment and disposal of industrial and domestic wastewater, inadequate solid and hazardous waste management, air and noise pollution.

In order to improve the situation of the environment in NWFP, the Government of NWFP, with the assistance of the Government of Federal Republic of Germany, implemented the first phase of Pak-German Urban Industrial Environment Protection (UIEP) Program in Peshawar from May 1996 to October 2000. The UIEP was implemented by NWFP Environmental Protection Agency (EPA) with the technical assistance of German Development Cooperation (GTZ).

The plan of operations of UIEP was developed based on a series of planning workshops that were attended by relevant stakeholders notably the representatives of: provincial planning, environment and development department, environment protection agency, GTZ, Sarhad chamber of commerce and industry, municipal authorities, road transport authority, traffic police, drivers unions, community based organizations, non-governmental organizations, plant protection department, and NWFP brick kiln owners association. A similar participatory approach was used during the implementation phase of UIEP

A brief description of the main pilot-projects implemented under UIEP program is as follows:

7.2.7.1. Establishment of Vehicle Emission Testing Station

This pilot-project was undertaken to support reduction in vehicular emissions, the principal source of air pollution in Peshawar, and raise awareness among the people regarding its causes and harmful effects. To achieve these objectives, Pakistan's first vehicle emission testing station (VETS) was established on the main grand trunk road near Chamkani. VETS has three testing lanes, one each for petrol and diesel vehicles and one for both. Each lane is fitted with a German- made BOSCH emission testing analyzer, with the three lanes having a capacity to test up to 10,000 vehicles per year.

VETS, which became operational on 17 June 1997, is operated according to a procedure duly approved by the NWFP Chief Minister. As per this procedure, diesel and petrol vehicles are tested at VETS for smoke opacity and carbon monoxide (CO), respectively. Every "Passed" vehicle (which complies with

[38] Malik, M. 2001. Improving the urban environment- experiences in Peshawar. The Nucleus 38(2): 177-181.

the specified emission standards) is issued a certificate and a green sticker is pasted on its windscreen. The sticker and certificates are valid for six months for diesel vehicles and one year for petrol vehicles. A testing fee of Rs 100 is charged per vehicle. The "fail" vehicles are required to come back to VETS after tune up and necessary repairs within 21 days and not charged any fee for the second test if they fulfill this requirement. As of 31 March 2001, VETS has tested a total of 27,400 vehicles. Out of these, 22,206 were diesel while the rest were petrol vehicles. Fifty four percent passed the tests on the first attempt.

In order to ensure turn-up of sufficient number of vehicles to VETS, four mobile vehicle emission testing (MVET) teams; three for diesel and one for petrol vehicles, were set up. These teams, each of which has a traffic police head constable as member, carry on-the-spot measurement on the city roads, fine (Rs. 200 per vehicle) the polluting vehicles under motor vehicle rules 1969, impound their documents and ask the drivers to get their vehicles tested at VETS. The documents of these vehicles are returned only after the drivers have got their vehicles tested at VETS and have been issued a "pass" certificate. Over 80 percent of the vehicles coming to VETS are directed by MVET teams.

To determine the utility of VETS as an effective tool to control vehicular emissions; the data of 7,463 vehicles tested at VETS upto June 1999, were analyzed. The analysis showed that out of total, 1674 vehicles (1522 diesel and 148 petrol) failed to "pass" the VETS test on the first attempt. The smoke opacity value for diesel vehicles falling in this category averaged 85 percent. The corresponding value of CO for petrol vehicles was found to be 6.4 percent. These vehicles showed an average reduction of 77 percent in CO and 29 percent in smoke opacity when brought to VETS after maintenance and issued a "pass" certificate. The overall reduction in smoke opacity and CO achieved through VETS, however, is considerably higher as majority of the drivers/owners take their vehicles to workshop for tune up and necessary repairs before visiting VETS. About 80 percent vehicles tested at VETS are thus assumed to have improved in this manner.

It has been estimated that about 20 similar VETS under UIEP would be required to be set up in Peshawar if all the vehicles in the city are to be tested. A series of introductory workshops were, therefore, organized for the workshop owners and other entrepreneurs to encourage them to establish VETS. Guidelines for establishment and operation of private sector VETS were also published and widely disseminated. As a result of these efforts, 8 entrepreneurs have formally applied to the government for grant of no-objection certificate (NoC) for establishment of private sector VETS.

VETS, which is now being managed by NWFP EPA, is unctioning on self-sustained basis. A study to assess the impacts of VETS estimated that it is effecting an annual saving of Rs. 65 million in terms of health cost and fuel saving.

7.2.7.2. Emission Control from Brick Kilns

The objective of this pilot-project was to initiate activities aimed at reducing emissions from around 400 brick kilns in the vicinity of Peshawar city. During the first phase of this pilot-project, studies were undertaken to gather baseline data regarding various aspects of pollution from brick manufacturing. The salient findings of these studies are summarized below:

- On average (n = 150), sulfur dioxide (S02) concentration in the exhaust of a typical Peshawar kiln is 3 g/m3.

- Main reasons for high S02 emissions from kilns are the use of poor quality coal and burning of rubber tyres as a fuel additive. The tyres are used with a view to give reddish brown color to bricks, which is considered to be indicative of good quality bricks.
- The average brick production per kiln per cycle (which lasts for 25-30 days) is 500,000 i.e., 1250 tons. The corresponding amount of coal and rubber used is 110 and 1 ton, respectively.
- In residential areas around brick kilns, S02 concentration in the ambient air ranges from 0.5 to 5.75 mg/m3 i.e., 4 to 46 times higher than the corresponding safe limit of 0.125 mg/m3 set by WHO.

During the second phase of this pilot-project, a good house-keeping (GHK) program was implemented. Under the GHK program, an agreement was signed with the kilns owners and it was practically demonstrated to them that quality of bricks could be improved and pollution reduced considerably by adopting GHK techniques (GHKTs) such as proper selection of soil, using proper covering for green bricks, improving insulation system of the outer walls of the kiln, using small grain size coal, addition of lime to coal and soil, ensuring a uniform burning process by decreasing coal feeding time, decreasing the amount of coal at every stoking, increasing the number of firing zones and eliminating the use of rubber and other fuel additives. The brick kilns owners and fire masters were also provided necessary training. It was demonstrated to the kiln owners that, contrary to the existing belief, burning of rubber does not have any impact on the strength of the bricks but increases emissions by as much as 40 to 60 percent. [39], [40]

As a result of effective lobbying by the project, the government of NWFP banned burning of rubber in brick kilns and also issued a notification whereby all the works departments of the province were directed not to procure bricks from kilns where rubber tyres are used as a fuel additive. Although the ban is being enforced by NWFP EPA with the assistance of district administration, the notification regarding procurement of bricks was never followed by any of the concerned departments. Similarly, the brick kiln owners are no longer implementing the GHKTs due to lack of an effective enforcement mechanism.

7.2.7.3. Improvement of Solid Waste Collection

Peshawar produces about 600 tons of solid waste daily. Less than 50 percent of this is collected and dumped in the outskirts of the city. With a view to develop and demonstrate appropriate measures for sustainable solid waste management (SWM) system through active participation of stakeholders, UIEP implemented SWM pilot-projects initially in three selected localities of Peshawar i.e., University Town, Shaheen Town and Ittehad Colony. These localities respectively represent high, middle and low-income areas.

The SWM concept introduced in the University Town involved construction of 34 improved filth depots for collection and a specially designed and fabricated tractor trolley for transportation of the waste. Moreover, 50 existing filth depots were repaired and intensive awareness campaigns were undertaken to

[39] Ayaz, M. 1999. Report on brick kiln emission reduction pilot-program- good house keeping. GTZ and NWFP EPA, Peshawar.

[40] Hassan, I. 1998. The art and Science of brick making (Urdu version). GTZ, Peshawar.

motivate the community to use the filth depots for storage of waste instead of throwing it on the dumps. After one year of successful operation, the system was handed over to the University Town Committee.

The implementation strategy for the Shaheen Town and Ittehad Colony involved selection of target areas through stakeholders meetings, baseline surveys, public awareness and education campaigns, strengthening of the existing or formation of new community based organizations (CBOs), development of linkages between the Municipal Corporation (MC) and the community, hiring of a private waste collector by the community, provision of hardware (one handcart, one shovel and one pair each of gloves and shoes) to each collector and launching of operation clean-ups to clear the solid waste backlog. As a result of the above interventions, a community-managed door-to-door waste collection system was introduced in the target areas. Under this system the waste collectors collect waste from the individual households at specified time and take it to MC's designated transfer points from where it is transported away for final disposal by MC's trucks. The collectors are paid monthly at a rate of Rs. 20 per household by the CBOs, which collect the same from individual households and also oversee the system. Following the requests from the community and MC, the above SWM system was replicated in additional areas and as of October 2000, it was in place in six areas having 1300 households and a population of over 9,000.

7.2.7.4. Safeguarding and Disposal of Obsolete Pesticides

Under this pilot-project, which was undertaken to safeguard and dispose of outdated pesticides stockpiled in two major stores of NWFP, the following main activities were carried out:

- A comprehensive survey was undertaken to establish an inventory of outdated pesticides stored in NWFP. The survey revealed that there are 185.5 tons of outdated pesticides stockpiled in 150 stores throughout the province.
- 324 drums (50 tons) of obsolete German manufactured Gusathion lying in the warehouse of Department of Plant Protection (DPP), which is located in a thickly populated area on the main Jamrud road, were safeguarded. The safeguarding process involved re-storage of corroded and partially leaking drums into UN specified over drums and cleaning of the storehouse by removal of contaminated soil.
- 239 drums (40 tons) of obsolete Italian manufactured Dimethoate lying in Manglot wildlife park, Nizampur, Nowshera, were safeguarded and the storehouse cleaned. These drums were originally shifted from Peshawar to Nizampur in 1995 as an interim measure to reduce foul smell coming from the warehouse of the DPP.

As no facility existed in the country for disposal of these pesticides, dialogue was initiated with the management of three cement plants in NWFP to persuade them to undertake necessary technical modifications in their kilns at the expense of UIEP and then incinerate the pesticides under the supervision of German and national experts. These efforts to dispose of the pesticides within the country, however, could not succeed. Consequently, 50 tons of safeguarded pesticides from DPP's Peshawar warehouse were shipped to U.K and incinerated there. The cost of incineration was shared by the German Government and AG Bayer, the manufacturer of the pesticides. The safeguarded pesticides stored in

Nizampur, however, could not be disposed of as the project could not get the ownership of the pesticides from the federal Ministry of Food and Agriculture. These pesticides were later on shifted by the DPP to Sindh and stored in Bakrani warehouse.

7.2.7.5. Noise Reduction from Rickshaws

This pilot-project aimed to initiate activities for the reduction of noise emission from 14,000 rickshaws plying on the city roads. As a first step, a study was undertaken to evaluate 20 commonly used rickshaw silencers with respect to noise emission, engine pickup, durability, capital cost and operation and maintenance. Based on the findings of the study, a low-noise silencer was developed with the assistance of the traffic police. The silencer went through extensive trial testing and improved in the light of recommendations of rickshaw drivers. Following the approval of the final design of silencer by the Rickshaw Drivers Unions and relevant Government authorities, the traffic police started a campaign for its installation in rickshaws in May 2000.

As of 28 February 2001, the low-noise silencer has been installed in 7,400 rickshaws. The cost of this silencer is Rs. 275 and installation is carried out free of cost at the traffic police headquarters. Noise emission from rickshaws fitted with this silencer averages 80 dB(A) which is significantly lower than the corresponding national environmental quality standard of 85 dB(A).

In addition to the above-mentioned pilot projects, a number of activities aimed at improving the urban environment of the city were undertaken during the program period. The salient among these were undertaking of three pressure horn removal campaigns as a result of which 2,638 pressure horns were removed from heavy vehicles and destroyed; organization of a two-day free vehicle tune-up camp during which 312 vehicles were tuned-up; development, publication and dissemination of an Urdu booklet entitled "Industrial Pollution and Environmental Laws; organization of roundtable meetings on vehicular emissions, rickshaws and brick kilns; organization of a three-days course on project-planning and organization of a two-days course on concepts of participatory development for 12 partner CBOs of UIEP.

7.3. Combating Industrial Pollution

7.3.1. Kasur Tanneries Pollution Control Project

The leather sector in Pakistan is one of the largest foreign exchange generator. The tanning industry is concentrated in Korangi (near Karachi), Kasur, Lahore, Sahiwal, Multan, Gujranwala and Sialkot. No attempt has been made to treat tannery wastes in any of these locations and the Kasur project, where the problems are arguably the most acute, is seen as a model for further locations to emulate.

In Kasur, there are more than 200 tanneries (the number continues to grow) processing 8,000 hides (cattle, buffaloes) and from 12,000 to 15,000 skins (sheep and goats) to the wet-blue stage. The production capacity is about 250 tons/day of raw hides/skins. These tanneries are located in three clusters in the centre of a town of over 300,000 inhabitants. Domestic sewage is freely discharged and an increase in the number of tanneries has increased the total volume of waste being considered for treatment is 12,700 cu.m. per day.

Drinking water in Kasur is obtained by tubewells and residents

complain that the quality of water is deteriorating due to organoleptic effects. The water quality is below the standards for drinking water. Four stagnant pools exist and receive waste-water from the tanneries. These stagnant pools cover an area of 132 ha and considered to be highly polluted by Chromium and organic waste: not so much the water itself, but the sludge, ground soil and the ground-water underneath the pools.

The Kasur Tanneries Pollution Control project (KTPCP) is a part of the Kasur Environment Improvement Program. The Government of Pakistan, Government of Punjab, Tanneries Association, Dingarh and UNDP jointly fund the project. Technical assistance for the project is provided by the United Nations Industrial Development Organization (UNIDO) and is being implemented through the Kasur Tannery Waste Management Agency of the Kasur Development Authority, Government of Punjab. The Phase I of the project has the following objectives: (i) introduction of better process control in tanneries; (ii) in-house pre-treatment in tanneries; (iii) establishment of overall drainage system including evacuation of existing stagnant pools; and (iv) chrome recovery plant. The ultimate solution for the tannery wastes treatment plant and its infrastructure is estimated to cost approximately US $ 8 million in total. Such a plant is self-evidently beneficial to the general environment and socio-economic conditions in the area. However, it is recognized that the end-of-pipe solution is only one component in a complex series of interlinked problems.

The project has been completed with the successful operation of the Central Effluent Treatment Plan (CETP) having a capacity of treating 13,000 m3 per day, all the tanneries are connected with the system which have installed water meters to recover the operation and maintenance cost of the CETP from the tanners (based on the waste-water discharged), chrome recovery (capacity 20 cubic meter of chrome liquor per day) and solid waste management plants are in operation. The workers have also been trained. All the stagnant pools have been evacuated. The chrome recovery plant is in operation since April 2000 and in 8 months it processed 0.27 million litres of tannery waste water and recovered 13,000 litres of chrome solution, which has been re-cycled.

7.4. Combating Vehicular Pollution

7.4.1. Energy Conservation and Fuel Efficiency in Road Transport Sector Project

The achievements of the Pak-German Urban Industrial Environment Protection Program in combating vehicular pollution in Peshawar have been discussed in Section 7.2.7.1.

The implementation of "Fuel Efficiency in Road Transport Sector" (FERTS) project commenced in 1996 with an assistance of US$ 7.0 million from Global Environment Facility (GEF-UNDP). The primary objective of the project is to improve energy efficiency of motorized vehicles through proper tune-up and maintenance practices to minimize GHG emissions. The project's mission is to introduce instrumented engine tune-up practices in the country. Its benefits will accrue at regional, national and international levels. Vehicle owners will benefit from reduced fuel expenditures, while at the national level, the oil import bill will be minimized. The project further aims to create job and business opportunities for sustaining the accomplishments of the project. At the global level the project will contribute

The newly installed chrome recovery pilot plant of Kasur Tanneries project has processed 0.27 million liters of tannery waster water in 8 months during 2000

in reducing GHG emissions, thus reducing global warming. It will also result in reduced deposition of toxic chemicals (lead, carbon monoxide, sulfur dioxide, etc.) in humans; especially traffic police, children and residents of congested areas of cities having limited air circulation.

To date the project has been instrumental in the installation of 16 gasoline and diesel-cum-gasoline tune-up stations at Islamabad, Rawalpindi, Quetta, Karachi, Hyderabad, Peshawar, Multan, Abbotabad and Lahore. Last year, some 11,000 vehicles were tuned in these stations. The project organized 23 training workshops and trained 573 mechanics in engine tuning. The project has also established a revolving loan fund of US$ 3 million to provide loans to the private sector for the establishment of more tune-up stations.

7.5. Combating Land Degradation

7.5.1. Pakistan Community Development Project for the Rehabilitation of Waterlogged and Saline Land

The project aims to develop and promote sustainable biological systems for reclamation and rehabilitation of saline affected and waterlogged lands to improve community livelihoods in the Punjab province. The project strategy emphasizes participatory decision making by stakeholders. The project is being implemented at three sites in Punjab (Pindi Bhattian, Sahiwal and Shorkot) and its objectives are achieved by organizing communities into Salt-Land Users' Groups (SLUGs) and Women Interest Groups (WIGs), imparting them training of cultivating salt-resistant plant species, providing

Box 13

Transport Using Compressed Natural Gas (CNG)

Natural gas can be substituted to power transport vehicles in two ways: (i) as compressed natural gas (CNG), which is simply gas under pressure; and (ii) as liquefied natural gas (LNG), which is gas liquefied to a temperature around -160 °c. CNG offers greater advantages as an alternate transport fuel as compared to LNG due to the ease with which it can be transported and compressed. The liquefaction and maintenance of gas at low temperatures increases complexity and costs. Of the two, CNG is thus the preferred fuel for many developing countries, including Pakistan, which, lack indigenous oil resources but are rich in natural gas reserves. CNG is also a much cleaner fuel as compared to oil, and its use in transport can considerably reduce emission of pollutants and greenhouse gases into the atmosphere. Moreover, it is non-toxic and non-corrosive. Unlike oil, it also holds great promise in major urban centers, where fleets already use centrally located fuelling and maintenance facilities.

The advantages of CNG as an alternate fuel have inspired many countries to initiate efforts for converting their existing fleets to CNG. Russia, Canada, United States, Argentina, New Zealand, and Italy are the more prominent in this respect. Although the use of CNG in the transport sector is still in its infancy in Pakistan, plans are being made to make a substantial use of this technology. Around 160 CNG stations have been established in the country and another 150 are under construction; while 150,000 vehicles have been converted to CNG and another 150,000 are expected to be converted by the end 2003. In this respect the government has deregulated the prices of CNG and LPG, the import of furnace oil and high-speed diesel, and the primary freight petrol.

them seedlings of such plants, and micro-credit for promoting income generating activities. Constant testing of biosaline technologies on farmers' fields and dissemination of newly generated information is another feature of the project. The Project is jointly funded by the UNDP and Australian Aid (AusAID).

Some 95 community organizations have been established half of which are WIGs. Their total membership is 1,812 of which 1,024 members are women. The combined savings of the groups amount to Rs. 176,420. In its efforts to further the cause of research on the innovative technologies the project is implementing 10 research studies.

The project has established 242 demonstration plots and 40 groundwater observation wells which have stimulated the communities to use biosaline technologies for the reclamation of salt-affected lands.

7.5.2. National Drainage Program

Waterlogging and salinity are the major threats to the sustainability of irrigated agriculture in Pakistan. According to the World Bank report, 37.6 percent of the Gross Commanded Area (GCA) is waterlogged, of which 15 percent is severely waterlogged, 14 percent of the surface is saline, of which 6 percent is severely saline. The magnitude of this waterlogging and salinity issue has a severe impact on agricultural production. Many experts attributed 25 percent reduction in the production of Pakistan's major crops to soil salinity alone.

In the presence of the on-going drought in the country for the last 3-4 years, waterlogging is disappearing, whereas the problem of salinity is becoming severe due to the shortage of freshwater as the drainage of excessive salts from good soils has become questionable. Likewise, with the use of more tubewell water (mostly saline) to sustain agriculture, the problem of soil salinity is increasing.

To address this problem, the Government of Pakistan (GoP) has prepared the National Drainage Programme (NDP) to be implemented in phases over a time period of 25 years. The first phase of NDP is aimed at initiating the process of restoring environmentally sound irrigated agriculture. It comprises three complementary components: (a) sectoral planning and research; (b) institutional reforms aimed at decentralizing the management of drainage and irrigation systems; and, (c) capital investment to improve drainage and water management infrastructure. One of the key thrusts of the NDP is to help Pakistan address the core issue of governance through decentralization, promote more operational and financial transparency, and involve communities substantially in the design, implementation and O&M of the irrigation and drainage management.

In the presence of the on-going drought in the country for the last 3-4 years, waterlogging is disappearing

The first NDP is being implemented over a period of six and a half years, starting from 1 January 1998. The executing agencies of NDP involve WAPDA (Water and Power Development Authority) and Participating Agencies (PA), such as PIDAs (Provincial Irrigation and Drainage Authorities), and PADs (Provincial Agricultural Departments). The total cost is estimated at US$ 785 million. The Governments of Pakistan, including all four provinces and beneficiaries, finances US$ 260 million, whereas the World Bank (US$ 285 million), Asian Development Bank (US$ 140 million) and OECF (US$ 100 million) meet the balance of the costs on a parallel-financing basis.

7.6. Water, Harvesting and Conservation/Natural Resource Management (NRM)

Area Based Programs of UNDP in AJK, NWFP, Northern Areas and Balochistan

The Area Development Program AJK, Area Development Program Balochistan, Lachi Poverty Reduction Project, Pakistan Community Development Project for Rehabilitation of Saline and Waterlogged land (Biosaline) and Northern Areas Development Project have some common elements which collectively aim at the alleviation of poverty and natural resource conservation through social mobilization.

Area Development Program - AJK address poverty through introducing sustainable farm practices

The projects are actively working in the areas of natural resource management (NRM), micro-credit, vocational skills training for enterprise development, and women empowerment and advocacy.

7.6.1. Area Development Program - Azad Jummu & Kashmir (ADP-AJK)

Started in 1997, the Area Development Program-AJK is being implemented by the Planning & Development Department, Government of AJK. Its main focus is poverty eradication by increasing agricultural productivity, adoption of sustainable farm practices and technologies ensuring natural resources conservation, human resources development and creating opportunities for sustainable livelihoods, such as employment and income-generation, informal sector and micro-enterprise development, access to credit and social services, mobilization of savings for local development and provision of basic infrastructure. The program is pro-poor, pro-jobs and pro-environment in nature with linkages to gender and governance dimensions. It has been conceived as a model of a community-based poverty eradication program by using the experience of other successful rural support programs in the country. The project is funded by UNDP with a parallel financing of International Fund for Agricultural Development (IFAD) for its constituent Neelum Jehlum Valley Community Development Project (NJVCDP).

By the end of 2001, the program had established 1,041 Community Organizations (COs) out of which 462 were women COs. The membership of these COs was 26,609 out of which the number of female members was 12,136. The micro-credit program was initiated in 1997 in NJVCDP and in 1999 in South AJK project. Some 355 groups are operating their Community Credit Pool (CCP) or have benefited from the credit programs of the project. In NJVCDP 305 COs are operating micro-credit-Rs.21.090 million as CCP against a total disbursement of Rs. 10.545 million as matching fund. It may be observed that women are equally active in making use of credit as their male counterparts. From the total CCP of Rs.21.090 million, an amount of Rs.44.859 million have been disbursed as credit to 4,241 individuals. These CO members established their new enterprises or improved old ones from this amount. Among 4,241 loanees, 1,658 are females who are 40% of the total loanees. In South AJK project Rs. 4.701 million have been disbursed among 95 female and 154 male CO members.

Vocational skills training was imparted to a total of 2,378 persons in 2001 out of which 1,339 were women. Agriculture/livestock training, management skills, outreach community training and diploma training was imparted to over 6,500 people.

In the area of NRM much has

been accomplished. In 2001 alone check dams were constructed with a total capacity of 57,378 cu.m., forests were planted on an area of 2,789 ha, cumulatively 186 demo fish ponds have been established with fish production of over 1,700 tons on private farms. Sericulture has been widely promoted and adapted. Overall farmers produced 82,000 kg of cocoons and earned approximately Rs. 6.5 million.

7.6.2. Lachi Poverty Reduction Project

Starting in April 2000, the Lachi Poverty Reduction Project is a continuation of the South Asia Poverty Alleviation Program (SAPAP). It aims to bring sustainable improvements in the livelihoods of 100,000 poor people living in Tehsil Lachi, District Kohat, NWFP and seeks to promote a replicable model for rural poverty in other parts of Pakistan. Assistance under LPRP focuses on consolidating on-going activities in Union Council Shakardara, and for expanding it into five other Union Councils of Lachi. LPRP focuses on social mobilization, human resource development, investment in rural infrastructure (physical and social), providing micro-credit to the rural poor for income generating activities and establishing formal linkages between the communities and government line departments. Through the formation of men's and women's community organizations, LPRP aims to facilitate rural communities to help themselves. The Project is jointly funded by DFID, UNDP and parallel financing from SAPAP.

During 2001, a total of 109 Men and Women Community Organizations were formed, Rs.3.22 million credit was disbursed to 510 households, 99 Productive and Social Infrastructure schemes (PSIs) were initiated and 746 men and 1,040 women were trained in managerial and technical skills. Innovative ideas in the field of NRM sector were also implemented such as bio-gas development, drip irrigation, water catchment rehabilitation, range management and forestry development. With the disbursement of Rs. 3.22 million as credit, a total of 510 families were able to implement their household level plans. Part of the credit was utilized for the purchase of improved wheat seed in the project areas by the poor farmers.

In advocacy and linkage development, the project trained all the elected representatives in Tehsil Lachi in the Devolution plan 2000 and social mobilization. Training of elected representatives in fact was extended to the entire Kohat Division. The impact of the training program for the elected representatives has resulted in countering the anti-project propaganda of religious elements in the project area. The initiation of Productive and Social Infrastructure Schemes (PSIs) for the construction of water reservoirs to store rainwater for long-term use resulted in a total of 39 small dams to store 140 million gallons of rainwater, which benefits 9,970 households covering a population of some 79,760. This activity created 175,500 workdays for the poor contributing some Rs. 3.5 million income for them. The benefits in terms of aquifer recharge and increased agricultural were in addition.

Lachi Poverty Reduction project constructed 39 small dams to store 140 million gallons of rainwater

7.6.3. Northern Areas Development Program

Since its start in October 1997, the Northern Areas Development Project (NADP) aims to establish community organizations for the provision of technical and social services on sustainable basis by improving: status of women, resource base through rehabilitation and extension of irrigated areas and social forestry, and access to markets through valley and feeder roads. The project components are: (i) community and

women's development; (ii) village infrastructure development; (iii) agricultural development; (iv) valley roads; and (v) strengthening of the agricultural support services. UNDP's support to NADP covers all costs of the community and women development components. The remaining components are being funded through parallel financing of IFAD.

During the life of the project, 114 community organizations and 25 women development groups have been formed. Some 31 village development plans have been prepared; and, 41 schemes identified out of which seven completed under the IFAD component. Another 6 schemes are close to completion and the remaining are under process. An amount of Rs. 0.93 million has been disbursed as credit under the Islamic mode of financing and an amount of Rs. 1.3 million has been saved by different community organizations. One hundred trainings with 2,021 participants in various fields of skill development have been held.

Box 14

Water Conservation –
ACHI Poverty Reduction Project Initiatives

The four-year drought situation in Pakistan has had a serious impact on both surface- and ground-water reservoirs in the arid-zone. Tehsil Lachi, District Kohat, NWFP is no exception. The hardest hit in such areas are normally women who are primarily responsible to travel long distances for collection of water for domestic requirements. To help alleviate the situation, the Lachi Poverty Reduction Project, initiated Productive and Social Infrastructure (PSI) schemes in partnership with the organized communities. Under the schemes, initially 34 hand-pumps and later 45 dug-wells were established to access ground-water. However, due to the prolonged drought both the hand-pumps and dug-wells dried up. This situation led the project team to review the drinking water problem and to find a sustainable solution. As a result, water reservoirs were constructed to store rainwater for long-term use. A total of 39 small dams were constructed by the communities to store 140 million gallons of rainwater which benefits 9,970 households covering a population of some 79,760. This activity created 175,500 workdays for the poor contributing some Rs. 3.5 million income for them. The benefits in terms of aquifer recharge and increased agricultural production are at the top of it. From having to suffer for want of water to having enough water to sustain themselves and their children, the beneficiaries no doubt have a happy story to tell.

Village Badasum is situated at a distance of 10 km from Shakardara town on a small hillock. There are 20 households in the village. Like other villages in Union Council Shakardara, the inhabitants of Badasum were also facing problems of drinking water. Ms. Bibi Roshan, an inhabitant of the village and a member of the Women Community Organization says, that before the construction of the dam they had to travel for an hour to a well in another village to fetch water for household consumption. She says that when the water dried up in that well they were forced to fetch water from another source that was a further two hours away. Women from other villages would also come there and this sometimes resulted in conflicts over water. Ms. Bibi Siboor Nisa, another member of the Women Community Organization, had also suffered as she was the only woman in the house and had to leave her children behind with other women to take care of them while she went out for water collection. But that had now changed.

Mr. Odin, the village activist, says that the villagers were aware of the water problem. However, because of their poverty and a lack of skill and understanding, they were unable to construct a dam or dug-well. He said that when UNDP started its development program in this area, they, like other inhabitants of Union Council Shakardara welcomed the initiatives. Men and women were organized into community organizations to help improve their income generating capacity. He says that now when he looks at the people of the area, he can hardly believe all this had been possible. Both men and women community organizations have a saving of Rs. 60,000 from which 3 women and 5 men have obtained loans for income generating activities.

The LPRP engineers visited a number of sites in the area and with the community members' assistance decided the location, Odin told while pointing towards the constructed dam. The LPRP provided finances (Rs. 406,455) for the construction of dam, whereas the villagers contributed land and labor of Rs. 174,000. The dam once filled with rainwater could serve the village needs for two years.

This change of circumstances has had many positive effects in the village. Establishing the dams has meant a rise in the watertable downstream. To take advantage of this, the villagers have constructed a dug-well that is recharged with natural filtered water from the dam. Water from the dug-well is pumped into two tanks to supply water to all households in the village. Moreover, the villagers have stocked the dam with 20,000 fish seed with the support of the Fisheries Department.

Drip irrigation has been introduced in this village based on surplus water that is used for fruit and vegetable growing. Pomegranate and lemon were introduced of which pomegranate has grown successfully in the area. The villagers have also grown coriander for household consumption this year in the same plot. Livestock, the most valuable asset of the villagers, is now recovering after being severely affected due to the drought, thus helping the villagers to revive this source of income once again.

The villagers of Tehsil Lachi have shown by practical example that development is about collaboration and perseverance. No doubt, the intervention has helped these people - a fact that makes our work so rewarding. But it is the people themselves, their high level of motivation, their desire to better their lives and their remarkable ability to learn that helped to make such a difference possible.

7.6.4. Area Development Program Balochistan

Initiated in July 1997, the Area Development Program Balochistan aims to achieve its objective of poverty alleviation through community-based activities. It focuses on achieving sustainable human development through improved agricultural productivity, land and water resources management, watershed and rangeland resources as well as diversification of income generation activities, improved access to social services, environmental protection and rehabilitation, and strengthening of women's role in development with active participation of all the stakeholders, especially the beneficiary communities. Due to widespread drought in Balochistan, the project has been re-oriented to assist local communities in mitigating drought effects and management of drylands on sustainable basis. The primary focus is on construction of small dams, checkdams and valley dykes to harvest rainwater; watershed management and promotion of high-efficiency irrigation techniques to conserve water; and rangeland management to sustain livestock population which is the main source of income of the poor. The project is funded by UNDP with a parallel financing from the Government of Balochistan and World Food Program (WFP).

Area Development Program Balochistan is striving to construct small dams, check dams and valley dykes to harvest rainwater

In 2001, 282 new Community Organizations including 162 men and 120 women, were established, each having nearly 20 members. The cumulative savings stood at Rs. 230,0975 and credit worth Rs. 842,700 was disbursed to these COs. Over 400 women were trained in various skills in 2001 and marketing was given special attention for the products produced by them.

Some 836 acres of land was targeted for the planting of catchments, 150 acres for water harvesting and spreading and valley dykes having a capacity of 624,000 c.ft were constructed in the project area. Some 444 acres of rangeland was improved and 10,884 acres were monitored to discourage damaging grazing practices. Some 54,177 livestock was vaccinated and treated and the use of urea molasses blocks was greatly encouraged to mitigate the affects of drought.

The core assumption of the philosophy of NRSP's activities is that there is a tremendous willingness amongst the people to help themselves

7.6.5. On-Farm Water Management Program

Briefly, the 'On-Farm Water Management Program', consists of or ten large on-farm projects with a total estimated cost of $200 – 250 million, implying an annual budgetary cost of Rs. 1.0 billion. For running the program, there are OFWM departments in all four provinces, AJK and the Northern areas, which employ thousands of agri-engineers and a small number of other professionals. There are also OFWM training and research institutes in three provinces and a Federal Water Management Cell for Coordination, working with expatriate technical assistance. At least six donor agencies are involved in providing financial and technical assistance. These facts and figures reflect the institutional and financial stakes in the project. The premise of the project is that Pakistani farmers need support and awareness in order to efficiently use water resources.

7.7. National Rural Support Programme

In 1992, the National Rural Support Programme (NRSP) at the national level was set up in Pakistan as a non-governmental organization and registered under the Corporate Law Authority (CLA) with a funding of Rs. 500 million from the Government of Pakistan, which has now increased to Rs. 607 million and is placed as an endowment, invested in government securities.

NRSP is presently entrusted with the responsibility of fostering a countrywide network of community organizations at the grassroots level in 24 districts of Pakistan as well as Azad Jammu and Kashmir. The goal of NRSP is to strive to reduce the intensity of poverty and improve rural people's quality of life, while its immediate objective is to foster a countrywide network of community organizations at the grassroots level and also to enable them to plan, manage and implement their development plans at their own.

The core assumption of the philosophy of NRSP's activities is that there is a tremendous willingness amongst the people to help themselves. However, in order to harness this willingness there is a need to mobilize them. To achieve this, a support mechanism is required that can ensure the provision of social guidance to the people. Social guidance initiates a process wherein the communities learn to organize into socially viable groups, enhance their skills, expand their collective and individual resource base and utilize the available resources effectively. Experience has taught NRSP that in the process of social guidance, the availability of an honest local level activists is vital. Only through a cadre of such activists can the benefits of social guidance be fully realized.

As of 31 July, 2001 NRSP which is working in 24 districts has formed 13,789 community organizations with a membership of 297,630 households. These members have a saving of Rs.190.400 million. Credit amounting Rs.2,781.359 million has been disbursed to 188,512 loanees. As part of capacity building 86,000 community members have been trained in different disciplines. The communities have planned and executed 2,722 productive physical infrastructure schemes costing Rs.271.553 million under the guidance of NRSP. Some 2,519 schemes costing Rs.186.029 million benefiting 64,985 households have already been completed. In social sector side 227 community schools with an enrollment of 10,121 students have been established. NRSP has also assisted communities in taking over three basic health units covering a catchment population of 73,981and running them successfully on self help basis. NRSP has also trained 713 community members in the health sector in first aid training, epidemic prevention, family planning orientation, flood rescue training, health and sanitation and traditional birth attendants. Besides this, 133 health camps have been held where 13,954 community members have been provided treatment. One village Jugoowala comprising 209 households in District Lodhran has successfully replicated OPP's low cost sanitation programme by adopting and implementing a rural sanitation project under the Lodhran Pilot Project.

On the urban front 1,086 groups comprising mainly of females have been formed with a membership of 5,430. An amount of Rs. 55.095 million has been disbursed to 5,282 borrowers with a cumulative recovery rate of 99%.

Impressed with the achievements of the NRSP, the Government has established several other rural support programs.

7.8. Pakistan Poverty Alleviation Fund

The Pakistan Poverty Alleviation Fund (PPAF) represents an innovative model of public-private partnership sponsored by the Government of Pakistan and funded by the World Bank. It has been incorporated as a private company, limited by guarantee, under the regulatory supervision of the Securities and Exchange Commission of Pakistan. The institution has been established to enhance the availability of resources and services to the poor. PPAF has three windows through which financial assistance is provided: (i) lines of credit for expansion of poverty targeted micro-credit programs; (ii) grants and loans for community physical infrastructure, on a cost-sharing basis; and (iii) grants to strengthen and build the institutional capacity of partner organizations and communities.

Consequent to the receipt of the first tranche from the World Bank, the PPAF became fully operational in early 2000. During the six months available to the institution in FY 2000, an amount of Rs. 754 million was approved. During 2001, which was the first full year of operations, total approvals amounted to Rs. 1,135 million, an increase of 51% over the previous year. Similarly, disbursements increased almost 10 times from Rs. 59 million to Rs. 598 million. The scope of the organization's activities extends across the country. By the conclusion of Financial Year 2001, cumulative approvals amounted to Rs. 1,889 million, out of which about Rs. 300 million was approved specifically with a view to mitigating impact in the worst affected drought areas of the country. Credit and enterprise, the

largest component of the institution, accounted for 58% of the total approvals, followed by community physical infrastructure (28%). The capacity building assistance, provided in support of credit and infrastructure financing had a share of 14%.

7.9. Protecting Forests, Watershed and Rangelands

7.9.1. Malakand/Dir Social Forestry Project (MSFP), NWFP [41]

MSFP, covering Malakand and Dir districts, was started as a pilot phase in Malakand Agency in 1987-88. Its second phase ended in 1997. The aim of the project was to contribute in raising the standard of living in Malakand Agency and Dir district, by improving the productivity and use of hillsides and marginal farmlands. The long-term objectives of the project were to:

- Restore suitable vegetation to the denuded hillsides and marginal farmlands to create an ecologically and economically improved living environment on a sustainable basis.
- Develop extension for these filed activities.
- Stimulate institutionalization of the extension approach, at local level and within the NWFP Forest Department.

MSFP has covered a forestation, range management, tree improvement, extension, women's activities and training. A key component of the project was Village Land Use Planning (VLUP), a phased approach for preparing a Village Action Plan that contains a complete perspective on land use and zoning as envisaged and agreed by the project. VLUP was not used during the pilot phase of this project but was developed in the second phase. It signifies a shift in the project approach towards management through extensive participation. Acceptance of the process of participatory planning by the Forest Department has raised hopes that democratic, people-centered forestry management approaches are beginning to take root in the NWFP government.

7.9.2. Kalam Integrated Development Project (KIDP), NWFP

KIDP is an area development project, covering the whole of Kalam and Behrain Tehsils in the north of Swat. KIDP started in 1981 and, today, the project area extends to 0.3 million hectares and a population of almost 171,000. The main aim of the project is to "improve the socio-economic conditions of the population in the project area through people's participation in forestry, agriculture and village development, taking into consideration the ecological, social, economic and institutional sustainability of all means and activities at all levels". The project identified various factors exerting heavy pressure on the natural resources. These were increased population pressure; change from subsistence to cash crop (potatoes), increased number of grazing cattle, and the fast-growing tourist industry.

KIDP operates in a relatively egalitarian context, in which each male member of the community (even babies) has a share in the benefits of the forest. However, the gujars - landless herders - are not entitled to these benefits.

During 1993-95, the main focus of the project was to strengthen village organizations, channel income generation activities, and develop close interactions with the service delivery

[41] This section has been drawn mainly from Ahmad, J. and F. Mahmood. 1998. Changing perspectives on forest policy. IUCN and IIED, Islamabad and London.

departments. The second important task was to streamline innovation in forestry, agriculture and human resources development. During phase IV of the project, KIDP focused on four principle objectives:

- To create, support and strengthen participatory Village Organizations (VOs) to the point that they can assert their due rights and avail resources from government and non-government institutions; in short, to increase their bargaining power.
- To strengthen government line departments, the Forest Department, the Forest Development Corporation, and Agricultural Extension directly and other governmental agencies and programs indirectly.
- To bridge service delivery among VOs, government and non-government programs; and to accustom all these to work with and deliver services to VOs.
- To transfer technical knowledge, both productive and managerial, to farmers and project staff.

7.9.3. Siran Forest Development Project NWFP

Siran Forest Development Project (SFDP), also known as the Siran Intensive Forest Management Project, is located in the Hazara Civil Division of NWFP and extends to most of the Siran watershed. The Hazara forests have been under increasing pressure over the last three decades. To halt deforestation, the NWFP Forest Department, supported by GTZ, established the Kaghan Intensive Forest Management Project (KIFMP) in 1980. By 1991, this had become the Siran Forest Development Project (SFDP). The project area covers Tehsil Mansehra and the newly formed Tehsil Balakot. The entire Siran watershed is approximately 181,000 ha, of which 170,000 ha are considered to be a part of the project. The project identifies rapid population growth, inadequate and un-guided land use practices, and low levels of productivity in food and fodder production, as exerting high pressures on forests for agriculture and range use, in addition to exploitation for firewood and domestic timber usage.

The principal objective of the project is to maintain the productive and protective functions of forests in the Siran Valley through joint forest management. Reserved forests in the Kaghan valley are among the most productive in Pakistan. To effectively tap this potential, KIFMP was instrumental in constructing roads, raising nurseries, providing seedlings, harvesting timber, training people, establishing range management demonstration plots and a forest workers training school at Malkand.

7.9.4. Agha Khan Rural Support Program (AKRSP), Northern Areas

AKRSP, one of the largest NGOs in Pakistan, was established in 1982 to work in the Northern Areas. Today it covers Baltistan and Chitral and has formed more than 1,500 Village organizations (VOs) and almost 1,000 Women's Organizations (WOs). The broad objective of AKRSP is to "increase the capacity of local people to identify and utilize opportunities and to solve their problems". It also enables them to plan and implement development programs leading to increased incomes and employment; to improve health, nutrition, education and living conditions, and to improve the sustainability and productivity of the environment.

In aiming to secure economic, social and environmental objectives, AKRSP has always embodied a sustainable development approach. The key of AKRSP's approach is the VO – a broad-based coalition of all

those village residents whose common interest is best served by forming a multi-purpose development organization. The VO is the executing agency for all village level projects sponsored by AKRSP and its collaborators.

7.9.5. Watershed Planning and Management Project (WPMP), Balochistan

The primary objective of WPMP was to plan and implement programs for the rehabilitation of seriously degraded watersheds, particularly in northern Balochistan. WPMP is a part of the Area Development Program that integrates the ongoing development efforts and inputs of UNDP and the Government of Balochistan. The program is expected to cover 380 village communities in five districts with an estimated beneficiary population of almost 700,000 people. The project emphasizes the preparation and implementation of management plans for watershed rehabilitation, beginning with the Quetta valley. Upland grazing and agricultural lands would be managed and rehabilitated; and improved land use practices would be promoted, which may compensate for a considerable proportion of the present overuse of groundwater. It is envisaged that, through these, and dune stabilization works, contour ridging, construction of earth dams, spreading of seeds of indigenous grasses and planting of fodder shrubs on gravel out-wash, the project would assist in achieving improved vegetation cover, increased fodder supplies, increased groundwater recharge, and reduced damage by run-off and moving sand dunes.

7.9.6. Suketar Watershed Management Project (SWMP), AJK

The Suketar Watershed Management Project (SWMP) was a development project jointly undertaken by the Government of AJK, UNDP and FAO- now merged with the Area Development Program AJK. The World Food Program provides project support in the form of food commodities that are used to help pay for labor required by the project. The project area comprised of 3,082 hectares of Suketar Watershed located in Mirpur District. Out of the total project area, 952 hectares (31 percent) constitute government-owned demarcated forest area, 436 hectares (14 percent) cultivated lands, and the remaining 1,694 hectares (55 percent) uncultivated Khalsa wasteland and shamilat. The project area is a typical example of the highly eroded watersheds of AJK. It is located in the sub-tropical semi-evergreen vegetation type, but has been stripped of trees and grasses to meet grazing and fuel wood requirements. The main objective of the project is to reverse the process of land degradation and soil erosion in the Suketar watershed through sustainable production of food, fodder, timber and fuel wood, involving public motivation and education through extension services, practical demonstration for better land use, participation of the local people and strengthening the Forest Department of AJK.

7.9.7. Sindh Forestry Sector Development Project (SFSDP)

SFSDP's main objectives are: (i) to build up Sindh's forest resources to help meet the acute shortage of fuel wood and timber in the province; and (ii) to improve the quality of the environment through afforestation to stabilize river flood plains (mainly along the Indus) and to reduce damage to crops and communities caused by flood waters, strong winds and high temperature. The project pursues a sustained yield system of management, whereby harvest of mature trees is followed by replanting and/or provision for natural regeneration. It covers, inter alia, about 10 percent of Sindh's existing riverine

and inland forest resources identified as urgently needing rehabilitation. The main components are as follows:

- Social Forestry: Assistance to farmers by establishing private farm wood lots and tree plantations in shelterbelt areas, on eroding embankments and along waterways covering 12,000 hectares. The project provides assistance in the form of seeds and seedlings and technical advice on site selection.
- Rehabilitation of Government Reserved Forests: Rehabilitation of 21,000 hectares of selected forests which are seriously degraded due to lack of regular water supply and silivcultural treatment.
- Institutional Support: Strengthening of the institutional capabilities of the Sindh Forest Department (SFD) through the provision of staff training, research facilities, and consulting services.
- Private Sector Credit Component: Provision of credit on pilot basis for private sector participation in the development of up to about 3,000 ha of selected Government Reserve Forests, in combination with the production of agricultural crops and/or industrial wood. However, this component has now been dropped because of government restrictions on lease of state land.

7.9.8. Forestry Planning and Development Project (FPDP)

FPDP was funded by the United States Agency for International Development (USAID) with the primary goal to help increase Pakistan's indigenous energy supplies and achieve energy staff-sufficiency. The secondary goal was to improve Pakistan's forest assets. The primary objective was to strengthen the capability of federal, provincial and local institutions to design, implement and evaluate policies and programs for increasing the production of fuelwood and timber in Pakistan. The secondary objective was to demonstrate the economic, technical and social feasibility of producing tree crops on privately owned farm and rangelands. It involved establishing units within the Provincial Forest Departments to conduct farm forestry assistance programs. The project has an impressive list of achievements:

- Supported the establishment of over 5,000 private farmer nurseries and produced over 150 million seedlings from these nurseries.
- Trained over 20,000 farmers, forest officers and industrial wood users in nursery and plantation management and in marketing principles.
- Produced and used 100 multiple language technical packages to help transfer technology to forestry extension workers and farmers.
- Supported 50 studies on topics covering the tree-crop interface, tree management and economic feasibility of tree farming.
- Provided grants to 70 NGO's involved in farm forestry and environmental aspects of natural resources use.
- Helped establish marketing channels for wood raw material to industries throughout Pakistan.
- Helped involve about 150,000 farmers as tree producers with about 130 million additional trees planted.
- Helped afforestation on 5,000 acres.

7.10. National Conservation Strategy (NCS)

The major objectives of the NCS were improved efficiency in the use and management of resources, conservation of natural resources and sustainable development. The NCS had a clear set of priorities and 14 core program areas for implementation during the 1990s. In addition, a total of 68 specific programs were identified in these areas, each with a long-term goal

and expected outputs and resource investments required within the next decade. Each program also had communication, extension, research and training components. Followed by the NCS, Sarhad and Balochistan Provincial Conservations Strategies have been developed. The achievements of NCS are discussed in Annex 7.

7.11. Environmental Planning and Resource Conservation Project

This project aims to initiate the upgrading and strengthening of Pakistan's environmental protection institutions and also the rehabilitation of several watershed and rangeland areas. Again, it is difficult to make an assessment of this initiative because of poor monitoring mechanisms. However, the information that exists indicates that many of its objectives were achieved. Environmental institutions have become stronger, public awareness of environmental issues has increased, participatory approaches and sustainable management practices were introduced on a pilot basis both at community and watershed levels, and an adequate legal and regulatory framework has been developed. On the institutional side, provincial Environment Protection Agencies (EPAs) were either created or strengthened. Implementation and enforcement of key provisions of the Pakistan Environment Protection Act (PEPA) of 1997 were delegated to provincial governments and provincial EPAs.

The EPRCP did not specifically include or address sectoral policy objectives, but these were implicit in its design through policy studies, public awareness and cross-sectoral coordination and exchange. One of the important contributions of the project is the increased sensitization of government officials in key federal and provincial agencies and among the general public.

The EPRCP was implemented in three provinces, i.e., Punjab, NWFP and Sindh; in Balochistan it was implemented under the name of Balochistan Natural Resources Management Project (BNRMP). In Balochistan, experience has shown that due to weak implementation, political interference and inefficiency of the implementers, several project objectives were not achieved, such as a special studies component including a baseline air pollution study in Quetta; solid waste management in five selected cities of Balochistan; a Quetta Valley groundwater management study, which would have developed a mathematical model, community water supply schemes, environmental studies in Hub and Gadani area and Balochistan EPA´s mass awareness projects.

8.0

GOVERNMENT'S FUTURE PLANS AND POLICY INITIATIVES

8.1. Poverty Reduction[42] Strategy

The Government of Pakistan (GoP) has developed a Poverty Reduction Strategy (PRS) to ensure that economic growth is complemented with policies that enhance social development. The core principles of the strategy are (i) engendering economic growth; (ii) creating income generating opportunities; (iii) improving social sector outcomes; and, (iv) reducing vulnerability to shocks. The salient features of the PRS and their impacts on poverty and environment are given as follows:

8.1.1. Employment Initiatives

The thrust of the government's efforts is aimed at generating jobs in all sectors of the economy. However, owing to the greater elasticity of employment in the construction sector and small and medium industry, the government has designed specific policies aimed at generating jobs in these sectors.

In order to generate activity in the construction sector the government has reduced duties not only on essential inputs like iron and steel scrap, bars & sheets but also on critical construction machinery, tax deductibility on mark-up paid on house loans has been allowed, which, coupled with the new housing policy will reactivate the construction and building industry.

8.1.2. Macroeconomic Framework

The government's macroeconomic framework aimed at restoring growth has three key elements, which are fiscal and monetary adjustment, external adjustment, and debt management.

Over the next years, the government aims at reducing the fiscal deficit even further to 4.9%, and lowering the current account deficit to 2% of GDP. Similarly, GDP growth has been targeted at 4% while inflation at 5%. Public Accounts Committees have been established at the Federal as well as the Provincial level that are making public hearings; a major step in the direction of promoting transparency in public expenditure management.

Over the next years, the government intends to reduce fiscal deficit to 4.9%

The Export Promotion Bureau is developing a medium-term program for encouraging exports of non-traditional value added goods. In this respect a Horticulture Export Board has been established to promote integrated development, through various stages of production and processing of vegetables, fruits, and flowers for the purpose of exports. The Board is a non-government effort, which will be spearheaded by various stakeholders in the respective sub-sectors.

8.1.3. Agriculture

The most important challenge facing the agricultural sector in Pakistan is the shortage of water, which became especially acute in the face of the recent drought. Around 25 million acre-feet of water is lost every

[42] Major part of the text has been extracted from the draft Interim Poverty Reduction Strategy Paper, prepared by the Government of Pakistan.

year in the system due to low water management efficiency. The major focus of the next development plan will be on the water sector, where Rs.4 billion have been allocated to initiate work on some of the new water sector projects. For this purpose, a medium-term plan has been prepared which aims at augmenting water resources at a cost of Rs. 86.1 billion. This plan will create additional storage capacity of 4.5 MAF through such projects as Gomal Dam and Meerani Dam, raising of Mangla Dam, and new irrigation schemes like Rainee, Thar and Kachi canals and lining of watercourses. Furthermore, 10,000 tube-wells will be installed in the provinces to increase the availability of water at the farm level. In addition, development budget for 2001-02 envisage a drought support program of Rs. 10 billon, which will be used for undertaking projects and would not only mitigate the suffering of those adversely affected by drought but also help them get better prepared for its recurrence in future.

The government has initiated formulation of export oriented policies for industrial growth

Another critical element of the policy is to accelerate agricultural growth by raising per unit yields and increasing production of high value non-traditional crops like edible oils, olives, tea, spices and medicinal plants. The government is giving great importance to sunflower and canola, for which 2 million acres of existing cultivable area will be brought under cultivation over the next five-year period. This will add 0.5 million tons to the current production of edible oil of 0.6 million tons. Strategies like contractual arrangements for the guaranteed procurement, revitalization of Oilseeds Development Board, and increased funding through the levy of cess at enhanced rate of 1% on edible oil imports is also being implemented.

The government is in the process of formulating a policy to encourage corporate agriculture to bring vast tracks of uncultivated land under cultivation. This will not only encourage large investment in the agricultural sector but also create job opportunities for rural inhabitants and create exportable surplus.

8.1.4. Industry

Pakistan's small and medium enterprise (SME) sector holds great potential of generating employment, adapting technology and creating an export-base grounded in the country's true comparative advantage. An integrated approach has been adopted to encourage SMEs and Small and Medium Enterprises Development Authority (SMEDA) is actively pursuing strategies in this area. SMEDA has been reorganized and given the necessary resources to lead the process of supporting the development of SME sector. The focus of the new organization is to make processes easier and facilitate the development of SMEs.

Small Business Finance Corporation (SBFC), which serves as an operational arm of SMEDA, has also been revitalized for the promotion of SMEs. For this purpose, the financing limit of SBFC has been raised from a maximum of Rs.1.5 million to Rs.30 million. SBFC has developed special financing packages for specific SME industries; some of them have also even been launched.

The government has also initiated formulation of export-oriented, open, transparent, and consistent sector specific initiatives aimed at creating a predictable and conducive environment for overall industrial growth. In this respect Textile Vision 2005 has already been developed and a Textile Board has been constituted to implement recommendations of the Textile Vision. This policy is aimed at encouraging the production of value added products in the textile sector while moving up the value chain.

Marble and Gems industries would be encouraged near the point of deposits to add value to current low value added products of these industries. To revive the dormant SAINDAK project, a Memorandum of

Understanding (MoU) has been signed with a Chinese firm to lease it for a period of 10 years. Revival of this important project will generate sizeable employment opportunities for the people of Balochistan.

8.1.5. Infrastructure

Similarly, maintenance and rehabilitation of existing roads network is being given priority to integrate remote areas with the national highway network to improve rural access and farm-to-market roads as part of the Khushal Pakistan Program. Ministry of Communications and National Highway Authority have formulated a medium-term plan 2001-04 at a cost of Rs. 13 billion and priority has been accorded to completion of on-going projects along with the rehabilitation and dualization of existing highways. These projects will create hundreds and thousands of jobs for the poor.

8.1.6. Energy

The government is fully committed towards encouraging the use of hydel, coal and gas reserves for power production purposes. Additionally a comprehensive restructuring plan of Water and Power Development Authority (WAPDA) and Karachi Electricity Supply Corporation (KESC) is already underway, which would reduce systems losses and insulate the federal budget from outlays emanating on account of losses incurred by public sector power companies. These interventions will have a positive impact on the environment.

The government aims at accelerating the exploitation of domestic natural gas through elimination of price distortions by adopting a new pricing framework with rationalization of gas prices for domestic use and encouragement of CNG use. Around 160 CNG stations have been established in the country and another 150 are under construction; while 150,000 vehicles have been converted to CNG and another 150,000 are expected to be converted by 2003. In this respect the government has deregulated the prices of CNG and LPG, the import of furnace oil and high-speed diesel oil, and the primary freight pool. For environmental protection, the government has banned use of two low grades of motor gasoline, besides keeping a check on adulteration. In a gradual manner, use of unleaded gasoline will also be eliminated. These interventions would help to combat urban pollution, vehicular emissions and conservation of forests, watersheds and saving of organic matter.

Furthermore, work on 817 Km cross-country white oil pipeline is in progress. Operationalization of Chashma Power Project will add another 300 MW of electricity to the National Power Supply Grid. New fields and offshore discoveries in oil and gas sector are being pursued by multinationals. The installation of oil pipeline will reduce vehicular pollution to a great extent. Likewise, the use of nuclear energy will release pressure from non-renewable sources of energy.

A mineral development policy is being designed to fully exploit country's mineral potential

Efficient use of coal reserves is being looked into to replace furnace oil as feedstock for industrial power. A mineral development policy is being designed to fully exploit country's mineral potential. Thar coal will be developed both as fuel for power generation and for other commercial applications such as in cement industry. Exploitation of coal may be detrimental from environment point of view, however, the industrial development will definitely create job opportunities for the labor class.

8.1.7. Information Technology

Bandwidth charges of Pakistan Telecommunications Corporation Limited (PTCL) on average have been reduced by 98%, since 1998. Within two years, bulk availability of bandwidth has been increased 20 times. Free Internet connections have been provided to public sector universities.

Pakistan has one of the lowest (2.5%) tele-density in the world, therefore, Information Technology (IT) usage is also very low. The GoP is laying maximum stress on the development and expansion of the telecommunications infrastructure in the country. In the recent past, Pakistan has made rapid strides in converging with the global Internet revolution. Around 400 cities, towns and villages (covering 80% of Pakistan's population) have access to Internet facility as of June 2001, while another 300 are expected to be brought in the net in the next one year. With 90% telephones, Pakistan has already been digitalized. Due to concerted government efforts there has been a 110% increase in Internet usage in Pakistan over the last 6 months.

In order to encourage software exports the State Bank of Pakistan has allowed software exporters to retain 35% of their export earning in foreign currency accounts, and contracts are now being accepted as collateral for software exports. Pakistan Software Exports Board has been revamped to meet the challenges of the new IT environment with the main focus of providing marketing support to local IT companies. Furthermore, the government is opening marketing offices in Singapore, London and San Francisco to encourage software exports from Pakistan.

8.1.8. Governance

The Chief Executive's Seven Point Agenda, as highlighted by the national reconstruction program, aims at introducing several cross cutting governance reforms that will not only improve transparency and accountability but will also result in the more efficient delivery of services and thus a better life for the poor. In this regard, the Devolution of Powers Plan will be a key intervention (see Annex 8).

8.1.9. Assets of the Poor

Depressed economic growth, rising population, and rapid urbanization has resulted in an increased demand for housing infrastructure, which has not been met. Against an annual requirement of 570,000 housing units per year only 300,000 units are being constructed, resulting in a backlog of 270,000 units each year. Inappropriate planning and poor service delivery mechanisms have intensified the problem of urban settlements and have led to an explosion of population living in unacceptable housing conditions. Estimates for urban population living in Katchi Abadis range from 35-50%. The growth of Katchi Abadis on public land is a direct result of the shortcomings in the housing delivery system and lack of access to affordable tenure by the poor.

To ameliorate the living conditions of the poor the government has decided that available government land in rural areas, in the form of 'shamlat' around villages would be given to homeless people free of cost. Government policy regarding katchi abadis aims at regularization through the provision of basic services.

Pakistan's Poverty Reduction Strategy proposes fundamental structural changes to address the issue of poverty in rural areas, including the accelerated distribution of state owned land to small farmers. The distribution of about three million acres of available land will be fully supported with the provision of infrastructure and technical packages. Micro-credit windows will be provided from Agricultural Development Bank of Pakistan, Khushali Bank, and other institutions. In this respect priority will be given to women so they can equally benefit from distribution of state land and supportive packages. During 2000-01, 82,932 acres of land was distributed among 9,137 haris in Sindh, while another 9, 860 acres of land was distributed among 464 haris in Baluchistan. This process will be further extended to ensure proper cultivation of such land and the Agricultural Development Bank (ADBP) will be co-opted to design special package for providing credit to these farmers.

Pakistan's Poverty Reduction Strategy proposes fundamental structural changes to address the issue of poverty in rural areas, including the accelerated distribution of state owned land to small farmers

8.1.10. Micro-credit

Access to credit is the surest way of empowering the poor and improving their income generating opportunities. However, due to their lack of collateral and weak asset base it is very difficult for the poor to get credit from public and private financial institutions, in spite of the fact that small borrowers exhibit a lower credit risk than larger borrowers. The Pakistan Poverty Alleviation Fund (PPAF)[43], Agricultural Development Bank of Pakistan (ADBP), First Women Bank (FWB), the National Rural Support Program (NRSP), and the government are involved in credit allocation to small enterprises.

To supplement their work, the Government has now established the 'Khushali Bank' or 'Micro Finance Bank' which has already started lending support to the activities of NGOs and Rural Support Programs (RSPs), which are dealing with micro-credit.

8.1.11. Education

A comprehensive policy on educational reforms with medium-term targets [Education Sector Reforms (ESR)] has been finalized after exhaustive consultations with over 600 partners. This participatory round involved participation of the Chief Executive, Federal and Provincial Ministers for Education and Finance, NGOs, and the private sector. The ESR is based on a long-term framework with a three-year action plan for 2000-2003. The main features of the reform agenda include macro level reforms in planning, procedures, resource mobilization and utilization; sector wide approaches for reinforcement of linkages between sub-sectors; strategies and milestones for implementation; integration with the Social Action Program (SAP); Education For All (EFA); institutional reforms at all tiers of government; and delivery of quality education.

An innovative element of ESRs is the emphasis on inculcation of employable skills alongside education. This will be achieved through the introduction of technical education stream at the secondary school level. This plan aims at introducing a skill development group in the ninth and tenth grade, parallel to the existing science and arts groups, in 1200 operational secondary schools with adequate work shop space and in 60 model technical high schools that will be established under this program. Training will be imparted in trades that are selected with consultation of local industry, thereby creating employment linkages with industry. The program will be supplemented through the provision of micro-credit to encourage self-employment.

8.1.12. Health

Immunization being the most important program in preventive health will receive special attention. The program aims at protecting children and mothers by immunizing them against preventable diseases. Routine immunization coverage will be expanded through fixed centers, outreach teams and lady health workers. Special immunization days and campaigns will be conducted. The Program is providing vaccination against six vaccine preventable diseases to 4.5 million children annually with immunization coverage at 77% for children and 50% for expecting mothers.

The National AIDS Control Programme is being revamped and an allocation of Rs. 92 million was approved for 2000-01. Though, HIV/AIDS has not reached epidemic proportions in Pakistan, but it is still regarded as a high-risk country.

8.1.13. Population

Between 1991-01, population growth rates came down from 3% per annum to 2.2%. The awareness of at

[43] PPAF was set-up with an endowment of $100 million, as a wholesale lender to NGOs engaged in providing micro financing. Until 1 June 2001, it has provided total assistance of Rs.1.2 billion to 33 NGO in all parts of the country, for onward lending to the poor..

least one method of family planning is around 97%, while contraceptive prevalence rate is 33%. However, the current total fertility rate (4.6) is still one of the highest in Asia.

The service delivery infrastructure of the population program operates through 1,658 Family Welfare Centers (FWCs), 131 Mobile Service Units, and 106 Reproductive Health Centers and 12,000 Village Based Family Planning Workers (VBFPWs) providing reproductive health and family planning services to both urban and rural population in the country. The FWCs are proposed to be upgraded as Mother and Child Health (MCH) Centers after the provision of necessary inputs of training and equipment. The 12,000 VBFPWs of Ministry of Population Welfare (MoPW) and 43,000 Lady Health Workers (LHWs) of the Ministry of Health have been unified as one cadre of 55,000 Family Health Workers (FHWs) and will be brought together technically at par with each other for the provision of PHC/ RH service at the grassroots level. These workers will be trained further in a phased manner to provide midwifery services at the community level. The entire Program will be backed by independent media and advocacy campaign, for high social marketing and NGOs involvement.

Government plans to capacitate provincial authorities for implementing environment protection laws

8.1.14. Drinking Water

At present 63% of the country's population have access to safe drinking water (83% in urban areas while 53% in rural areas), whereas planned sanitation facilities are available to about 39% of the total population (59% in urban areas while 27% in rural areas). Water supply facilities will be increased from 63% (in 2000-01) to 66% in 2003-2004- 86% in urban areas and 56% in rural areas. The planned sanitation facilities will be increased from 39% in 2000-01 to 43% in 2003-04.

8.1.15. Gender Mainstreaming

Government of Pakistan is committed to gender mainstreaming and empowerment of women. In this respect the first ever Permanent Commission on the Status of Women has been set up for the emancipation, equalization of opportunities, and reduction of all forms of discrimination against women. The Commission has been assigned the task of examining existing policies, programs, and legislation concerning women and has recommended a number of measures for instituting women development and gender equality. Additionally, an allocation of Rs.113 million has been made during 2001-02 for various programs aimed at women development. A large number of social welfare projects being run by the women's division are receiving funding under the above allocation.

8.1.16. Environment

National Conservsation Strategy (NCS) is the broad national environment policy of Pakistan, within which, National Environment Action Plan (NEAP) has also been approved. The government has formulated a comprehensive strategy to develop provincial capacity for implementing environmental protection laws and monitoring their effectiveness. A proposal to strengthen their capacity and improving their effectiveness has been prepared for presentation to Pakistan Environmental Protection Council (PEPC). Once approved, Finance Division will be requested to provide financial support for its implementation.

The Environmental Protection Act, 1997 has now been promulgated, which provides a comprehensive framework for conservation of wildlife habitats and biodiversity; compensation for damages/ losses caused by a polluter, thus internalizing the externality; establishment of environmental tribunals and magistrates; initiation of environmental assessment; and promotion of public education and awareness of environmental issues.

8.1.17. Social Safety Nets

The Food Support Program for the poorest sections of the population has also been revitalized and funds for the program have been set aside. The program is designed to mitigate the impact of increase in wheat prices. Its coverage extends to 1.2 million poorest households with monthly income of up to Rs. 2000. Cash support of Rs. 2000 is provided to them through biannual installments. An allocation of Rs. 2.5 billion during the year was spent on this program from the federal budget. The program was implemented at the district level through the help of district officials. A system of means testing at the local level has been adopted for identification of beneficiaries by linking the program with the Zakat system where records of Mustahiqeen (deserving) are developed through extensive participation. For the fiscal year 2001-02 allocation for this program has been increased by 16% (Rs.400 million) to Rs. 2.9 billion. The Pakistan Bait-ul-Maal also provided support to destitute people that totaled Rs.327 million for a number of purposes including medical support, fund for bonded labor, students stipends, community education and dialysis support.

Due to its transitory nature the Khushal Pakistan Program is a social intervention aimed at generating economic activity through public works in the country. A sum of Rs.11.5 billion has been released under the Khushal Pakistan Program (Poverty Alleviation Program) to the districts through provincial governments; while the schemes under the program have been identified and selected at the district level through active community participation. The program has generated considerable economic activity including employment opportunities for 2 million persons. It has resulted in the construction of 2,055 farm to market roads, 1145 water supply schemes, 118 spurs and 2746 repair and operationalization of schools. Under the IT component of the program, Rs. 1 billion has been released for rural-based vocational training in computers. Khushal Pakistan Program will receive an allocation of Rs. 7.5 billion during 2001-02, which has been adjusted in accordance with the rate of utilization experienced last year. With the functioning of district governments under the devolution of power plan, the Khushal Pakistan Program will gain further importance and local ownership.

8.2. Industrial Pollution

Effective environmental policy and regulations potentially have a greater impact on industries than industrial policy itself because they attempt to directly address the environmental problems at the source and force industries to internalize environmental costs. This section reviews Pakistan's environmental policy and regulations affecting industrial pollution as summarized in Figure 2. It describes the important laws and regulations and makes some assessment of their effectiveness.

Khushal Pakistan Program has generated 2 million jobs for the poor

8.2.1. Environmental Legislation

The Constitution of the Islamic Republic of Pakistan itself contains no statement of principles or policy about the rights and obligations of the state and its citizens with respect to the environment. It does, however, confer concurrent legislative power on the Federation and the Provinces to legislate in respect of environmental pollution and ecology.

Prior to promulgation of Pakistan Environmental Protection Ordinance (PEPO) of 1983 and the recent passage of Pakistan Environmental Protection Act (PEP-Act) 1997, Pakistan had laws that contain provisions for environmental protection. These laws dealt with land use, water quality, air quality, noise, toxic and hazardous substances, solid waste and effluents, marine & fisheries, forest conservation, mineral development, energy, public health, etc. However, they are not effective; punishment for violations was mild

and easy to circumvent. The laws included:

- The Pakistan Penal Code, 1860
- The Canal Drainage Act, 1873
- The Punjab Local Government Ordinance, 1979
- The Motor Vehicles Ordinance, 1965; and The Motor Vehicles Rules, 1969
- The Factories Act, 1934
- The West Pakistan Fisheries Ordinance, 1961
- The Forests Act, 1927
- The Boilers Act, 1923
- The Pakistan Petroleum (Exploration and Production) Rules 1986
- The Antiquities Act, 1975
- The West Pakistan Epidemic Diseases Act, 1959, etc.

Three provinces have designated environmental magistrates under the PEP-Act 1997

8.2.2. The Environmental Protection Ordinance (PEPO) No. XXXVII of 1983

Before the Pakistan Environmental Protection Act of 1997 (PEP-Act, 1997), PEPO of 1983 was the only piece of Pakistani legislation dealing specifically with the environment, and it was the principal statement of Pakistan's national commitment in the field of environment. Its objective was "to provide for the control of pollution and the preservation of the living environment" in Pakistan.

The key components of this Ordinance are as follows:

- The establishment of a high level Environmental Protection Council (PEPC) at the federal level to form national environmental policy and ensure enforcement of National Environmental Quality Standards (NEQS); and
- The establishment of Federal Environmental Protection Agency (FEPA), under MoELG&RD, headed by a Director General, with wide ranging functions including powers to set and enforce National Environmental Quality Standards (NEQS). These include the preparation and coordination of environmental policy.

The Ordinance was designed to establish an environmental policy and management structure and to install the Environmental Impact Statement (EIS) as the central component of environmental protection in Pakistan. Under clause 8 of PEPO, Environmental Impact Assessments (EIAs) are required for all projects that may pollute the environment. Essential elements of an EIA are measures to identify, tackle and monitor adverse environmental impacts of a project during design, construction and operation.

8.2.3. Pakistan Environmental Protection Act, 1997

PEP-Act of 1997 is an improvement over PEPO of 1983. The Act provides for sustainable development through the protection, conservation, rehabilitation and improvement of the environment. After the passage of PEP-Act 1997, the following major steps have been taken:

- The Pakistan Environmental Protection Council (PEPC) was re-constituted to give more representation to provinces, trade, industry and NGOs.
- Two Environmental Tribunals have been set up, one in Lahore and the other in Karachi. The Karachi Tribunal has its jurisdiction in the Provinces of Sindh and Balochistan, while the Lahore Tribunal has jurisdiction over the Provinces of Punjab, NWFP and Federal Capital Territory.
- Three of the four provinces have designated Environmental Magistrates under the provision of Section 24 of the PEP-Act 1997.
- The Federal Government has delegated powers to the provincial governments for implementation of the Act.

- A system for self-monitoring and reporting for industry has been developed, which includes a Self Monitoring and Reporting Tool (SMART). SMART is a software and information package to streamline data reporting. This would facilitate monitoring and networking with industries and Federal and Provincial EPAs.
- A National Coordination Committee headed by the Director General, Pakistan Environmental Protection Agency has been constituted under Section 7(k) of the PEP-Act, 1997 to supervise implementation of environmental policies and enhance inter provincial coordination.
- Analytical methods and sampling procedures have been formulated.

8.2.4. National Environmental Quality Standards (NEQS)

One of the functions of Pak-EPA under the provisions of PEPO of 1983 was to issue NEQS for municipal and liquid industrial effluent, industrial gaseous emissions and motor vehicle exhaust and noise. The Pak-EPA, however, did not issue a Statutory Regulatory Order (S.R.O) until 1994. It required all units coming into production after 1st July 1994 to comply immediately with the new standards. Those already in production at the time of the S.R.O. were required to comply starting 1st July, 1996. The Pak-EPA was not able to implement the NEQS effectively for many reasons, including lack of implementation capacity and resistance from industry.

With the PEP-Act of 1997, the Pak-EPA revised the NEQS with full consultation of the private sector: industrialists, trade and business associations and NGOs. The municipal and liquid industrial effluent standards cover 32 parameters. The standards for industrial gaseous emissions specify limits for 16 parameters, and the standards for motor vehicles prescribe maximum permissible limits for smoke, carbon monoxide and noise. Revised standards cover discharge limits of effluents into inland water, sewage treatment plants (where these are operational) and the sea.

The NEQS are primarily concentration based. Unfortunately, the limits on liquid industrial effluents are neither industry-specific nor do they have any relationship with the quantum of production. NEQS prohibit dilution, but this can be easily circumvented.

8.2.5. Self Monitoring and Reporting System

The Self-Monitoring and Reporting System (SMRS) of the Pak-EPA takes into account the resources and interests of both the EPA and industry. It classifies industries into categories A, B, and C, each corresponding to a specified reporting frequency. Category A industry will report their effluents and emission levels every month, Category B industry quarterly and Category C industry biannually. Industries must have their effluents tested by a Pak-EPA certified/accredited laboratory and enter the results in the electronic forms included in the software package. The data must be sent to the respective provincial EPA via email or on a floppy disk. Sampling analysis requirements, procedures and the reporting format are also prescribed.

Self Monitoring and Reporting system has enabled the industry for environmentally friendly production

SMRS makes the country's industry owners and operators responsible for systematic monitoring and reporting of their environmental performance, saving EPAs expense, time and effort, as well as enabling industry to make long-term provisions for environmentally friendly production.

Pak-EPA started implementation of SMRS with SMART on a pilot basis on 1st January 2000. For this purpose, a list of more than 100 hundred industrial units comprising all the three reporting categories was provided by the Federation of Pakistan Chamber of Commerce and Industries (FPCCI), the Overseas International Chamber of

Commerce and Industries (OICCI) and other stakeholders. Out of these, 50 units were selected for pilot phase.

8.2.6. Pollution Charge Programme

The modalities for the implementation of the pollution charges have evolved through a unique process of coordination among representatives of industry, government, environmental NGOs and academic researchers. The consensus of all stakeholders has been sought to adopt a market based approach, i.e., a pollution charge or tax combined with fiscal incentives to industries, rather than a command and control approach through regulations to ensure compliance with NEQS. Appreciable progress has been made towards operationalizing the process. Unfortunately, the January 1999 deadline for commencing implementation was exceeded due to procedural and departmental hurdles. The pollution charge payable by an industrial unit will be determined in accordance with guidelines to be prepared by the Pak-EPA. Industrial units liable to pay the pollution charge will themselves be responsible for ensuring the correct calculation, reporting and payment.

8.2.7. Pakistan Environmental Assessment Procedures

Pursuant to the provisions of PEP-Act of 1997, all Government ministries, departments, agencies, and establishments and private sector project sponsors are required to prepare Initial Environmental Examinations (IEEs) and Environmental Impact Assessments (EIAs) prior to the approval of their proposals for projects. The primary purpose of the environmental assessment process is to provide proponents and decision makers, as well as members of the public, with an understanding of the potential environmental effects of proposed action, so as to avoid or minimize adverse effects, bearing in mind the costs and benefits of using the environmental resources in this particular project wherever possible.

Pak-EPA has developed a complete package of Environmental Assessment Procedures. It has also developed IEE/EIA regulations (1998) for implementation of EIA process. One problem has been the ten-year period of inactivity of the PEPC, which has meant that the environmental impact assessment system has not worked effectively. EIAs have been carried out in a rather haphazard manner, and it has been left largely in the hands of the developer to decide whether an EIA is needed and what the scope of the investigation would be.

8.3. Analysis and Recommendations with Comments on the Direction of Environmental Policies

8.3.1. Constraints to Effective Environmental Protection

- An Unstable Political Situation: In 52 years after the independence, shifts between military government and democracy have been frequent and it is still not clear what kind of governing system Pakistan will have in the long run. In short, political instability prevails. Additionally, there are tense relations with India which results in shift of development funds for defense.
- A Deteriorating Economy: Partly as a consequence of the large defense budget and debt servicing, foreign debt continues to mount. Pakistan's per capita income was US$ 400 (1998-99) which has been decreased in recent years. This has a direct impact on industrial pollution. According to World Bank research, there is a one per cent decline in the intensity of organic water pollution (the amount per unit of industrial output) for each percent increase in per capita income. Overall, the data reveal that pollution intensity falls by 90 percent as per capita income rises from $500 to $20,000. Most importantly, the fastest decline occurs before countries reach

middle-income status.

- Shortcomings in Institutional Capacity: Although in the past two decades a complete regulatory machinery has emerged, but it is unable to implement environmental policies effectively. Technical know-how, training opportunities, planning capacity, adequate staff, infrastructure, monitoring systems and most importantly adequate budgets are lacking. For instance, the Pak-EPA has a well-equipped laboratory, but it is non-functional because of inadequate trained staff and operational budget.
- Lack of Information: Environmental information has to be processed and organized and made useful for the policy makers, managers, technical experts, or citizens. But the quality of the processed information – its reliability, representativeness (lack of bias), periodicity, and comparability – cannot be better than the quality of the primary data. Primary data collection (e.g., water quality data from various point sources, organic content of soils at various sample points, and so forth) is unfocused and scattered. Lack of information on cleaner technologies, sources of funding and assistance, and access to markets for environmental friendly products is also a major constraint for environmentally sound and sustainable development.
- Job Dissatisfaction: According to a recent analysis. "Officer level salaries in Pakistan have declined dramatically over the last three decades... At present, public sector salaries (for mid to senior levels) as percentage of private sector salaries are about 20 per cent in Pakistan compared to 110 per cent in Singapore and 70 per cent in Korea; they do not provide an adequate living. Salaries have [not] kept pace with inflation..."[44] .
- Financial Constraints: Budgetary cuts due to sanctions imposed by international community and cuts in development assistance programs are affecting the environmental agenda.
- System Hurdles: The cumbersome procedures of the administration seriously affect the implementation of new initiatives.
- Lack of Awareness and Political Will in Government: Although there is significant environmental awareness among the general public (particularly among the educated), environment is still a low priority area in government. Government ministries and line departments are unaware of the need for mainstreaming conservation in annual development plans. Budgetary allocations for the environment are low. In the last four years, the PEPC, the highest environmental policy making body, met only once.
- Inactive Local Government Institutions: The lowest tier in the government machinery can play a vital role in environmental protection and pollution control activities as they are close to the ommunities. But most of the time local governments have remained inactive. The present government is trying to revive local governments, so far without many results in advancing the environmental agenda.
- Indifferent Attitudes of Industrialists: Industrialists are reluctant to accept suggestions for improvement, which is a major constraint for implementing pollution control measures.

The lowest tier in the government machinery can play a vital role in environmental protection and pollution control activities as they are close to the communities

8.3.2. Policy Recommendations

A recent World Bank Policy Research Report "Greening Industry"[45], has highlighted several innovative

[44] The New, February 6, 2000

[45] Greening Industry: New Roles for Community, Markets, and Governments", World Bank Policy Research Report, October 1999.

programs that demonstrate the potential for pollution reduction. It suggests that coordinated action on three fronts – economic reform, formal regulation, and informal regulation – can reduce industrial pollution significantly even in very poor countries.

The new approach proposed by the World Bank pays particular attention to the problems of the poor, who suffer heavily from pollution. Evidence from Mexico, China, and elsewhere has shown that education provides a powerful lever for improvement. Even poor people will not passively accept pollution if they are well informed about its sources and impacts. Through public education and maintenance of appropriate environmental standards, governments can help assure basic amenities and human dignity for the poor during the transition to greener industry. This is of direct relevance to Pakistan.

8.3.2.1. Strengthening of the Regulatory System and Institutional Capacities

The standards presently in use are not adequate and the monitoring and enforcement capacity of national and provincial EPAs is still weak. The following areas are identified for particular emphasis:

- Development of ambient air quality standards and drinking water quality standards.
- Strengthening of monitoring infrastructure for air and water quality, e.g., strengthening of laboratories and establishment of air monitoring stations.
- Updating existing monitoring protocols on the basis of latest developments for effective monitoring.
- Strengthening of staff capabilities in the areas of cleaner production, pollution prevention and monitoring, environmental audits, EIAs, public disclosure, community-handling procedures and generally for the effective implementation of environmental policies.
- Procedural reforms for implementation of environmental laws, etc., with emphasis on increased responsibility, accountability and decentralization of authority.
- Effective government action to remove the financial constraints of regulatory agencies.
- Improving job satisfaction and recruitment procedures (including safeguards against political pressure).

8.3.2.2. Self-Monitoring and Reporting and Pollution Charges

Experience in developing countries shows that pollution charges work well because they combine economic incentives for cleanup with maximum flexibility to factory managers. Pak-EPA should keep in view the lessons learned from similar programs in other developing countries such as Indonesia's PROPER, Brazil's FEEMA and Philippines Eco-Watch. Indonesia's PROPER led to remarkable results and suggests that performance ratings and public disclosures can be powerful tools for improving environmental conditions. FEEMA, the pollution control agency of Rio de Janeiro State, has ranked several thousand factories according to their contribution to the overall volume and risks of local air and water pollution. The analysis suggests that targeting only 50 factories in the top group could control 60 per cent of industrial pollution. Controlling pollution from 150 plants in the next group would eliminate another 20 per cent of the total. The Philippine experience with pollution charges was that plant managers, faced with a continuous payment rather than sporadic legal action, moved quickly to reduce pollution to the point where the marginal cost of abatement was equal to the pollution charge.

In view of the above, the following is recommended:

- To be credible and effective, regulatory agencies should focus their efforts, be transparent and encourage community participation.
- Target a small group of serious polluters, limit regulation to a few critical pollutants, effectively measure these pollutants for regulatory compliance and publicly document the activities.
- Pak-EPA should make efforts to raise public awareness in communities and markets, through public education on environmental quality, goals, progress and major polluters.
- Information on the pollutant discharge of factories and its affects on the health and economic status should be made accessible to general public and local governments.
- Information on possible actions by the industry to minimize those affects and the role of community should be made available through setting up special offices, awareness raising seminars/workshops, and use of media.
- In the Pollution Charge, more attention should be given to factors such as marginal social damage (MSD) vs. marginal abatement cost (MAC) and the impact of marginal expected pollution penalties (MEP).

8.3.2.3. Training for Small and Medium Enterprises

No formal survey of the SME sector in Pakistan has been undertaken in recent times, but it is estimated that about 9 to 10 million people are engaged in the rural informal sector and over 30,000 light engineering facilities exist [46]. SMEs mobilize community resources and help revitalize the local economy by catering to domestic and export markets. The two industrial triangles, Lahore-Sheikhupura-Faisalabad and Lahore-Gujranwala-Sialkot, are a witness to this phenomenon. SMEs, however, also generate a sizable amount of industrial pollution.

- There is a need to develop a specific policy for SMEs. It is recommended that a training program for SMEs be developed for cleaner production, pollution prevention at source and in-house environmental management. Industrial associations and the Small and Medium Enterprise Development Authority (SMEDA) can play a vital role in this regard. Specific focus should be on creation of mechanisms to help SMEs select and adopt least-cost process and pollution control technologies and appropriate management techniques.
- It is also recommended that economic incentives be provided to SMEs, such as easily accessible credit lines and import facilities for new technologies.

It is estimated that about 9 to 10 million people are engaged in the rural informal sector and over 30,000 light engineering facilities exist

8.3.2.4. Establishing Industrial Estates

Firms benefit through industrial estates from land development, construction and common facilities such as power, security and communications. Industrial estates can provide centralized environmental services such as sewage systems, effluent treatment, and pollution prevention assistance and energy conservation measures. Such facilities can particularly be for SMEs, which may not be able to afford them individually. In Pakistan, industrial estates exist in all the four provinces but they are deficient in several facilities and most importantly environmental infrastructure and services are not provided. Through the Board of Investment (BOI), the GOP has launched a scheme of National Industrial Zones (NIZs), including industrial estates, free industrial zones, free trade zones, export oriented units and estates for SMEs. There are,

[46] The News of February 7, 2000, article on (SMEs)

however, no location restrictions to export oriented enterprises. The Ministry of Environment needs to coordinate activities with BOI in this regard. The following measures are recommended:

- Help BOI in identifying locations where industrial estates would be an economical solution to the infrastructure needs of industries and where their developmental impacts can be maximized while their environmental impacts are minimized.
- Plan and establish estates, ensuring that environmental services and infrastructure are fully integrated in the design and operation of the estates.
- Attach advisory services to estates, including service points for information on cleaner production and environmental management.
- Establish integrated infrastructure and services on existing estates.
- Develop programs to promote industrial ecology within and among estates, including investment incentives for co-location of complimentary processes and design of processes to facilitate the cross-use of wastes.
- Develop a national policy to regulate the number of industrial estates to correspond to the demand such that all are financially viable and can provide appropriate services and infrastructure for firms.
- Pak-EPA should encourage carrying out programmatic EIAs for the proposed industrial estates. For this purpose close links should be established with the BOI. The programmatic EIA applies to an entire industrial estate is based on a carrying capacity analysis. This determines the maximum waste-load that the local ecosystem can assimilate, the maximum amount of ground- water extraction that can be allowed, or the level of air emissions ensuring acceptable ambient air conditions (determined from modeling techniques). From the carrying capacity of the area, a determination of the appropriate type or mix of industries, as well as the allowable intensity of development, can then be made. This should be incorporated into a management plan, which becomes the basis for issuing an environmental clearance for the industrial estate. The management plan can serve as a reference for compliance monitoring.
- It is also recommended that a very clear policy indicating site selection criteria, zoning and type of industries be developed for selection of industrial estate sites, keeping in view long-term objectives for environmental protection.
- For existing industrial estates, complete environmental reviews (including industrial audits) are recommended, followed by the development of environmental management plans that include identification of installation/operational costs for common treatment facilities.

8.3.2.5. Strengthening Local Governments

Local governments can play a vital role in pollution control at the grassroot levels. The Local governments are in place now. The following is recommended in this regard:

- Developing capacities in local governments for developing environmental performance criteria, cleaner production methods and public information/disclosure.
- Training of local governments in the interpretation and enforcement of environmental regulations, and the collection and use of community-based information.

8.3.2.6. Encouraging Industry to Adopt ISO-14000 Certification

It is recommended that industries be encouraged to work towards achieving ISO 14000 Certification. This will require industries to follow standards for environmental management systems (EMS) and comply with NEQS.

Annexures

ANNEX 1
PAKISTAN ENVIRONMENTAL FACT SHEET

Sector		
Population	Total (1998) Growth Rate (1981-1998)	130.6 million 2.6% per annum
Urbanization	Urban Population (1998) Cities over 1 million	42.46 million (32.5%) 8
Health	Life Expectancy (1998) Infant Mortality (1998)	62 Years 95 per thousand
Economy	GDP (1996-1997) Per Capita Income GDP Growth (1982-1996) Exports Share of GDP Imports Share of GDP Industry Share of GDP Agriculture Share	Rupees 2.503 trillion Rupees 17.384 (1996-1997) 5.00 per cent per year 13.57% (1995-1996) 18.31% (1995-1996) 24.54% (1996-1997) 25.38% (1996-1997)
Human Development	PCI Rank (1999) HDI Rank Poverty Rank GDI Rank	119 139 64 120
Land Area		882,000 sq.kms (88.2 million hectares)
Land Use (1995-1996)	Forest Area Cultivated Area Current Fallow Culturable Waste Not Cultivated	3.61 million hectares 21.54 million hectares 5.26 million hectares 8.92 million hectares 24.43 million hectares
Agriculture	Major Crops	Wheat, Rice, Cotton, Maize, Sugarcane, Tobacco, Potato, Pulses
Agricultural Chemicals	Fertilizer use (1997-1998) Pesticide use (1997)	2,602 million nutrient tones 44,872 tones
Surface Water	Total Per Capita (2000)	145 million acre feet (MAF) 1.1 acre feet (1,306.6 cubic meters)
Deforestation		Woody biomass declining at 4% per year
Livestock	Sheep and Goats Cattle Buffaloes Camels/Donkeys/Horses	75.3 million 17.8 million 20.2 million 5.6 million
Fisheries	Marine catch (1995) Inland catch (1995)	405,500 tones 136,400 tones
Industry	Main Industries	Textiles, Leather, Food products, Tobacco, Paper and board, Machinery, Cement, Steel, Pharmaceutical, Sports equipment.

Pollution	LITE, Korangi: Daily discharge into harbor	35 tones, TSS, 376 tons TDS, 2 tones ammonia, 1.4 tones arsenic oxide, plus other chemicals
Energy Shares (1995-1996)	Electricity (Hydel): (Thermal): Oil Gas Coal	14.7% (4.9%) (9.8%) 48.3% 29.7% 6.3%
Air Pollution (Karachi and Big Cities in Punjab)	Ambient concentration CO (PPM) 1998 TSP (g/m3) PM 10 (g/m3)	 0.6-3.8 (WHO Guidelines 9) 180-1,375 (WHO Guidelines 150-230) 110-790 (WHO Guidelines 90-150)
Solid Waste	Generation Rate (1998) Total Waste (8 cities) National Total	0.263 - 0.613 Kg per capita per day 3.8 million tons per year 12.5 million tones per year

Source: Banuri, T. and S. R. Khan. 2000. Environmental strategy background report. Sustainable Development Policy Institute, Islamabad

ANNEX 2
AREA, PRODUCTION AND YIELD OF MAJOR CROPS[47]

Wheat			
Year	Area ('000' hectares)	Production ('000' tones)	Yield (per hectare in Kgs)
1990-91	7911.4	14565.0	1841
1991-92	7877.6	15684.2	1990
1992-93	8299.7	16156.5	1946
1993-94	8034.2	15213.0	1893
1994-95	8169.8	12002.4	2081
5-years Average	8058.5	15724.2	1951
1995-96	8376.5	16907.4	2018
1996-97	8109.1	16650.5	2053
1997-98	8354.6	18694.0	2238
1998-99	8229.9	17857.6	2170
1999-00	8463.0	21078.6	2491
5-years Average	8306.6	18237.6	2196

Rice			
Year	Area ('000' hectares)	Production ('000' tones)	Yield (per hectare in Kgs)
1990-91	2112.7	3260.8	1543
1991-92	2096.9	3243.1	1546
1992-93	1973.4	3116.1	1579
1993-94	2187.1	3994.7	1826
1994-95	2124.6	3446.5	1622
5-years Average	2098.9	3412.2	1626
1995-96	2161.8	3966.5	1835
1996-97	2251.1	4304.8	1912
1997-98	2317.3	4333.0	1870
1998-99	2423.6	4673.8	1828
1999-00	2515.4	5155.6	2050
5-years Average	2333.8	4486.7	1922

[47] *The New, February 6, 2000*

Maize			
Year	Area ('000' hectares)	Production ('000' tones)	Yield (per hectare in Kgs)
1990-91	845.2	1184.5	1401
1991-92	847.5	1203.1	1419
1992-93	867.5	1183.6	1364
1993-94	878.5	1213.0	1380
1994-95	889.5	1318.1	1481
5-years Average	865.6	1220.5	1410
1995-96	938.7	1503.9	1602
1996-97	927.7	1490.8	1607
1997-98	932.6	1517.3	1627
1998-99	962.2	1665.0	1730
1999-00	961.7	1652.0	1718
5-years Average	944.6	1565.8	1658

Sugarcane			
Year	Area ('000' hectares)	Production ('000' tones)	Yield (per hectare in Kgs)
1990-91	883.8	35988.7	40.7
1991-92	896.1	38864.9	43.4
1992-93	884.6	38058.9	43.0
1993-94	962.8	44427.0	46.1
1994-95	1009.0	47168.4	46.7
5-years Average	927.3	40901.6	44.1
1995-96	963.1	45229.7	47.0
1996-97	964.9	41998.4	43.5
1997-98	1056.2	53104.2	50.3
1998-99	1155.1	55191.1	47.8
1999-00	1009.8	46332.6	45.9
5-years Average	1029.7	48371.2	47.0

Cotton			
Year	Area ('000' hectares)	Production ('000' tones)	Yield (per hectare in Kgs)
1990-91	2662.2	9627.7	615
1991-92	2835.5	12822.2	769
1992-93	2835.9	9053.8	543
1993-94	2804.6	8041.1	488
1994-95	2652.8	8697.1	557
5-years Average	2758.2	9648.4	595
1995-96	2997.3	10594.9	601
1996-97	3148.6	9374.2	506
1997-98	2959.7	9183.8	528
1998-99	2922.8	8790.2	512
1999-00	2983.1	11240.0	641
5-years Average	3002.2	9836.6	557

ANNEX 3
ESTIMATED LIVESTOCK POPULATION IN PAKISTAN[48]

Cattle (Bulls 3 Years and above) (000 heads)		
Year	For Breeding	For Work
1992-93	222	4640
1993-94	223	4592
1994-95	224	4544
1995-96	281	3389
1996-97	286	3452
1997-98	292	3516
1998-99	297	3516
1999-00	303	3651

Cattle (Cows 3 years and above) (000 heads)			
Year	In Milk	Dry	Not yet calved
1992-93	4272	2267	588
1993-94	4301	2277	589
1994-95	4330	2290	595
1995-96	6326	2381	1314
1996-97	6443	2425	1338
1997-98	6564	2471	1363
1998-99	6688	2517	1389
1999-00	6815	2565	1416

Buffaloes (Bulls 3 Years and above) (000 heads)		
Year	For Breeding	For Work
1992-93	94	81
1993-94	96	80
1994-95	98	79
1995-96	198	163
1996-97	204	168
1997-98	209	172
1998-99	215	177
1999-00	221	182

[48] *Agricultural Statistics of Pakistan, Ministry of Food and Agriculture, Islamabad.*

Buffaloes (Buffaloes 3 years and above) (000 heads)			
Year	In Milk	Dry	Not yet calved
1992-93	6840	2793	1094
1993-94	7016	2865	1122
1994-95	7197	2939	1151
1995-96	7810	2433	1968
1996-97	8027	2501	2023
1997-98	8253	2571	2080
1998-99	8488	2644	2139
1999-00	8734	2721	2201

Sheep (000 heads)			
Year	Male 1 year and above	Female 1 year and above	Youngstock less than 1 year
1992-93	3731	16423	7514
1993-94	3824	16833	7701
1994-95	3919	17253	7893
1995-96	3411	13290	6843
1996-97	3429	13360	6879
1997-98	3448	13435	6917
1998-99	3468	13512	6958
1999-00	3489	13595	7000

Goats (000 heads)			
Year	Male 1 year and above	Female 1 year and above	Youngstock less than 1 year
1992-93	3929	23078	13218
1993-94	4098	24072	13787
1994-95	4275	25108	14381
1995-96	5317	22357	13595
1996-97	5405	23161	14084
1997-98	5599	23994	14590
1998-99	5801	24858	15116
1999-00	6010	25755	15661

ANNEX 4
DECOMPOSITION OF CROP GROWTH INTO AREA AND YIELD EFFECTS FOR SELECTED PERIODS

Crop	Period	Area	Yield	Multiple
Wheat	1961-1967	111.4	-9.9	-1.5
	1967-1976	13.7	75.7	10.6
	1976-1989	40	47.3	12.7
	1989-1998	30.8	64.4	4.9
Rice	1961-1967	44.5	46.2	9.3
	1967-1976	18.6	73.6	7.8
	1976-7989	78.5	16.5	5
	1989-1998	39.3	54.3	7.1
Cotton	1961-1967	45.8	39.9	14.3
	1967-1976	1.7	91.2	7.1
	1976-7989	19.1	58.4	22.5
	1989-1998	141.4	-37.1	-4.3

Source: FAO. 2000. Policy and strategies for sustainable household food security and poverty alleviation. FAO, Islamabad.

ANNEX 5
YIELD OF IMPORTANT CROPS BY MANAGEMENT CATEGORY OF FARMERS

	Yield (t/ha)				
Farmer's Category	Rice-Paddy		Cotton "Phutti"	Sugarcane	Wheat
	Rice	Basmati			
Punjab					
Progressive	1.75	1.23	0.8	32.92	1.22
Traditional	1.02	0.67	0.44	14.38	0.66
Average	1.34	0.89	0.67	20.87	0.87
Sindh					
Progressive	2.13	-	0.84	33.65	-
Traditional	1.09	-	0.4	16.15	-
Average	1.48	-	0.6	22.1	-

Source: FAO. 2000. Policy and strategies for sustainable household food security and poverty alleviation. FAO, Islamabad.

Notes:
Rice and cotton yields for the Punjab and Sindh are for the 1994-1995 and 1995-1996 crops, respectively.
Wheat yields are for the 1986-1987 crops; those for sugarcane are for 1990-1991 crops.

ANNEX 6
BARTER TERMS OF TRADE FOR AGRICULTURE AND IT'S SUB-SECTORS, 1980/81-1998/99

Year	Agriculture	Major Crops	Minor Crops	All Crops	Livestock	Fishing	Forestry
1980-81	100.00	100.00	100.00	100.00	100.00	100.00	100.0
1981-82	111.08	107.62	132.20	113.75	105.84	99.61	100.59
1982-83	108.05	106.32	110.32	107.36	112.10	95.36	96.80
1983-84	107.10	99.61	123.40	106.73	111.38	87.08	91.17
1984-85	107.29	97.52	128.55	105.92	117.52	60.29	94.78
1985-86	103.88	94.74	111.28	99.14	119.04	80.65	93.31
1986-87	100.45	90.27	99.93	92.87	121.63	77.70	92.50
1987-88	105.73	89.80	111.43	95.36	133.15	797.1	90.61
1988-89	107.63	90.55	122.26	98.79	131.57	84.28	91.24
1989-90	101.62	89.93	94.27	91.10	128.37	75.22	95.59
1990-91	101.19	85.89	109.27	92.10	125.68	68.14	93.07
1991-92	102.82	90.63	104.72	94.05	127.31	70.30	101.20
1992-93	108.62	94.37	105.81	97.61	133.22	84.16	105.79
1993-94	109.79	99.00	102.45	100.06	133.81	71.41	102.84
1994-95	111.54	103.06	96.43	101.06	137.31	70.40	99.56
1995-96	102.64	95.61	100.81	97.17	114.46	72.85	100.71
1996-97	108.73	96.88	91.80	95.30	133.17	67.38	101.27
1997-98	113.59	105.81	94.23	102.32	137.19	63.48	105.91
1998-99	117.06	107.57	104.15	106.53	139.59	63.81	105.20

Source: FAO. 2000. Policy and strategies for sustainable household food security and poverty alleviation. FAO, Islamabad.

Notes: The terms of trade are defined as prices received divided by prices paid. The terms of trade have been computed from GDP deflators of relevant sub-sectors

ANNEX 7
IMPLEMENTATION STATUS OF INDUSTRIAL POLICIES AND MEASURES PROPOSED BY NCS

Recommended Policy/Measures	Status
DEVELOP AND ENFORCE EFFECTIVE POLLUTION CONTROL	
Collection of statistics on industrial pollution	• Federal Bureau of Statistics: Compendium on Environmental Statistics of Pakistan 1998 indicates data on air and water pollution collected by Federal and Provincial EPAs. • EPAs have collected data on a number of variables, including key air pollutants (CO, SO2, NOx, SPM, Ozone) in selected urban locations: chemical and organic contaminants in urban drinking water, major watercourses and wastewater drains. Noise levels have also been calculated at certain locations. Data is in uneven format, still it provides a useful baseline to estimate the cost of air and water pollution. • Punjab EPA has collected statistics on industrial wastewater for industries in Punjab. • Sindh EPA has collected data and has compiled water quality results for 118 industries. In addition, it has also recorded data on stake emissions for 5 Power Plants. • NWFP EPA's UIEP project has collected some statistics on the brick kilns in the surroundings of Peshawar. • Studies on water quality of river Ravi, River Kabul and 'Nallah Lai' have been carried out.
Establish government regulations and NEQS in consultation with industries	• Pollution Charge for Industry (Calculation and Collection) Rules, 1998. • Environmental Samples Rules, 1999 • Hazardous Substance Rules, 1999 • Environmental Laboratories Certification Regulations, 1999 • National Environmental Quality Standards (Self Monitoring and Reporting by Industry) Rules, 1998. • Pakistan Environmental Impact Assessment Procedures including Initial Environmental Examination and Environmental Impact Assessment Regulations 1998. The above-mentioned rules and procedures have been developed and finalized through proper consultation with the private sector institutions and industry. The Law Ministry is reviewing the drafts of these rules and regulations.
Implementation program to control pollution by the government.	Pak-EPA with the help of Environmental Standards Committee, Expert Advisory Committee, SDPI and FPCCI has developed Self-Monitoring and Reporting System for Industry. Through this program the industry will examine and evaluate environmental performance on its own, and shall make the information on environmental parameters available to the EPAs. Originally this program was to be launched for implementation starting 1-1-2000 but due to some procedural formalities the launching of this program has been delayed. However, currently it has been decided that self-monitoring and reporting system shall be introduced as a pilot activity. So starting January 1, 2000 a pilot phase has been started. The objective of pilot phase is to test the efficacy of the program.

Recommended Policy/Measures	Status
Establish industrial wastewater treatment plants	In Karachi, Korangi Industrial area a water treatment facility is being planned for leather tanneries. Similarly, Kasur Tanneries Pollution Control Project is in advance stage of completion. This project is being implemented with the assistance of UNIDO/UNDP.
Incorporate a program with the concerned government agencies for environmentally safe products	No action yet.
Promote latest industrial processes and technology	1. A Joint Program of FPCCI and the Government of Netherlands: "Environmental Technology Program for Industry" has made significant strides in this direction. The ETPI has completed its 1st phase and the Netherlands Embassy has recently signed an agreement with FPCCI for its 2nd Phase. The ETPI offers: • DATABASE DEVELOPMENT for comprehensive profiles of industries, Institutions and Environmental Markets on 'who is who' basis. • INSTITUTIONAL NETWORKING (INET) for smooth development and implementation of environmental policies/regulations from public to private sectors. • INSTITUTIONAL SUPPORT AND TRAINING (IST) to create Environmental Cells in the most relevant private sector institutions and train professionals to facilitate the realization of ETPI goals over a longer period of time. • DEMONSTRATION PROJECTS to demonstrate the viability of Cleaner Production (CP) options and End-of-Pipe (EOP) treatment technologies in sixteen selected industrial sectors of Pakistan. 2. UNIDO is helping to open a Cleaner Production Technology Center (CPC) for Oil an Gas Sector at Attock Refinery, Rawalpindi and is working on both a national CPC & sectoral CPCs for industries like sugar, textile, etc. 3. Project on Ozone Depleting Substances (ODS) -- with funding from GEF, UNIDO and World Bank is also an initiative in this direction, for instance: • GEF funds cleaner fuels & tune-up stations for cars. • Montreal Protocol Fund for ODS- implemented by UNIDO, UNEP, WB and UNDP.
Incentive for old industries to shift to latest technologies.	Proposal submitted by SDPI to PEPC in March 1995. No information on the action.

<table>
<tr><th>Recommended Policy/Measures</th><th>Status</th></tr>
<tr><td colspan="2">PROMOTE CLEAN INDUSTRIAL PROCESSES AND RECYCLING</td></tr>
<tr><td>Promote recycling technology and its dissemination.</td><td>1. So far no specific action in this direction has been observed. However, a very strong and efficient recycling community exists in Pakistan, which operates through scavengers, who collect paper, glass and steel products from general waste and sell back to the related industries.
2. In addition, there is a non-formal sector that treats the waste lubricants and oils and re-introduce it into the market.
There is an urgent need to do research in this area and streamline it on modern lines.</td></tr>
<tr><td>Encourage waste trading networks.</td><td>No Progress</td></tr>
<tr><td>Develop institutions to transfer environmentally benign technologies</td><td>1. National University for Science and Technology (NUST) has made significant developments in the area of solar energy, particularly successes have been achieved for solar cookers and water heating systems. NUST is unable to commercialize its products due to financial constraints.
2. ENERCON plans to undertake study in the area of Fuel Cell Technology under UNDP funded Fuel Efficiency in Road Transport Sector Project.</td></tr>
<tr><td>Insist international organizations having business in Pakistan to meet or do better then the environmental standards in their home countries.</td><td>1. Engro Chemicals Pakistan Limited (ECPL), the demonstration unit from the fertilizer sector has started implementation of environment improvement measures. Engro is also actively coordinating with SDPI and Pak-EPA for Self-Monitoring and Reporting Program.
2. ICI Pakistan has also started their environmental improvement Program in PTA Plant Karachi, and is also actively participating & Coordinating with SDPI and Pak-EPA for Self-Monitoring and Reporting Program.</td></tr>
<tr><td>Provide special incentives to industries having recycling technologies</td><td>So far no special incentives package for recycling technologies has been announced. However, as a result of extensive negotiations between Environmental Standards Committee (ESC) and industry representatives, the PEPC has approved a detailed proposal of fiscal incentives to industry for pollution abatement or compliance with NEQS. The agreed incentives are given as follows:
<table>
<tr><th>Agreed Incentive/Recommendations</th><th>Current Status</th></tr>
<tr><td>1. National Development Finance Corporation may be designated as the Development Finance Institution (DFI) for channeling soft-term credit to industries for environmental purposes.</td><td>State Bank regretted to extend the credit line to industry through National Development Finance Corporation (NDFC) for this purpose</td></tr>
<tr><td>2. Purchase of equipment for pollution abatement may be given the most favored treatment, i.e., 10% with regard to import duty, sales tax, and no regulatory duty.</td><td>Presently pollution equipment are subjected to 10% customs duty with no regulatory duty.</td></tr>
<tr><td>3. Most favored tax treatment may be extended to those developing indigenous technology for pollution control.</td><td>No action has been taken.</td></tr>
</table></td></tr>
</table>

Recommended Policy/Measures	Status	
	4. The amount collected from pollution charges and other sources for the Provincial Environmental Trust Fund may be matched by proportional grants from the government.	This proposal was deferred due to financial constrains of government.
	5. The use of the Provincial Environmental Trust Fund may be decided by the respective governing boards in accordance with the guidelines laid down in the recommendations of ESC.	No information
	6. Provision of accelerated depreciation of anti-pollution equipment within three years of income tax purposes.	Existing depreciation of plant/machinery is allowable as follows: - normal depreciation 10% - initial depreciation 25% - extra depreciation for double shifts 50% - triple shift 100%
ESTABLISH INCENTIVES FOR ENVIRONMENTALLY BENEFICIAL OR BENIGN INDUSTRIES		
Apply the current incentives of the national industrial policy to environmentally beneficial industries	No information	
Grant specific fiscal and trade incentives for defined categories of environmentally sustainable industry.	No information yet	
Develop incentives to offset the cost of environmental control equipment.	• CBR has given custom rebate on import of environmental equipment. Anti-pollution equipment has been placed under lowest tariff bracket • Efforts are being made to develop soft term credit line for industry.	

Recommended Policy/Measures	Status
DEVELOP A POLICY TO SITE INDUSTRY IN AREAS OF LOWER ENVIRONMENTAL SENSITIVITY	
Control on the location of industry in urban areas	• Government of Punjab, Environment Protection Department through Notification Number SO(G)E.P.D./4-27/98, Dated 20th August 1998 has imposed ban on the establishment/installation of new industrial units or expansion/extension in existing industrial units within the municipal limits of urban areas. This action has been taken keeping in view the acute environmental degradation due to the operation of industrial units. • Until recently any one planning to setup an industry in any area in any province had to obtain a "No Objection Certificate" from the provincial authorities. Punjab and Sindh had established elaborate locational rules, while NWFP and Balochistan placed no ostensible restriction on where an industry could be located. The 1984 Industrial Policy Statement of the Federal Government spells out these requirements in fuller detail. The locational restrictions in practice were exceedingly cumbersome and frustrating. After protracted negotiations, all provincial governments have finally agreed that the system of 'NOCs' was counter-productive. An official guide to invest now provides that "there is no requirement for obtaining NOC from the provincial governments for locating the industrial projects anywhere in Pakistan except in certain areas which are notified as negative areas such as within the municipal limits of urban areas. • The effort of the authorities to promote industrial estates and export processing zones and the steps being taken to establish one window facility, at least among these industrial areas is a part of more promising actions to facilitate industrialization and at the same time protect the environment. • Aside from the above, the Environmental Impact Assessment Process which Pak-EPA is planning to implement as a necessary tool for future industrial developments, adequately addresses the location of an industry. The EIA process always offers appropriate mitigation measures and/or an alternate solution or shifting of project site to an environmentally acceptable place.
Protect agriculture and ground water area from pollution by industries	There is no such policy.
Protect agriculture and ground water area from pollution by industries	BOI's policy to develop industrial zones is a step towards this direction.

Recommended Policy/Measures	Status
BUILD AWARENESS WITHIN INDUSTRY	
Awards for environmentally clean industry	No information -- Idea was discussed in PEPC in March 1995. project site to an environmentally acceptable place.
Sustainable development awareness through mass media.	Some action taken through workshops and seminars. There is still a lot to be done.
Promote pollution control systems as potential opportunities for business.	• ETPI Program of FPCCI and Netherlands government is working in this direction. • Dutch funded environmental marketing of textiles is an other initiative in this direction.
DOMESTIC AND INDUSTRIAL WASTEWATER POLLUTION	
Promote municipal wastewater treatment technology as industry.	Projects for sale of manure after treated municipal water are being developed in several cities. The CDA's treatment plant in I-9 sector already sells the manure to general public.
Focus the regulatory approach on industrial toxic effluents.	Implementation of NEQS through Self-Monitoring and Reporting System would be step towards this direction once implemented.
Stop industrial effluents from entering municipal sewers by providing alternate disposal methods.	No action yet.
Establish legal institutional and pricing system to support these measures.	No action yet.
Adopt biological treatment technologies	Research initiated at National Institute of Biological and Genetic Engineering Faisalabad.

Recommended Policy/Measures	Status
URBAN AIR POLLUTION	
Change import duties/adjust taxes to favor fuel-efficient engines.	No action - but ENERCON is working to introduce the energy efficient technologies in the country.
Require new vehicles to meet lowest possible emissions levels achievable without catalytic converters.	Daewoo is introducing a new vehicle of smaller size for local use in Pakistan: only its use will testify whether it is energy efficient?
Reduce the subsidies for kerosene to prevent its mixing with diesel.	Ministry of Petroleum and Natural Resources has taken action to reduce subsidy for kerosene to prevent its mixing with diesel. Impact is yet to be seen.
Consider terrain and wind characteristics when siting factories and generating stations.	Implementation of EIA process is a step in this direction. Pakistan Environmental Procedures have already been developed, which contain sectoral guidelines for EIAs of industries. However, formal implementation is still pending as presently IEE/EIA rules are under review by the Law Division. Private sector Power plants are taking action in this direction.
VEHICLE EMISSIONS	
Promote good maintenance of motor vehicles and industrial boilers and furnaces	ENERCON is working in this direction. Setting up Vehicle tuning stations. Slow progress on industrial boilers. NWFP-EPA's Urban Industrial Environmental Protection (UIEP) program is working on vehicular emissions controls by introducing a concept of Vehicular Emissions Testing Stations in Peshawar.
Introduce lean urban engines	Ministry of Petroleum and Natural Resources Policy to encourage Compressed Natural Gas (CNG)/Liquid Petroleum Gas (LPG) use and conversion of two stroke Rickshaw engines to CNG is step towards this direction. CIDA is planning to export two Rickshaws to CANADA for research purposes.
Encourage the installation of catalytic converters in the vehicles.	No action

Recommended Policy/Measures	Status
PROMOTE ENERGY EFFICIENT AND ENVIRONMENTALLY BENIGN TRANSPORT SYSTEMS	
Develop and upgrade economical mass transit system.	Lahore Development Authority is in the planning stage for developing such a system for Lahore.
Upgrade public transit by providing comfortable bus/tram operations	Punjab government has introduced an Urban Transport System in Lahore with the help of Private Sector. Similar programs are underway for Rawalpindi and Karachi
Develop safe bike/bicycle ways as a health and environmentally benign mode of transport.	Action taken by Punjab Government at limited scale to develop bicycle lanes along major urban roads in Lahore, particularly Gulberg area.
Encourage a demand for small (highly fuel-efficient) cars that are on the drawing board of manufacturers through duties and incentives.	No action yet -- ENERCON plans to act in this direction.

ANNEX 8
DEVOLUTION OF POWER PLAN

In the old system of local governance, the province governed the districts and tehsils directly through its bureaucracy at the division, district, and tehsil levels. The provincial bureaucratic set-ups are the designated 'controlling authorities' of local governments that tend to determine local priorities. This systemic disjoint coupled with a lack of horizontal integration and functional coordination between line departments at the division, district, and tehsil levels, resulted in mismanagement, exclusion of the poor, and their disempowerment. That is why the government has devised a new roadmap to effectively move sectors like health and education, from the previously provincial system to the new district based system under which the people will be able to determine their own (social sector) priorities. Devolution of powers is aimed at strengthening governance by increasing transparency and accountability of administrative operations.

A two-pronged strategy has been adopted for providing adequate financial resources to ensure proper functioning of the incipient governments. First, district budgets have been prepared in a framework of fiscal devolution, which would operate through the mechanism of a provincial finance award. This will provide adequate resources to new governments to meet their obligations of providing basic services such as education and health to their people. Second, a lump sum provision of Rs.3 billion has been provided to meet the transition costs of setting up basic infrastructure of the new governments, wherever needed.