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The Environment-Poverty Nexus: An Institutional Analysis

Shaheen Rafi Khan and Asad Naqvi

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Mailing Address: PO Box 2342, Islamabad, Pakistan.
Telephone ++ (92-51) 2278134, 2278136, 2277146, 2270674-76
Fax ++(92-51) 2278135, URL:www.sdpi.org

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List of Acronyms

AchE	-	Blood Acetlcholine Esterase
AJ&K	-	Azad Jammu & Kashmir
AKRSP	-	Agha Khan Rural Support Program
BAP	-	Biodiversity Action Plan
CO_2	-	Carbon dioxide
DALY	-	Disability Adjusted Life Year
DSE	-	Development, Sustainability, Equity
EDC	-	Enterprise Development Consultants
EIA	-	Environmental Impact Assessment
EKC	-	Environmental Kuznets Curve
EPA	-	Environmental Protection Agency
ETPI	-	Environment Technology Programme for Industry
FPCCI	-	Federation of Pakistan Chambers of Commerce and Industry
GDP	-	Gross Domestic Product
IMF	-	International Monetary Fund
ISO	-	International Standards Organization
KKH	-	Karakorum Highway
LDG	-	Local Dialogue Group
NEQS	-	National Environmental Quality Standards
NO_2	-	Nitrous Oxide
NRB	-	Natural Resource Base
NWFP	-	Northwest Frontier Province
OFWM	-	On-Farm Water Management
O&M	-	Operations and Maintenance
PDF	-	Pakistan Development Forum
PPM	-	Parts per million
SHD	-	Sustainable Human Development
SO_2	-	Sulphur dioxide
TTSID	-	Technology Transfer for Sustainable Development
UNDP	-	United Nations Development Programme
WRI	-	World Resources Institute

The Environment-Poverty Nexus: An Institutional Analysis

Shaheen Rafi Khan and Asad Naqvi

1. Background to the Study and its Thematic Focus

The establishment of the Local Dialogue Group (LDG), a subsidiary of the Pakistan Development Forum (PDF), represents an attempt to broad base the discussions of the Forum which, traditionally, have focussed on macroeconomic issues. Among other things, it has begun to address generic issues of institution building and poverty, which both underpin macroeconomic outcomes and are integral to the development debate. Poverty will be the special theme in the forthcoming session of the PDF in April this year.

The Poverty-Environment Nexus paper is one of four papers commissioned by the UNDP, Pakistan. The papers, aimed at determining the nature, causes and impacts of poverty in Pakistan will, variously, analyze the linkages between human rights and poverty, the effectiveness of formal and informal social safety nets, the poverty-environment nexus and document existing theoretical and empirical literature on the subject. Subsequently, the studies will be reviewed in provincial workshops, primarily as institutional adjuncts to the National Poverty Strategy, as formulated in the Draft Ninth Five-Year Plan (1998 – 2003).

The Poverty-Environment Nexus paper begins with an attempt to identify the factors responsible for environmental degradation in Pakistan. Essentially, such degradation is rooted in a development process, which fails to meet key aspects of sustainability, as well as in high population growth, which is partly an outcome of this process. The impact of environmental degradation on poverty will be assessed in relation to four key areas of concern, namely, air and water pollution, solid waste management, deforestation and land degradation. In turn, the impulses and imperatives created by poverty, which further degrade the environment will be examined. Next the paper will look at policy and institutional initiatives, community efforts and collaborative ventures which have attempted to arrest this downward spiral. Based on a critical evaluation of these, the elements of a strategic framework aimed at alleviating poverty and environmental degradation will be presented.

2. Root Causes of Environmental Degradation

Development and demography are key to understanding the linkages between environmental degradation and poverty. Considerable debate surrounds the question of whether the problem is sourced in affluence or in poverty. The approach adopted in this paper begins with the premise that it is too simplistic to attempt such distinctions. Poverty and affluence both contribute to degradation but in different ways (Mink: 1992: 1). Essentially, degradation is rooted in an unsustainable development process. One aspect of such development is that by increasing occupational choices it tends to sever the traditional links people have with their environment, thus converting stable relationships into unstable ones. Also, the poverty which accompanies this kind of development has two consequences; it increases the vulnerability of the poor to degradation and, second, by restricting choices and entitlements for the poor it turns them into potential predators of natural resources. However, the converse of this is that limited choices also create an impetus for nurturing resources and using them in a sustainable manner. A credible construct that contextualizes the poverty-degradation

relationship is probably a blend of the two. In other words, poverty does not necessarily induce degradation but if it does this reflects inevasible responses rather than deliberate and voluntary acts.

2.1 Sustainable Human Development – A Conceptual Framework

The absence of sustainable development was alluded to earlier. What exactly does the term mean and why does it need space? Literature on the subject is both rich and varied, reflecting both its inherent appeal and evolutionary character. There is a need to give it space here because it posits desirable economic, social and environmental outcomes against which the development experience of Pakistan can be assessed.

Sustainable human development (SHD) is an all embracing concept that defines and integrates development, sustainability and equity (DSE) in relation to the three central pillars of sustainable development -- economic, social and environmental. In doing so, it extends the definition of sustainable development, as originally formulated in the Brundtland Commission report, and stated as, 'meeting the needs of the present generation without compromising the needs of future generations'.[1]

Applied to the economic aspect, it refers to income growth which is efficient (in the strong or weak Pareto optimal sense); equitable, where the focus is on increasing human welfare through policies promoting income distribution and poverty alleviation and; sustainable, such that the income flows are maximized while maintaining the stock of capital (assets) intact. A less limited definition of economic sustainability embraces the notion of social and ecological capital. This is intuitively valid as economic growth would not be sustainable when the natural resource base is degrading or when human development is being ignored.

In the social context, development refers to human capital improvements, to investments in health and family planning, education, water supply and sanitation, skills enhancing technology and the assurance of sustainable livelihoods. Equity refers to processes that generate fair economic and social outcomes, such as grassroots participation, the empowerment of disadvantaged groups, the creation of public space for civil society organizations (social capital) and the preservation of social and cultural norms. A precondition is the fulfillment of certain political and governance criteria. These are enhanced pluralism and a credible institutional framework (policies, laws, regulations and administration) – in other words, the elements of good governance. Sustainability relates to the resilience of social and political systems. Specifically, this means that such systems should have an in-built ability to adapt to changes represented by a modernizing environment.

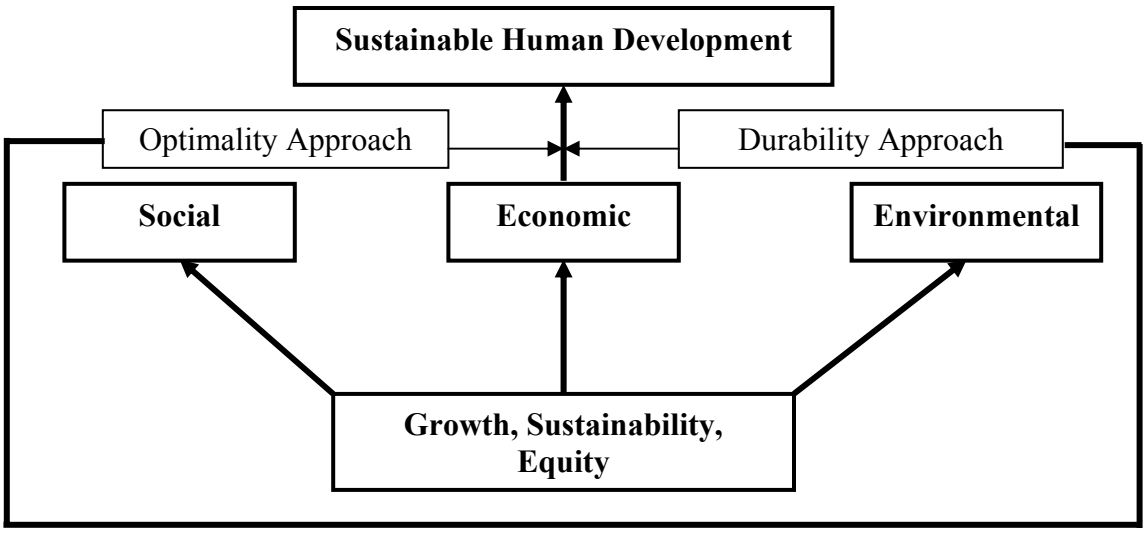
In the environmental sphere, development refers to growth and management of natural capital. Equity relates to the incidence or distribution of the costs and benefits of environmental impacts. A more innovative view asserts that humans have the responsibility of stewardship or trusteeship over nature, which goes beyond mere rights of usage (usufruct). Environmental sustainability focuses on the resilience of biophysical systems. In this context, natural resource degradation, pollution and loss of biodiversity are detrimental because they reduce system resilience and increase vulnerability.

There are two ways in which DSE considerations can be integrated within a sustainable development framework. The optimality approach seeks to maximize economic growth while maintaining the stock of social, ecological and physical capital intact. A valuation problem arises, which is dealt with by imposing non-economic constraints on social and ecological variables (minimizing biodiversity loss, meeting the basic needs

1 This section is a synthesis of Munasinghe's (see bibliography) rich paper on the subject. However, while he describes DSE as an integrating theme for the key aspects of sustainable development, he stops short of defining the outcome of such integration. The term proposed by Shahrukh Rafi Khan, 'sustainable human development', appears a fitting definition, capturing the richness of the analysis.

of the poor). The optimization approach tends to be biased towards the economic aspects of sustainability. The durability approach is less biased in that it focusses on quality of life issues. It favors development paths, which are willing to trade off some economic optimality for the sake of more safety – in order to stay within safe environmental and social limits. In this case, express indicators of 'state' are delineated that measure the resilience (or vulnerability) of complex ecological and socioeconomic systems.

A stylized depiction of the elements and processes, which constitute sustainable human development, are presented below.



2.2 The Development Process in Pakistan: Implications for the Environment and Equity

This section assesses the nature of Pakistan's development process. It establishes that the growth process has fallen considerably short of the exacting criteria of sustainable human development, and has come directly at the expense of environmental degradation. Growth has also exacerbated poverty thus, indirectly, putting pressure on natural resources.

2.2.1 The Development Process and its Institutional Underpinnings

Pakistan's economic performance, as measured by its GDP growth, was surprisingly strong in the two decades from 1970 to 1990, averaging respectively 4.9% and 6.1%. However, the growth process was flawed in that it was structurally unsound, socially inequitable and environmentally unsustainable. Structural problems emerged in the shape of declining savings and investment rates, persistent budget and current account deficits and deterioration in physical infrastructure. Depressed social indicators and rising income inequality reflected the social and distributional unsoundness of such growth. Concurrently, extensive environmental degradation took place, with rising levels of emissions, water pollution, land degradation and deforestation. The problem was compounded by a persistently high population growth rate, which not only added to the structural, social and environmental pressures, it also eroded the benefits of growth.

The secular deterioration in Pakistan's environmental health is evident from several key indicators. Roughly 38% of Pakistan's irrigated land is waterlogged and 14% saline. The annual rate of deforestation ranges from 2.5% - 3%. CO_2 emissions are increasing annually at the rate of 8%-10%. And an estimated 250 million

gallons of untreated water is dumped into the Arabian Sea every day, causing great harm to both humans and the ecology.

Two recent empirical analyses suggest that Pakistan's economic growth has come at the cost of long-term sustainability concerns. Using extremely conservative assumptions, World Bank economists, Brandon and Hammond (1995) estimate that environmental degradation results in the loss of about 4 percent of GDP every year, thus considerably offsetting the conventionally measured GDP gains. The breakdown of the GDP loss includes annual health impacts of water pollution ($759 million) and air pollution ($301 million), and the loss of agricultural production due to land degradation ($300 million).

Another way of interpreting the same data is in terms of the net savings rate of the country – after accounting not only for the depreciation of physical capital, but also the degradation and depreciation of "natural capital", accounting for energy and mineral resource depletion, net deforestation and emission impacts. A low savings rate means the lack of adequate resources for investment and growth. The Environment Department of the World Bank (1997) estimates the "genuine savings rate" for Pakistan in 1997 to be only 2.5% of GDP.

Development-environment links have been formalized in the shape of the inverse U-shaped environmental Kuznets curve (EKC). Basically, the EKC hypothesis is that it is inevitable for poor countries to experience a period of increasing degradation during the initial stages of the growth process before witnessing environmental improvements. Environmental outcomes (abatement of pollution and degradation) are deterministically linked with specific levels of per capita income. In other words the EKC is a recipe for doing nothing, for letting 'nature take its course' as it were.

As opposed to this, we take a more proactive view that the right mix of economic, social and environmental policies, enabling institutional conditions and accumulated experience and technology can make it possible to 'tunnel through the curve', or even to shift this curve downwards (lower pollution at each given level of per capita income). Studies have also shown that environmentally friendly policies and appropriate technology choices can mitigate the extent of degradation (Munasinghe: 1996).

An obvious corollary to this is that the current state of degradation and pollution can be attributed to policy and institutional deficiencies. This explains far more credibly the current state of degradation in Pakistan, than the deterministic EKC postulate. Both the magnitude and, in some cases, irreversibility of environmental degradation is largely due to ***the inability to mainstream environmental activities within the development process*** (Jalal: 1993: 9).[2]

In effect, development policies have tended to promote extractive and capital intensive production processes, encouraged consumption excesses and impoverished the poor. Such policy biases and the imbalanced growth processes they support can, in turn, be partly attributed to the exploitative and non-representative character of the state:

> *Despite the recent trend towards greater democratization, with the routinization of some key elements of a democratic system – frequent elections, a freer press, and somewhat robust political parties -- non-elected institutions continue to hold great power and rule by executive ordinance dominates legislative action. Underlying the system's lack of political accountability and its developmental approach is a state structure deeply penetrated by a powerful nexus of vested interests, namely, the landlords, the industrial elite, the bureaucrats*

2 Specifically, this refers, not to the management of the environment per se but to the management of development activities within the assimilative capacity of the environment.

> *and the military. This elite is dedicated to advancing its own interests largely to the exclusion of those of society at large. Consequently, the development emphasis has been on stressing efficient resource exploitation, rapid economic growth and state profit over conservation and human welfare. Over the past five decades, the country has witnessed the emergence of a profusion of low-cost, capital intensive, high polluting industries and an agriculture system intended to boost short-term production at the expense of long-term sustainability. Not surprisingly, strong traditions of environmental consciousness have been absent, both within government and society at large. Environmental legislation has been weak. While the adoption of the Environmental Protection Ordinance in 1983, and its updated 1997 version, represent explicit efforts to deal with the environment, governmental practice often does not reflect the spirit of the legislation, and efforts to improve the environment continue to confront old mind-sets, political gridlock and institutional weakness. (Gizewski and Homer-Dixon: 1996: 2,4,5).*

Non-representative and centralized state institutions tend, at best, to be insensitive to the importance of community property rights and empowerment and, in general to the need for public space to facilitate growth of social capital. At worst, they are actively hostile to decentralized initiatives, viewing them as a threat to its sovereignty and in conflict with its own development imperatives. This is unfortunate as, backed by the right incentives; traditional community practices offer considerable hope for sustainable environmental management. Similarly, an aware and motivated civil society can play an active role in environmental conservation.

2.2.2 The Implications for Poverty

As indicated, Pakistan achieved impressive aggregate economic growth, with GDP averaging in excess of 5% over the past three decades and ensuring a steady increase in per capita income.[3] There is some debate on whether this brought about an improvement in the consumption poverty status.[4] The proportion below the poverty line declined from 46% in 1984/85 to 34% in 1990/91 (World Bank: 1995). Subsequent trends are less clear. Also, uncertain is whether the improvement in consumption poverty was accompanied by a reduction in the absolute number of people falling below the poverty line.[5]

Pakistan did not perform well by another measure of poverty, namely, income inequality -- as represented by the income share ratio and the Gini coefficient. Both have worsened over time. Finally, Pakistan's performance was even less creditable with regard to human development. Its social indicators are far below those of low-income countries with comparable or lower levels of per capita income. Furthermore, disparities across both provinces and the rural-urban divide are pronounced.

3 Currently assessed at $480.00 in real terms and at approximately $2,000.00 in purchasing power parity terms.

4 Poverty is a multidimensional term. Consumption poverty refers to the extent to which the private consumption of individuals or households falls below the 'poverty line', the minimum acceptable standard of private consumption. Another important dimension focussing on human development, a term which captures improvements in education, health, water and sanitation and the provision of sustainable livelihoods.

5 This is an important issue because resources are finite.

Table 1: Comparative Social Indicators: Cross-country Comparison

	Real GDP/capita 1995		Adult Literacy 1995 (%)		Total Fertility Rate (children/woman)	Contraceptive Prevalence Rate (%) 1990-95	Health Expenditure as % GNP of 1990	Piped Water Supply 1990-96 (% of population)
	GNP	PPP$	M	F				
Pakistan	460	2209	50.0	24.4	5.3	18	0.7	28
Low Human Developed Countries	316	1362	63.0	38.3	4.3	31	1.5	71

Note: UNDP: Human Development Report 1998
Adult Literacy Rate is for Population 15 Years and above.
PPP= Purchasing Power Parity

Table 2: Pakistan's Social Indicators: An Urban-Rural Comparison

Percentage of population above 10 that ever attended school 1995				Total Fertility Rate 1993-95		Women Using FP 1996-97		Access to Pipe Water 1995-96		Sanitation 1996-97 (% of population)			
M		F		U	R	U	R	U	R	In House Flush		Under-ground drains	
69		35		4.54	5.79	29	11	60	13	U	R	U	R
U	R	U	R							85	22	46	1
80	63	57	25										

Note: Pakistan Integrated Household Survey (PIHS) 1996-97

FP	=	Family Planning	UD	=	Under Ground Drain
U	=	Urban	R	=	Rural
M	=	Male	F	=	Female

Table 3: Income Inequality Indicators

	Income Share Ratios	Gini Coefficient*		
		Overall	Urban	Rural
1984-85	6.2	.43	.38	.35
1987-88	5.5	.35	.37	.31
1990-91	6.1	.41	.39	.41

Source: (Khan and Aftab: 1997: 14)
Note: * = The Gini coefficient is a measure of income inequality. The closer it moves to 1 the less the inequality and vice versa

In addition to its directly degrading effects, growth has also created indirect threats to the environment, via its adverse distributional and social outcomes. These effects are documented sectorally later on. One consequence that is examined immediately, and one that has wide-ranging environmental consequences, is population growth. Both a consequence of social sector neglect and a factor that, subsequently, makes inroads into the benefits of growth, population growth has impacted the environment in Pakistan in principally two ways, as shown below.

2.2.3 Population Growth Impacts

Population growth has accelerated intra-rural migration. In the NWFP land hungry rural populations have moved up into marginal lands, into erosion prone hill areas and into fragile semi-arid areas that have traditionally served pastoral groups and their herds. This has resulted in conflicts over land access. Consequently, low-quality pasture is now being used more intensively and pastoralists herds, forced to graze post-harvest crop residues are not fertilizing agricultural land as much as before. As resources come under pressure from increasing numbers of land-poor and landless rural people, traditional management, tenure and rights systems face collapse. Thus, grazer rights are being encroached upon, tree rights are subsumed under land rights, leading to deforestation and land clearing and state lands are under constant threat from farmers, loggers and fuelwood collectors. The refugee influx in NWFP and Balochistan has aggravated the problem further.

A different and more complex situation prevails in the Northern Areas. In these areas, the resource management problem is a function of cognitive space, property regimes and scarcity (EDC: 1992: 30). Exposure to market forces, thanks to the Karakorum Highway (KKH), has expanded the economic horizons of the remote mountain valley dwellers, provided an outlet for an expanding population and commensurately reduced pressure on the environment. However, another outcome of this is that 'degradation of their surroundings is less of a concern to the villagers because its importance is not as dominant as it used to be' (EDC: 1992: 33). Also, migrations to the small towns that have sprung up along the KKH have given rise to problems of urban pollution. On the other hand, in the more inaccessible valleys, the people are more sensitive to the degradation problem and traditions of communal participatory management remain strong. By the same token, there is greater receptiveness to AKRSP style interventions, which build upon such practices.

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, lack of clean water, industrial, energy and transport emissions have exposed such populations to health hazards. The unbalanced development process tends to reinforce these trends. An additional push factor in rural areas is the growing land concentration induced by commercial Green Revolution technologies which has rendered small farmers share croppers and tenants landless, thus forcing them to migrate. At the receiving end, the burgeoning pollution problems reflect both the inadequacies of urban infrastructure and its service orientation towards the more affluent areas.

3. Effects of Environmental Degradation on Poverty: A Sectoral Vulnerability Analysis

As indicated, the economic growth process in Pakistan has proved to be environmentally unsustainable and socially inequitable. The effects: poverty, population growth and degradation are interactive. This section analyzes the vulnerability of marginalized populations to environmental degradation at the sector level. While the problem is a national one, the effects on the poor are specially destabilizing because of their limited choices and the resulting pressure brought to bear on the natural resource base. The four sectors examined are:

- Water and Air Pollution
- Solid Waste Management
- Deforestation
- Land Degradation

3.1 Water and Air Pollution

3.1.1 Water Pollution

The Pollution Loop

Water pollution has three main sources: bacterial and organic liquids and solids from urban and rural domestic sewage; toxic metals, organic, acids and other less toxic but still polluting substances from industrial discharges; and chemical pollution in the form of pesticide and fertilizer run-off from agricultural lands (Bakhtiar: 1992).

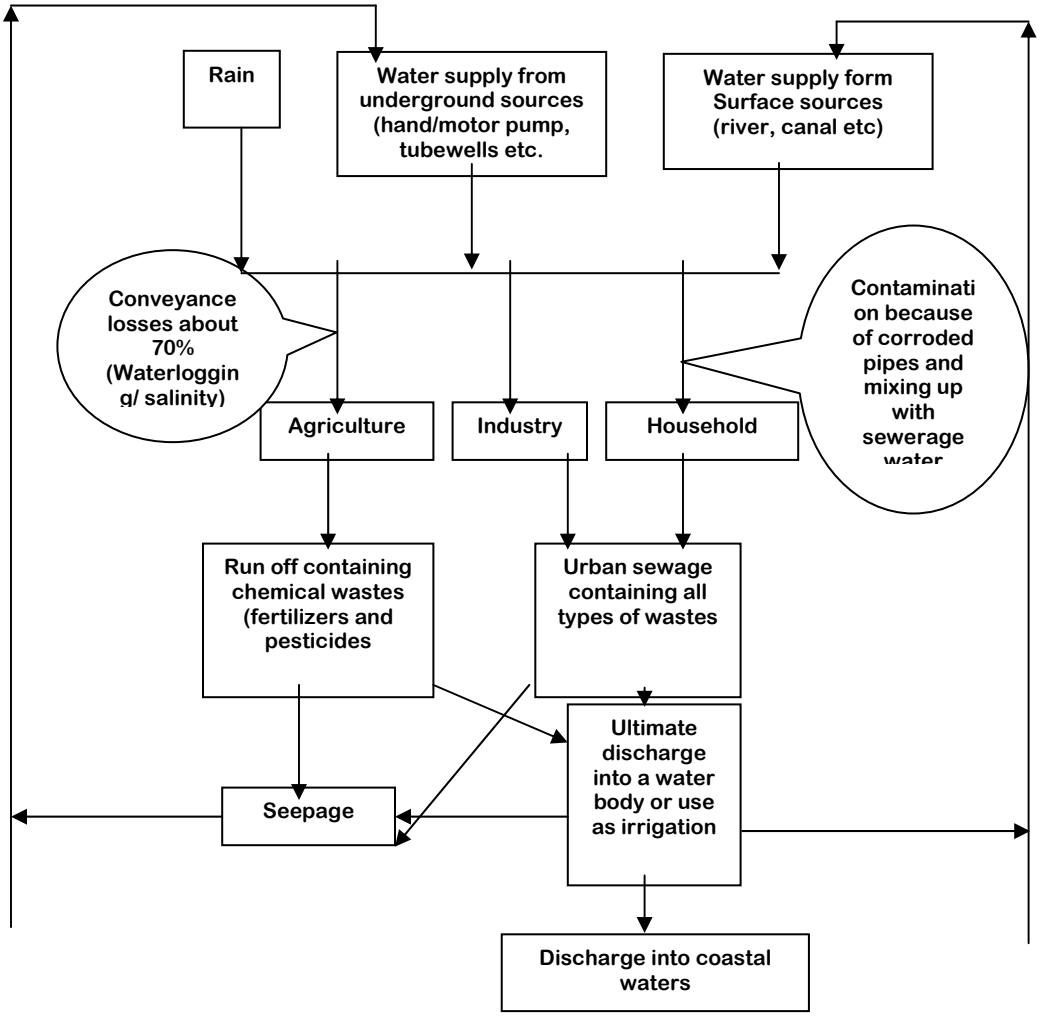
Untreated industrial effluents, containing large amounts of toxic chemicals are dumped into municipal sewers and into open lands close to cities, from where they seep into the ground water. The major polluting industries are leather and tanning, electroplating, ghee, fertilizer and plastics, food production and power plants. These effluents also flow into rivers and into the sea, with disastrous consequences for inland and coastal fisheries. The use of chemical fertilizers, pesticides, and fungicides has increased tremendously over the years[6]. The run-off from irrigation feeds into surface water and also seeps into sub-soil water, as crops utilize not all chemicals. A survey by the Public Health and Engineering Department (Punjab) found 72% of the samples collected from wells and tube wells throughout Punjab to be biologically and/or chemically contaminated[7]. Consequently, over the years, there has been a change in the pollutant composition towards chemical sources. The run-off from irrigation mingles with surface water and also seeps into sub-soil water as crops do not utilize all the chemicals. Tubewells and pumps draw this up in turn as a source of drinking water. Waterlogging and salinity are also major contributors to the steadily deteriorating quality of ground water with excessive amounts of salt in the water rendering it impotable.

The pollution loop is captured in the simple schematic shown below:

6 The consumption of fertilizer has increased about 123% between 1980-81 and 1996-97 (Agricultural Statistics of Pakistan. Page 130)

7 Sustainable Development Policy Institute. 1995. Nature, Power, People: Citizen's Report on Sustainable Development 1995. Islamabad.

Figure – 1:



Vulnerability of the Poor

Although the pollution caused by organic and chemical discharges has been widespread, its preponderant impacts are on the poor, reflecting the skewed distribution of sewage, sanitation and piped water facilities, both across the rural-urban divide and in poor urban slums.

In the older parts of cities, which are prone to in-migration, sewage infrastructure is both poorly designed and corroded, which results in the mixing of raw sewerage and drinking water. Thus, even piped drinking water in poor urban localities is highly contaminated. Where it is not available, residents are compelled to use groundwater accessed through dug wells and shallow hand pumps. Such water also contains bacterial and chemical impurities, as does the water flowing through streams and rivers, which is used for washing. A recent World Bank report has demonstrated that when a tap or a well is shared with neighbors, the likelihood of child or infant mortality is much higher compared to access from a residential piped water system[8]. Poor sanitation and sewerage

8 The World Bank. Nd. A Review of Environmental Health Impacts in Developing Countries Cities. Urban Management Program Discussion Paper Number 6.

typically synonymous with the absence of proper waste disposal. Dumped close to the sources of water, disease-causing pathogenic substances seep into the ground from where they find their way into the water supply. Also, the poor tend to settle in the low-lying urban areas, which are affordable but prone to flooding, water pollution and disease.

In rural areas, the poor depend on rainwater that accumulates in ponds, in rivers and springs, as well as on ground water extracted through dug wells and hand pumps. The absence of modern sanitation and prevalent evacuation practices results in biological contamination of the water supply. In peri-urban areas, where rural migrants tend to concentrate, on-site run-off as well from proximate industrial and residential areas contributes to water pollution.

Health and Productivity Impacts

The commonly found bacterial organisms in polluted water are salmonella, e.coli (including fecal), staphylococci and klebsiella. The resulting infectious and non-infectious water-borne diseases are diarrhea, dysentery, cholera, helminthiasis, enteric fever and pneumonia. In addition, in rural areas, guinea worm disease contracted from drinking pond water is a problem, though its incidence has fallen in recent years.

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, hypertension.

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. Absence of adequate nutrition and 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, 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.

Carter Brandon has estimated the health costs of using polluted water in terms of Disability Adjusted Life Years (DALYs). His estimates range from US$ 403 to 1,093 million. (1992 prices). Conservatively estimated, about 45% of total infant deaths are attributable to water-borne diseases, while inadequate supply of safe water and sanitation is responsible for 80% of all cases of sickness in Pakistan (Kardar: 1994)

3.1.2 Air Pollution

Sources of Air Pollution

In terms of health effects and their incidence on the poor, air pollution ranks equally with water pollution. The emissions from different sources and sectors are shown below:

Table 4: Estimated Air Pollutants by Sector

(Thousand tonnes)

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	12,308	19	n/a	26,680	423	n/a	53,429	982	n/a
Transport	7,068	52	n/a	10,254	57	n/a	18,987	105	n/a
Power	3,640	4	3	11,216	95	10	53,062	996	76
Domestic	16,601	5	n/a	24,054	16	n/a	39,980	40	n/a
Agriculture	845	5	n/a	4,490	28	n/a	6,368	40	n/a
Commercial	1,726	11	n/a	2,587	13	n/a	4,261	25	n/a

Source: NCS Sector Paper on Energy
N/a: not applicable

The incidence of non-stationary source pollution has increased rapidly in recent years. The average Pakistani vehicle emits 20 times as much hydrocarbons, 25 times as much carbon monoxide and 3.6 times as much nitrous oxide in grams per kilometer as the average vehicle in the US. Carbon monoxide levels in the range of 8-30 parts per million (ppm) and 6-40 ppm have been recorded for Lahore and Karachi, respectively. Ambient lead levels in Karachi have been measured at between 0.024 and 0.13 micrograms per cubic meter, which is high, by World Health Organization/World Bank criteria.

Past and projected trends in air pollution are closely linked with the country's energy profile as well as its use efficiency. Two factors are of concern from a poverty perspective. First, the reliance on biomass still continues to be high, at close to 40% of total energy consumption (Khan: 1997). While it is the predominant fuel in the rural sector, reliance on biomass is also very high in urban slums. Second, among modern fuels, oil is rapidly replacing natural gas as a fuel source for energy generation and industrial consumption and, as gas supplies dwindle further, substitution with indigenous coal is becoming increasingly feasible. The use of both coal and oil based fuels in the industry and transport sectors has adverse health implications for the poor, especially within and in the proximity of urban areas. In particular, the use of subsidized diesel in old public transport results in extremely high and toxic emissions.

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 kilns, air pollution is fast becoming a rural problem as well, particularly in the peri-urban areas and along the major national highways. For instance, it would be difficult to find an uninhabited stretch of more than five miles along the Grand Trunk road between Lahore and Islamabad.

Impacts on the Poor

> *The poor are most exposed to fumes [and polluted rivers] 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 rural poor in developing countries. Smoke from fuelwood 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, upto 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 (UNDP: 5: 1998)*

This global tableau is an accurate mirror of the situation in Pakistan's rural and urban sectors, suggesting a commonality of ways in which the poor, women and children are affected by air pollution.

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 the most exposed to auto-emission 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 can not afford to travel in vehicles using cleaner but more expensive fuels.

The incidence of respiratory diseases and lead poisoning (predominantly among children) from mobile and stationary source emissions is escalating rapidly. Factors which further increase the vulnerability of the poor are poor nutritional intake, crowded living conditions (which increases the risk exposure) and lack of access to good medical facilities. Ultimately, those who are the most disadvantaged are made more so. The probability of escaping poverty, or enhancing their range of choices in their lifetime is reduced for them and the ability to pass on a better life to their children is also reduced.

Chronic respiratory infections, often related to smoky indoor atmospheres due to biomes use for cooking and heating are common in Pakistan's rural areas and in urban slums. Women suffer from much higher health risks as they do the cooking exclusively;, as do the children and infants who tend to stay close to their mothers.

In the rural areas, poor uneducated farmers are more exposed to the detrimental effects of chemical agricultural inputs. Excess use, drifting sprays, leaky applicators and the lack of knowledge of handling dangerous substances simply enhances the risk of ill health. Similarly, women and children engaged in cotton picking, the cash crop for which pesticide use is the greatest, are exposed to numerous ailments. These include carcinogenic diseases, enzyme imbalances, skin and allergic reactions, lung diseases, sterility, cataracts, memory loss, change in the central nervous system and damage to the immune system. The cotton crop consumes about 90% of the total fungicides and pesticides. According to a 1991 sample survey of 88 cotton pickers (mostly women), only 1% was safe from the hazardous effects of pesticides. Seventy four percent had blood acetlcholine esterase (AchE) inhibition between 12.5 – 50% and 25% were in dangerous condition where blood AchE inhibition was between 50-87.5%.

Brandon (1995) estimated the cost of health impacts alone (morbidity, mortality, IQ level loss) resulting from air pollution in Pakistan. It ranged between US$ 233-368 million per year. Such figures do not include the environmental and economic cost of air pollution. The cost of remediation for air pollution is estimated to be US$ 119.49 million per year (Rogers: 1997).

3.2 Solid Waste Management

Over-consumption

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, whether it involves dumping by foreign companies, or is sourced internally, in rapid urbanization and industrialization. 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.

Lack of Waste Management in Low Income Settlements

In most cities in the South, between a third and a half of the solid wastes generated within urban centers remain uncollected, often accumulating on road sites and streets. In Pakistan an average 50,000 metric tons of waste is generated every day. Municipalities collect only 60 percent of this waste. Also, of the 8,000 tons or so of excrement produced daily, just under 50% are deposited by the roadside or are incorporated into solid waste. Whatever is collected is dumped in the open or, more frequently, burnt. Commercial, industrial and hospital wastes – and some consumer goods include chemical pollutants such as heavy metals or poisonous or highly inflammable organic solvents, which are classified as 'hazardous' or 'toxic'. Such wastes are disposed off untreated as normal liquid or solid waste into drains; water bodies or in open dumps without any special precautions. In general, there is a lack of provision of space for waste collection bins and dumping sites, municipal authorities lack manpower and vehicles for waste collection and disposal and make little or no efforts to instill a civic sense in the neighborhoods they serve.

The problem is partly rooted in the disjuncture between policy making and implementation. While policy and planning is conducted at the federal level, actual implementation is entrusted to provincial and local bodies. The lack of coordination between the three tiers, coupled with continuous funding shortfalls, contribute to the inadequacies of the system. Also, the system, such as it is, rarely serves low-income settlements. In fact, the solid waste collected in upper or middle class areas of cities is dumped in the slums and city peripheries, either in landfill sites, or is thrown directly into watercourses. The poor areas of the city are generally the worst served by garbage collection services, or not served at all. The resulting problems are smells, disease vectors and pests attracted by garbage and overflowing and clogged drainage channels.

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. Also, with O&M costs being unaffordable (since the government sets inflexible standards) the structures tend to deteriorate rapidly.

Health Effects

A study by UNDP on Nalla Lai in Rawalpindi found that the 'nalla' has become a dumping ground for the factory owners, scavengers, and other people living around it.[9] The untreated waste is loosely covered with soil and tends to absorb moisture, contaminating the underground water, which the poor use for drinking, cooking and washing. The resulting health impacts have been noted in the earlier

9 UNDP, Solid and Liquid Waste Management Practices in the Settlements Around Nalla Lai, Islamabad, 1997

section on water pollution. Municipal waste also contains left over food, which attracts animals and insects. These are 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 disease medium. Residual waste which scavengers are unable to sell (torn plastic bags, pieces of tyres and pieces of cloth) is used as fuel producing harmful emissions. Burning, a common method of getting rid of accumulated waste also produces toxic gaseous emissions, which affect poor people living in close proximity.

3.3 Deforestation

Origins of the Problem

Deforestation and the related problem of rangeland degradation have extremely complex origins and attributes. As such, an examination of the historical antecedents in the forestry sector provides a good lead in to the present situation. Events in the past 400 years of subcontinental history were particularly turbulent. This period witnessed degradation on a large scale. It was the era of British colonial rule, of large-scale infrastructure construction (railroads, canal networks, cantonments, bridges). Such developments came at considerable cost to the environment, as manifested in the commercial exploitation of coniferous forests, extensive land clearance and the alteration of river ecosystems, resulting in their fragmentation and the disappearance of riverain thorn forests on the Indus river (Khan: 1998)

The legal and administrative precedents for forest management was 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 the 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 easily to their free access being proscribed 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 (Azhar: 1993). 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 seignorage for any proceeds generated through sales of forest products.[10]

This form of colonial governance was effective only in so far as the administration did not misuse its powers and community needs for forest products were relatively limited. In a more fundamental sense, it was flawed. The top down, non-participatory approach drove a wedge between communities and their birthright by denying them say in its management and subjecting them to legal process, which was often arbitrary. The unprecedented levels of degradation that the country is witnessing currently, partly has its roots in this. It has engendered conflict and a predatory mindset. Alienated from their resource base, communities are becoming profligate in its use.

10 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.

Impact of Modern Development

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

The management system, designed for a specific purpose, has been unable to cope with these changes. The multiple, and often conflicting interests of commercial loggers, private developers, government and military agencies, hunters and impoverished communities has placed it under relentless strain. The forest department tends to choose the path of least resistance, coming down with a heavy hand on the disempowered communities and colluding for personal gain and profit with vested interests. Officials have become increasingly vulnerable to outside economic inducements, as opportunities for financial and professional betterment become hostage to fiscal insolvency. Rising prices of timber, fuelwood and forest products, an erosion in the standard of living of the forest custodians, fines and penalties that are selectively applied and fail to match the nature of the transgression, and royalties that are appropriated by the rich and powerful, combine to create a complex of perverse incentives antithetical to conservation. The irony is that commercial and development groups which management is not in a position to oppose are making the key inroads into forest resources and -- in fact, cooperates with. On the other hand, it has targeted communities, whose needs are of an essentially subsistence nature and who – if their rights and traditions are protected – can collaborate with the authorities in the sustainable management of forest resources.

Institutional reform, which could make a change, is difficult because those who are in a position to initiate it have a vested interest in perpetuating corruption. The result is increasing collusion between the predators and the protectors at the expense of the resident communities, who are the most affected by such absence of accountability. The ingredients for environmental conflict, a phenomenon already present in many parts of the world, are maturing rapidly.

The Brandon (1995) report estimated that the cost of deforestation in Pakistan is between US$ 28-36 million per year. The cost of remediation for forests estimated by Rogers (1997) is about US$ 157.40 million.

How Have Communities Been Affected?

As indicated earlier, colonial governments weakened community rights to the use of forest resources. Usufruct rights continued to remain but were heavily proscribed. Community management traditions, already fragile, have eroded further with new opportunities for employment and out-migration. Also, demographic and development pressures have forced communities out of their ancestral lands into marginal areas where competition for resources is severe, resulting in further violations of indigenous property rights. The situation is increasingly marked by conflict, with communities forced to act as predators rather than as guardians of the commons.

Weak property rights increased fears of expropriation by powerful groups, fuel insecurity about future earning streams, especially in an inflationary environment and, in general, give rise to concern about the free rider problem, namely, that forests will disappear no matter what the community might do (Inayatullah: 1996). Even in privately owned forests (guzaras) "right holders may see in regeneration a reintroduction of state property rights, which may stifle even natural regeneration." (Azhar: 1993).

Forests meet the subsistence needs of communities in the form of fuelwood, timber fodder, medicinal and edible plants and as a potential source of agricultural produce, via conversion to cropland. There is little doubt that under the presently hostile management and tenure regimes, communities are showing a propensity to raid forest resources. But their activities pale in comparison with the depredations of timber contractors, driven by rising timber prices. The timber trade also demonstrates a distinct anti-community bias; while communities are entitled to a substantial share of revenues (royalties) from the logging in 'guzara' forests, active collusion between the 'timber mafia' and the forest department results in appropriation of the bulk of these royalties. The text box illustrates how the system is manipulated to the disadvantage of communities.

Forest Royalties in the Northwest Frontier Province (see Knudsen: 1995)

Forest royalties are at the very core of the problem of perverse incentives. With the enormous financial stakes involved, most of the revenues tend to get skimmed off before reaching the communities. The system is not only inequitable but is designed to induce deforestation rather than conservation.

In both protected and guzara forests, where communities have legal rights to forest resources, the net revenues (after deducting costs) from timber sales are split between communities (royalties) and the government. The distribution is as follows:

- Prior to 1981, the fixed price system was adopted, where the concessionaires were paid a fixed price per cu. ft. of the harvested volume. The problem with this system was that it did not keep pace with the rising price of timber.
- Subsequently, the system was replaced by the net-sale system. Under this system, the harvested timber is auctioned at timber markets. The net proceeds are then divided between communities and the government, with the community share ranging from 60% – 80%. Ideally, this allows communities to get the benefits of rising prices

In effect, the timber contractors, who in their capacity as large forest owners, elected members, manipulate the system for profit and community representatives carry considerable political clout. The forest department colludes actively in the manipulation of the system. Some common malpractices are:

- After being awarded a logging tender the contractor-owner deliberately delays logging in the specified block (coupe) in anticipation of rising prices because he has the financial means to engage the forest department in extended lawsuits. He meets existing demand from his own private stands
- Using the clout of local notables, timber contractors obtain powers of attorney for the village concessionaires for the collection of royalties from the government. These royalties are retained after payment of a pre-agreed amount to the local notables and forest department staff.
- Under the net-sale system, timber contractors buy up royalties from local communities for a fixed price slightly above the old fixed rates (Rs.50 per cu.ft.) -- communities are willing to forego higher but delayed payments for quicker upfront disbursements. Subsequently, the contractor bids for the contract under an assumed name. He also has an incentive to log more than the agreed volume (facilitated by bribing forestry department staff), as this means more royalties for him.

While, admittedly, these malpractices are possible due to loopholes in forest legislation, the politically powerful contractor networks not only enjoy immunity from the law; they also resist attempts at legal reform, which would close such loopholes

Also, in addition to benefiting the contractors at the expense of poor communities, the system is clearly geared for maximum destruction. An alternative system (Inayatullah: 1996), "involves a change in the formula of payment from royalties to income; in other words, owners receive an annual payment based on the number of trees standing in their area, not on the number of trees sold." Implementation of such a system pre-supposes extensive documentation and information about existing stands. More generically, it is premised upon the requisite political will.

In general, development has led directly to the mining of forest wealth. Independent estimates show woody biomass disappearing at a rate between 4% to 6% per annum, which is feared to be the second highest in the world (BAP: 1998: 11). It is estimated that if the present trend continues, Pakistan's total woody biomass could be totally consumed within the next 10 to 15 years (ibid.). Pakistan is one of the developing countries with no remaining biologically undisturbed forests (WRI: 1997). The Brandon (1995) report estimated that the cost of deforestation in Pakistan is between US$ 28-36 million per year. The cost of remediation for forests estimated by Rogers (1997) is about US$ 157.40 million.

Clearly, such degradation has come at considerable cost to the communities who depend on forest resources to satisfy a variety of needs. Further community inroads are a consequence of the lack of alternatives (fuel, building material etc.), which the government should take responsibility for providing. Also, communities are being denied their legitimate economic benefits from organized deforestation. Not only is the lack of empowerment a key factor in their impoverishment, it also weakens their incentives to manage forest resources sustainably.

3.4 Agriculture Land Degradation

Agriculture Strategy and Role

Sixty five percent of Pakistan's population is rural and depends for its livelihood on agricultural lands, rangelands and forests. Agriculture accounts for more than 25% of GDP, more than 50% of employment and, directly or indirectly, 70% of export revenues. In particular, it is a growth magnifier. Mellor, in his study of South Asian countries (1994), found that a 1% increase in agricultural growth led to a 1.5% increase in non-agricultural growth. This was due to strong backward linkages to farm inputs, such as chemicals, fertilizers and machinery, and forward linkages to food and fiber processing. Also, agriculture incomes tend to be retained and spent within the sector, generating rural employment and contributing to poverty alleviation.

Recent reforms initiated by the World Bank aim at dismantling rigidities created by the Green Revolution strategy of agricultural growth. The intensive application of water and chemical inputs to high yielding dwarf varieties did indeed enhance crop yields in wheat, rice, cotton and maize to a remarkable degree. However, the strategy has also raised questions regarding its longer-term viability. The evidence shows that the country's agriculture resource base, comprising both land and water, has been mined unsustainably. This in turn is due to policies and public sector management systems, which gave little or no space to incentives as a means of conserving such resources, or using them efficiently.

Impact on the Environment

The Green Revolution strategy was premised upon a sufficiency of both land and water. Major irrigation schemes (fed by Mangla and Tarbela) were launched to harness this water and to apply it at the extensive margin. However, it became apparent even then that the drainage system would be unable to cope with the excess water and, indeed, problems of waterlogging and salinity emerged rapidly.

The economic aspects of the strategy focussing on output price supports (which has kept prices of major crops such as cotton and wheat below border prices) and compensating input subsidies have contributed to environmental degradation in a number of ways. The price support system has created relative price differentials, depressing prices of wheat and cotton, while increasing the price of sugarcane above world price levels. Over production of this highly water dependant crop has given rise to problems of waterlogging and salinity.

Environmental impacts stemming from input subsidies are even more pronounced and wide ranging. Input subsidies include those on irrigation water, and electricity, pesticides, fertilizer, seed, and machinery. Excessive use of fertilizers and pesticides has given rise to water pollution, soil degradation and health problems. A good review of these effects is in Banuri (1998) and Khan (1999). Intersectoral effects are also evident in the case of natural gas the price of which is depressed to subsidize fertilizer production and which has adverse implications for emissions. A combination of inadequate O&M, low cost recovery and inefficient water pricing has also exacerbated problems of waterlogging and salinity.

Policy Impacts on the Poor

Adverse terms of trade for food and cash crops have led to intersectoral transfers of income and to impoverishment of the poor rural population. Small and landless farmers are traditionally the worst affected, with their indigence leading to increased pressure on natural resources. Parastatals tend to collude with processors and traders in extracting rents from the management of price supports; by the same token they ignore small farmers who, lacking storage facilities and in perpetual debt, are compelled to sell at distress prices. Also, subsidized inputs rarely benefit small farmers, tenants and sharecroppers as they are denied access to them. Cheap tractors have tended to be labor displacing; and are symptomatic of the more generalized process of land consolidation induced by farm mechanization.

Vulnerability to Environmental Impacts

Cropland degradation affects the health and nutrition status of the poor and lowers their productivity. This can happen directly through lower yields per unit of labor or land because of reduced soil quality and, indirectly through the reduced physical capacity of labor to produce because of malnutrition and poor health. Even in cases where the poor are healthy, labor productivity can be low due to increased time being allocated to less productive activities, such as fuelwood collection. As a result of deforestation, family members have to go further afield to collect fuel, which takes time away from more productive cropping activities. Also, as fuelwood becomes scarcer, animal dung is substituted, resulting in non-replenishment of soil nutrition and, eventually, soil exhaustion. Finally, large-scale irrigation engineering projects (dams, barrages, and canals) have gradually destroyed flood plains and wetlands in the Indus River ecosystem, which was a traditional and self-renewing source of livelihoods for poor communities.

4 The Impact of Poverty on the Environment: Is There a Vicious Nexus?

While there are clearly hypothesized links between poverty and degradation, attempts to demonstrate such links empirically have yielded mixed results. Poverty, it is presumed, imposes short time horizons. Poor people have high pure rates of time preference; simply put, they 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 to 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.

However, such hypotheses have not been empirically validated. In fact, there is widespread evidence that in many areas currently facing severe environmental degradation, the resource users were poorer in the past and, yet, natural resource degradation was consciously prevented. The explanation of such paradoxes lies in:

I. the nature and extent of the community's stake in the health and productivity of its environmental resources and;

II. The technological and institutional mechanisms at its command to safeguard the same. Dilution or disintegration of the community's stake and erosion or grass roots' level mechanisms to protect and augment it are the fundamental reasons behind environmental resource degradation, irrespective of poverty (Jodha: 1: 1998)

This anomaly was referred to earlier, where the resource management problem was functionally linked with cognitive space, property regimes and scarcity. Exposure to market forces and the integration into the broader administrative and legal framework weakened traditional management regimes and led to neglect and degradation of hereditary resource endowments. The following table presents two divergent outcomes where endowments are similar but the economic and institutional parameters differ.

Table-5: Natural Resource Usage under Traditional and Hybrid Systems

Situation under the traditional system	Situation under the hybrid system
A. Basic objective circumstances i) Poor accessibility, isolation, semi-closedness; low extent of and undependable external linkages and support; subsistence-oriented small populations ii) Almost total or critical dependence on a local, fragile and diverse natural resource base (NRB) *Bottom line*: Strong collective concern for health and productivity of the NRB as a source of sustenance	i) Improved physical, and administrative and market integration of traditionally isolated, marginal, areas/communities with dominant mainstream systems on the latter's terms; increased population ii) Reduced critical dependence on local NRB; diversification of sources of sustenance *Bottom line*: Reduced collective concern for local NRB; rise of individual (extractive) strategies
B. Key driving forces/factors generated by A i) Sustenance strategies totally focussed on local resource	i) External, linkage-based diversification of sources of sustenance (welfare, relief, trade, trade, etc.)

ii) Sustenance-driven collective stake in protection and regeneration of the NRB iii) Close proximity and access-based functional knowledge of the NRB iv) Local control of local resources/decisions; little gap between decision-makers and resource-users *Bottom line*: Collective stake in the NRB supported by local control and functional knowledge of NRB	ii) Disintegration of collective stake in NRB iii) Marginalization of traditional knowledge and imposition of generalized solutions from above iv) Legal, administrative, fiscal measures displacing local controls, decisions; wider gap between decision-makers and local resource users *Bottom line*: Loss of collective stake and local control over NRB; resource users respond in a 'reactive' mode
C. Social responses to (B) i) Evolution, adoption of resource use systems and folk technologies promoting diversification, resource protection, regeneration, recycling, etc. *Bottom line*: Effective social adaptation to NRB	i) Extension of externally-evolved, generalized technological/institutional interventions; disregarding local concerns/experiences and traditional arrangements ii) Emphasis on supply side issues ignoring management of demand pressure iii) Formal, rarely enforced measures iv) *Bottom line*: NR overextracted as open access resources
D. Consequences i) Nature-friendly environment systems ii) Evolved and enforced by local communities iii) Facilitated by close functional knowledge and community control over local resources and local affairs *Bottom line*: 'Resource-protective/regenerative' social system-ecosystem links	i) Overextractive resource use systems, driven by uncontrolled demands ii) Externally-conceived, ineffective and unenforceable interventions for protection of NRB iii) Little investment and technology in put in NRB *Bottom line*: Rapid degradation of fragile NRB; "nature pleads not guilty."

Source: Jodha (1995 and 1998**)**

To reiterate, development drives a wedge between communities and the natural resource base leading, at best, to its neglect, at worst to management systems which are not attuned to its needs and, hence, degrade it. The other concomitants of development, namely power, wealth and greed are even more pernicious; in combination with emerging perverse incentives and the market's inability to monetize costs of degradation, they engender a situation referred to as 'resource capture.'

> *Resource capture occurs when population growth combines with a decline in the quantity and quality of renewable resources and the spread of market incentives to encourage powerful groups to alter the distribution of resources in their favor. Resources are, in effect, appropriated by elites, increasing environmental scarcity among poorer or weaker groups as a result. The manner in which this is done is through conversion of land from customary tenure to formal land titling. Groups experiencing this scarcity are then often ecologically marginalized as they migrate to rural or urban areas that are ecologically fragile. The resulting high population densities in the receiving areas, along with the migrants' lack of capital and knowledge of how to protect local resources, act to generate further environmental*

> *damage and chronic poverty. As scarcities of resources such as forests and urban land worsen their prices increase which leads to more acquisitive behavior, in effect creating a self-perpetuating cycle. (Gizewski and Homer-Dixon: 1996: 9, 10).*

Proponents of the induced innovation theory claim that, ultimately, degradation is self correcting as in the long run it will induce the development of new agricultural and resource management processes. However, the evidence on this is fairly diffused. What is clear is that innovations and adaptations which appear to be induced are, in fact, dependant on supporting physical and economic infrastructure, namely, the availability of good roads, opportunities to grow high value added products for the market, access to capital for land related investments and opportunities for off-farm employment. This is not intended to take away from various participatory initiatives. In Pakistan's case, such efforts to arrest degradation have mainly occurred in the urban rather than rural areas. Some of these initiatives are described below.

5. Sectoral Interventions and Initiatives

A study of this nature cannot hope to cover the length and breadth of projects/programs/ initiatives that deal with degradation and community welfare issues in each of the four areas. With this in mind, a few have been selected highlighting the following aspects:

- that there is no inevitability to the poverty-degradation link. Accordingly, it is possible for communities/NGOs to initiate measures aimed at using natural resources sustainably. In other words, poverty is no bar to participatory, self-help initiatives
- that partnerships between communities, the private sector, and the government offer viable prospects for resource conservation and pollution abatement
- that programs started without participatory planning and stakeholder consultations stand little chance of being successful
- that an enabling institutional framework (laws, regulations, technically and financially sound management) is key to the sustainability of community, joint partnership and government environmental initiatives. In other words, effective micro-level interventions need an appropriate macro-level framework

5.1 Air Pollution Abatement: Community Efforts and Cross-Sector Partnerships

5.1.1 Implementing the National Environmental Quality Standards: Self-regulated Pollution Charges

A collaborative effort to develop a pollution charge regime aimed at achieving compliance with the NEQS was given impetus at the highest political level by the government of Benazir Bhutto in 1993. Essentially, the purpose of the NEQS is to bring down levels of industrial effluents and atmospheric emissions. This transition to sustainable industrial development has proven difficult given 'the exorbitant cost of new technology, lack of technical know-how, insufficient credit availability and the weak financial health of the industrial sector' (Khan: 1998: 1). As constituted, the NEQS did not make much headway, reflecting the extremely rigorous – and unrealistic -- standards applied and the regulatory approach to enforcement. It was with this in mind that a collaborative approach was envisaged to reconstitute the NEQS to acceptable levels and to develop incentive-based implementation modalities.

An initial push has come from the stringent certification requirements of ISO-14000, which has alerted export industries to the need for compliance with international standards in order to remain competitive. However, with the traditionally high levels of industrial protection, coupled with weakly enforced environmental and labor legislation, getting industry to comply with environmental standards is an uphill task. A large informal sector, even more prone to pollute, thanks to relatively outdated technologies, further complicates the problem. Thus, strategically, it was felt that a collaborative rather than coercive approach towards compliance was likely to yield greater dividends. Subsequently, a consultative partnership was developed between industry, business, government and an NGO (SDPI), providing coordination and advisory support. The following agreements were reached:

- Review of the NEQS which resulted in their rationalization
- Introduction of an incentive-based pollution charge, to be escalated progressively and linked to pollution loads in excess of those deemed acceptable under the reconstituted NEQS. The charge is to be set at levels exceeding the cost of cleanup and has been incorporated in the 1997 Environmental Protection Act
- The pollution charge would be self-enforced with periodic audits by government agencies. Shifting the burden of compliance from the government to industry is, in principle, sustainable as it presumes fore knowledge by industry of the costs (productivity losses) of pollution and a willingness to curb it.
- Creation of provincial environment trust funds that would be governed by a tripartite board of private sector, government and NGO representatives. These funds would be expended for pollution abatement in the form of soft loans, machinery upgrades, effluent treatment plants, research and training.
- Technical training provided to federal and provincial environmental protection agencies (EPAs) under SDPI's 'Technology Transfer for Sustainable Industrial Development (TTSID)' project and FPCCI's 'Environmental Technology Programme for Industry (ETPI)'.

The process has been participatory and has produced innovative solutions through indigenous as opposed to donor efforts. However, lack of political support has proven to be a major stumbling block and could still unravel the painstaking efforts that went into forging a consensus. On the other hand, the increasingly strict enforcement of ISO 14000, coupled with IMF mandated tariff reductions, and the machinery and equipment upgrades they entail for industry to remain competitive, may catalyze the process. Given the proximity of industries to poor areas and the unhealthy in-plant working conditions, such efforts can have important poverty alleviation effects.

5.2 Solid Waste Management: NGO Initiatives

A number of NGO initiatives, some indigenous, others donor-financed, represent important breakthroughs in demonstrating how solid wastes can be recycled cost effectively, while yielding economic benefits to the poor and enhancing environmental awareness.

5.2.1 Safai Kamai Bank (Garbage is Gold), 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 calculating 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 brought at the rate of Rs.15/kg and run through a

mincing machine and converted into compost (thandi meethi khad). Both the separated inorganic material and packaged compost is sold in the market.

5.2.2 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 socioeconomic condition of juvenile scavengers. The program provides health education to women and works towards strengthening relevant departments and local organizations. Land for compost has been leased with the help of the Environmental Protection Agency (EPA).

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

Households are provided 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 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.

5.2.3 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 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.

5.3 Land Degradation: Government/Donor Initiatives

5.3.1 On-Farm Water Management (OFWM) Project

Attempts to address land degradation fall into two categories. Upland degradation belongs to the genre of forestry and is dealt with a little later. Down-country degradation relates to desertification, loss of riverine and mangrove forests and the effects of erosion, waterlogging and salinity in the

Indus Plains. The focus here is on on-farm water management. While the National Drainage Program is, perhaps, more germane to the problem of degradation, it is a large and traditional project, which does not centrally address the link between environmental rehabilitation and poverty alleviation. For that matter the, the On-Farm Water Management Project does not do so either. But the fact that it is a government/donor project, which purports to address small farmer welfare, offers an opportunity for critical assessment.

Briefly, the 'On-Farm Water Management Project', consists of nine or ten large on-farm projects with a total estimated cost of $200 – 250 million -- that is Rs. 6-8 billion, 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 numbers of other professionals. There are also OFWM training and research institutes in three provinces and there is 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 project rationale is that is that Pakistani farmers are inefficient users of precious water. In support of this assertion, it is said that farmers waste water, under or over-irrigate their crops, flood-irrigate their fields, make do with inefficient field layouts, cultivate on undulating fields, adopt water-intensive cropping patterns, neglect maintenance of delivery channels, ignore proper irrigation scheduling and so on.

It comes, then, as somewhat of a surprise that project achievements have been minimal despite efforts to implement its recommendations over a 15-year period. Discerning analysis reveals the irrelevance of the OFWM recommendations; the recommended technology is uneconomical from the farmer's point of view and inconsistent with farmer resources and requirements.

At the field level, the recommendations relate to water application methods, precision land leveling, changes in the size and design of fields, basins, field channels etc. new structures and mechanical devices could be introduced. For instance, an official recommendation is for farmers to make their basins smaller for more even application of water. While this may make for better water utilization, it also takes away land for cultivation. Farmers have rejected such suggestions and studies have, in fact, shown that small farmers prepare their lands for irrigation with considerable attention to its quality, slope, porosity etc.

At the farm level, the OFWM approach recommends irrigation practices that would eliminate moisture stress on a particular crop. Considerations of yield maximization and technical notions of water delivery efficiency guide such an approach. The farmer, on the other hand is more concerned with allocative efficiency – that is distributing the fixed water so as to maximize income from the entire farm rather, or minimize risk by not concentrating all the water on one crop.

Critics have noted adverse equity impacts of the project in as much as official agencies tend to favor large farmers by selecting and lining a disproportionately large number or portion of their watercourses. Large farmers have been the main beneficiaries of the subsidies for land leveling. Also, the long established official policy of obtaining unskilled labor as a local farmer contribution for watercourse renovation is tantamount to the centuries old practice of 'begar' (forced labor).

Lastly, the project has proposed social organization innovations, which have again been given short shrift by the farmers. They have their own traditions of communal management of 'unimproved watercourses'. These are, basically, 'labor intensive practices and the farmers are finding it difficult to undertake the institutional innovation required for moving from their traditional maintenance models to those that are required for the new technology and capital that is embodied in renovated watercourses' (SDPI: 1995: 15).

The only success story is the "pacca nakka" (concrete water inlet). This is being manufactured in some regions, in the private sector and is purchased at its market price by large numbers of farmers. The reasons for its success is that farmers no longer have to break the channel every time irrigation takes place. This is a permanent device that can be installed and regulated to stop and initiate water flows.

To the obvious question why has this project been reported, the answer is that failures can be as illustrative as successes.

5.4 Forestry: Government and Donor Initiatives

5.4.1 Project/Program Level Initiatives

Here an overview is presented of government, non-government and collaborative efforts. Concern with deforestation has fostered a variety of interventions. A distinction is made between government and other projects, reflecting the different approaches to management. Given the large number of initiatives and the need for brevity the critique is taxonomic rather than textual.

Government Initiatives

Government efforts have achieved limited success primarily because of their control- minded and vertically oriented approach towards management. Mehmood and Ahmed (1997), and Khattak (1998) have identified the following methodological, policy, institutional and operational flaws.

Initiatives	Year	Tenure	Defects	Results
Forest Cooperative Societies	1980	Private/Guzara	➢ The establishment of cooperatives under the 1925 Forestry Act was not appropriate for the management of resources in the hills and mountains of Pakistan. ➢ Agriculture and Credit bias of legislation ➢ Inadequate organizational arrangements under the Act ➢ The FCSs, under lease to the government, were perceived as their agents ➢ Transfer of management and authority was too hasty ➢ The cooperatives were used as political instruments to appease influential guzara owners ➢ No participatory management in true sense	➢ Massive irregularities in the use of funds ➢ Sale of standing trees became a rule ➢ The management plans were defective and sub-standard ➢ Massive deforestation during 1980-91 ➢ Harvesting ban in 1992
Royalties, Contractors and Intermediaries	1973	Guzara/community	➢ Fixed price system (per cft of harvested timber) of paying royalty to community did not keep pace with the market prices of timber in market ➢ In the Net Sale System (selling timber to the highest bidder) money was channeled through the government to local owners. The resulting delays in payment were exploited by the profit motivated forest contractors. ➢ Contractors tended to cut more trees to make up for the open bidding in the open auction ➢ The strong link between provincial politicians, bureaucrats and forest contractors provides space to exploit the loopholes in the legislation.	➢ Establishment of Forest Development Cooperatives to separate forest management from harvesting in 1973. This led to buying of royalties from owners which was another incentive to cut more trees than the Forest Plan allowed

Forest Development Corporation	1978		➢ More emphasis on earning profit (Rs.11,957 in 1978-79 to Rs. 154,750 mil in 1988-89) but a reversal in even this trend (Rs. 69,052 mil in 1993-94) ➢ Rapid increase in assets from Rs. 3,000 mil in 1978-79 to Rs. 1,793,405 mil in 1993-94) ➢ FDC procedures never made transparent ➢ The system brought large owners, forest officials and contractors on the same table ➢ Lack of economic and scientific expertise ➢ Weaknesses in marketing management.	➢ Declining profits ➢ Little or no investment in forest development ➢ Collusion among forest department staff, contractors and large owners ➢ Forests not exploited along scientific and economic lines ➢ Accumulation of unsold timber
Logging Ban	1992	All	➢ Lifting of import ban on timber from Afghanistan in 1993	➢ Massive deforestation in Afghanistan

Community Based Forestry Projects

In recent years, based on experiences in other countries, and encouraged by technical and financial support from donors, a number of community based forestry projects have been initiated in the NWFP and the Northern Areas. An assessment of such projects on the basis of economic, social and ecological criteria is shown below:

Project	Forest Tenure	Equity	Stability	Sustainability	Productivity
MSFP	Private	Medium	Medium	Low Medium	Very High
KIDP	Protected	High	High	Low	High
SFDP	Reserved	Very High	Very High	Low	High
AKRSP	Communal	Very High	Very High	Medium	Very High
WPMP	Communal	High	High	Low	High
SWMP	Shamilat	High	Very High	Low	High
SFSDP	Protected	Medium	Medium	Low	High
FP & DP	Private	Medium	Medium	Low	Very High

Source: Mehmood and Ahmed: 82

Notes:

MSFD Malakand Social Forestry Project
KIDP Kalam Integrated Development Project
SFDP Siran Forest Development Project
AKRSP Aga Khan Rural Support Programme
WPMP Watershed Planning and Management Project
SWMP Saketar Watershed Management Project
SFSDP Sind Forestry Sector Development Project
FP & DP Forestry Planning and Development Project

A somewhat different picture emerges when such projects are judged on post-project sustainability criteria. Participatory and integrated approaches to forest management tend not to be sustainable in the

absence of an enabling institutional environment. In general, federal, provincial and local level institutions are not sensitised to community concerns, both at the policy and implementation levels. At the very outset, forest officials are reluctant to concede their powers which refers to their capacity to influence the outcome of social processes; they lack confidence in the ability of 'untrained locals' to manage their resources; the attempts to safeguard department prerogatives also precludes integrated approaches to conservation (involving livestock, wildlife and forestry departments) and; the culture of corruption and collusion – which is antithetical to conservation -- has become deeply ingrained. Community institutions (jirga, panchayats) and practices have also atrophied, partly because of the state appropriation of forest resources, but also as a result of modernization which has made economic relations more fluid, and created alternative systems of judicial and social recourse.

The absence of institutional preconditions also has adverse implications for financial sustainability, such as:

- failure to transfer of project activities from the development to the recurrent budget;
- small/declining proportion of counterpart to donor funding
- imbalanced division of donor funds between development, operational and technical service activities
- inadequate budgetary allocations for forest development activities
- failure to generate resources via sustainable harvesting of forest products

Legal and Institutional Reform

Legal and institutional reform is key to the sustainability of community initiatives as it creates the appropriate enabling environment for such initiatives. In its absence even the most well designed programs can run aground. However, such reform efforts face considerable resistance from vested interests who see them as hurdles in the way of unbridled profiteering. This is evident in the manner in which the forestry reform process in the NWFP has been subverted in their favor. The key reform components are:

- The NWFP Draft Forestry Act of 1998
- A Forestry Commission
- Forestry Roundtables
- Departmental Restructuring (through the Institutional Transformation Project)
- Formation of Village Development Committees

A Steering Committee, consisting of forest department staff, has also been set up to oversee the reform process.

Most of the reform components are in the penultimate stage, awaiting final approval. The intent of these reforms is to reverse ongoing degradation, address existing inequities and pave the way for more participatory forms of forest management. Reform efficacy and the promise of real change depend on stakeholder participation in the reform process itself, as well as during subsequent implementation. In other words, communities need to be consulted about the management arrangements they are meant to be a part of; they should be adequately represented in the new institutional mechanisms and their defined roles given legal sanction.

The evidence, however, suggests that the reform process has been non-consultative resulting in, essentially, cosmetic changes with the forestry department continuing to arrogate considerable power at the expense of the communities.

The first concern relates to the Forestry Act, which has gone through many drafts and has been widely circulated for comments each time. However, at each successive stage, the identified concerns have not been fully addressed. The final version of the act continues to invest vast powers on the forest department, in continued exercise of centralized authority. Specific areas of concern are:

- the arbitrary and unilateral manner in which reserved and protected forests, and banned watercourses will continue to be designated;
- continuation of the permit system in guzara forests;
- regulatory provision for joint forest management, rather than explicitly incorporating it in the law;
- fines and penalties that do not fit the crime, and are administered by forest department staff rather than an impartial judicial authority
- the need to invest environmental tribunals and magistrates with sufficient authority and financial means

Second, the constituted Forestry Commission is being widely perceived as a depository for retired forest officers with limited advisory functions. By the same token, government officials dominate membership of the Forestry Round tables, established as a forum and sounding board for all forest stakeholders.

Third, the Forestry Steering Committee operates as a closed shop, with observer status for donors and civil society participation only by invitation.

Clearly, the nature of the process is characterized by a lack of accountability, with its innovative content serving as a convenient gloss for the old and inflexible management style. This is further underscored the fact that the ban on logging, instituted in 1992, was removed while the reform process was underway.

6. Future Strategy

Addressing environmental degradation and conservation concerns successfully requires macroeconomic and social, as well as environment-specific policy interventions. In addition, with regard to the latter, the effectiveness of such interventions is contingent upon institutional space.

6.1 Policies Aimed at Poverty Alleviation

Macroeconomic and social policies, aimed at poverty alleviation have beneficial environmental impacts as well. Thus, the key policies identified relate to income redistribution, provision of social services, promotion of rural infrastructure, employment promotion and provision of credit to the rural and urban poor. It is generally accepted that as income grows rates of pure time preference decline such that individuals discount the future less strongly (Mink: 1992: 11). In other words, people tend to degrade the environment less.

6.2 Environment Specific Policies

Win-win is a term synonymous with sound environmental policies, with the focus of such policies being on market-led solutions. Efficient resource use also inhibits the rate of degradation or pollution. Additionally, by safeguarding natural resources and mitigating the adverse health impacts of pollution, they also contribute to poverty alleviation. However, pricing natural resources at their true opportunity cost can (water, energy) can also create financial hardships for the poor, requiring a measure of cross-subsidization. The two policy genera are: correcting for market failure and; b) eliminating subsidies

6.2.1 Addressing Market Failure

Correcting for market failure essentially means accounting for pollution externalities which the market fails to capture. In other words, a divergence is created between private and social costs which individuals or firms are not compelled to deal with in their private capacity, but whose consequences they bear in their collective capacity. Thus, deforestation creates adverse downstream effects, which can be mitigated by charging stumpage fees on trees cut. Similarly, air and water pollution affects human health, requiring that the sources from which pollution emanates be taxed at rates that create an incentive to curb such pollution.

Also, market failure problems have to be addressed directly, suggesting a central role for government. The benefits from addressing pollution are diffused and incommensurate with the efforts an individual may put into public interest litigation; likewise an enlightened company may have made the connection between degradation, in-house safety and productivity but it will still be subject to pollution imposed by other neighboring industries, as well as from other sources (Khan: 1998: 7).

6.2.2 Correcting Price Distortions

There are two aspects to correcting price distortions. First, they entail removing price subsidies for activities, which result in wasteful use of resources. Second, there is a need to follow up with incentives, which promote environmentally benign behavior, technologies etc. In the first case, price subsidies on irrigation and potable water, fuel, energy, chemical inputs for agriculture, forest royalties which encourage deforestation and trade restrictions should be eliminated, because of their adverse environmental and human impacts.[11] It could be argued that subsidies, such as on fuel (diesel) and energy benefit the poor. However, such benefits can be retained through cross-subsidies, where the affluent bears the burden of price increases.

At the same time explicit incentives need to be offered for the promotion of environmentally friendly practices and technologies. Sectorally defined, these are the promotion of sustainable agriculture (IPM, use of organic fertilizers); energy production and consumption efficiency (combined cycle, fluidized bed combustion, retooling of power plants (combined cycle, fluidized bed combustion, household energy savers etc); energy alternatives (renewables); transport emission controls (catalytic converters, mandated lead free petrol, import of fuel efficient); forestry incentives (royalties linked to tree stands rather than trees cut, alternatives to fuelwood). Ultimately, the purpose of such incentives is to convert perverse – but economically attractive -- incentives into environmentally benign ones.

6.2.3 Creating Institutional Space

A strong institutional base is a prerequisite for the effective implementation of sound environmental policies. If environmental laws and regulations do not exist or are weakly implemented, there is very little likelihood that policy initiatives will ever get off the ground. In other words, institutional space needs to be created for the environment. Thus, as a first step, the Environmental Law of 1997 should be strengthened and deepened. A key element of this is a legal framework supported by effective monitoring and enforcement capacity, and which recognizes the fundamental role of environmental impact assessments (EIAs).

Land redistribution, tenure security and defined rights of access to communal lands are key to empowering communities and providing them with an anchor amidst the conflicting strains and pressures of development. Clearly defined property and tenure rights are especially important where the population

11 Trade restrictions, by protecting domestic industries, allow them to pollute as well as refrain from adopting clean technologies.

is moving through the transformation from land abundance to scarcity. Where there is population pressure on urban sectors, there is a need to deal with the legal status of squatters, uncertain property rights, limited finance for infrastructure etc. While communities use their informal networks and collective values to mobilize social capital for environmental preservation, the provision of legal title and rights to land use facilitates this process immeasurably

Other institutional initiatives with relatively more oblique but community centered objectives are regulating protection of fragile lands, crucial ecosystems and cultural heritage, agricultural research and extension to benefit poor farmers and the strengthening of education and public health programs. Also, since policies take time to implement, targeted programs and projects can have poverty alleviation as well as demonstration effects. Amongst these are food for work programs, upgrading rural roads and drainage to minimize erosion, planting windbreaks and improving soil conservation and water harvesting techniques on common property or public lands.

Governments are increasingly facing fiscal and financial insolvency. Cross-sector partnerships are a way around this constraint. In the case of water and air pollution, voluntary and self-monitored emission controls represent an exciting collaborative venture with potential for creating a sense of ownership. Joint forest management, which involves the government, NGOs and communities, are a potentially important mechanism for arresting natural resource degradation. Trade partnerships with international bodies, which promote export certification, can help stop the production of goods, which harm the environment or are produced under conditions injurious to human health. An additional feature of such partnerships is that they tend to be driven by incentives rather than by heavy handed – and often ineffective – regulations. Within the enabling institutional framework, an important measure relates to building government-private, government-NGO and government-community partnerships. Such policies are an important way of mainstreaming environment and natural resource management into macro and sectoral policies.

Institutional Changes in Forest Management

The situation calls for deep-rooted changes in the present forest management system. This system should both be built around appropriate incentives for stakeholders and embedded in strong institutional and governance structures. The key elements are:

- Forestry policy which is formulated in a transparent and consultative manner. Moreover, ecological imperatives require an integrated management approach with implications for horizontal (interdepartmental) co-ordination. Participatory management entails devolution of authority and imparting social skills among forestry department staff.
- Adjustments in the incentive structure which include: a) pricing measures such as pricing negative externalities and linking fines with timber prices; b) improving institutional incentives -- promotions, salaries, social security and health and safety regulations; c) re-orienting royalty payments towards tree stands rather than trees cut; d) providing incentives to communities, such as development incentives which are usually provided by the donors/NGOs, such as rural infrastructure and services, energy alternatives, food for work, jobs in different projects and; e) increasing costs of projects implemented at risk to natural resources, e.g. road building, tourism etc.
- Ensuring clarity of tenure and usufruct rights
- Sustainable land use planning accompanied with data generation on cover, condition and density of the forests
- Research on forestry issues especially on incentives for sustainable forest management

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SDPI is an independent non-profit research Institute
on Sustainable development

Mailing Address: PO Box 2342, Islamabad Pakistan

Street Address: 3rd Floor, Taimoor Chamber, 10-D West,
Fazal-ul-Haq Road, Blue Area, Islamabad.

Telephone: +(92-51) 2277146
2278134 2278136 2270674-6

Fax: +(92-51) 2278135

URL: www.sdpi.org e-mail: main@sdpi.org