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Earthquake 2005: Some Implications for Environment and Human Capital

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Loss of human capital in the form of skills and experiences is one of the outcomes of any natural hazard such as earthquake, drought, famine, and floods. Generally such losses have many implications for further growth of individuals, communities and nations. Disaster management and risk assessment has established a new need to constitute a paradigm of planning frameworks to develop modules for dealing with interactive rehabilitation and reconstruction activities. However, such management still lacks due attention in perspective of the remedy of human capital loss particularly in environmental management. This paper discusses the post-disaster situations with respect to human capital flow and stock losses and some of their implications and suggests some measures to apply in the earthquake-affected areas of Azad Kashmir and NWFP.

Introduction

A sustainable environment facilitates directly and indirectly to the strengthening of economic growth, socio-cultural demographic uplift, infrastructural buildup, positive external generation, and improving beyond preserving levels the 'quality of life for humans'. Further it is complementary to economic growth for long run human development objectives as well, where it significantly affects human capital, its accumulation and the overall environment.

Azad Kashmir is the Pakistani-administered part of the former princely state of Jammu and Kashmir, along with the Northern Areas.

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It covers an area of 13,300 km square, with its capital at Muzaffarabad, and it has an estimated population of over three million people. The Azad Kashmir earthquake of 2005 was a major seismological disturbance that occurred at 08:50:38 Pakistan Standard Time on October 8, 2005 with the epicenter in the Pakistan-administered region of the disputed territory of Kashmir in South Asia. It registered 7.6 on the moment magnitude scale making it a major earthquake similar in intensity to the 1935 Quetta earthquake, the 2001 Gujarat Earthquake, and the 1906, San Francisco earthquake. As of 8 November, the Pakistani government's official death toll was 87,350. According to unofficial guesses, the death toll could reach over 200,000.

Azad Kashmir and North-eastern areas of N.W.F.P (N.A.) in Pakistan significantly contribute to the ecological balance/regulation of the environment of the region by virtue of its rich forest, hub of flora and fauna (wildlife) and excess of green foliage; which provides a major source of watershed, air pollution control, sufficient raining temperature regulation, air cleanliness and eco-tourism.

The October 2005 earthquake caused severe environmental, biodiversity, economic, social, political and geographic destruction in the AJ&K, and N.A. Pakistan. This natural disaster destroyed cultivable land, physical infrastructure, social infrastructure, provision of public goods, water quality and its sources, sanitation and sewerage, health and nutrition and human capital. This catastrophe not only distorted environmental components such as biodiversity, forest eco-system, agro eco-system and arid non-arid eco-system, it has created impediments in the rehabilitation of the environment due to the loss in stock and flow of human capital. Human capital mainly contributes to the sustainability of these components by reducing its degradation, through optimal/effective utilization of these natural resources and adoption of alternative sources of livelihood, energy requirement, technology absorption and in general less dependence on natural resources. Therefore human capital takes a complementary role directly towards environmental sustainability and indirectly through economic growth and its distribution. Thus the question of sustainability of environmental resources and the eminent threat of overburdening the left over resources for the context of human capital needs to be identified and explored.

Needs and Importance of the Study

Unfortunately, there has been relatively little research on the topic

of the economic effects of severe earthquakes by economists. Except man-made disasters, Azad Kashmir has faced its first ever-natural disaster with significant human and economic losses. Neither the state nor the citizens ever expected such grave circumstances nor such heavy casualties.

Pakistan suffers from frequent earthquakes of small magnitudes because of its location on the seismic belt. There was a major earthquake in Quetta, Balochistan, in 1935 wherein the entire city was destroyed. A number of earthquakes have occurred during last three decades killing around 10,000 people, while the most recent earthquake affected millions of people.

Since this is not the first or the last disaster in this country, there is a need of emergency preparedness and response for all types of disasters. This requires a new planning approach and extensive applied research on the topic that may help to channel and interlink the state machinery, households, private sector organizations, and international support agencies in a well-coordinated manner for disaster management activities. Since environment and human capital are two major affectees of such disasters, these call for academicians and researchers' responsiveness.

Objectives

The primary objective of the present paper is to initiate discussion on the post-disaster situation to identify the implications of human capital stock and flow losses for environment, as well as to suggest strategies for government institutions, non-governmental organizations and international donors for effective disaster management, environmental sustainability, biodiversity and other ecological protection in general and with respect to human capital loss and future development.

Methodology and Data

The present paper is primarily based on review of disaster management studies conducted in other earthquake hit countries. Most of the analysis draws heavily from the experience reported in such studies. However, primary and secondary source data have also been used for the study. The primary data come from field observations, focus group discussions and key informant interviews conducted in Azad Jammu & Kashmir and NWFP during the month of November 2005. Thirty semi-structured community level interviews of teachers, locally elected

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government representatives, elderly and other key informants were conducted in the affected areas of the Jhelum Valley, Muzaffarabad City, Garhi Habibullah, parts of Mansehra district and Abbottabad. The information was used to derive the preliminary findings.

Impacts of Earthquake: an Overview

Environmental sustainability, biodiversity conservation, ecological protection, development and rehabilitation have always been matters of concern indifferent countries of the world. Human capital loss and future development are the key agents of these ecological, socio-economic and cultural systems. Various reports indicate that about 3000 square kilometers of area in AJK and NWFP has been severely affected with a loss of 84 percent of the houses in AJK and 36 percent in NWFP. Some estimates show that about 3.5 million people have become victims of the earthquake. Some of the impact indicators are given in the following table:

Table 1
Key Impacts of the Earthquake Indicator

Area Affected	30,000 sq km	FRC
Population Affected	Between 3.2 and 3.5 million	FRC
Deaths	73,000	FRC
Injured	79,000	FRC
Houses	400,153 (damaged and destroyed)	ADB/WB
Families Affected	500,000 (average family size seven)	UNOCHA
Number of food insecure	2.3 million	WEP/UNICEF
Latrines needed	160,000	UNICEF
No. of school children affected	955,000	UNICEF
No. of women affected (age-15-49)	800,000	UNFPA

Adopted from: Pakistan 2005 Earthquake Early Recovery Framework, United Nations System, Islamabad, Pakistan, and November 2005.

Human Capital Dimension

According to the United Nations Missions Report November 2005, all major public buildings have been partially damaged or completely destroyed and a substantial number of local civil servants from local and district government have died. This is certainly a great loss of human capital since the dead people include those having variety of professional,

managerial and technical skills and experience of varying degrees. This has multidimensional impacts on environmental sustainability. It destroys or disturbs environment protection achievements, such as the arrest of soil erosion, the increase of forested area, maintenance of wildlife, air and water quality, etc.

Since higher levels of education lead to more awareness and more effective environmental regulations (McMahon, 1997), the implications of the earthquake suggest the future potential of a loss of educated people. This role of education has been recognized by the World Bank (1998), which learned that water pollution reduced significantly when population growth was reduced and education was increased.

There are other indirect channels as well where the reduction of economic well being, in our case due to the loss in stock and flow of human capital, would also lead to environmental degradation. This is substantiated by the growth models presented by Robert Barro (1997 and 2001). His findings show that education permanently increases the efficiency of the labor force and this human capital also facilitates the absorption of superior technologies. The loss of infrastructural capacity and flow of potential human capital would also impact the capacity of people to further produce and reap the benefits of human development. Philippestins (2001) estimated a positive strong correlation in natural resource abundance and human capital, and identified that excess returns from rich natural resources lead to reinvestment in higher human capital investments. Therefore the estimate of human capital loss is necessary for future strategic policy planning concerning rehabilitation and minimization of losses.

According to a UN report, “the earthquake’s impact on institutional capacities and loss of infrastructure in all sectors, including the public services, has reduced overall capabilities to manage waste and natural resources. This is likely to have additional negative effects on the environment in general and also on the livelihoods and health of the affected populations. In addition to the directly affected areas, environmental impacts are likely in the lower catchments. Environmental concerns associated with the earthquake will continue to require attention and resources beyond the current relief and early recovery phase. Thus, there is an immediate need to appropriately manage forests and other environmental aspects of the Indus River watershed” (UN, 2005).

Discussions and Implications

The areas hit by the earthquake were not centers of agricultural or

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industrial activity. Moreover, ports, telecommunication, airports, power plants, oil refineries and other major economic or infrastructural units of the country are intact. A gain in some industrial or commercial activity is also expected especially in the process of reconstruction. Despite that, the earthquake of 2005 has direct implications for many aspects of life, the environment and human capital being the most important among them.

Table 2
Affected Populations by Locations

Region/province	District	Total Population (000)	Affected Population (000)	%age Affected	Classification
Pakistan Administered Part of Kashmir	Bagh	456	364	80	Severe
	Muzaffarabad	911	820	90	Severe
	Poonch	463	271	59	High
	Total	1830	1455	80	
NWFP	Abbottabad	999	200	20	Less
	Battagram	241	204	20	Less
	Kohistan	-	-	50	High
	Mansehra	1361	602	44	Less
	Shangla	544	272	50	High
	Total	3145	1278	41	

Many reports so far indicate huge loss of skilled manpower due to the death of nearly ninety thousand people and a greater number that is out of work due to injuries. There are still many villages which remain cut off; hence skilled people are not able to make any economic contribution in these circumstances. The same is the case with over 3 million people who are homeless or disturbed because they have lost the original working environments where they were applying their knowledge and skill prior to the earthquake. According to initial assessment done by the International Labour Organization (ILO), over 1.1 million jobs have been eliminated by this earthquake, which is more than 50 percent of the total employment that existed in the quake affected region before the catastrophe. The report says, "Prior to the earthquake nearly 1.4 million people were engaged in agriculture, 730,000 workers in the service sector and 230,000 in industry. An estimated 40 to 50 percent of these people are likely to have lost their primary source of income due to the earthquake".

According to a UNDP report (November 2005), the earthquake's

direct and indirect impacts must be understood in the context of the Indus, Neelum, Jhelum and Kunhar rivers. The report says, “This is also true of the opportunities, constraints and risks associated with response stage interventions, early recovery and longer-term reconstruction”.

The report continues so state that, “the earthquake generated massive amounts of waste. There is waste from damaged buildings and infrastructure, solid and human waste from tented villages and temporary settlements, clinical waste associated with the care of approximately 79,000 injured persons, and other hazardous materials including agro-chemicals. In addition, the earthquake has intensified the pressure on natural resources as vegetation is removed for use construction, cooking and heating, and as water is contaminated”. The main implication of this is the possibility of heightening the vulnerability of the slopes which have been further destabilized by seismic activity and which could initiate the occurrence of more landslides (UN Report, 2005).

From a social development point of view the loss in this ecological system can lead to reduction in the pace of education and increase in income generation, natural resource dependent activities, or both, for women folk due to the loss of earning hands in these areas and poses a risk of shortfall in meeting MDG 3, i.e. the promotion of gender equality and empowerment of women. The protection, development and co-existence of bio diversity, the forest-eco system, the agro-eco system, and the arid and the non-arid-eco systems requires individuals (human capital) as well as institutions (cumulative human capital, i.e. governmental, non-governmental, community based, like minded, awareness forums, opinion leaders, etc.) to partner at the grassroots level and at secondary levels. However, this natural disaster has severely damaged human capital (stock and flow) and the infrastructural capacity for further development and therefore makes it difficult to meet MDG 8, i.e. the development of a global partnership for development. In that context, the short-run operational and long-run strategic policy options are impacted by the multifarious threat to the existing environment and the future and must address these issues to minimize the risk of not achieving these MDGs.

In order to estimate how much environmental disaster incapacitates human capital and how it would impact the future environment, first we consider the type of skills in a country. The human skills in the present context can be divided into three categories:

1. Convention skills which prevail in a country routinely.
2. Innovative skills which lead a country ahead of its counterparts.

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3. Emergency skills which enable a country to maintain a sustainable growth rate even in emergencies and natural or man-made disasters.

While the possible skills loss is also of three types as follows:

1. Permanent or complete loss if a skilled person dies or becomes disabled in a disaster.
2. Partial loss if a person is injured or disabled yet partially curable.
3. Temporary loss if a person is physically fit for using skills but either loses the required toolkits or technological infrastructure for using his/her skills or suffers from psychological shocks.

The instantaneous impact of this natural disaster is the destruction of the environmental system with the destruction of its components: biodiversity, the forest eco-system, the agro eco-system and the arid and non-arid-eco system. With human capital as the principle agent of these eco-systems and further debarring its rehabilitation due to the loss of human capital (stock, flow and its formation) and its contributing components (educational, community-based structures, etc.), a threat is posed to achieving MDG 7, i.e. the development of environmental sustainability. The adverse impact on human capital stock may lead to an increase in poverty levels; whereas the loss of human capital flow may push surviving human beings into a perpetual poverty trap which falls in the domain of MDG 1, i.e. the eradication of extreme poverty and hunger. The concept of stock and flow of human capital is further explained below in the light of field observation, focus group discussions, key informant interviews and secondary reports.

Loss of Human Capital Stock

Human capital stock is the accumulated form of education, skills, IQ's lifestyles, experiences and practices, etc. According to a joint WFP/UNICEF rapid emergency food security and nutrition assessment (UNWFP, 2005), "... between 3.2 to 3.5 million people are affected. Nearly half of the population lost their houses, leaving roughly 2.5 million people homeless. But also families who haven't lost their houses sleep outside, either because their houses are badly damaged, or out of fear of after-shocks".

Based on certain reports as well as field observations, we find that the death of local people has caused, (a) intangible loss to environment in terms of innovative or indigenous ideas, concept, perception; (b) tangible loss in terms of missing routine skills from locality; (c) a large number of people undergone permanent, partial or temporary loss of skills

due to direct damages or displacement, or fear of any sort; (d) behavioral deterioration in terms of increased dependency on forest oriented economic activity of left over people; (e) increased child labor due to changed parents' preference in crises; and (f) trickle down effect of human capital loss in terms of the above mentioned losses.

Loss of Human Capital Flow

Loss of human capital is basically a disruption, temporary or permanent, in the process of flow of human capital in the form of education, IQ's , skills experiences and practices. This process is directly and indirectly barred or slowed down due to the following devastations:

1. Loss of physical capital: This includes the losses to government and private infrastructures such as school buildings, infrastructures, electricity, furniture, laboratories, etc. For example, government employees, such as civil servants, teachers, police officers and others, receive their salaries while they are unable to work because officers, schools and other workplaces were destroyed.
2. Health facilities loss: This leads to a large number of weak, sick children and mothers and changes priorities concerning the education of girls and boys.
3. Loss of environmental capital: The reconstruction of a large number of houses will require timber, stones, etc. Similarly, the loss of sanitary facilities will lead to a high rate of morbidity, which in turn reduces the growth rate of human capital. Water supply loss also leads to water born diseases and results in the reduction of economic growth.
4. Source of earning loss: This is the loss of arid and non-arid agricultural fields, orchards, livestock, which lead to reduced income and increased morbidity due to less/impure foods and nutrition.
5. Human capital loss: This is the loss of students, teachers, trainers, support staff, and developed human capital.
6. Subject specifies loss: This is the loss of subject specialists and science laboratories loss that leads to the loss of opportunities to study science subjects including medicine, engineering, pure sciences, etc.
7. Community activist loss: This is the loss of native willing workers.
8. Loss of entrepreneurs: Entrepreneurs are the most precious human capital for devolving and sustaining the productive chain ranging

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from local businesses to the global economy. From the above discussion, one may conclude that with these shortfalls, the recovery will need time and this gap would reduce the availability and quality of essential resources to generate further human capital. The government aims to reduce poverty in the country which is based on the official vision of poverty reduction strategy having four pillars "...accelerated and broad-based economic growth while maintaining macroeconomic stability, improving governance and consolidating devolution, investing in human capital, and targeting the poor and the vulnerable" (WCDR, 2005). The improvement in governance, however, requires a long term vision and action (Hamdani, 2004-05) ranging from a 'will for change' to a completely transformed nation. This can be achieved through a value loaded, faith-based educational system that may help converting all other systems of the country into honest and just systems. Without honesty and justice first, through religiously better human capital, any disaster management will remain, in fact, mismanagement.

Conclusion and Recommendations

This paper discussed some implications of environmental sustainability and skills loss in earthquake areas. The conclusion is that the earthquake, as an environmental disaster, caused direct and indirect loss to human capital stock and flow which in turn has further increased threats to the destabilization of the environment within the victim region and also outside. There is a need to develop short and long run strategies to minimize the implications of the earthquake on the human capital stock and flow.

The short run priorities would be food security arrangement, health, psychological rehabilitation, shelter, management of waste from buildings and other infrastructure, management of human and medical waste and hazardous materials, etc.

The long run activities require legislation on environmental codes, the training of humans in disaster management, review of techniques for assessing environmental hazards, and hazard preparedness among masses. It also requires capacity building with respect to disaster related technology. Moreover, familiarizing planners with an approach for incorporating natural hazard management into development planning can reduce the impact of natural hazards if it addresses the following aspects: sociology, landscape, construction science, geography, civil engineering, rural sociology, public management, economy, psychology, Public health,

gender issues, environment, social ecology and other areas. The fast track development of physical capital, environment capital, social capital, local entrepreneurship, enterprise development, through the use of local and external resources, combined with the latest technology and strong motivation is required.

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