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William A. V. Clark:
Environmentally Induced Migration and Conflict

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Environmentally Induced Migration and Conflict

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Executive Summary

Population increase, migration and growing urban populations

In a world of increasing population (more than 9 billion in the next half century) the environment will come under increasing stress. Concerns with food production per se have been replaced with concerns about water availability, and a safe and clean environment more generally. Much of the world population growth is in cities and this population growth and these cities are in vulnerable environmental regions - coasts, tectonically unstable regions and those without reliable fresh water. Already 175 million persons live outside their country of birth and the displaced population within nations continues to grow from its current 25-27 million persons.

Migration and environmentally induced migration

Migration is a temporal and spatial process and has always been the way in which people adjust to changing contexts. Families and individuals move to escape stressful situations and to seek better opportunities in new locations. Environmental stress is only one dimension of migration generation, political and social conflict also generates migration and adjustment. These two processes often overlap, and it is not straight-forward to distinguish migration induced moves from those induced by social and political conflict. Most environmentally induced migration is event created, natural disasters rather than by long term changes in the environment. While long term environmental change has the potential in a century to create large scale migratory movements, by and large the slow pace of change allows for adaption to the changes. In poorer countries the infrastructure is less able to adapt and it is in these situations that conflict is most likely. The best current estimates suggest that environmentally induced migration either alone or in concert with social and political conflict is responsible for between 10 and 25 percent of migratory movements.

Migration and conflict

The literature on environmental security and conflict does not have any broad consensus. Several research projects describe how conflict can arise from competition over scarce environmental resources. These studies use both theories of ecological marginalization (when groups are marginalized in their access to land and resources) and resource capture (when power elites "capture" resources and deprive other groups from access). Such processes can lead to conflict. At the same time, while environmental scarcity can lead to conflict there is only very limited research that suggests that migration itself can lead to conflict. Most of the research suggests that the environment is a proximate not a direct cause of conflict. Mapping "demographic stress" regions emphasizes that most potential conflict is in Africa and in the Middle East. Of course in the latter there is substantial ethnic and religious conflict.

Future prospects

The report concludes that it is possible to identify the regions of likely stress arising from a combination of demographic and environmental factors and identifies 25 countries, mostly in Africa with very high levels of potential for conflict. Those conflicts are likely to have an environmental component but overlaid with existing religious and ethnic tensions.

Summary

The report emphasizes that environmental stress is likely to be linked to conflict indirectly but significantly and it will be greater in poorer nations. The impacts will come directly from declining resources and conflicts over those resources and from the tensions created by populations that are displaced or who move seeking improved life chances in other regions. However, most of the conflicts will embed environmental induced conflict under the guise of religious, ethnic of civil conflict. It has been, and will continue to be, difficult to identify any simple or straightforward links between the environment, environmentally induced migration, and conflict. S*eeking single agent causality in the environment and potential impacts on conflict tends to hide the fact that the environment and its resources and impacts are channeled through social, economic, and political factors which play very significant roles in population migration.*

1. DEMOGRAPHIC CHANGE, URBAN GROWTH AND MIGRATION

1.1 World population growth and urban change- the context.

During the 20th Century the world population increased from 1.6 billion people to 6.1 billion people and now it has increased further to 6.5 billion (United Nations Population Division, 2005). At no time in the past has the world population grown so quickly or to such a size. Although the rate of growth has slowed the world population will still reach about 9.1 billion people by the middle of this century. Of course, the actual number will depend on the extent to which family planning spreads more widely and on our ability to control the HIV/AIDS epidemic. The annual increment to the world population continues to be more than 77 million persons a year. India, China, Pakistan Bangladesh, Nigeria and the United States account for half of that growth. While there is less concern about providing food per se, there are real questions about access to safe drinking water, health care and human population security. Population growth alone will continue to stress the world's ability to provide a clean and safe environment. At least a part of the difficulty of providing a safe environment is related to the rapid expansion of the world's urban population.

The world population living in urban regions and cities reached approximately 3.2 billion persons in 2005 and is expected to rise to more than 5 billion persons in the next 25 years. The world's population is at an historic turning point. Within a few years, half the world's population will be urban (www.peopleplanet.net - The World Comes to Town). The change in the last half-century, has been significant; in 1950, the world was about 30% urban- 52.5% in the more developed regions and a little less than 18% in less developed regions. Now in 2005, about 75% of the population in developed regions is in urban areas and a little more than 43% in developing regions. Along with a growing world population, there will be continuing increases in urban populations, both in the more developed regions, and the less developed regions.

Cities and urban areas are increasing in numbers and size (Figure 1). They are gaining an estimated 60 million people per year. In many developing countries, cities are growing two to three times faster than the overall population growth. Some cities, have astonishing growth rates -- Dhaka for example doubled in population between 1990 and 2000. Other cities in India have had have also had very strong growth rates. Even though as we begin the 21st century cities continue to be engines for economic growth in a global economy, they often face a crisis in their inability to deal with the massive influx

of people. In many of these cities poverty is endemic and discontent and civil unrest could become a serious problem if the growth is not paralleled with a concomitant growth of the urban infrastructure.

Growth in the number of large cities in the developed and developing countries, 1950 - 2000.
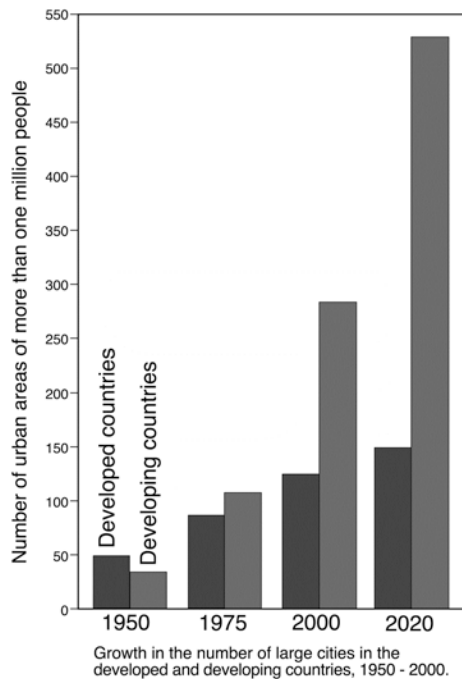
Figure 1: Growth of cities (Source: UN Population Division, 2002)

In the context of this report however, it is not just the growth of the cities that is relevant to our discussion of migration and security it is the fact that many of these cities are in vulnerable environmental areas. In addition, in some cases, the flow of population to large cities creates environmentally vulnerable areas. Populations that flow into the cities, particularly in developing regions often overwhelm the urban infrastructure and create large areas of unsubstantial, inadequate housing. According to UN habitat, about 900 million people, nearly 1 in three of the world's urban population are "slum dwellers", and that number is likely to increase in the coming decades.

Of the 20 largest metropolitan areas in the world in 2005 only three are situated in non-coastal settings and for the world's population as a whole about half live within 200 kilometers of the sea (Hinrichsen, 1995). Other statistics put the numbers at 3.6 billion within 150 km of the sea (www.aaas.org/international). In Asia approximately 1.5 billion people live within 100 kms of the sea. The exceptions are Pakistan and the

land-locked countries of Central Asia. The population of Latin America and the Caribbean is even more clustered on the coasts. The region's coastal states have a total population of around 510 million (in 2001); nearly three-quarters of them live within 200 kilometers of a coast. In the United States 54 percent of all Americans now live in 772 coastal counties adjacent to the Atlantic and Pacific Oceans, the Gulf of Mexico and the Great Lakes. In the US the coastal populations have grown by 41 million, faster than the country as a whole. Both Florida and Southern California are projected to have substantial increases in their population in the next two decades. The facts of population growth and the increase in urban concentrations are well documented and this demography is fundamental to a discussion of migration and its outcomes and to our discussions of environmental change and security outcomes.

1.2 Summary of migration theory - flows and patterns

Migration is both a temporal and spatial process. Human migration implies some form of permanent or semi permanent relocation by an individual or a household. The calculation of in and out migration necessarily involves a geographic unit – a neighborhood, a city, county or country.[1] Clearly there are more moves at smaller spatial scales. Perhaps the most fundamental distinction in discussions of population movements and central to the present report is the distinction between voluntary and forced moves (Figure 2). This distinction is between moves which are "forced" in which the individual

Figure 2: The continuum of migration

has no choice, and those where migrants evaluate alternatives and opportunities and decide to relocate based on their best interpretation of their opportunities and costs. A number of scholars have argued that outside of the developed world many of the moves are in fact moves which have little choice. Amin (1974) argues that a comparative costs and benefit analysis for individual migrants in Africa has little or no significance and only gives the appearance of rationality. Following Hugo I feel that population

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[1] The migration literature has a number of typologies that differentiate migrants and migrations by the permanency of the move, the distance moves, the kind of boundary crossed, the characteristics of the movers and the causes of the move (Hugo, 1996; Clark, 1986).

movements are best thought of as a continuum from totally voluntary migration in which individual choice is paramount to totally forced migration (Figure 2) in which the only alternative is relocation or death (Hugo, 1996,p.107).

Our knowledge of migration is based largely on research in western developed nations but it is reasonable to expect the general findings apply to migration in developing nations though as we will see the migration systems are likely to be much more unstable in these growing developing nations. But, an enduring finding from both western migration studies and from limited studies in developing nations is that migration is age driven (Figure 3). Younger people are substantially more likely to move than older households and renters are nearly three times more likely to move than those who own. To the extent that the developing world is by and large a youthful world, and also a world in which ownership is limited, it is likely to be a much more mobile world. Added to the instability of a youthful and peripatetic population is the volatility that comes from disruptions from unstable housing environments. Most of the urban populations not only
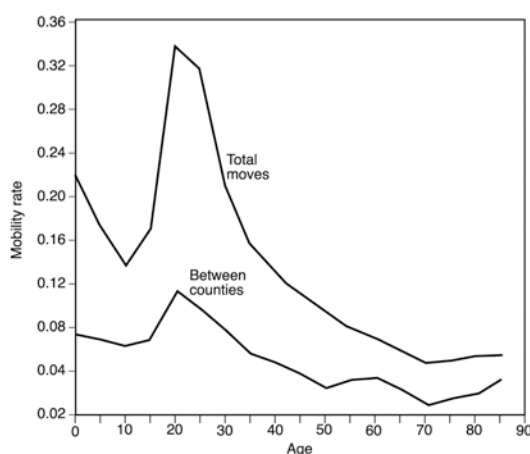

Figure 3: Age and distance related probabilities of moving in the United States

do not own the housing they live in, it is informal if not illegal. These barrios, favelas and slums are areas of substantial floating and hence mobile populations.

Classically we have viewed migration in terms of push and pull factors, the push factors of unemployment, poverty, political upheavals and religious and ethnic conflict - and the pull of jobs, security and increasingly the growing old age dependency ratios. In the OECD in particular the working age population compared to the over 65 population

will continue to shrink. The need for young workers is likely to increase in the coming decades. In addition, it is likely that developed nations will have increasing problems with cross border flows. Already the Schengen Agreement allows for the most part unrestricted travel across EU borders. The rise in illegal migrants is reflection of what many see as the widening gap between the developed nations and the unskilled populations in African and Asian nations. While the countries in Africa and Asian may be growing economically, much of that economic growth is not trickling down to low skilled and poorly educated populations at the bottom of the economic ladder. Some travel as refugees many are displaced within their own countries and others move for opportunities in developed western societies.

1.3 Typologies of migration

The research on migration and mobility recognizes four important distinctions, distinctions based on (1) the migrant, (2) the distance of the move, (3) the precipitating events and (4) the outcomes at the origin and the destination. Migrants and their families are distinguished by their age and composition - variables which categorize the likelihood of moving. Young persons are more likely to move than older persons and single people more likely than families. Overall moves are more likely to be short distance than long distance - individuals and families move within familiar surroundings. It is the precipitating events that are critical and for the past two or three decades the precipitating events have been more closely related to individual changes than to changes in the environment or the larger social landscape. Now that may be changing. The outcomes at the destination have by and large been benign. Movers have been accepted in their new environments and they have adjusted to the changes in their new locations. An important subtext of the current paper is whether this will change when large numbers of movers change their locations. This topic will be central in later discussions in this paper but first the review examines the extent to which migration has changed the patterns of population location.

1.4 Migration and displaced populations

About 175 million people live outside their country of birth. Many of these people of course, are illegal migrants, but many others are undocumented workers asylum-seekers and refugees. In addition to the very large number of people who live outside their country of birth, there is a substantial number of migrants who move within their own countries. These internally displaced populations have now reached about 27

million people, and the number is growing. Internally displaced populations are those that have been forced to flee their homes, because their lives were in danger from political conflict or environmental degradation. Unlike refugees, they have not crossed an international border.

Internal displacement comes about from two primary forces- political conflict, and environmental stress. Africa continues to be the continent, most affected by internal displacement. It is estimated that over 12 million people across some 20 countries were displaced internally at the end of 2005. Most of these were in the Sudan's Darfur region. Asia is similarly, an area of both displacement from political conflict and from environmental change, and how much from environmental change is hard to estimate, but later in the report I provide some estimates.

The United Nations Commission for Refugees (UNHCR) has defined refugees (still only those who cross an international boundary) as those who move for a well founded fear of being persecuted or where their safety and freedom are threatened by external aggression or generalized violence in their country of origin. A wider definition (Olsen, 1979, p.130) recognizes that refugees may be "forced to leave their homes because of a change in their environment which makes it impossible to continue life as they have known it". The attempt to include refugees in disruptions arising from environmental factors has led the popularization of the term "environmental refugee" but the terminology is not accepted by international agencies. An important distinction in the discussion is that environmentally engendered displacement generally occurs *within* a nation rather than across international boundaries.

2.0 THE ENVIRONMENT AND MIGRATION

Migration, often temporary, sometimes permanent, has always been the traditional response to the impact or the aftermath of disasters. With the increasing concentration of populations in urban areas, there is an increased potential for migration as a result of natural disasters (more properly natural events, as the natural event only becomes a disaster when large numbers of people are involved). Whether or not there is a disaster from a natural event depends upon its location. Earthquakes in an unpopulated area may have little impact. Now an earthquake on the California fault will have dramatic impacts on Los Angeles, San Francisco and the urban population of California. The increasing complexity of disaster outcomes is clearly related to changing population numbers and distributions. It is also related to our increasing dependence on technology as a solution

to environmental change. We have only to think of hurricane Katrina and its impact on New Orleans to recognize the validity of this observation. New Orleans is a city built on a coast susceptible to hurricanes, and susceptible to flooding from the Mississippi River, defended only by humanly engineered levees and ripe for a major environmental catastrophe. It is a classic case of the increased impact of natural events *because* of the growth in populations in locations, which are vulnerable to sudden and acute natural events.

2.1 Linking migration, environmental change and migration outcomes

We know a good deal about migration in general but much less about the complex inter-relationship between migration and environmental change as both a cause and consequence of migration. As Hugo (1996) presciently notes, "how migration and environmental concerns interact and impinge upon economic development, social change, and conflict is little understood " (p.105). In a context where global environmental stress and degradation have accelerated and unprecedented numbers of people are on the move it is critical to have a better understanding of migration and the complex links to social and environmental stress. We can suggest a series of links between contexts, migration and outcomes.

A useful structure is one that recognizes population movements as the outcome of political and social conflict and environmental stress (Figure 4). We allow the two forces to interact as environmental change is often exacerbated by political conflict although we recognize that environmental stress from a wide range of causes is generating and will continue to generate large scale population movements. A simple diagram captures the distinction between political and environmental refugees but at the same time recognizes the possibility for interaction between these two generating forces (Figure 4). Migration, in the context of political or environmental stress is a response to a change or a specific event that modifies the existing context and leads to migration and a response both in the region or country of migration and in the original location. In our presentation the changes or events are political/social conflict and environmental stress. The latter can involve both natural disasters, specific events including earthquakes, tsunamis and flooding and hurricanes. These short term near instantaneous outcomes are paralled with human/technologically induced environmental stress which is longer in term and maybe spatially more extensive. The migration from one region to one or more destination regions has potential outcomes including, acceptance in the new location, conflict, or return migration either as a result of conflict or inability to adjust in the new location.
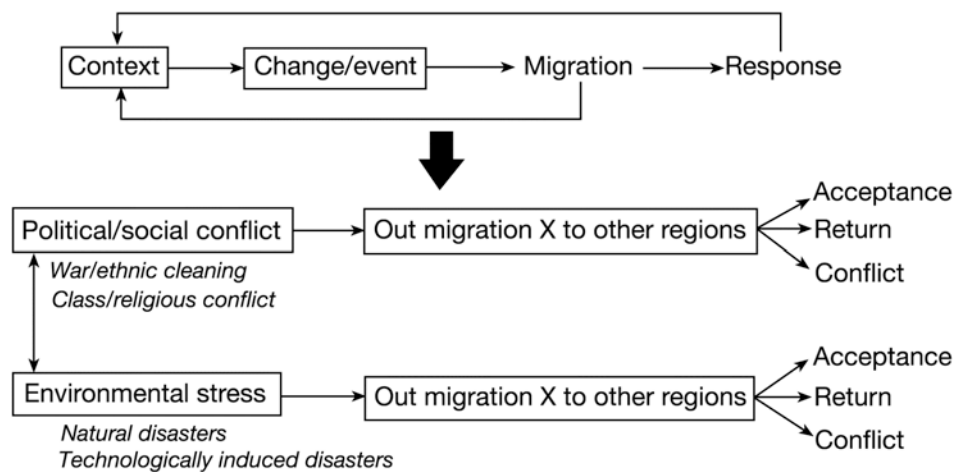
Figure 4: The structure of stress induced migration

Outcomes from migration have, at a minimum, three possibilities. We know from previous research that many migrants return to their places of origin even when there have been major precipitating events. Not all migrations are successful and migrants often return to their origins, pulled by familiar settings or by family and other contacts still in the original locations. The other two alternatives are assimilation and acceptance or conflict. Many migrants who move with local support (often international migrants who link up with family or who are sponsored by refugee agencies) make successful transitions to life in their new environments. The final possible outcome, conflict can arise when newcomers overwhelm local contexts and conflict arises over scarce resources or who bring contrasting cultures which conflict with local settings. Thus far we have not observed any significant conflicts arising from migration. Later in the report we will review the limited evidence for migration induced conflict.

While most research groups believe that environmentally induced migration is likely to grow in the future, for now the research emphasis has been on migration induced by social and political conflict. The best estimates of the relative forces is that environmentally induced moves either alone or in concert with social and political conflict generate between 10 and 25 percent of all moves world-wide although there is no specific agreement on the proportions. The remainder of the report focuses more directly on what we know about the links between migration, the environment and conflict although we reiterate in the analysis that social and political conflict has the greater impact on migrations both internally and internationally.

Most of the evidence about the links between the environment and migration has focused on environmental forces, which have generated acute or reactive migration. Research documented in Hugo (1996) suggests that the pace of environmental change has increased, and the ability all many developing countries to cope with these environmental change has decreased and thus we might expect increased migration from environmental change, acute or long term.

2.3 Some empirical data on social/environmental stress and migration

Hugo (1996) shows that between the mid-1970s and the mid 1990s that the number of persons displaced in Asia by natural disasters has both increased and become more frequent (Figures 5 and 6). He used reports from the United Nations disaster research organization news for 1976 to 1994, to show that there has been a trend towards increasing numbers of people displaced by environmental disasters, though of course there is considerable variation by year. Not all of the changes are environmental degradation or stress, the construction of China's three Gorges dam alone will displace more than a million people. But in contrast in Bangladesh, there are frequent cyclones floods and tidal surges that continue to impact people in low lying areas.
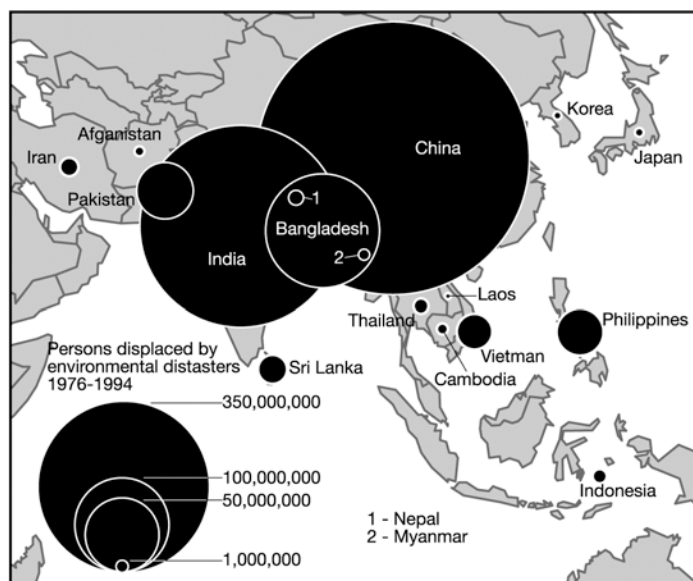

Figure 5: Environmentally induced migration in Asia
(Source: Hugo, 1996 and United Nations, (UNDRO News 1976-1994)

Temporally, the data provide some support for Hugo's position that environmental displacement has been increasing. His data include findings through the early 1990s but other sources suggest that the pattern of environmental disruption has continued and increased (see also Lonergan, 1999). Certainly, for the period 1987 to 1994 there are several "spikes" in the number of displaced persons (Figure 6).
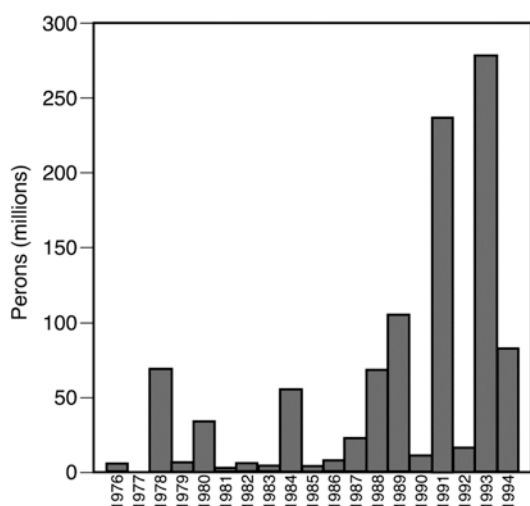

Figure 6: The temporal pattern of environmentally induced migration in Asia (Source: Hugo, 1996 and United Nations -UNDRO News 1976-1994)

In Africa, the droughts of the 1980s and 1990s led to millions of environmentally displaced persons. Although we cannot easily distinguish between persons displaced by environmental impacts or by social and political conflicts we can indicate that these two processes together have generated significant migration, both internally and between countries. Much of the difficulty within Africa is the continuing increase in population and associated pressure on agricultural land. Many countries in Africa continue to grow at population growth rates of more than 3% per year (PRB, 2005, Population Reference Bureau, Washington, D.C.). These population increases are difficult to sustain in environmentally sensitive areas. Additionally in Africa it is difficult to control deforestation, water pollution, land degradation and the overall stress on the environment, brought about by growing populations. Although it is difficult to measure there is also an impact on the environment from foreign investment. Where multinational corporations have established factories to use low cost labor it is certainly possible that there are additional stresses on locally sensitive environments.
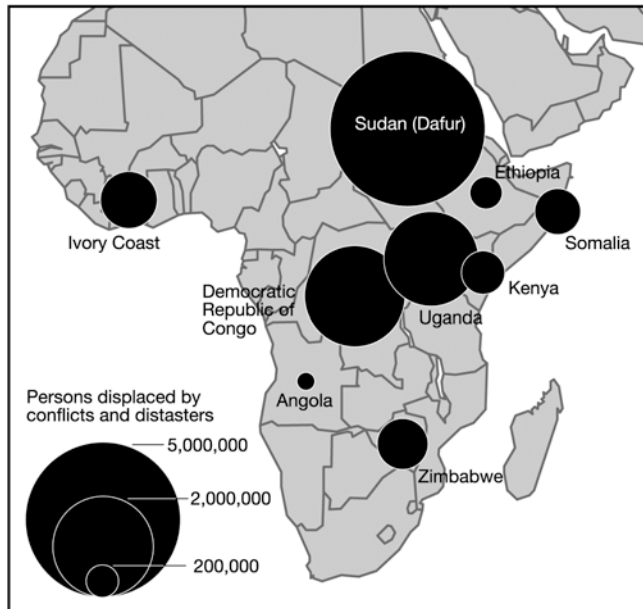
Figure 7: Stress induced migration in Africa (Source:
Internal Displacement: Global Overview of Trends and Developments
In 2005, Internal Displacement Monitoring Centre, Geneva, 2006)

The limited documentation, and review above on environmentally induced migration has focused on specific individual events and their migration outcomes. It is much more difficult to measure the migration impacts of long-term environmental changes, such as land degradation, deforestation and water pollution. It is very important to recognize that environmental degradation is a proximate cause of migration, the underlying causes are found in increasing population pressure on land and changing patterns of resource use (Suhrke, 1992, 1994). That is, it is demography and political economy that changes much of the long term environmentally induced migration. Thus, migration is brought about by changes in the development process - it is these processes rather than environmental change per se that are at the heart of the link between environmental change, and migration. There is a growing consensus that points to the increasing strength of environmental push factors, created by social and economic change, especially in the developing countries in Africa and to a lesser extent in Asia. To use only a few figures from the 1990s, it estimated that about 17 million hectares of tropical forests vanish each year, and possibly a billion (US) tons of topsoil are lost. Certainly many thousands of hectares of land lose their agricultural productivity, and increasing water pollution will threaten as much as a quarter of the world's fresh water

supply in a decade. However, these long term impacts are difficult to measure and relate to actual migratory behavior.

Most recently, attention has focused on the role of global warming and its impact on rising sea levels (National Academy of Sciences, 2003 and 2004). Current estimates suggest that sea levels may rise by approximately a meter within this century. With perhaps a half or more of the world's population within 100 km of the coast and much of it in areas of low lying land subject to flooding from tidal changes and more than 30 all the world's largest cities, the implications for population displacement are considerable. Even though global warming and population displacement is often cited as an important aspect of environmentally induced migration, we need to provide some caution on a crisis approach to this possibility. Even in countries like Bangladesh, where a rise in this the level of a meter would generate a population displacement of 13 to 15%. Such a displacement at a steady rate would only generate 200,000 or 300,000 persons moving annually. The figure is large, but in the context of all migration and the large number of new arrivals who annually enter Bangladesh's labor market, it is relatively modest (Suhrke, 1993).

In sum, environmentally induced migration he is not unimportant, but is much less than that induced by social and political conflict, and much of it is from individual natural events (disasters), rather than from slow, environmentally induced change. This is not to say that further environmental degradation and the resulting stress on the environment will not increase the numbers of environmentally induced migrants. "The reality of external and internal migration induced mainly, or partly, by environmental factors cannot be denied (Richmond, 1993, p.2).The next section of the report examines more specifically the size and impact of this environmentally induced migration.

2.3 Environmentally induced migration and the debate about environmental refugees

There is a debate about the term environmental refugee. Although environmental studies have usually emphasized specific natural events and population movement, increasingly there has been attention also to the impacts of pollution, deforestation soil erosion, desertification and other environmental processes on population shifts. In some studies these environmental changes have been framed as disastrous, because they create stress, disrupt normal social processes, and force people to adapt by making temporary or permanent changes in how, where and when they do their everyday activities (Oliver-Smith, 2006). Some have gone as far as to assert that human induced environmental

change, such as desertification, deforestation and soil erosion interacting with natural events (disasters), could force as many as 50 million people to migrate by 2010 (Myers, 1997).

Not all researchers agree about the potential impact of people induced environmental change, and several challenge even the terminology of environmental refugees. Several researchers stress than migration is part of a complex intersection of political, social, economic as well as environmental forces (Wood 2001; Black 2001). The consensus of this work is that *seeking single agent causality in the environment tends to hide the fact that the environment and its resources and impacts are channeled through social, economic, and political factors*. In this conceptualization an environmental disaster is not simply the event itself, but it is the process that sets in motion the post event outcomes of adaptation and adjustment. Forced migration can be a part of the process, but it is not inevitable. Disasters often act as triggers or accelerate his of changes that are already underway. Oliver Smith (1992) cites as an example the several decade-long migration from the highlands of Peru to the coastal cities. The Peruvian earthquake of 1978 accelerated the process, and it was further exacerbated by the fact that disaster aid distribution occurred primarily in the urban areas. At least in developed economies the outcomes of a disaster may be locally damaging, but regionally advantageous to other cities and towns. When hurricane Andrew struck Miami-Dade County in 1992, it cost approximately $30 billion in damage and displaced more than of those of a million people temporarily. About 10% of those migrated permanently, but nearly half moved only a half an hour's drive north, sparking a population boom in the nearby counties. The net loss was soon replaced by additional migration (unrelated to the disaster) to Florida.

The recent experience of hurricane Katrina is yet another example of the complexity of migration responses to environmental disasters. Although the estimates of migration as a response to Katrina exceed a million people, current estimates (2006) suggest that perhaps a half of these evacuations have moved back to the city. Still, it is likely that somewhere between a third and a half a million people will never return to the city. Katrina represents an emerging reality that a combination of increasing urban populations, the occupation of hazardous sites (coasts and low lying areas) are very likely to increase the number and scale of forced migrations in the future. If we add, in addition, the effects of global climate changes, including increased risk of flooding, soil erosion and sea level rise then we have the potential to increase social dislocation. As Oliver Smith (2006) notes, earthquake victims, hurricane victims and all the other myriad

impacted populations who are affected by major natural events, all experience uprooting and relocation and must cope with the consequent stresses, and the need to adapt to new or radically changed environments. Many do indeed adapt to those new environments, and are accepted in a new locations. In some cases, however, there is evidence that social and political conflict can arise from environmentally induced migration. This is the topic of the next section of the report.

3.0 Migration and induced conflicts - state of the art of migration and conflict theory

There is a growing literature on environmental security, conflict and migration. The discussions are reviewed in Lonergan (1999) but it is clear that there is no broad-based agreement on how to link security and migration outcomes. The work that is most relevant to the present expertise is that by the Peace and Conflict program at the University of Toronto (Homer-Dixon, 1991, 1994) and by the Environment and Conflicts Project (ENCOP) in Zurich and Bern. (See Lonergan, 1991, 1999, and National Academy of Sciences 1991). The work by these groups is the only work that provides some scholarly analysis of the potential for conflict as a result of environmental degradation. What are the findings?

3.1 Conflict and migration or migration and conflict?

The thesis underlying the Homer-Dixon (1994,1996) work is that growing populations will likely result in scarcities of renewable resources at the same time that the amount of high quality agricultural land will decrease as will the extent of renewable forests. The widespread depletion and degradation of aquifers, rivers, and other water resources, either from human induced stress or from climatic change, has the potential to produce violent conflicts. The research that Homer-Dixon conducts is focused specifically on developing nations, and it suggests that environmental stress and acute conflict is most likely in those countries where institutional capacity for adapting to environmental stresses is weak. These are the nations that are likely to be the most impacted by the three pre-conditions of scarcity that he views as fundamental in creating conflict. These three pre-conditions are:
>   (1) decreased quality and quantity of renewable resources,
>   (2) increased population growth, and increased per capita consumption,
>   (3) unequal resource access across local populations.

Given these pre-conditions, the Homer-Dixon research identifies two processes that can produce conflict:

(1) ecological marginalization, and

(2) resource capture.

Ecological marginalization occurs when population growth and unequal resource access create migrations to regions that are ecologically fragile, such as steep upland slopes or marginal agricultural areas adjacent to deserts. High population densities in these areas, in association with a lack of knowledge and capital to protect the local resources cause severe environmental damage and eventually endemic poverty. The specific case study reported in the Homer-Dixon research focuses on environment-conflict outcomes in the Philippines, where the government has encouraged the expansion of large-scale lowland agriculture, which in turn has increased the number of landless agricultural laborers. In turn many of these newly landless laborers migrated to the Philippines steep and ecologically vulnerable hillsides where they cleared land to establish subsistence agriculture. Civil dissent has increased in these areas, and they are largely beyond the effective control of the central government.

Resource capture describes the situation in which there is competition between powerful and less powerful groups for the declining quantity or quality of renewable resources. This case study examines the conflicts between Senegal and Mauritania in West Africa where the construction of dams along the Senegal River were designed to regulate the river flow, produce hydropower, expand irrigated agriculture, and provide a river transport to the ocean. While these may be laudable goals, the outcomes led to increased land values along the river and a struggle between power elites for the control all of these properties. Homer-Dixon reports that 20,000 black Mauritanians were forcibly expelled to Senegal from where they launched raids to retrieve expropriated cattle. Diplomatic relations between the two countries were severed, although they have now been restored. He sees it as the interaction of human induced environmental scarcity, degradation of the land resource and population pressure. The investment scheme raised land values and offered the potential for a move to high-intensity agriculture. A powerful élite than changed property rights and resource distribution in its own favor, which produced a sudden increase in resource scarcity for an ethnic minority and the expulsion of that minority led to ethnic violence.

Even though these cases are illustrations of potential conflict resulting from environmental change or environmental stress, they are also conflicts that are embedded

in social and political contexts as well as environmental change. Still, it is correct that poor countries will in general be more vulnerable to environmental change than rich ones, and poor migrants are more likely to be affected than rich migrants. The social and political context is immensely broad and complex and includes patterns of land distribution, family and community structure and economic and legal incentives, including systems of property rights and markets. All of these interact with environmental change, and it is not simply environmental change that leads to conflict. Indeed we can argue that environmental conflicts may manifest themselves as political or social tensions including ethnic and religious conflicts rather than conflicts over resources per se.

INCOP also used case studies to suggest three levels of environmentally induced conflicts.
1.when the environment plays a role between groups within the country,
2.when internal conflicts become internationalized through population displacement, and
3.when conflict arises from the degradation of shared regional environments or shared environmental resources such as river systems.

Clearly it is difficult to make fine distinctions amongst these categories, and the INCOP conclusions stress that social political and economic factors play key causal roles. The environment alone is usually not the sufficient cause of conflict. Their research situates environmental conflict within the social economic and political structure of societies and emphasizes that environmental change is seldom the sole course for those conflicts.

The large body of work by Spillman and Bachler (1995) suggests that environmental degradation and resource depletion may play a number of different and sometimes subtle roles in effecting security and contributing to conflict. In this view, the environmental changes are the background to the tensions in which some other event is a trigger for conflict. Despite the contributions of these authors and the range of case studies the evidence for a direct causal link between environmental degradation and violent conflict remains speculative. While some, including those I discussed above, argue that environmental scarcity can cause violent conflict. Others argue that it overstates the importance of resources and the environment as contributors to conflict. The debate will continue, but for now the consensus seems to be that while

environmental degradation may be a contributor to conflict and insecurity it is embedded in larger political and social processes.

3.2 What kinds environmental change affect human security and cause conflict

All of the research on the broad issue of human security and the environment must be set within the context of three premises. First we must recognize that human perceptions of environments, and the way we use environments, are socially, economically, and politically constructed. Second environmental problems must be addressed from a perspective that encompasses both poverty and inequality. Third, the nation state may not be the appropriate spatial level to examine these questions. Given that context, we can ask what types of environmental change affect human security.

Environmental disasters such as earthquakes, volcanic eruptions, floods and drought have always presented a threat to human existence and their impact has increased as populations of move into vulnerable and disaster prone areas. These immediate effects are paralleled by environmental changes which are slower and less immediate, including effects of resource depletion, deforestation, erosion and climate change. These are more gradual, and the ability to adapt to the slower changes may be possible for richer and developed nations but much more difficult for populations and nations which are impoverished. We can distinguish four levels of changes which have the potential to create migration and conflict:

(1) Natural events (disasters), including floods, volcanic eruptions and earthquakes- all rapid events based on impacts and outcomes. The outcome is a function of the number of vulnerable people in the region rather than the severity of the disaster.

(2) Cumulative changes or slow onset changes including land degradation deforestation, desertification, and climate warming. Included within the cumulative a slow onset change is an increasing concern with water availability, which will soon, if not already affect many countries in the Middle East and parts of Sub-Saharan Africa.

(3) Technological disruptions or industrial accidents are a third form of environmental stress. The two best examples are the nuclear meltdown at Chernobyl and the Union Carbide accident in Bhopal, India in 1987. He is estimated that between 1986 in 1992, there were 75 major chemical accidents, which killed nearly 4000 persons worldwide and displaced over 2 million (however, most of the displacements were temporary).

(4) Development projects, which include dams and irrigation projects, can in turn create forced resettlement. It is estimated that over 20 million persons have been uprooted by development projects in the past three decades and the three Gorges dam project in China is expected to displace over one million persons.

Just how these varying environmental changes will play out in particular settings is as yet unclear but some research by Kasperson and others (1996) suggests that much of the outcome depends on the vulnerability of the region in which the events occur.

4. Environmentally induced migration – future developments

In the end the question is whether, the extent, and where, there is the likelihood of environmentally induced migration and conflict. The "where" is somewhat more easily answered than the whether and extent of disruption induced from environmental stress. A map (Figure 8) of demographic stress (and possible conflict) can be ordered from very high risk (a large youth bulge, rapid urban growth and low cropland or freshwater availability), high risk (large youth bulge and either rapid urban growth or low cropland/freshwater availability) low risk (low cropland or fresh water availability) and no risk (none of the factors). The map is extremely useful in identifying Africa and to a lesser extent the Middle East as primary areas of potential conflict and tension arising from rapid population growth and environmental stress. There are other "hot spots" in Asia and northern South America.
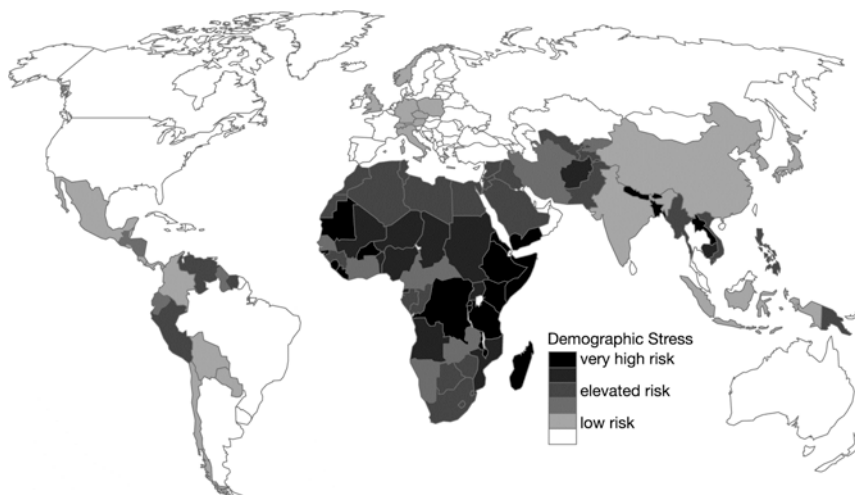

Figure 8: Demographic Stress 2000-2010. (Source: Cincotta, Engelman, and Anastasion, Population Action International, Washington, D.C. 2003)

How likely is conflict (generated from environmental causes) in these regions and what is the potential extent? Of course any such estimate, as we have already established, depends on the strength of the link between environmental change and migration and we have already made it clear that the links are limited. Thus, conflicts generated from environmental change are much less likely than conflicts generated by religious, ethnic and other rivalries. That said, it is clear that environmental stress in the "high risk" nations will likely be a factor in increasing population dislocation and potential conflict. The conflict that arises may be masked as civil strife but the underpinning causes are likely to include environmental change. Twenty-five countries, the greatest number in Africa, have been identified as in the highest risk category of civil conflict in the next two decades and the likelihoods continue on increase over time. All of these countries have low crop land availability per person and half of them have fresh water availability problems and all are amongst the poorest nations in the world. All the countries in the highest level of risk are likely to have civil conflicts in the coming decade.

In sum, the report suggests that environmental stress is likely to be linked to conflict indirectly but significantly. Its impacts will come directly from declining resources and conflicts over those resources and from the tensions created by populations that are displaced or who move seeking improved life chances in other regions. However, most of the conflicts will embed environmental induced conflict under the guise of religious, ethnic of civil conflict. It has been and will continue to be difficult to identify any simple or straightforward links between the environment, environmentally induced migration and conflict.

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