ENVIRONMENTAL MIGRATION – HOW CAN IT BE ESTIMATED AND PREDICTED?

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Abstract

Environmental degradation and resource depletion play a contributing role in affecting population movement, often filtered through contexts of poverty, food deficiency, social inequity and personal insecurity. Some experts declare that number of incidents, that cause people to leave their houses and fields due to environmental problems, is increasing rapidly and they perceive this as a global serious issue. The work explores the subject of environmental refugees as a significant group of migrants, includes definition of the term and explanation main reasons for fleeing the people from their habitats. The international refugee legislation does not recognize the term "environmental refugees "and they can not count with any official material or juridical support of institutions like the UNHCR or government agencies.

The main signification of the paper is contribution to the discussion of some possibilities for estimation of contemporary estimations and predicting the phenomenon of environmental migration in the world. The special view is aimed at analysis of works by Bo R. Döös (1997) and Norman Myers (1993, 1997, 2001a, 200b) as the most important authors interested in the topic.

Keywords: environmental migration, environmental refugees, estimation, prediction.

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1. Introduction

The most frequently quoted determinants which play significant roles in the origin of human migration flows are following:

1. Economic and social determinants.
2. Political determinants.
3. Demographic determinants.
4. Environmental determinants.
5. Psychological (psycho-social) determinants.

We often perceive a mutual causing of some determinants and it depends on which determinant play (or is attributed) more important role.

Environmental degradation and resource depletion play a contributing role

in affecting population movement, often filtered through contexts of poverty, food deficiency, social inequity and personal insecurity. Some authors (e.g. Myers, 1993, 1994, 1997, 2001b; Brown, 2004; Hugo, 1996; Döös, 1997) declare that number of incidents, that cause people to leave their houses and fields due to environmental problems, is increasing rapidly and they perceive this as a global serious issue, especially in the light of analysis of climate change identified by the Intergovernmental Panel on Climate Change as being very likely to occur in this century (McLeman & Smit, 2004, 5).

Who are environmental refugees in reality? They are people who have been forced to leave their traditional habitat, temporarily or permanently, because of some lack of natural resources and/or an environmental disruption that jeopardized their existence and seriously affected the quality of their life. Region is not able to ensure them safe livelihood. By ´environmental disruption´ is meant any physical, chemical and/or biological changes in ecosystem (or the resources base) that render it temporarily or permanently unsuitable to support human life and it can be caused by natural and/or human activity. This often relates to population pressures and poverty in the area. Not all of the refugees flee their country, many being ´internally displaced people´ (compare with LiSER, 2004; Myers 1993: 752; 1994; 1997: 167, 2001b: 609; Leiderman, 2002, 5).

The international refugee legislation - the Treaty of Geneva from 1951 and the Protocol Relating to the Status of Refugees from 1967 - calls refugees "as persons forced to flee across an international border because of a well-founded fear of persecution based on race, religion, nationality, political opinion or membership of particular social group". (UNHCR 2005; UNHCR, 2002) The main conditions are that a person finds himself in a foreign country and does not have legal protection in the country of his nationality in the named individually reasons (compare with LiSER, 2004). For the responsibility for the refugees, correspondent with the treaty, was established the organization United Nations Commissioner for Refugees (UNHCR). Both (treaty and organization) were established more than fifty years ago and originally were meant for the huge number of displacement people after World War II.

Many critics argue that conditions have changed during the last few decades. There are, at least, two reasons for making changes – categories persons called "internally displaced people" and "environmental refugees" because at this moment the international law does not recognize them as refugees and they can not count with any material or juridical support of institutions like the UNHCR or government agencies (compare with Black, 2001, 1; LiSER; UNHCR, 2002;).

The debate about issue "environmental migration" and the possibilities of its predicting is becoming more frequent in scientific as well as humanitarian field. The current prognosis of extent of the phenomenon are based on estimates more than significant evidences, in spite of this is essential do not underrate the impacts of environmental changes and depletion of natural resources on movement of population from the view of international security (compare with Rábelová, 2000: 7). In the future "the refugees may be forced to move considerably farther away from their country of origin" (Döös, 1997: 41). For this reason seems to be important

to deal with predicting environmental migration and identifying vulnerable regions and future "hot spots" of insecurity and potential environmental migration/refugee pressure.

2. Domain of research, methodology and goals

The domain of the research is the subject for finding the possibilities of estimation and prediction of environmental migration phenomenon. The main used method is analysis of selected research works, which are specialized on the issue and the discussion the most important facts from the materials. The main goals of the work is presentation of the main approaches and discussion in the issue of prediction or estimation of environmental migration phenomenon in the future, especially the works by Bo R. Döös (1997) and Norman Myers (1993, 1997, 2001b). These works are most frequently cited in articles interested in the issue of environmental migration.

3. Estimation of number of environmental refugees in contemporary research works

For the 1995 year, Myers estimated number of at least 25 million environmental refugees in the world, and predicted their increasing magnitude in the future (Myers, 2001b: 609; see also Myers 1997). Out of the 25 million environmental refugees, there were roughly five million in the African Sahel, another four million were in the Horn of Africa including Sudan. In other parts of Sub-Saharan Africa seven million people had been obliged to migrate in order to obtain relief food (Myers 2001b: 609).

In China, at least six million environmental refugees were recognized, if they have been forced to abandon their farmlands due to shortages of agricultural plots. In Mexico, there arise one million new environmental refugees each year. "Some become assimilated in cities, and a few return home, leaving a cumulative total, as a bare minimum in 1995, of two million" (Myers 2001b: 609).

Finally, there are those people displaced involuntarily by public works and development projects, notably large dams, which are increasing by 10 million every year (with a cumulative total of 50 million in China and India alone). Most of them resettle elsewhere, but the number remaining in a refugee-like situation totals one million (Myers 2001b: 609; compare with WCD, 2000: 102-104).

Myers claims that his estimate of 25 million environmental refugees for 1995 year is cautious and conservative. In whole developing world are 135 million people threatened by severe desertification, and 550 million people subject to chronic water shortages. "Although certain of these people will have been included in the figure of 25 million, many could have been driven to migrate without being counted as environmental refugees" (Myers, 2001b: 610).

The number of 25 million environmental refugees Myers compared with a figure of 22 million traditional refugees (it means corresponding with

international refugee legislation or supported by UNHCR) in 1995 (Myers, 1997: 167). While the total number of refugees under the mandate of UNHCR is slowly declining – UNHCR registered 19.8 million refugees at 1st January 2002 and 20.6 million refugees at 1st January 2003 (UNHCR, 2003; UNHCR, 2004) – the number of environmental refugees may well double by the year 2010 if not before. "Their numbers seem likely to grow still more rapidly if predictions of global warming are borne out, whereupon sea-level rise and flooding of many coastal communities, plus agricultural dislocations through droughts and disruption of monsoon and other rainfall systems, could eventually cause as many as 200 million people to be put at risk of displacement" (Myers, 1997: 167-168).

4. The first approach - the estimation of number of environmental refugees in the future by Norman Myers

"How many environmental refugees can we realistically anticipate in the future—or rather, how many people are likely to become vulnerable to environmental problems that could force them to migrate?", asks Norman Myers (2001b: 610). He answered, that "a still larger pool of potential environmental refugees lies with the phenomenon of marginal people driven into marginal environments. They have been by-passed by development processes: for reasons political, economic, social, cultural, legal and institutional, they have been "marginalized." They comprise around 900 million of the 1.3 billion people who endure absolute poverty with an average cash income of $1 or less per day. Of the 900 million, over 70 per cent live in agricultural areas of very low potential: and of these, 57 per cent try to survive in areas ecologically vulnerable to undue soil erosion, droughts, desertification, floods and other environmental hazards. A proportion of them are over-loading the environmentally fragile areas" (Myers, 1997: 168).

4.1 Outlook for the year 2010

The total estimation of 25 million environmental refugees in 1995 amounts to one person in 225 worldwide (Myers, 1997: 168).
As indicated, there are additional problems closely associated with the environmental factors displacing people. They include population pressures and poverty; food insecurity, malnutrition and famines; landlessness, deforestation and climate change; covering of adequate access to safe water and sanitation; over-rapid urbanization and growing the consumption of water and other natural sources; construction of large dams and other "development" projects; unemployment, social and economic instability; pandemic disease; government shortcomings together with ethnic strife and conventional conflicts; and also exogenous problems such as foreign debt (compare with Myers, 1997: 168-169; Hardy, 2003: 161; Lonergan, 1998; Wang & Ren & Ouyang, 2000).

The population of developing countries is projected to have grown from 1995 to 2010 by well over one billion people, a 24 per cent increase in just 15 years. Sub-Saharan Africa's total will have expanded by some 240 million - that is 42 per cent increase, and the Indian subcontinent's by 377 million – that is 32 per cent increase. The numbers of people in absolute poverty are predicted to swell from 1.3 billion to 1.6 billion and the 135

million people affected by severe desertification could well increase to 180 million in 2010. The populations of water-short countries were 550 million in 2000 and are expected to surge to more than one billion. During the period we can expect shortfalls in food production, especially in Sub-Saharan Africa and the Indian subcontinent (Myers, 2001b: 611, compare with Myers, 1997: 169-172).

In the light of mentioned trends of environmental decline and its associated problems, Myers expects that, probable by 2010 there will be another 25 million such refugees on top of the 25 million in 1995, "if only because the impelling factors will continue to be at least as prominent for the communities concerned ... In fact, the increase could be more than another 25 million because of increasingly degraded environments coupled with growing numbers of impoverished people" (Myers, 2001b, 611).

For a specific instance of the problem's scope to expand, Myers offers the prospect for Sub-Saharan Africa until the year 2010. This is already the region with half of the world's traditional refugees and at least a similar proportion of environmental refugees. Despite some advances in soil conservation (in Kenya and Ethiopia), small-scale agriculture (in Nigeria and Zimbabwe), reforestation (in Tanzania and Malawi), anti-desertification (in South Africa), and population planning (in Kenya, Zimbabwe and Botswana), the outlook is unpromising, according Myers.

The region's population is projected to increase to more than 800 million people, fully 42% more than in 1995. Severe desertification might well affect more than 100 million people, half as many again was in 2000 year. Ten countries are expected to be experiencing chronic water shortages or even acute water scarcity, with collective populations totalling well over 400 million people. Without greatly expanded efforts to tackle the region's lack of development, the index per capita GNP will probably stagnate in real terms at around US$400, or little higher than in 1970.

Most important of all will be the region's incapacity to feed itself. Some 20 countries with a total projected population of 440 million are expected to experience up to 25 per cent shortfall in food supplies, and a further eight countries with a projected 75 million people face more severe deficits. The total number of malnourished people will continue to grow, with at least 100 million (Myers 2001b, 611). Because of its exceptional poverty, the region will be unable to get food on world markets (compare with Myers, 2001b: 611). In early 2000, Sudan had eight million people who were officially considered at risk of starvation, with another six million in Somalia and three million in Kenya, plus several million others in other countries. A large, proportion of these people could be characterized as environmental refugees (Myers, 2001b: 609).

4.2 Outlook for the year 2050

For the estimation of magnitude of the environmental migration in the world for the year 2050 Myers argues with issue of global warming and its impacts of sea-level rise and flooding of coastal-zones, but also to increased droughts and disruptions of rainfall regimes, such as monsoonal

systems. According him the impacts of global warming and climate change could threaten large numbers of people, with displacement by 2050 or earlier (Myers, 2001b: 611).

Preliminary estimates indicate that the total number of people at risk of sea-level rise in Bangladesh could be 26 million, in Egypt 12 million, in China 73 million, in India 20 million, and elsewhere, including small island states, 31 million. At the same time, at least 50 million people could be at severe risk through increased droughts and other impacts of climate dislocations (Myers, 2001b: 611). The total number making 212 million people at risk of climate change in the half ot the century.

In the same year 2001 Myers presented a little bit different figures of the estimation on the lecture at occasion of laureate of the Blue Planet Prize by The Asahi Glass Foundation in Tokyo. The total number of people at risk in a globally-warmed world is 204 million. The number of people at risk of sea-level rise in Bangladesh could be 28 million, In Egypt 15 million, in China 77 million, in India 23 million, in island states 1 million and in drought areas about 60 million (Myers, 2001a). The main difference is in the unclear column "elsewhere" which create approximately 30 million people in previous estimation.

5. The second approach - the possibilities for predicting of environmental migrations by Bo R. Döös

The approach to the issue by Bo R. Döös starts the question "can large-scale environmental migrations be predicted?". His answer, in general, is that are large number of factors that can contribute to the risk of environmental migrations including not only stresses on the environment, but also a variety of socio-economic and political factors. In addition, national and international conflicts and wars can, through feedback processes (destruction of environment or access to natural sources), contribute to cause or amplify involuntary displacement of people. Moreover, the problem of predicting the environmental migration is aggravated by the fact that some of the influencing factors either have a very low, or no predictability (Döös, 1997: 58).

There is a list of selected basic environmental, socio-economic and political determine factors which play significant role in the process of prediction of environmental migration (compare with Lonergan 1998, XI; Döös, 1997: 42-48).

1. Environmental factors

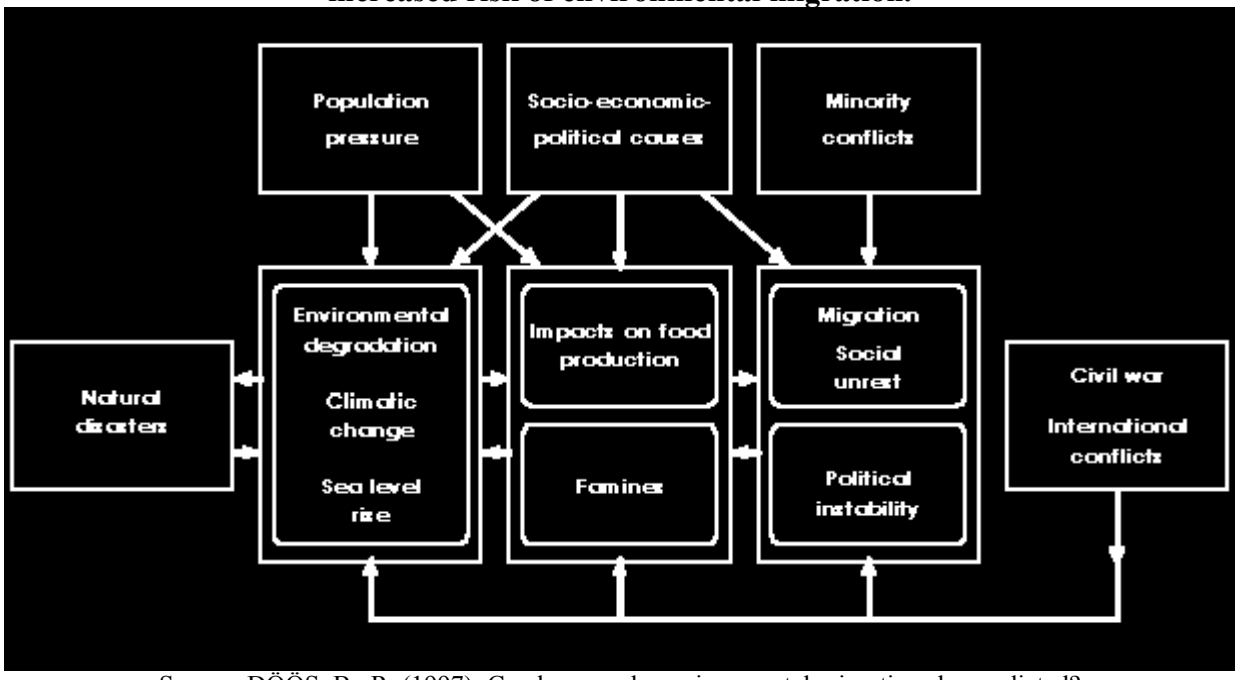
- frequency and intensity of natural hazards (e.g. floods, earthquakes, volcanic eruptions, tropical cyclones);
- intensity and result of climate change (e.g. floods, deficiency of precipitation and drought, tropical storms, crop reduction, food deficiency and famines, sea-level rise);
- degree of environmental degradation and pollution, resources depletion (e.g. lack of safe water resources, air pollution, soil degradation and erosion, desertification, deforestation, area of overfishing or natural resources depletion).

2. Social, economic and political factors

- intensity and result of population pressure (e.g. overpopulation, food and safe water deficiency, environmental degradation);
- significance of social unrest and political instability (e.g. religious intolerance, unemployment, political subversions);
- intensity and duration of economic crisis (e.g. unemployment, external debts);
- number, intensity and duration of conflicts (e.g. food deficiency and famines, ethnic or minority conflicts, civil wars);
- poverty.

The interdependence of some of the factors that can have an influence on the magnitude of a mass displacement of people is given in Figure 1(Döös, 1997: 42-48).

Figure 1: Interconnections between the major factors that can have influence, or reinforce environmental degradation, resulting in increased risk of environmental migration.



Source: DÖÖS, Bo R. (1997): Can large scale environmental migrations be predicted? Global Environmental Change, Vol. 7, No.1, pp.43.

Döös deals with prediction of two types of environmental migration – migration caused by insufficient food availability and migration caused by a rising sea-level.

5.1 Migration caused by insufficient food availability

Döös concludes the following estimates of the predictability of the factors influencing this type of migration (Döös, 1997: 59):

- It might be assumed that a global change of the availability of food per capita can be predicted with a fair amount of accuracy over a period of about one decade.
- For individual regions the predictability must be considered to be very limited. This is evidently particularly the case in drought prone regions where a radical change in the food availability can occur from one year

to another.

- Even if the food availability in a region falls below the level of sufficiency, it may take some years before the stage of famine occurs - "famines do not strike unexpectedly".
- It has to be recognized that no reliable formula exists for predicting migrations following a famine. The experience is, however, that migration is not an early response to a famine. The lag-time may be several years, see the Figure 2.

This figure schematically illustrate the different stages in the development of this type of migration in a given region. The insufficient food availability results in malnutrition and hunger; next acute food shortages culminates in stage of famine; that results extensive migration out of the region. This type of development can be a relatively slow process, lasting much longer than decade. The problem is in prediction whether a given magnitude of food shortage eventually will result in a mass human migration, and whether this will be of temporary or permanent character (Döös, 1997: 57).

Figure 2: Schematic illustration of the different stages in the development of a migration out of a region suffering from insufficient food availability.

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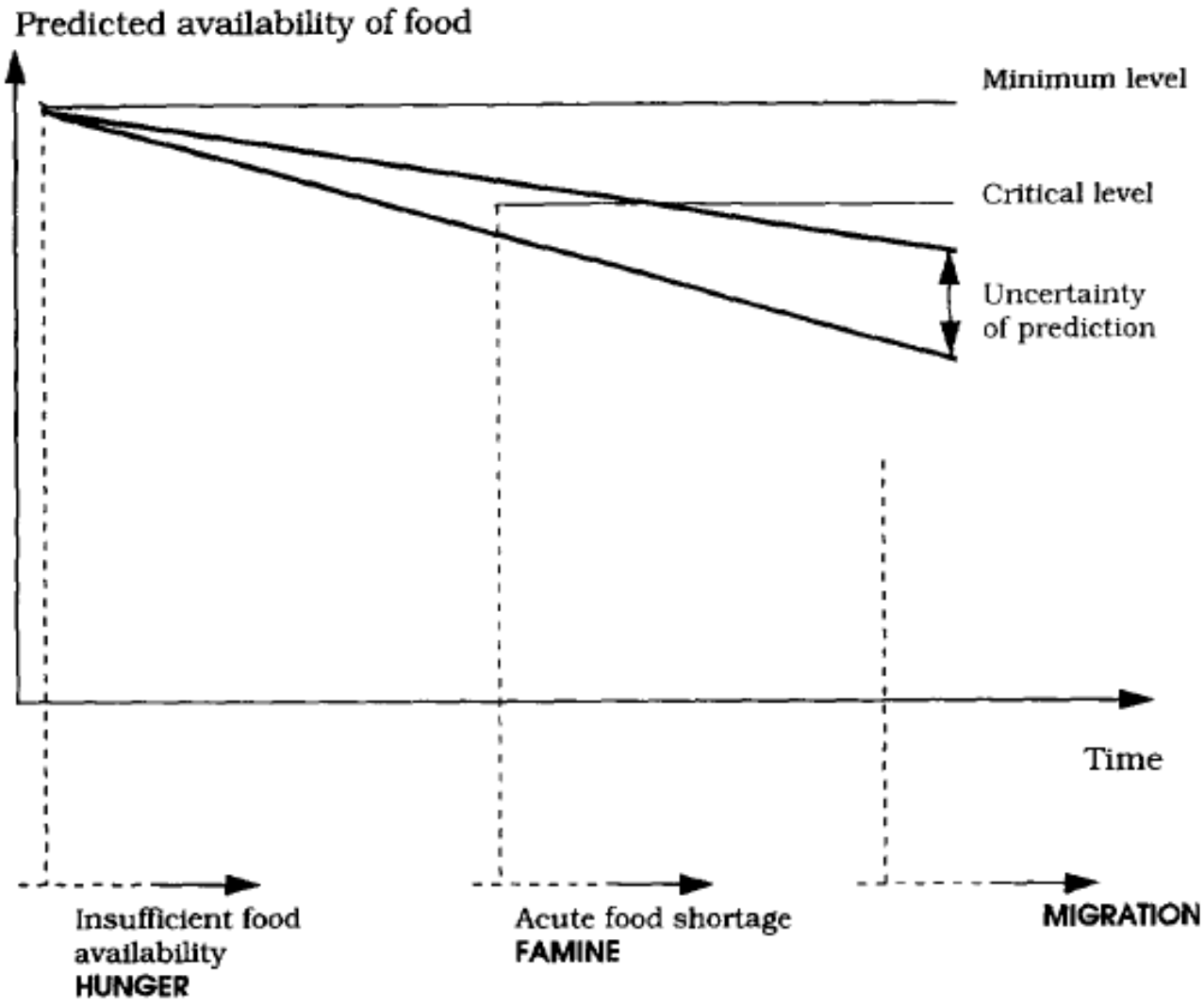

Source: DÖÖS, Bo R. (1997): Can large scale environmental migrations be predicted? Global Environmental Change, Vol. 7, No.1, pp.57.

5.2 Migration caused by a rising sea-level

This type of migration is of a somewhat different nature in the sense that the time-scale of its main driving force is considerably longer (several decades). More specifically it can be concluded(Döös, 1997: 59):

- Despite the statements by the Intergovernmental Panel on Climate Change about the increased confidence in predicting the future rise of the global sea-level caused by a greenhouse gas induced climatic change it has to be recognized that the range of uncertainty is still significant.
- In many densely populated coastal areas the subsidence of land is currently contributing much more to the relative mean sea-level than the rise of the global sea-level, and it can also be predicted with a better accuracy.
- Taking these two points into account, it can be judged that the rise of the relative mean sea-level can be predicted with some accuracy permitting fairly realistic predictions of future migrations in coastal areas where the relative mean sea-level is also affected by local subsidence.
- In contrast to many other types of environmental migrations, the exposed people have no choice but to migrate.

6. Conclusions

The issue of prediction of environmental migration phenomenon is very complex and different answers are existing – concernig how to do it, or if it is possible to do it. This paper presents two different approaches to the specific discussion.

The main disparity between the authors is related to approach to the issue. While Döös presents the methodology "how to do the prediction of environmental migration", Myers "did it" or tried to estimate the contemporary and future numbers of environmental refugees on the base of various environmental, economic, demographic, social and other statistical data. But we have to note, that is quite unclear the process of his estimation or prediction the numbers of environmental refugees extracted from this data. He did not explain that adequately.

The another problem are different statistical data and indicators or their development. For instance, Myers introduce growth of number people in absolute poverty from 1.3 billion in 2000 to 1.6 billion in 2010 (Myers, 2001: 611). The United Nations Statistical Division presents that numbers of people in absolute poverty is estimated on 1.1 billion for year 2005 (UNSD, 2005) and the prediction of the phenomenon is expecting very slow decline for the future.

We can observe that we have very limited opportunity for reaching the definite and comprehensive conclusions due to complexity of the problem and we have to take into consideration very different environmental and socio-economic and political determine factors which come in to play and

interact with each other (compare with Lonergan 1998, XI; Döös, 1997: 41). For some factors such as population growth, famines, food security, deforestation, drought, precipitation, conflicts and wars, religious intolerance, unemployment, poverty and wage differences, etc, we have developed suitable theories and models.
But at some factors are difficult to quantify and possess a very limited degree of predictability and for this reason it cannot be expected that their integrated effect can be predicted with a high degree of accuracy.

With regard to the various types of environmental migration, there are compelling reasons to claim that some of the types can be predicted with sufficient reliability (e.g. droughts and deficiency of safe water, desertification and soil degradation, famine and food insecurity, climate changes, sea-level rise, environmental pollution, construction of large dams or irrigation canals, mining natural sources, unemployment, etc.), some of them with very limited reliability (floods, tropical cyclones, conflicts and wars, political instability, etc.), some of them are not predictable (earthquakes, volcanic eruptions, landslides, nuclear or industrial disasters, etc.)

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