Climate change, water stress, conflict and migration

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Papers presented at a conference

held on 21 September 2011 in The Hague, the Netherlands

Text editing
Michael R. van der Valk and Penelope Keenan

Design
Michael R. van der Valk | CrossVision

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Conference summary

Karin Thomas, Marguerite de Chaisemartin and Michael van der Valk

The symposium – held on 21 September 2011 at the International Institute of Social Studies, The Hague, The Netherlands – was opened by the Chair, Mr Marius Enthoven, Chairman of the Alliance for UPEACE. He requested a moment of silence in remembrance of the late Mr Mahmoud El Zain Hamid, a professor of the University of Peace (UPEACE), and honoured his efforts and commitment to sharing knowledge.

Mr Enthoven announced the opening of a UPEACE office in The Hague in 2012.

Session 1 – Introduction to the symposium

Professor Rolain Borel, PhD, of the Department of Environment, Peace and Security at UPEACE, San José, Costa Rica, provided an update on UPEACE in Costa Rica, highlighting the multicultural student body and its positive impact on the learning environment. Through a series of cartoons on climate change, the message was clear: today not everybody sees the urgency, and the ones who might see it talk instead of taking any real action.

Mr Borel went on to stress three key associations that require further consideration: climate change and human rights, disaster prevention and research, and disasters and conflict data. Closer links

Karin Thomas is director of Thomas Consulting – Responsible Investments, Tilburg, the Netherlands. **Marguerite de Chaisemartin** is legal consultant at UNESCO's PCCP programme (From Potential Conflict to Cooperation Potential). **Michael van der Valk** is Scientific Secretary of the Netherlands National Committee IHP-HWRP, the Dutch governmental advisory body for the intergovernmental water programmes of UNESCO and WMO.

between climate change and human rights need to be identified, including the right to live and to migrate. He also questioned why migrations are often considered negative. Disaster prevention could feature more prominently in policy-making agendas for climate change, and disasters should be used as a learning tool. Proper data of disasters and conflict is also necessary to ensure good research in this field.

Major-General (ret.) A.N.M. Muniruzzaman, President of the Bangladesh Institute of Peace and Security Studies (BIPSS), Dhaka, Bangladesh, began his presentation by showing the international response to climate change by citing the UN Security Council (20 July 2011) and the UN Secretary-General Ban Ki-moon.

Since Bangladesh is trapped between the Himalayas in the north and the encroaching Bay of Bengal to the south, it is vulnerable to natural disasters due to the frequency of extreme climate events and its high population density. The impacts of higher temperatures, more variable precipitation, more extreme weather events, and sea-level rise are already felt in Bangladesh and will continue to intensify. Climate change in Bangladesh will induce water crisis and large-scale migration and thereby reinforce present trends of instability and conflict while at the same time draw new lines of conflict. For Bangladesh there is no time to talk about climate change anymore, action is needed. 35 Million people are becoming climate migrants, and Bangladesh itself will be too small to accommodate all these migrating people. Migrating people from Bangladesh want to go to India, but they currently risk being killed if they are seen close to the Indian border as India wants to prevent Bangladeshi people from entering their country.

Mr Muniruzzaman put forward two kinds of securities that are needed in reacting to climate change:

1 *Hard security*: socio-political and economic unrest, radicalization and terrorism, resource conflict, inter and/or intra-state conflict potentials, State collapse, and regional conflicts;

2 *Human security*: water, food, livelihood, health (including water borne diseases), disaster, and energy.

In relation to environmentally induced migration, Dr Tamer Afifi of the United Nations University, Institute for Environment and Human Security, Bonn, Germany, identified three types of migrants:

1 *Environmentally Motivated Migrants* who 'may leave' a steadily deteriorating environment to pre-empt the worst;
2 *Environmentally Forced Migrants* who 'have to leave' to avoid inevitable and grave consequences of environmental degradation;
3 *Environmental Emergency Migrants* who 'flee' the worst of an environmental impact to save their lives.

Mr Afifi showed different case studies from Lake Chad, Mexico, Guatemala and Niger. In Niger, seasonal migration – cattle herding – has become permanent and migration is now crossing the national borders. Drought led to deforestation and overgrazing the land, which led to land degradation. Due to this land degradation the sand siltation also increased, thus negatively impacting lakes and fishes, so fisherman also had to migrate. Canals are now being dug by women and children. The Government is trying to increase water levels to promote fisheries and to attract men to the region again. Mr Afifi mentioned land ownership as a tool against migration: if people owned the land instead of renting it, they would stay longer at a certain place instead of becoming a migrant. He also argued that language has an impact on migration.

The Chair opened the floor for discussion.

Mr Muniruzzaman was asked whether situations of non-climate change, and where the situation is already difficult, should not also be taken into account. He responded that indeed the potential for problems already existed but climate change made it worse, therefore the two situations are overlapping. When asked whether these challenges would not be a solution in disguise for downstream countries as enormous floods would be made available to them, he

said it is not true for glaciers and deltas, as the solution of storing water is not feasible ecologically. When his argument for building the capacity of the military was questioned, he explained that this is important for fragile countries with weak institutions and that – in consideration of the time required for capacity-building – it is important to start the process in advance to be prepared. The military has to be considered as a capacity of the State and all capacities of the State need to be involved.

According to Mr Muniruzzaman the pending climate-induced migration from Bangladesh calls for a regional and international framework. He questioned the internal capacity of India, as an already overcrowded country, to absorb millions and millions of people. He also referred to the planned electrified fence between Bangladesh and India as an illustration of the tensions and suspicions regarding climate change migrations, and an issue that should be considered at the level of the whole region.

In addressing a question on water as a tool of power manipulation, Mr Muniruzzaman recalled that riparian countries are not considered equally in the region, where India is one of the two hegemons with China. He highlighted however China's increased receptivity to regional negotiations related, among others, to ecological considerations.

Mr Borel was asked on the issue of climate change migration and if it was to be seen from the point of view of the State or of human rights. He recalled that indeed negotiation mostly concerns State interests, and that the security of the people opposed to state security must be put forward. He maintained that greater political will and building a framework at the transboundary and regional level is needed to avoid a destabilizing crisis. South Asia is a high-risk region where the symptoms of tension in this nuclear zone would be very risky.

Session 2 – Different perspectives of the symposium theme
(Moderated by Mr Wouter Veening, Chairman of the Institute for Environmental Security, The Hague, Netherlands)

Dr Michele Nori, Programme Officer at EuropeAID of the European Commission (Brussels, Belgium), highlighted three main issues: (a) the uncertainty and unpredictability of climate change; (b) the need to increase capacities to access services in the Horn of Africa and Sahara region; and (c) the fact that climate change, although well known, is not recognised as the main problem by people in the region. While the agricultural system that best deals with climate change is pastoralism, this system however now has to deal with extreme poverty. In the Horn of Africa, pastoral people suffer from decreased access to territories, markets and to services that would lead to diversity. For them, climate change – like drought – is not the problem, it is these other restrictions.

Dr Karen Witsenburg, Policy Advisor at Both ENDS (Amsterdam, the Netherlands) said that research shows that the number of violent incidents was higher during the wet season than during the dry season, with a low during extreme drought. She added that there is no evidence that climate change will lead to violence and insecurity. Climate change may be related to natural disasters and violence but climate variability is less harmful than natural disasters. Ms Witsenburg underlined that people are more inclined to cooperate in times of scarcity, not the contrary, and that people live in marginalized areas, drought and flood-prone areas, not because they are poor but because they were initially already marginalized because of political issues. They should therefore be called political refugees instead of climate change refugees.

Mr Joep van Mierlo, Director of Vétérinaires Sans Frontières (Brussels, Belgium) stated that a good farmer will never deteriorate his own land, unless there are political, economical, or environmental obstacles. Water is not an issue, but access to water is. He referred to a vaccination programme for children in Sudan by UNICEF and Médecins Sans Frontières. In this case, pastoralists did not want to have their own children vaccinated if the livestock

was not healthy – if the livestock died then children would have nothing to eat. He stressed the importance of preserving indigenous knowledge, substantiated by external knowledge. Pastoral field schools have been developed.

Early warning systems – ones that predict drought – are highly important. Early warning response is needed, to move away from reacting to a problem to preventing a disaster from happening. The situation in the Horn of Africa is a case in point; the disaster was known a year beforehand (pastoralists had been gone further – and longer – away with their herds, leaving woman, children and elderly people) but nothing was done. The amount of the aid to pastoralism also needs to be readjusted, as pastoralism is an important contributor to the wealth of the nation but only receives 1% of aid.

Dr Thanh-Dam Truong, Associate Professor of Women, Gender and Development Studies at the International Institute for Social Studies (The Hague, the Netherlands), suggested that there are too many assumptions concerning migration and greater emphasis needs to be placed on how we understand migration. Sometimes something is called migration, while it actually is 'moving'. She also underlined the huge issue of human trafficking in Southeast Asia. Science has the capacity to predict, and therefore it is an important element in informing proper decision-making.

Dr Maarten Kappelle, Chief Conservation Officer for Biodiversity at WWF Netherlands (Zeist, the Netherlands), mentioned sea-level rise and the related issues affecting forests, droughts, flooding and declining fish stocks. Greater emphasis is needed on risk management, and consideration of the environmental, economic, political or social issues. Mr Kappelle identified several case studies of the impact of climate change on wildlife: in India, where moving wildlife has put pressure on the people in local villages as their wildlife is leaving their territories; in the Pacific, where coral bleach has a great impact on local fisheries and the tourism industry; in Borneo, where forest droughts have led to the endangerment of Orangutans; and in Mozambique, where the man-made dam of the Sambesi River that provides South Africa with hydro-power has

impacted eco-tourism and agriculture in the region. Mr Kappelle mentioned solutions could include implementing a Climate Change Adaptation strategy (a report has been published); reforestation, using mangroves; and a tourism programme with sea turtles.

Session 3 – Preparation for afternoon group work

Mr Alexander Flavell, Policy Liaison and Project Development Coordinator at the International Organization for Migration (Brussels, Belgium) focused on the legislation and policy challenges associated with climate change and migration. He claimed that the human security approach is the best way to address security, starting from the individual perspective: physical, food and water.

Session 4 – Group discussion on recommendations

The participants broke into four working groups to discuss and formulate recommendations on the following four areas:
Group 1: Legal
Group 2: Policy
Group 3: Capacity development
Group 4: Best practice

Session 5 – Symposium recommendations

Group 1: Legal recommendations
(Presented by Ms Mariëlle Matthee, Associated Researcher at T.M.C. Asser Institute, The Hague, the Netherlands)

1 Define the 'environmental migrant' in practical terms.
2 Climate change should be included in international law as a threat to peace and security.
3 The UN Security Council should include climate change threats to peace and security within its mandate as a high priority.

4 The UN should take the initiative to establish the rights of environmental migrants, thereby ending the ongoing discussions as to whether this can be best achieved through a new convention, a protocol under the 1951 Refugee Convention, by reinterpreting the current refugee regime or through incorporation into the UNFCCC regime.
5 A legal framework for environmental migrants should contain a set of principles for rights and duties, acknowledge different categories of environmental migrants, and designate institutions for dealing with environmental migrants.

Group 2: Policy recommendations
(Presented by Mr Wouter Veening)

1 The challenge of environmental migrants has to be identified locally and regionally in time and space in order to facilitate preventive actions and adaptation by governments, businesses and other parties involved, by setting up early warning systems and constructing easy to read risk maps.
2 All countries vulnerable to considerable adverse effects of climate change should prioritise prevention and risk reduction in their development policies, disaster relief programmes and management of their ecosystems.
3 The UN should continue to promote the development of arrangements for local and regional eco-services and disseminate the results of practical application of eco-services as preventive measures against adverse effects of climate change.
4 The UNFCCC climate change negotiators in Durban (November 2011) should be encouraged to make progress on the Cancun Adaptation Framework in order to make timely and appropriate instruments available to prevent conflicts from climate change and to be able to deal with large-scale environmental migration.
5 Use the financial crisis as an opportunity to come to new forms of global social and ecological solidarity.

Group 3: Capacity development recommendations
(Presented by Mr Michael van der Valk, Scientific Secretary, National Committee IHP-HWRP (UNESCO and WMO), the Netherlands)

1 National governments and international development agencies should mainstream climate change and adaptation policies in order to prevent disaster and conflicts from the effects of climate change, and employ unorthodox ways of learning and training to build capacities in the various components of their societies for handling these effects.
2 Governments, in cooperation with NGOs, scientists and other stakeholders, have an active role to play in raising the awareness of their population about climate change and water stress and what can be done to manage the adverse effects. A carefully designed approach is needed to engage the population, appealing to their aspirations and with clear actions.
3 Governments should implement policies that guarantee equal access to water resources in dealing with the effects of climate change. When countries share water resources they should create mutual agreements with institutions to provide fair water management and avoid conflicts.

Group 4: Best practice recommendations
(Presented by Mr Henk van Schaik, Programme Coordinator, Cooperative Programme on Water and Climate, The Hague, the Netherlands)

1 The UN (UNEP, UNDP, UNU, UNFCCC) together with other relevant bodies should collect and codify best practices in the area of mitigating the adverse effects of climate change (water stress, conflict and migration) and make them easily accessible.
2 The following cases are recommended as an example for developing specific best practices:
   i Disaster preparedness, resilience building and poverty alleviation: policy initiatives by the Government of Mozambique;

ii Community-based disaster management: Red Cross and Red Crescent experiences in the Philippines;
iii Early warning systems: climatic alarm experiences in Bangladesh involving large groups of volunteers;
iv Water security: irrigation system investment programmes by the Indian Government, and recent experiences with equal access to water policies in South Africa.

Session 6 – Closing remarks, short reflections on the day and next steps

Mr Borel expressed his interest to incorporate the following elements into teaching at the University for Peace:

1 Develop learning related to displacement and migration due to climate change.
2 Prepare graduates to work in a variable, uncertain, unpredictable environment.
3 Encourage students to be aware of assumptions (which may not be true).
4 Foster greater inclusion of law department.
5 Emphasise risk reduction and adaptation.
6 Identify cooperation at local, international and multi-levels.
7 Strengthen capacities for leadership for change in conjunction with social networks, and awareness of the structural frameworks needed for these human resources to be effective.
8 Encourage students to "wiki" their experiences on climate change.

Mr Muniruzzamans' closing remarks comprised of five clear messages:

1 Acknowledge the urgency of the issue.
2 Involve and train the next generation to prevent climate degradation.
3 Develop a broad vision in conjunction with local, regional and global approaches.
4 Appeal for implementable practices.
5 Encourage a wider dissemination of information.

Mr Afifi recalled that natural disasters not only affect developing countries, referring to the tsunami in 2004 and hurricane Katrina. This increases the awareness of the problem, and involves more and more people in the debate. Action is needed.

Mr Enthoven thanked the participants and concluded the symposium. He announced that the recommendations will be published in hardcopy format and online.

Climate change, water stress, conflict and migration

Taking stock of current insights through a vulnerability lens

Leon Hermans

Introduction

There is a growing awareness in international policy circles that climate change may be a driver of increased migration flows. In addition to political refugees and economic migrants, climate change-induced migration and environmental migrants are increasingly recognized as categories in human migration. As climate change-induced migration is a relatively new phenomenon, there is little established policy or legislation on how to deal with the associated pressures and how to address the needs and rights of environmental migrants. International decision-making on climate change and its impacts would need to address these new emerging issues.

A prerequisite for well-informed international and national decision-making on climate-induced migration is a better understanding of the phenomenon. It is plausible that the four terms of climate change, water stress, conflict and migration have causal linkages, but the exact nature and direction of these linkages are likely to be context-dependent and difficult to assess (Institute for Environmental Security, 2011). Furthermore, it is plausible that climate change-induced migration causes vicious cycles, whereby climate change leads to water stress, which leads to conflict, which leads to more migration, which leads to increasing pressures on

Leon M. Hermans, Faculty of Technology, Policy and Management, Delft University of Technology, P.O. Box 5015, 2600 GA Delft, The Netherlands, e-mail: l.m.hermans@tudelft.nl.

water resources , thus increasing water stress and conflict, which in turn further fuels migration, and so on.

The two aspects of international decision-making and a better understanding of the associated phenomena, were the subject of the symposium, 'Climate change, water stress, conflict and migration'. This paper reviews and discusses some of the main results of this Symposium. The paper starts with a review of the current understanding of climate change induced migration, and the role that water stress and conflict play in this phenomenon. This review follows the Symposium contributions that addressed three aspects: (a) the realities on the ground; (b) the international policy responses; and (c) the current state of understanding. This review is followed, in the second part of this paper, by an attempt to put this debate in a more theoretical perspective. Although based on cues given by Symposium speakers, the second part of the paper also goes beyond the Symposium contents. Literature on vulnerability is explored and linked to livelihoods frameworks as a promising way to further our understanding of the links between climate change, water stress, conflict and migration. Finally, returning to the Symposium's presentations and discussions, the implications for policy-making are addressed.

1 Taking stock of realities on the ground, international policy responses and (limits to) current understanding

Realities on the ground: the case of Bangladesh

A good way to start a review of current knowledge on the links between climate change, water stress, conflict and migration, is to look at these four terms and their linkages for specific countries. To this end, the presentation and discussion of the situation in Bangladesh is instrumental. Available evidence, facts and trends on the situation in Bangladesh clearly suggests a degrading cycle exists between climate change, water stress, conflict and migration (Muniruzzaman, 2011).

Due to its location, Bangladesh is vulnerable to the impacts of climate change on Himalayan glacier melting. As the origin of the

major rivers that run through the country, glacial melting may change the future flow regimes in rivers from perennial flows to seasonal rivers. Also, Bangladesh suffers from the impacts of climate change on sea-level rise, which will affect the safety and salinity in its coastal regions. In addition to these 'slow but steady' changes in longer-term patterns, climate change will also lead to an increased occurrence of extreme weather events, in a society already plagued by such events under the current conditions. Added to this mix of 'soft' security concerns related to water, food, and livelihood security, are the 'hard' security concerns. These 'hard' security concerns are related for instance to risks of radicalization, socio-political unrest and intra- and interstate conflicts. For instance, there is a conflict between Bangladesh and India over the construction of dams in some major rivers, at locations upstream of Bangladesh (Muniruzzaman, 2011).

This makes Bangladesh one of the loci where part of the current projections used by IPCC, International Office of Migration and others will materialize: 'It is estimated that by 2050, 150 million people could be displaced by climate change related phenomenon like desertification, increasing water scarcity, floods and storm etc.' Indeed: 'Large-scale migration will add extra pressure on the scarce resources in Bangladesh and thereby heighten competition and conflict over resources. Intra-regional forced migration, such as those from Bangladesh to India is subject to stimulate bilateral tensions' (Muniruzzaman, 2011).

International policy responses

Given these international dimensions, it is clear that climate migration matters would also need to be addressed between countries at the regional level, and not left solely for national and local governments to cope with. A first step towards such international policy responses would be the international recognition of an increased flow of climate migrants as a real and important consequence of climate change. A review of current international law and treaties on migration, refugees and displacement, shows that environmental refugees and climate change-induced migrants are

not recognized yet (Flavell, 2011). The existing treaties and conventions provide a basis for certain rights and protection for persons that are displaced due to natural hazards, but environmental migrants as such can claim little structural protection under international law. Even if migration and mobility may be considered a human right, the protection of this right is not explicitly arranged under current laws and treaties. In this regard, the recognition in the UNFCCC Cancun agreements that climate change may induce displacement and migration should be considered a helpful starting point and building block: 'Measures to enhance understanding, coordination and cooperation with regard to climate change induced displacement, migration and planned relocation, where appropriate, at national, regional and international levels.' (para. 14f, COP 16 Cancun / Mexico, December 2010).

Understanding migration as a multi-faceted phenomenon

The development of such formal policy responses, both internationally and nationally, is complicated by the fact that migration is a multi-faceted phenomenon. Human migration has multiple causes, of which environmental factors are just one. Recent research by the United Nations University and others shows that various factors play a role in households to migrate including:

- Profession (mainly farmers and cattle herders);
- Attachment (land ownership, family, history);
- Cultural issues (e.g. language);
- Financial means;
- Alternative livelihoods in other villages/regions;
- Pull factors in villages/regions/countries of destination (Afifi, 2011).

This is in line with other reports, such as the assessment report on environmental migration published by IOM in 2009 (Laczko and Aghazarm, 2009, p 48):

"It is generally agreed that the key drivers of migration are:

a factors related to the region or country of origin, including political instability and conflict, lack of economic opportunities, and lack of access to resources ('push' factors);
b factors related to the region or country of destination, including the availability of employment and demand for workers, higher wages, political stability or access to resources ('pull' factors);
c intervening factors that facilitate or restrict migration, including ease of transportation, family or social networks, government immigration or emigration policies, economic ties such as trade and investment linkages, or social and cultural exchanges.

However, what is not so clear is how these different factors interact with each other to inform migration behaviour or, more importantly, for the purpose of this chapter, the extent and magnitude of the role that the environment plays in these decisions".

Thus, the influences of climate change and environmental drivers are difficult to isolate from other influences on the decision to migrate. Current knowledge is also not clear on causes and consequences related to intermediate parts in the causal chains that connect climate change and migration, such as water stress and conflict. For instance, an often heard assumption is that water stress would lead to more conflict. Possibly, the relationship between water stress and conflict may be another. There is a lot of evidence that suggests that conflict is less likely in areas under stress, but instead, conflicts are more likely in areas that have resource to fight over (Witsenburg, 2011). A special issue of the Journal Peace Research suggest that there is more violence in time of abundance. Also a more generic link between climate change and conflict is difficult to prove, as supported by the data from the database of the Peace Research Institute in Oslo (Witsenburg, 2011).

Even if we set aside the difficult questions of cause and effect, the sheer size of the terms in the equation are also insufficiently known. Few data are available on the size of the current problems (Truong, 2011). What is the size of environmental migration flows? Forecasts vary between 25 million to 1 billion climate migrants by 2050, with the most often cited projections suggesting as much as 200 million climate change-induced migrants by 2050 (Laczko and Aghazarm, 2009). But even if cited by the IPCC, IOM and the Stern Review (see IOM, 2008, p.11-12), they

are forecasts and not established facts. As a recent publication puts it, citing these projections again and again, does not make them more (or less) accurate (reference unknown). What is needed is sound monitoring information on the size of current flows and their development over time.

The absence of such information regarding international climate change-induced migration flows points to another way in which international decision-making is linked to a better understanding of the underlying phenomena. Not only is a sound understanding needed for decision-making, there is also some sort of a 'chicken-and-egg' problem: in the absence of an internationally agreed definition of environmental migrants, measuring quantities becomes troublesome (Afifi, Douma, Truong, 2011).

Realities on the ground: pastoral livelihoods and access

A better understanding of the links between climate change, water stress and migration can also be obtained from looking at more traditional types of migration in response to water stress. Water stress is expected to increase as a result of climate change, but it is not a completely new phenomenon. Likewise, migration in response to water stress is not new. Pastoral livelihoods are a prime example of a livelihood that uses migration, or mobility, as a key element in a (rural) livelihood strategy. Although often mistaken for a primitive transitional livelihood activity, it is actually a 'skilled and tailored way to produce food in environments where water is in deficit', (Nori, 2011).

If one takes a closer look at pastoral livelihoods and the difficulties encountered by pastoralist groups, it becomes apparent that it is not the physical phenomenon of water scarcity or variability that is causing most problems. In fact, (seasonal) mobility has been developed as a strategy to respond to such variability and local scarcity. It is not resource scarcity, but access that poses problems for pastoralists; access to water, (range) land, but also access to markets, vaccines and knowledge and information (Nori, Van Mierlo, 2011).

Access is difficult. This can be understood by realizing that pastoral activities are often practiced by groups at the margin of society, in effect marginalized groups. The marginal lands used by pastoralists are furthest from the capital cities that are typically located in the 'green' areas (Nori, 2011). Furthermore, the causality is not clear: were pastoralist gradually marginalized because of their distance from the power centres, or were they marginalized groups who turned to pastoralism as the only remaining option (Witsenburg, 2011)?

Sometimes access is modified by (new) national laws and regulations. Access to markets may be restricted by national regulations, such as in Ethiopia, where selling animal proteins to Saudi Arabia is not allowed, even if it is more lucrative (Nori, 2011). Traditional grazing grounds may be claimed for other uses, such as national parks or for the development of large irrigated farms. The state declares authority and then leases out land to private companies, either for growing food, bio-fuel crops such as jatropha, or because valuable minerals or oil resources have been found (Nori, Truong, 2011). Note that such processes do not only affect pastoralists, but also other groups. For instance, the discovery of oil in the South China Sea was a cause of conflict and migration, forcing fishermen out of their traditional fishing grounds (Truong, 2011). In these cases, physical resource scarcity is not the issue, but rather access and barriers to access.

Access is not only modified by state institutions and regulations, but also by traditional culture within the pastoral groups. For instance, only in recent years a new market in Puntland has developed in camel milk. This was seen as taboo at first, but it is now becoming a booming activity. Subsequently, the role of Somali women in society has changed as women have become more empowered (Nori, 2011). This also points to another aspect: although sometimes referred to as 'traditional', rural livelihoods such as pastoralism are dynamic and subject to change, also without climate change as a driver (Truong, 2011).

Access can not only be restricted, it can also be enhanced. For instance, access to knowledge can be addressed by setting up Pastoral Field Schools. Rooted in the belief in indigenous knowledge,

Pastoral Field Schools have been established following the example of the Farmer Field School concept promoted in past years by the Food and Agriculture Organization of the United Nations (FAO). These field schools are community-based schools located under a tree, where the local participants lead practical research, tests, and solve their own problems with minimal guidance from outside facilitators. Pastoral Field Schools have led, for instance, to the establishment of participatory early warning systems based on local knowledge with a little input from satellites. What is missing, however, is a capacity to respond to such early warnings (Van Mierlo, 2011).

Understanding migration in relation to barriers, borders and boundaries

Access and barriers to access provide a critical link, not only for understanding migration in the context of pastoral livelihood strategies but also for migration in general. Migration is also linked to barriers at a fundamental level. Migration was first used in relation to human migration in the 16th century, clearly associated with the existence of borders (Truong, 2011). Migration is more than simply moving around; migration is, originally, related to borders, and borders pose barriers to migrants. These borders, or barriers, may be national, regional or local, and in existence for a long time or established recently. Finally, it is important to remember that it is not only humans that migrate, but also nature itself, although it does not recognize the boundaries defined by societies. Wildlife migration and the connection of countries through river flows are also essential parts of the preservation of the ecosystems on which much of human livelihoods depend (Kappelle, 2011).

As a cross-border issue, migration poses challenges to the traditional governance systems, as it needs to be addressed at all levels, local, national and international.

Stock-taking: what we know about climate change, water stress and migration

When we look at the realities on the ground, the policy responses and our current knowledge and understanding of climate change, water stress, conflict and migration, we are clearly dealing with complex issues.

- *Realities on the ground* suggest that migration or mobility is an important and growing phenomenon. It may be induced, forced or voluntarily. It may be due to climate change, natural hazards or scarcity of land and water resources, but it may also be caused by other factors, or, typically, a cluster of different factors.
- *Policy responses* are needed, but are problematic. There is a clear need to address the legal rights and responsibilities of environmental migrants in international decision-making. However, the issue of climate change-induced migration also has to be addressed at other levels. Migration has to do with boundaries and with crossing boundaries. This makes it impossible to address migration issues at one predefined level of government.
- *Understanding* the realities is required for sound policy responses, which is both challenging and currently limited. We do not know how large the problems are in relation to climate change-induced migration: the size of environmental migration is unknown, there are no internationally comparable data available on the subject, and the causal linkages between climate change and migration are unclear, highly diverse and location-specific.

In the second part of the paper, we will explore if there are certain theoretical and analytical perspectives that might act as organizing frameworks to develop a better understanding of the realities related to climate change-induced migration and water stress. Following this more theoretical exploration, we will then return to the policy implications, which should help to cope and respond to the realities on the ground.

2 Exploring a vulnerability lens to organize understanding of climate change, water stress, conflict and migration

Making sense of climate change induced migration: choosing a perspective for learning

Faced with a complex problem such as climate change-induced migration in relation to water stress, problem framing becomes a critical issue (Enserink et al., 2010). How do we look at climate change-induced migration? Do we frame it as a problem of international migration flows? As a pastoral livelihood issue? As a water security problem? As a 'hard' security issue? A legal issue? A wildlife conservation problem? It will be clear that looking at any one of these problems can provide useful insights. But it will be difficult, perhaps sometimes even impossible, to connect and reconcile the insights that emerge from these very different ways of framing the problem.

At the Symposium, different contributions were made, illuminating different problems in relation to climate change, water stress, conflict and migration. If we want to make sense of the relations between these problems and issues, we need to choose a perspective, an angle from which we will connect different problems at different scales. During the Symposium, a suggestion was done to further explore these issues by using a 'disaster' perspective (Borel, 2011):

> *"Processes of disaster can serve as a proxy or model for approaches that will be needed to anticipate and respond to impacts of climate change, and its variability and impact on people. Right now disaster provides us with a good model. Some of the common elements are:*
> - *Need for preventive action – prevention is cheaper than response. In principle, states have an obligation to cover the whole cycle of protection, not only the response side. But most governments emphasize the flashy side of response rather than prevention;*
> - *Need to understand better the whole package of risks that vulnerable people are exposed to. Overcrowding, local violence, domestic violence, policy violence, landlessness, joblessness, political exclusion, etc. This is the risk in which most of the human*

population lives today. And it is the reason why the risk of climate change doesn't appear at the forefront of priorities.

- *Challenges to monitor, detect and account for many small events. Concerning disaster response, large disasters (earthquakes, tsunamis) call for international attention, but many small events account for the majority of total suffering. It is difficult to account for all these small elements, but they are very important to understand what's going on."*

Looking at disasters through a vulnerability lens

Taking 'disasters' as a starting point, we can see that the literature on disaster management, risk management and vulnerability is diverse. However, there are also some clear overlaps. From a cursory reading of this literature in relation to water stress and climate change, especially the ongoing discourse on vulnerability, adaptation and resilience is relevant. Vulnerability requires an adaptation strategy or coping mechanism. Groups that are vulnerable to certain pressures, such as climate change-induced water stress, may choose to migrate in response. Or, if there are no other options, they may be forced to (temporarily) migrate as a coping mechanism. Often the most vulnerable groups have no alternative for dealing with disaster, and if disaster hits them, they are left to the mercy of nature and society. Therefore, in the following sections of this article, we will explore the meaning and potential of using a vulnerability perspective to understand climate change, water stress, conflict and migration.

Research on vulnerability has evolved from different traditions. The point that vulnerability does not necessarily have to do with a physical scarcity of resources, but with access to those resources, is directly in line with the key notions in one of these traditions: the entitlement approach (see Adger, 2006). In this tradition, entitlements explain such things as food insecurity and conflict. This entitlement approach has been put forward by Amartya Sen in the 1980s, whereby entitlements are 'the set of alternative commodity bundles that a person can command in a society using the totality of rights and opportunities that he or she faces' (Sen, 1984, as cited in Adger, 2006).

Other important traditions, as posited by Neil Adger, are the approaches rooted in the physical sciences and engineering, whereby risks of natural hazards are conceived as 'probability x impact'. This tradition often interacts with a human/political ecology tradition through, for instance, Pressure-and-Release models whereby the focus is on why the poor and marginalized groups in a society are most at risk from natural hazards (Adger, 2006; Turner II et al., 2003).

Vulnerability of human-environment systems

Rooted in these (and related) traditions, current thinking converges on notions of vulnerability as a property of a system. Vulnerability is related to the way in which a coupled human-environment system responds to outside pressures such as perturbations or stressors (Turner et al., 2003). Vulnerability is thought to consist of three main elements of a coupled human-environment system: exposure, sensitivity and response (Turner et al., 2003):

- Exposure refers to the components of a system that are exposed to shocks and stresses. Often such shocks and stresses come from outside a system, but they may also originate (partly) from within a certain system. This points to the distinction between external and internal sides in relation to a system's vulnerability (Fussel, 2007). Furthermore, often vulnerability doesn't result from a single shock or stressor, but from an interaction among multiple pressures.
- Sensitivity refers to how sensitive a system is to a certain external pressure. For instance, a pastoral system will be highly sensitive to hazards that affect the availability of land or water resources, as these are critical to the livelihood strategy. Also the sensitivity of a system doesn't often depend on a single system characteristic, but on a multitude of factors and their interactions.
- Responses refer to the way in which a coupled human-environmental system responds to the pressures and impacts the system. Do pastoralists move to other areas, temporarily or more permanently? Do they change the size of their herds? Do they

diversify into other livelihood strategies to better absorb variability in water availability, or do they migrate?

These three elements of vulnerability are now widely accepted as a basis for vulnerability analysis, sometimes with minor modifications. For instance, in the Millennium Ecosystem Assessment, reference is made to Exposure, Sensitivity and Resilience, whereby immediate and short-term coping mechanisms are considered to belong under 'Sensitivity', while Resilience covers the more fundamental adaptive response strategies (Kasperson, Dow et al., 2005). Marchand (2009) uses the framework as a basis to model vulnerability in coastal areas in India and Vietnam. Furthermore, these three parts are mirrored in disaster management, which often speaks of a multi-layered approach that should include prevention, event management and post-flood measures (Deltares, 2010).

Understanding vulnerability of systems

Given the above-mentioned conception of vulnerability, it is no wonder that vulnerability is difficult to measure (Adger, 2006). One can identify several indicators that may contribute to vulnerability. One could combine these indicators to compose a vulnerability index (e.g. Brooks et al., 2005), but ultimately the role of the underlying factors in causing vulnerability is highly site and time specific. The human-environment systems by which the vulnerability is evaluated are dynamic. This means that vulnerability, as a characteristic of those systems, is also a dynamic phenomenon that is difficult to capture with static measurements (Adger, 2006). Furthermore, vulnerability results from an interplay of factors, whereby the exact nature of the causal relations is difficult to establish due to delays, threshold effects and feedback mechanisms.

Thus, the initial insights from vulnerability literature confirm the complexity encountered when looking at climate change, water stress and migration. There are many factors, many relations, and it is difficult to single out one specific cause, or to predict one specific outcome resulting from specific pressures. Dealing with vul-

nerability requires a systems approach. Vulnerability is a characteristic of a system, not easily pinned down to one specific part of this system. Systems are generally valued for the outcomes, outputs or the goods and services they produce. This means that systems perform a function – even if these functions can change over time. Hence, we can work with the following understanding of vulnerability: 'Vulnerability refers to the extent to which a system is at risk of no longer being able to perform its primary functions'. Thus, understanding vulnerability requires understanding the 'functioning' of a certain system.

In elaborating further on this systems approach, it is important to realize that any system that we choose to focus on will be part of a nested 'system-of-systems'. Our system of choice will be one layer, one aspect. It may have smaller sub-systems within, be part of a larger system, and have systems that are external to the system but nevertheless interact with the system. Understanding such systems ultimately requires unpacking the systems until one reaches the level of the smallest unit. Where systems feature an important human component, the smallest unit is often that where the individuals and their decisions are perceived (e.g. Ostrom, 2005). Without resorting to psychological frameworks, the closest we can get to understanding local systems that inform decisions of migration in underdeveloped areas is a sustainable livelihoods framework, which considers the household as its prime unit of analysis.

Vulnerability in local livelihood systems

A sustainable livelihoods framework can be used to analyse at household level how people provide for their livelihoods in a given environment. The dominant framework is explained by Ellis (2000), and adapted and used for a more specific focus on the link between water and livelihoods, for instance by Nicol (2000) and FAO (2005). In a sustainable livelihood framework the purpose of a local livelihood system is to provide a secure livelihood and healthy environment. These outcomes are defined in terms of income level, stability, seasonality and degrees of risk for livelihoods, and to the quality of various characteristics such as land

quality, water, biodiversity for the environment (Ellis, 2000). Outcomes are influenced by the decisions that households make regarding the livelihood strategies. These decisions are based on the opportunities they have based on their access to assets, in the context of trends and shocks. This view of livelihoods systems is illustrated in figure 1.

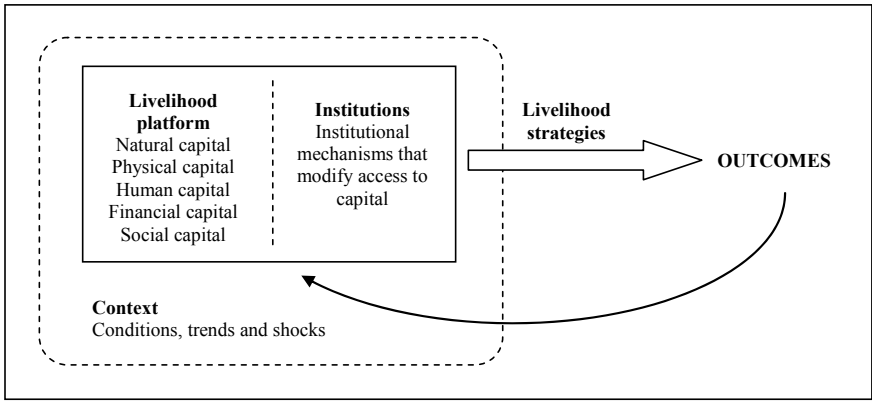

Figure 1: Sustainable livelihoods framework (FAO, 2005, Fig.2, adapted from Ellis, 2000 and Nicol, 2000).

The sustainable livelihoods framework is not perfect, especially in its discussion of the role of information, but it helps to recognize many of the factors mentioned before. It easily translates to the vulnerability framework and its three elementary concepts. The livelihood context defines the exposure to (mainly) external stressors and perturbations – but also opportunities. The sensitivity of the system can be assessed by looking at the way these external pressures influence access to assets that are critical for obtaining secure livelihoods and sustainable environments. Responses are the options that households have to cope with these pressures and to change their livelihoods. Migration can be part of such a response strategy (Ellis, 2000).

Migration and mobility as strategies to deal with vulnerabilities in a livelihood system

In relation to vulnerability, the question is: how long can a local livelihood system function while exposed to stressors and shocks? When might migration become a serious option to consider in response to pressures on the livelihood basis? Part of the answer can be found by looking at this livelihoods basis, which is formed by a household's access to assets, to capital. In order to produce secure livelihoods, a household needs a certain amount of capital to work with. Typically natural, physical, human, financial and social capital are distinguished, which is considered to form the livelihood platform. Social capital has close linkages with the institutions that can modify access to the assets.

The assets in a livelihood platform can, to a certain extent, be substituted and/or converted. Financial capital can be converted into physical capital when equipment is purchased. In cases of conflict or land-grabbing, access to land may be acquired at the expense of social capital in the form of trust and good relationships with other parties in the area. A loss of assets can also be addressed by changes in livelihood strategies. Loss of access to land or water resources may be dealt with by moving to other (range)lands, or by changing livelihood strategies: growing less water-dependent crops or diversifying livelihood strategies to include other activities. For the well-educated farmer, human capital in the form of formal education can help in such a diversification strategy. Loss of any one particular asset can be disastrous, but that depends on the extent to which this loss can be addressed by the reliance on other assets. Hence, there is a sort of 'networked vulnerability' as part of the robustness of a system, to reduce its sensitivity to external shocks.

In some cases, migration or mobility may be the chosen response. In terms of migration and mobility, one can then propose a certain distinction between these two terms. Mobility can be seen as moving around within the existing boundaries of the livelihood system. This would apply to pastoralists moving around in their traditional territories. They exchange access to one type of land for access to better lands elsewhere, at the expense of labour

and some social capital. Social capital tends to erode when communities maintain less frequent contact.[1]

Migration can be seen as moving across system boundaries. It is a much more fundamental change in livelihood strategy. Households, or members of households, move elsewhere. They do not only move 'out of' their prior system, but also 'into' another system. In such a way, migrants themselves are a context factor and a pressure on the systems at their destination. If they stay at those destination sites they will, eventually, be incorporated in the system, initially as a marginalized group, not well represented in the institutions that modify access to capital, but later, hopefully, as more accepted members of the system.

Migration and institutions

As migrants move into other systems, where current institutions are not equipped to address the claims of these new entrants to environmental resources such as land and water in those systems, tensions and conflicts may arise. This is illustrated, for instance, in cases where pastoralists move into 'new' areas that are dominated by crop-based agriculture. See e.g. FAO (2005) for a case in Tanzania, using the livelihoods framework as basis for vulnerability analysis.

Thus, understanding some of the responses to migration is served by understanding the evolution of institutions. Whereas most of the literature on livelihoods approaches focuses on the use of capital, other literature focuses on the development of institutions. Here, it is key to realize that trust is a critical term, and that trust develops over time. New entrants into a system are not yet part of the trusted clique, and the inclusion of their interests requires time to develop. Having certain rights asserted through higher-level institutions is helpful but, in addition, time is needed for full acceptance at local level. This means that, even with international laws and conventions in place, local institutions also need

[1] It may well be that this social capital also means they are underrepresented (marginalized) in decision-making and governance. In essence, these decision-making arrangements are social and dynamic constructs. The institutional mechanisms not only modify access to social capital, they are also the product of the (use) of social capital in the past.

to adapt, which takes time and trust-building; essential but difficult challenges.

Conclusions

The links between climate change, water stress, conflict and migration are uncertain and there is insufficient understanding of those links to support well-informed policy responses. Yet, the reality on the ground shows that we cannot put decision-making on hold until everything is clear. Problems exist, are likely to worsen, and policy-makers need to act. What could they do? And how does this review of the Symposium results and further exploration of a vulnerability perspective help to progress towards actionable knowledge?

One consequence of the complexity sketched here, including the insights from vulnerability literature that various interactions and combination of factors produce certain outcomes, is that, at the level of the system, probabilities are unknown. It is not meaningful to predict certain consequences tied to individual factors in the context or within a system, not even within margins of error or with probability distributions. There are too many unknown variables and too many possible combinations with different effects, including delays and threshold effects. This makes 'classic' risk assessments of the type 'risk = probability x impact' problematic.

Rather, we need to move towards a more adaptive policy-making approach (Walker et al., 2001). We do not know the exact relations in our systems, but we do know some of the factors that play a role and some of the relations at work. And for some of these factors and relations, we can assess probabilities, or predict future developments, even if we cannot do this for the system as a whole. Based on our current knowledge and 'best guesstimates', we can formulate policies and decisions, and we can anticipate certain future risks and uncertainties. We can think, in advance, of mitigating measures or hedging actions, to make our policies more robust, for instance, by ensuring that environmental migrants and climate change-induced migration gain international recognition and rights, through inputs in the text discussed at UNFCCC forums.

Given the fundamental nature of the systemic uncertainties, such 'robust' policy decisions will need to be accompanied by continuous learning efforts. For such learning, it is useful to signal the assumptions we have made in coming to decisions (Walker et al., 2001). Can we monitor certain indicators to obtain feedback on the accuracy of these assumptions, while implementing our policies? Thus, making assumptions explicit, as was done at the Symposium, becomes a hallmark of future learning. This seems one of the most promising ways to make progress towards sensible and fair decisions, at all the relevant levels, on the way to address the multi-faceted and multi-level linkages between climate change, water stress, conflict and migration.

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Climate change, water stress, conflict and migration

Background paper

Climate change, water stress and other environmental problems are increasingly recognized as major issues threatening human security. Their impacts on human life affect many aspects of international politics. Migration and conflict are two of the possible effects.

Climate change is likely to dramatically increase the frequency and intensity of hydro-meteorological hazards, such as tropical storms, floods and landslides. All of these phenomena may severely restrict livelihood options for large populations in hotspots. The new challenges that climate change pose on the world's population have already been discussed by high-level international institutions. The General Assembly of the United Nations has addressed this issue and has included climate change in the concept of human security during the human security debate that took place on 20 to 21 of May 2010. Furthermore, after having discussed the impact of climate change for the first time in 2007 without reaching clear results, the topic of climate change as a human security issue has been recently discussed by the UN Security Council. The meeting which took place on 20 July 2011 aimed at considering whether to expand the Security Council's mission to keep the peace that could potentially be threatened by climate change, including the creation of a new environmental peacekeeping force – green helmets – which could intervene in conflicts caused by shrinking resources. Even though the council settled for a watered-down statement of the 'possible security implications of climate change', there is increasing attention paid to this subject in the international arena (Security Council, 2011).

But besides the political turmoil, climate change is a hard reality for many around the world. For instance, Bangladesh is one of the most vulnerable countries to sea level rise due to its high population density and low-lying land. Based on these factors, the UNDP predicts that 21 per cent of the country could go under salt water due to a sea-level rise of approximately 1 metre (Rahman et al., 2007). Migration seems to be the only chance of survival for this population (Hoque Patwari 2009). Governments and regional institutions are raising awareness of this issue. According to the Asian Development Bank (ADB), governments in the Asia-Pacific region face the risk of unprecedented numbers of people displaced, within and between nations, by storms, floods and other impacts of climate change (Forest for Climate, 2011).

The impacts on climate change may also involve violent conflict. Disasters and environmental degradation are likely to undermine livelihoods by threatening the access to clean water and undermining food security (Reuveny, 2007). Conflicts may arise when there is a competition over limited resources, such as land and water.

In accordance with Kolmannskog (2008), such conflicts may relate to climate change-induced migration in two scenarios with the potential of a vicious cycle: forced migration can be triggered by – and itself also trigger – environmental conflicts. If these relationships were put in a simple diagram they would look like the following:

Case 1: Climate change impacts conflict migration
Case 2: Climate change impacts migration conflict
In addition, we cannot exclude:
Case 3: Migration environmental degradation conflict

In the first case, there is a direct link between climate change impacts on the environment and migration. Thus initially the climate change impacts may cause violent conflict, and in a second phase those affected by the conflict are forced to flee due to violence. In addition, any type of conflict can further deteriorate or

accelerate environmental degradation, which in turn may lead to migration.

Drought is expected to be one of the climate change impacts that could trigger conflict as per the first case. According to Kolmannskog, water scarcity may contribute to distributional conflict, although as also other researchers have found, interaction with certain socio-economic and political factors must be present for (violent) conflict to erupt (Suliman 2005). Hence, there is potential for conflict when a population experiences social discrimination in terms of access to the safe and clean water. Schellnhuber et al. (2007) argue that the impacts of water scarcity and soil degradation on food security have led to migration rather than violent conflict.

Regarding the second case of links between climate change and conflict, some experts consider migration as one of the most alarming possible effects of climate change (Campbell et al., 2007). Research suggests that migration – along with the politicization of ethnicity, the financial effects of a diaspora, and export of existing conflicts – could exacerbate existing conflicts (Kolmannskog 2008).

And in the third case, a massive influx of migration can put excessive pressure on the environment where migrants relocate. This is mainly due to a sudden increase of demand on resources like water, fuel wood and food. If ethnic groups have to compete for the limited resources, the likelihood that this competition turns into conflict may increase if there is a history of tension between the ethnic groups due to existing social or cultural differences.

Additionally, other factors such as governance, political stability, economic strength and the history of violence in the places of transit or destiny of the migration will be potential conflict variables.

A contemporary case of a country being heavily affected by the impacts of climate change, and which illustrates the migration and security dimensions of the problem, is Bangladesh. With a geo-

graphic area slightly larger than that of England, but with almost three times England's population, Bangladesh faces severe human and food security challenges. On the one hand, the geographical composition of the country, situated on a delta and criss-crossed by 54 rivers, makes it highly susceptible to nearly every worst-case climate change scenario (Carney et al., 2011). A one-metre sea-level rise would leave almost 20 per cent of the country under water. Current sea-level rise is turning much of the country's fertile land into a saline desert, threatening the population's access to locally-produced food and the national agricultural economy.

It is not surprising therefore that many Bangladeshis see migration as the best option for survival. Its (historically friendly) neighbour, India, feels, however, that it cannot accommodate large influxes of migrants and has started to build a guarded fence around Bangladesh. Smuggling of migrants and casualties amongst those trying to cross are heightening tensions between the two countries and are compounding the already difficult stability situation in the wider region.

The melting of the glaciers on the Tibetan Plateau and in the Himalayas, the water tower of South and South-East Asia will become a major geo-political factor for the region including China, and thus for the world as a whole.

* * *

On the global level, it is hard to predict the number of people in need of moving out of their countries due to environmental factors. But experience from previous years has drawn some estimates of displacements induced by natural disasters. According to the United Nations Office for the Coordination of Humanitarian Affairs (OCHA), at least 36 million people were displaced by sudden-onset disasters in 2008. Of those, more than 20 million were displaced by sudden-onset climate-related disasters (OCHA and IDMC, 2008). Moreover, there is evidence that about 4.6 million people were newly internally displaced by conflict in 2008, in con-

trast to the mentioned 36 million of environmentally displaced persons (IOM, 2009).

Besides the threats of sudden-onset disasters, slow-onset events such as drought and erosion will have major impacts on freshwater and food production (Kolmannskog, 2008). Such impacts are already affecting hundreds of millions of people around the world, while demand for safe drinking water continues to increase due to growing population. According to an IPCC report, it is predicted that rain will decrease in the already semi-arid to arid sub-tropics, increasing evaporation, rising sea levels, and resulting in the salinization of coastal groundwater (Parry et al., 2007). Threats to food security are also expected to increase with the temperature rise. The IPCC reported that water problems will affect 74 to 250 million people in Africa by 2020, and more than a billion people in Asia by 2050 (Parry et al., 2007).

Predicting the precise number of people that will need to leave their countries because of the impacts of climate change in the forthcoming years is not possible. Also it has to be realized that migration in the sense of moving away from one's existing location simply may not be an option due to the lack of even the most basic resources to do so. However, it is a fact that there is significant potential for migration and displacement. The impacts of climate change and other forms of environmental degradation (pollution, damming and drainage of water courses and wetlands) are a real phenomenon already affecting large populations around the world, and they will increasingly continue to do so. In turn, the consequent migration due to these climate changes has effects on the global economy, international development, peaceful societies, and national budgets, all of which could have serious implications on human security and wellbeing. As UNEP's Executive Director Achim Steiner expressed it, 'the world does not have perfect knowledge on current or future climate changes', but '...human beings have never planned strategies or responses based on hundred percent certainty [...]. Rather we make decisions based on risk assessments...' (UNEP, 2011). Report results by several institu-

tions, including those by the Intergovernmental Panel on Climate Change (IPCC), aren't favourable and the clock keeps on ticking.

1 Definition of environmental migrants

Currently, there is no legal definition of environmental migrants to which a framework of protection can be attributed. In 1985, a researcher of the United Nations Environmental Programme (UNEP), Essam El-Hinnawi, used the term 'environmental refugees' to define those people who involuntarily leave their traditional habitat because of a marked environmental disruption. This was the first attempt at providing a definition, and pointed out the need for a protocol for humanitarian assistance and protection (Oliver-Smith and Shen, 2009).

However, the term 'environmental refugee' raises controversy because environmental migrants do not qualify as refugees under the 1951 Geneva Convention relating to the Status of Refugees as amended by the 1967 Protocol. Critiques say that referring to them as refugees is misleading due to the lack of a legal basis in international law, and potentially undermining the legal regime protecting refugees (Westra, 2009). For these reasons, the term of environmental refugee has been strongly rejected by the IOM and United Nations – even though the UN Secretary-General Ban Ki-Moon made use of that term to express the severity that climate change impacts pose on human life at the meeting about climate change as a human security issue on 20 July 2011 at the Security Council (Security Council, 2011).

Further attempts of defining this issue have been made and, as the number of communities affected by climate change is on the rise, there is increasing literature on the topic. The current debate presents positions ranging from those advocating for the expansion of the definition of a refugee in the 1951 Refugee Convention, those calling for the adoption of new instruments, and to those claiming that the need of providing environmental migrants with a refugee-like protection is exaggerated and dangerous.

Moreover, another point of discussion is whether the model of protection should cover displacement across borders due to climate change impacts only, or if should include a broader range of environmental factors. Hence there is a need for establishing concrete criteria that determine the access conditions and scope of the model of protection.

2 The current debate on climate change and human rights

Scholars have identified that the inexistence of environmental rights and the absence of accepting environmental refugees under international humanitarian law are among the difficulties of adapting the existing international legal frameworks to protect environmental migrants. In this sense, one of the main problems is the inexistent legal recognition of the gravity of environmental destruction and its impact on humans (Westra, 2009). Existing refugee norms consider environmental protection only in the context of warfare. Thus, there is a need for establishing criteria that determine whether an environmental harm constitutes a human rights violation.

In the literature on human rights and environmental law, three strategies for constructing a human rights-based approach to climate change can be found: (1) the application of procedural rights found in international law to climate change litigation; (2) a re-interpretation of existing human rights in the environmental context; and (3) the recognition of a distinct right to environmental well-being in the framework of human rights (Aminzadeh, 2007). The first strategy is criticized for not addressing the substance of the issue, and for not creating a coherent legal framework that harmonizes international environmental law and human rights law. But the most heated debate lies between, and within, those advocating for re-interpretation of existing rights and norms, and those in favor of creating new rights and protocols.

Some of those advocating re-interpretation suggest extending the legal definition of refugee of the 1951 Refugee Convention and 1967 Protocol to include those people displaced due to impacts of climate change, or broader environmental factors. Others look at the 'fear of persecution' requirement of the Convention and interpret environmental harm, the intention of harming a specific population group in the context of man-made disasters, or the intentional omission of assistance and protection of a population group after an environmental disturbance as forms of persecution (Lopez, 2007, 378-379). 'Environmental discrimination', as it is sometimes referred to, (Westra, 2009), also means that it is possible to encounter 'governments that are intentionally destroying a people's environment, are discriminating against them in the provision of assistance, or are using the consequences of a disaster' (Stavropoulou, 2008) in ways that could qualify as persecution for one or more of the reasons of the 1951 Refugee Convention. Indigenous groups may be the most vulnerable to this kind of discrimination and special protection might be required (Westra, 2009). This position, however, has been put forward by many scholars who claim that such re- interpretation could include an incredibly large amount of people, and it is suggested to limit the definition with specific requirements. Another difficulty arising is that the 'persecution' in the form of the environmental harm is not caused, at least not caused solely, by the country from which persons are fleeing, but rather by other countries.

On the other hand, those proposing the creation of new legal frameworks justify their position by stressing that the spectrum of solutions may range from mitigation resources to relocation. Thus, the term refugee of the 1951 Refugee Convention and 1967 Protocol should not be expanded according to them (Bronen, 2009). Furthermore, others call for the need to recognize the plight of environmental migrants as superior to that of regular convention refugees 'in the sense that the jus cogens norms that are not observed from the beginning of the actions or omissions that cause the condition (in turn causing their flight) are non-derogable, whether or not the states involved have signed a convention dealing with their problem' (Westra, 2009). Finally, one more argument in

favour of creating a new legal framework of protection of environmental migrants under the human rights regime is the universal jurisdiction of this regime. In contrast to international environmental law, the human rights regime allows greater intrusion upon states' internal affairs and thus reaches situations that international environmental law cannot. Thus, human rights enjoy universal jurisdiction based on the theory that 'some behaviors are so unacceptable that they are every nation's concern regardless of where they occur or whom they involve' (Osofsky, 2005).

3 Universal protection or ad hoc basis action?

Having no consensus on the definition and rights of environmentally displaced people is confusing and unhelpful, yet nonetheless expected. The problem lies on two main issues: (1) the difficulty of isolating environmental factors from other drivers of migration, thus establishing the conditions under which environmentally-displaced people can be granted protection; and (2) the lack of environmental rights and effective mechanisms for their protection.

3.1 Conditions under which environmental migrants should be granted international protection

Scholars and experts have provided classifications of migrants or refugees based on various elements. Some of these elements are the subject of debate concerning the establishment of criteria for the conditions under which protection can be granted.

i *Degree of compulsion involved in the displacement.* Voluntary migrants choose to relocate for a variety of reasons, most commonly related to economic improvement. Other migrants are forced to relocate by external forces, such as contemplated in the 1951 Convention on refugees. Thus, one may say that migrants not meeting the criteria of the mentioned Convention can be considered voluntary migrants. However, between these clearly defined categories lies a grey area with those people mobilizing

due to deficiencies in the local social, economic or environmental context. Many migrants cannot demonstrate direct or social compulsion to relocate. Thus, compulsion can be intense, like in the case of an acute natural disaster, or moderate, like in the case of gradual environmental degradation (Westing, 1992). A successful framework for environmentally- displaced people should contemplate measures in cases like displacement as an anticipatory move, a way of coping with an emergency condition, or a last measure of survival and last resort.

ii *Duration of displacement*. Depending on the resulting (in)hospitability of the place of environmental disruption, the displacement can be temporary or permanent (Stal and Warner 2009, 8). Slow-onset events leading ultimately to the devastation of ecosystems are the more likely events to generate seasonal and long-term migration. This is particularly the case for people whose livelihoods directly depend on the surrounding ecological conditions. The duration of displacement caused by rapid-onset events will depend on the level of devastation caused and the possibilities of reconstruction.

iii *Boundaries of the displacement*. This element refers to whether the displacement is within or outside national boundaries. The scenarios studied in the symposium will focus on international displacement, while acknowledging that up until now, most environmental migrants stayed in their own country. Research on migration patterns has found that people are more likely to migrate when they have a social network abroad. Thus, migrants are expected to choose the destination where they already know people who live there (McLeman, 2006).

For the purposes of the Symposium, we suggest the study of a couple of scenarios in order to define the appropriate legal protection. Since some of the main recommendations from the Symposium should aim at drafting a new international legal institution of protection, scenarios that pose plausible forced and international migration due to climate change impacts should be considered. However, these scenarios are not definitive and experts at the

Symposium will have the opportunity of narrowing down or elaborating the cases in which protection could be applied.

1 Cases of sudden extreme environmental events that may cause large-scale human displacement in the wake of natural disasters. The drivers of this type of migration are tsunamis, flash floods, and severe storms (cyclones or hurricanes).
2 Cases of advanced stages of gradual environmental change causing endangered habitats and livelihoods, which will promote large-scale permanent migration. Drivers of this type of migration are advanced ecosystem degradation such as sea-level rise, water scarcity and desertification.

It is important to study possible scenarios and to consider these elements of environmental migration when establishing under which conditions and to what extent protection will be granted. Particularly in the case of gradual environmental degradation, the difficulty lies in determining the threshold levels of environmental destruction where protection is needed. Also, the prerequisites of accessing protection by international law may vary depending on the vulnerability of the affected communities. Governments and communities have different capacities of coping with environmental and climate change impacts. Such coping capacities or resilience depends on various social, economic and environmental parameters that should be considered when granting international protection to those being environmentally displaced (Renaud et al., 2007).

3.2 Environmental rights and mechanisms for their protection. A brief overview on existing international and regional legal instruments related to environmental migrants

The issues of climate change impacts, human security and migration have already generated a response from the international community. However, they are still recent topics on the international agenda, e.g. the main international instrument dealing with the issue of climate change, the United Nations Framework Con-

vention on Climate Change (UNFCCC) included the problematique of human mobility for the first time in Draft Decision -/CP.16 of December 2010 (UNFCCC, 2010). This recommended establishing the Cancun Adaptation Framework as part of addressing the loss and damage associated with the adverse effects of climate change in relation to both extreme weather events and slow onset events. These recommendations are to be considered by the 18th Conference of the Parties of the UNFCCC at the end of 2012.

Currently the outlook for substantial and binding mitigation agreements is not very positive, as attention to the challenges for adaptation, including improved insights in the migration and relocation aspects, becomes more salient.

On the regional level, the Council of Europe (CoE) has acknowledged the relevance of these issues for Europe and has called for the elaboration of a CoE 'Framework Convention for the Recognition of Status and rights of Environmental Migrants' (Parliamentary Assembly, 2008). Within the European Union, the European Commission has stressed the need for a policy response to the impacts of climate change on migration (European Commission, 2008). Other relevant initiatives of the European Union are the research project on environmental change and forced migration scenarios (EACH-FOR), and the research project by the European Refugee Fund on environmental degradation as possible factor of forced migration to EU Member States.

Nevertheless, despite these international and regional initiatives the repercussions of climate change impacts on the individual person have often been neglected in international instruments. The question of how to deal with those being displaced due to environmental and climate factors, particularly in terms of their legal status, has hardly been touched upon in the international political agenda. However, there is ongoing debate among scholars of public international law on the validity or the potential use of existing international and regional legal instruments in the clarifi-

cation of the environmental refugees' legal status and international protection.

a *Refugee law*. As previously mentioned, there is a heated discussion about the applicability of refugee law in the case of environmental migration. The arguments revolve around whether or not climate-induced displacements fulfill the 'refugee' core elements of the definition in the Geneva Refugee Convention (GRC): (i) well-founded fear of persecution, and (ii) a nexus of the well-founded fear of persecution with one of the enumerated reasons (race, religion, nationality, membership of a particular social group, or political opinion) (OHCHR, 1951).

Those advocating the implementation of refugee law in the case of environmental migrants argue that they can fulfil the element of fear of persecution. While there is no defined concept of persecution, it is recognized that it consists of severe harm or violation of human rights, and also of a lack of state protection (Ammer, 2009). It is argued that in some instances those elements of persecution are present in environmental disasters or degradation. A commonly-used example is that of the drainage of marshes in southern Iraq. In this region the tribes of the so-called (Shi'a)'Marsh Arabs have established their livelihoods based on marshes through fishing, buffalo breeding and agriculture. Considered rebellious by the Saddam Hussein regime, the government started and executed major drainage works of the marshes with the intent to destroy this ethnic group. This led to dramatic loss of livelihoods and deportation, as a result of which thousands of Marsh Arabs died (Lopez, 2007).

b *African Union Convention of the Organization for African Unity (OAU) governing the specific aspects of refugee problems in Africa*. This regional convention recognizes an expanded definition of refugees as persons who were forced to leave their home country 'because their lives, safety or freedom have been threatened by [...] circumstances which have seriously disturbed public order' (OAU, 1969).

There is no consensus among international law scholars on whether the protection of environmentally displaced persons can

be regarded as obligation under the OAU Convention. On the one hand it is argued that the reason behind the broad refugee definition is found in the support of the flight of displaced people in the wars of independence in the continent (Ammer, 2009). On the other hand, it is contended that the OAU Convention unequivocally includes victims of environmental crises since such events seriously disturb the public order (Lopez, 2007).

Some scholars point out that even though environmental migrants could qualify for protection by these instruments, the OAU Convention provides only a short-term solution for people who return to their countries after the crisis is over. Those affected by durable environmental degradation and with no place to go need a different kind of protection.

c *Cartagena Declaration*. The Cartagena Declaration on Refugees also contemplates a broad definition of refugee, which like the OAU Convention sets 'circumstances which have seriously disturbed public order' as an element to qualify for refugee status (OAS, 1984). However, the International Conference on Central American Refugees (CIREFCA) has clarified the scope of the definition and announced that 'circumstances seriously disturbing public order must result from human acts and not from natural disasters' (CIREFCA, 1989).

3.2.1 Submerging territories

In addition to these legal instruments, there is the extremely urgent case of submerging island states. The disappearance of small island states is a consequence of sea-level rise, and the UNHCR has acknowledged its relevance as a particular challenge (UNHCR, 2008). The most affected island states are Tuvalu, Nauru, Kiribati, Vanuatu, Maldives and the Bahamas. Countries with low-lying coastal zones like Bangladesh and Vietnam will not entirely submerge, but are expected to lose a significant part of their surface.

The status of a population whose territory has been submerged is not clear from a public international law perspective. Scholars point out two alternatives. The first one is that the country of origin and citizenship continue to exist. This is possible if the government has the right to exercise some forms of sovereignty in parallel to the territory of a third state, if the country of origin was ceded territory from a third state, or if new land could be 'created' (land reclamation). Tuvalu, for example, is considering buying land from a third state such as New Zealand (Ammer, 2009)

The second option submerging states have is that the country of origin and citizenship ceases to exist. Scholars suggest that an international body would need to be made responsible for determining when the state ceases to exist, and regulate the conditions under which such determination can be made (Ammer, 2009).

Regarding the citizenship status of the population, it is not clear whether the stateless-ness regime or international protection obligations are applicable (Ammer, 2009). The *Convention relating to the status of Stateless Persons* bases its definition of stateless-ness on the denial of nationality under the 'operation of law' – that is, no state recognizes a person as a national (OHCHR, 1954). This means that the convention does not contemplate situations of de facto stateless-ness, such as would be the case of a person in possession of a citizenship, which in practice is not effective (Ammer, 2009). Hence, the population of submerging island states would not qualify for protection under this Convention.

In conclusion, there is a need for international involvement with respect to forced migration. The pressing situation of those being displaced calls for the creation of new international legal instruments that provide them with rights and access to international protection. This challenge, however, should only be part of a larger legal framework for environmental justice aiming at the adoption of sustainable ways of living and defining the responsibility of states.

4 Looking for solutions

In this section we present a series of arguments and current debates that aim at concluding policy recommendations. The basis of such debates and policy recommendations fall within four categories: (1) the legal aspects of environmental migration and the search for a legal definition of environmental migrants; (2) measures of prevention and adaptation to climate change; (3) best practices; and (4) capacity-building.

4.1 Prevention and adaptation to climate change

As previously mentioned, the UNFCCC is the main international legal instrument to deal with mitigation of and adaptation to climate change and its impacts. The traditional industrialized countries, with the exception of the United States, have ratified the Kyoto Protocol with binding commitments to reduce their greenhouse gas emissions by 2012 by an average of 5% against 1990 levels. The other Parties, formally still 'developing countries' are of course also committed to reducing their emissions on the basis of the principle of 'common but differentiated responsibilities', but do not have obligatory emission reduction targets, and are entitled to financial and technological support from the developed 'Kyoto' countries in meeting their mitigation and adaptation objectives.

It has been recognized now that former developing countries like Brazil, India, China and South Africa with rapid economic growth and rapidly-expanding industrial sectors and thus large greenhouse gas emissions cannot remain outside a regime with strict emission limits. For example, China overtook the United States in 2007 as the leading emitter of these gases in the world. Whether this shift will result in the development of a global 'Kyoto Protocol' after 2012 will depend on the very difficult negotiations of the 17th Conference of the Parties of the UNFCCC, 28 November - 10 December 2011, in Durban, South Africa. While all efforts are needed to come to a drastic and effective international agreement to reduce emissions, the composition of the global atmosphere is

already such that the impacts of climate change will manifest themselves for decades in all parts of the world, requiring massive investments in adaptation. This again makes the Cancun Adaptation Framework of December 2010 such a vital instrument.

An excellent first programme to implement the Framework is suggested in the submission by the Institute for Environment and Human Security of the United Nations University in Bonn to the UNFCCC on 15 August 2011. The submission identifies, amongst others, knowledge gaps in the role of the environment as a push factor for migration, the need for climate risk management strategy and conflict mediation and the need for new thinking in relation to the possibility that these measures may not be able to keep apace with 'the rising and potentially permanent changes associated with desertification, sea level rise, ocean acidification, loss of geologic and other freshwater sources, etc., which can add pressure to human mobility'(UNU-EHS, 2011).

While the UNFCCC is the multilateral environmental convention (MEA) with the most political weight (it deals with energy, one of the most if not the most important economic and geopolitical commodity) other MEAs are also apt to carry out the Cancun Adaptation agenda. MEAs like the Convention on Biological Diversity and the Ramsar Convention (The Convention on Wetlands of International Importance, especially as Waterfowl Habitat) are of great value to protect the natural defenses of communities against the impacts of climate change, e.g. intact coral reefs and mangroves form first lines of protection of coastal zones against sea-level rise.

Also, there is a lot of room for the inclusion and participation of existing channels of multilateral and bilateral assistance and national governments in the climate change adaptation agenda.

a Prioritizing prevention and risk reduction in the disaster management agenda

Perhaps one of the most important challenges is prioritizing, at international and national levels, the more structural and preventative risk reduction in the disaster management agenda. Some observe that there appears to be more attention paid to humanitarian and direct development action than to disaster risk reduction. This may be a consequence of lack of understanding and a cultural divide between development and disaster specialists, and of the perception that risk reduction competes with other development agendas (Schipper and Pelling 2006). Furthermore, risk reduction policies generally work on long-term objectives that do not give prompt, visible effects, as emergency relief does. Thus, there is a need for integrating disaster risk reduction, humanitarian relief and development into one agenda that allows for collaboration from all these fields. Even though this may require some rethinking in development practices, a few administrative changes could make a difference. For example, some experts have proposed to integrate adaptation into development decision-making by applying risk assessments to development assistance projects (Burton et al., 2006). This concept has been borrowed from the World Bank's due-diligence policy and the 'screening tool' which provides information on climate trends, scenarios and projections, local resilience to climate shocks and adaptive capacity of the environment where a project will be implemented (World Bank, 2006).

The benefits of introducing mandatory climate risk assessments on development projects financed by multinational lenders and donor countries providing bilateral assistance are many. Developers can better understand and integrate climate change factors into project planning, help decision- makers develop the policies or measures needed to tackle climate change impacts, and overall contribute to climate change adaptation and risk reduction. But in order for this to happen, the information retrieved by the risk assessments must be formally considered in the project design, review and approval. If a project proposal does not seem to perform satisfactorily on the

assessment it should not be approved until it has been modified to reduce the risks to acceptable levels (Burton et al., 2006).

As an initiative like this could mean higher up-front costs for donors and recipient countries, incentives have to be built into such integrated projects.

National and international NGOs which the have a longer term 'tenure' than governments should be involved in project design, and especially in project implementation monitoring.

b Implementing Early Warning Systems at national and local levels

A vital role should be played by early warning system tools that aim at generating, disseminating and using information 'about potential risks, hazards, and vulnerabilities to empower individuals and communities under threat from natural (e.g. droughts, floods, heat waves, tornadoes and other hazards (famine, violent conflict) to take effective and timely decision-making to protect lives, property and the environment from the effects of disasters' (Vordzorgbe, 2007).

Overall they contain three basic elements: monitoring and early warning, risk assessment, and mitigation and response plans, which are up-to-date and, if possible, tested.

The first stage of monitoring and risk assessment requires vast human and technological resources and collaboration with international or regional programmes such as the Famine Early Warning Systems Network (FEWS NET), funded by USAID, and the Global Monitoring for Food Security (GMFS) started jointly by the European Space Agency (ESA) and the European Commission Global Monitoring for Environmental and Security (GMES) Initiative. Both initiatives monitor, analyse and identify threats to food security issues (e.g. through vegetation monitoring). FEWS NET operates in Africa, Central America, Haiti, Afghanistan and the United States, and GMFS concentrates on Sub-Saharan Africa.

Mitigation and response stages require good local organization and broad-reaching communication with the population at risk. These tasks should be fulfilled by the national and local governments, as well as with NGOs. Communicating an approaching dis-

aster to communities may not be as simple as it seems. Experiences with early warning have shown people perceive risk and respond to it in many different ways, e.g. unwillingness to leave their homes and properties to look for shelter, underestimating the danger posed by the disaster risk, or simply not understanding the early warning (Jeggle, 2003). Some attribute these responses to differences in education, religion, cultural background, or socio-economic position. Of course the early warning system should be composed in such a way that it meets the various needs. This involves getting to meet the local people and bridging the gap between disaster professionals and people at grassroots level (Jeggle, 2003).

There is a major role here for NGOs to fill the gap between researchers and communities. As they know the local conditions, they can assist with disseminating information at the community level, preparing community actions, and establishing mechanisms to link communities with policy-makers. But in order to do that, they should have better and timely access to the scientific information, and be involved in the research and decision-making process (Jeggle, 2003).

In general, early warning initiatives should, in the medium to long term, aim to support countries in building and generating their own local resources to increase their disaster prevention capabilities. In the end, early warning should be brought to the people all over the world to reduce the loss of human life and damage to property as much as possible.

There is vast room for improvement. Early warning practice could greatly benefit from increased international collaboration on telecommunications for disaster prevention, public-private partnerships for preparedness and risk management at local community levels, and social science and public information activities to increase local awareness and response to early warnings (Jeggle, 2003).

c Disaster risk prevention and adaptation as ways of achieving water and food security

Climate change is having an impact on food and water security. Variability in the frequency of rainfall and changes of mean temperatures will change the availability of water and will challenge the existing agricultural practices. Water security, which in part determines food security, is defined as 'the availability of an acceptable quantity and quality of water for health livelihoods, ecosystems and production, coupled with and acceptable level of water-related risks to people, environments and economies' (Grey and Sadoff, 2007). According to Grey and Sadoff (2007) there are three typologies of country levels of water security: (1) countries that have harnessed hydrology; (2) countries that are hampered by hydrology; and (3) countries that are hostage of hydrology, often the poorest countries. They face 'difficult' hydrologies, which comprise high inter- and intra- annual rainfall variability. To maintain or achieve water security both technological and institutional investments are needed. Much can be learned from practices in the past to conserve and distribute water in culturally and ecologically appropriate ways (Grey and Sadoff, 2007).

On food security it is argued that access to technology determines a farm's productivity, no matter how climate change impacts the land and the climatic conditions. In the absence of such technology and agricultural inputs such as improved seeds and fertilizers (a new 'Green Revolution'), poor farmers will be less able to adapt to climate changes because they have fewer options in their agricultural system to sustain their productivity (Brown and Funk 2008). A promising initiative has been taken by one of the biggest reinsurance companies in the world, Munich Re, which provides weather-indexed insurance for crop failure (e.g. due to droughts) to poor farmers in developing countries. A comparable scheme has been set up in India by Microensure, which receives funding from the Bill & Melinda Gates Foundation and uses comic books to explain the workings of the arrangements to the local farmers.

Of course there is a lot to be learned from older cultures and their ways of coping with changing climatic conditions, for example, the

Inca's use of crop varieties, using crops resistant to heat, and dealing with water scarcity (Wojtkowski, 2008).

Prominent in addressing the current challenges of food security in relation to climate change is the CGIAR Research Programme on Climate Change, Agriculture and Food Security (CCAFS), in which all 15 research centres of the Consultative Group on International Agricultural Research (CGIAR) worked together. Their first theme is 'Adaptation to Progressive Climate Change', in which they will analyse and design processes to support adaptation of farming systems in the face of future uncertainties of climate in space and time. It is also a race with time – as they say 'The intention here is to try and stay ahead of future change!' The social, economic, cultural and institutional conditions for successful adaptation of farming systems will be included in the research (see http://ccafs.cgiar.org/our-work/research-themes/progressive-adaptation)

Indeed, a holistic approach is indicated (CARE, 2011) and clean water, the stability of the availability, and access to such resources should be guaranteed by a strong government (Brown et al., 2007), and the willingness of societies to change (Tompkins and Adger, 2005).

For instance, adaptation measures to hurricanes could include the availability of wind-resistant glass for windows. But it is not enough that they are available. People at risk must also be able to find out that these windows exist, purchase them, effectively install and maintain them. If economic or social constraints do not permit this, there will be a limited response to the adaptation measure. Public policies, power relationships and cultural norms can also play an important role in determining access to resources. According to CARE International, socially-excluded groups such as women, children, persons suffering with HIV&AIDS and landless people are the most vulnerable to climate change as they have a limited access to food and water due to political and cultural norms.

Mali is an example of how development assistance and promoting equal access to food and water can help prevent and manage conflicts. Mali, as part of the Sahel region, experiences the extremes of

drought and flood, and has a history of armed conflict and humanitarian crises. Climate change has exacerbated the local conditions since mid-1970s with the decline of Lake Faguibine. According to a report by the IUCN, the region surrounding the Lake Faguibine in the north of the country used to be a prosperous wetland system (Andrade Perez et al., 2010). Agricultural and pastoral lifestyles were sustained by its flooding regime. But recurrent droughts over the past century have almost completely dried up the lake. As a consequence hundreds of people have died, many have lost their livestock, and thousands have been forced to leave. These movements didn't occur without an increased competition for the remaining resources, leading to the marginalization of the most vulnerable groups. After a long history of unrest and with the re-establishment of peace, a series of initiatives to assist the return of refugees, reconstruct social infrastructure, and introduce irrigated agriculture began in 1995. The main projects were made possible by the German Gesellschaft für Technische Zusammenarbeit's (GTZ) and the Mali Nord Programme in collaboration with the European Union and the World Food Programme. The United Nations Environmental Programme (UNEP) has also been working on the rehabilitation and sustainable management of the Lake Faguibine system. It does so mostly by working at the community level to strengthen civil society to prevent and control violent competition for the scarce resources. Hence, it is a real need to restore the ecosystem to diminish conflicts and enhance cooperation among competing groups (Andrade Perez et al., 2010,).

4.2 Best practices

Building resilience to climate variability and promoting food security: The case of Mozambique

Mozambique is prone to experiencing considerable year-to-year variability in rainfall. On average, there are 375 to 600 mm of rainfall every year, with rains between October and November and May to June. Extreme events are likely to increase over time, with intervals of heavy rain and drought. These climate patterns have a

considerable impact on the livelihoods of people who depend on agriculture. Even though rural populations are familiar with rainfall variability, extreme events such as the floodings in 1977 and 2001, and droughts in 1983-1984, 1994 and 2003, had serious impacts on their livelihoods (Osbahr et al. 2008).

Research by Osbahr and fellow researchers describes the case of Mozambique. This is one of the few countries in southern Africa that has a relatively well-developed disaster preparedness plan alongside a long-term poverty-alleviation policy (Osbahr et al., 2008). Rural villages in Mozambique, especially those where the population was displaced by the civil war and later returned, are physically and economically isolated. One example of such a village is Nwadjahane, which is dependent on subsistence farming, including the production of cattle, chickens and pigs, and rainfed/irrigated cultivation. Therefore livelihoods are closely connected to the variability and productivity of the surrounding natural resources.

The Government of Mozambique has endeavored to include disaster risk reduction and capacity-building in its policies. A multidisciplinary group composed of various ministries was established to perform vulnerability mapping analysis and to collaborate with external networks to provide early warning forecasts (Osbahr et al., 2008). Very relevant was the integration of concerns about disasters and climate change impacts into the development agenda. In Mozambique, Government- led programmes are usually delivered in partnership with NGOs, e.g. the multi-donor 'PROAGRI' programme, coordinated by the Ministry of Agriculture and Rural Development. The main activities of this programme were microfinance, and support for setting up small-scale farming in rural areas through technical training, infrastructure development and local organization. This programme later became a long-term project delivered at national and provincial levels. It emphasizes building local resilience to drought, food security and poverty-reduction. This initiative is an example that successfully links spatial, temporal, jurisdictional, institutional, and management scales at different levels (Osbahr et al., 2008).

Community-based disaster management in the Philippines: raising awareness and empowering local people

Involving communities at risk in disaster management while raising awareness can be an effective way to reduce disaster risk and help communities cope with climate change impacts. The Red Cross and Red Crescent Societies have developed Disaster Preparedness activities that 'address everyday risks of communities through programmes such as health, social welfare and first aid activities' (Kokawa, 2003). These activities aim to increase self-reliance, raise awareness of vulnerabilities and the root causes of disasters, and develop skills. The activities are implemented with the help of volunteer networks that have a good knowledge of the local conditions and can easily interact with communities.

In the Philippines, a typhoon - and flooding - prone country, this approach has been successfully implemented in high-risk communities. The programme works with both local government and communities to ensure that development and mitigation strategies are shared and sustained. The key areas addressed by this programme are dissemination of technical information, training, raising awareness of risks and vulnerability, accessing local knowledge and resources, and mobilizing local communities (Allen, 2006). With the training obtained, the communities develop hazard maps, disaster action plans and build teams to be operational in networks of focal points (Kokawa, 2003). Furthermore, Allen (2006) observes that raising awareness contributes to increasing the willingness to cooperate in disaster preparedness initiatives of community members once they become knowledgeable of the vulnerability their livelihoods have to hazards. Raising awareness 'as well as fulfilling an educational function, it [...] engenders participation in practical CBDP (community-based disaster preparedness) initiatives' (Allen, 2006).

The Community-Based Disaster Preparedness initiative requires high levels of community participation; hence it is necessary that the community enjoys a relatively high level of cohesion to yield good results. In this way the community is in a better position to collectively identify problems, take decisions and act on them, and allocate resources (Allen, 2006).

Early Warning System in Bangladesh: Effectiveness through simplicity and low technology

After a long history of severe cyclonic storms, Bangladesh has improved its disaster management and response. On 15 November 2007 the cyclone Sidr – a category-5 equivalent tropical cyclone on the Saffir-Simpson Scale, and the strongest named cyclone in the Bay of Bengal – hit the coast of Bangladesh.

Even though the damages caused were severe and extensive, the number of casualties was smaller compared to that of the cyclone that hit Bangladesh in 1991 – 3,447 lives were lost in 2007 in comparison to more than 138,000 in 1991. Many attribute this improvement of the population's response to the early warning system that was put in place in response to the cyclone Sidr and that resulted in mobilizing over 40,000 Red Crescent volunteers to warn people through megaphones about the coming cyclone.

First, the authorities in Bangladesh were alerted about the coming cyclone 72 hours before it made landfall. The WMO global cyclone observatory fed data to the regional outpost at the Indian Meteorological Office in New Delhi, which subsequently communicated this to the Bangladesh Government. Once the Government of Bangladesh received the alert, it passed it on to the local Red Crescent Office. A network of 40,000 Red Crescent volunteers, who had been specifically trained for this task, were mobilized at the 15 affected districts (out of Bangladesh's 64). The volunteers bicycled around the districts at risk and ordered the population to enter the 1,800 disaster shelters that were built along the coasts. By the time the cyclone indeed made landfall, about 2 million people were already sheltered. One the most peculiar characteristics of this early warning and response system is the easy technology that was used. Bhupinder Tomar, Senior Disaster Preparedness Officer at the International Federation of the Red Cross and Red Crescent in Geneva, explains that the project is centered on 'preparing people for disasters by using community-based volunteers who do everything from street theatre to school education and lectures to women's groups' (IRIN, 2007).

The volunteers are set up in various committees that focus on different issues, such as warning, first aid, shelter and relief. When a cyclone alarm goes off they go on their bikes and megaphones to the streets to alert people.

This example of an early warning system is relevant because it can be easily replicable. According to Tomar, the only important factor to consider when implementing this system is that there needs to be a fairly high frequency of disasters so that people accept there is a genuine risk (IRIN, 2007). Indeed, a major study revealed that 95 per cent of the surviving households of the cyclone of 1991 were aware of the official cyclone warnings but only 17 per cent of them responded by seeking shelter before the landfall of the storm. Of those who did not respond, 45 per cent did not believe the storm would be as severe as the warning made it seem, 16 per cent did not understand the warning, and another 16 per cent was not able to reach shelter due to the strong winds and floods (Twigg, 2003). In that year previous false alarms were one of the main reasons for refusal to trust the warning, and many were skeptic about having a cyclone striking at that time of the year.

But Bangladesh still faces challenges in disaster preparedness and disaster risk reduction. Preparedness remains patchy particularly in rural coastal areas where there is a lack of infrastructure. According to Howell (2003) many rural people do not fully understand the signal system. Women in particular are the most vulnerable. They have serious problems in access to information and lack preparation to face disasters partly due to the purdah culture – which includes the seclusion of women from public observation by wearing concealing clothes from head to toe and by the use of high walls, curtains, and screens erected within their homes. Their isolation impedes them from interacting with others as a way of learning about a risk. In addition, women are not allowed to leave their homes without the permission of their husbands, even to go to a cyclone shelter (Howell, 2003). The statistics confirm these facts. In the cyclone of 1970 the entire adult female population of the island of Monpura was lost, and in 1991 the mortality rates were significantly much higher for women and children than for men (Howell, 2003).

In Bangladesh (and other countries) the NGO, Displacement Solutions, plays an important role in assisting people displaced by, amongst others, climate change, and in recovering lost housing, land and property belongings (HLP). Displacement Solutions has established a Global HLP Rights Expert Registry with over 125 experts who can be called upon in case of need to recover losses or if compensation is required.

Water security

On water security there are many good and bad practices around the world. A very sophisticated system of subterranean water transport was developed in old Persia (the qanats) and found its way to other parts of the world (figure 1).

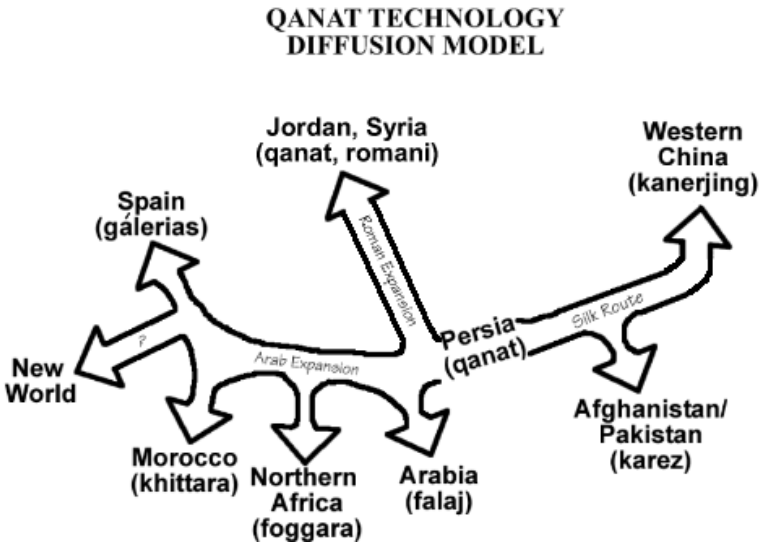

Figure 1: Qanat Technology Diffusion Model.

Of course current demand for water due to population growth, urbanization, industrialization and the impacts of climate change require different solutions to water security. But it does not hurt to look at the good practices of the past, not only technological, but also institutional, so as to provide equitable distribution of the

water, to receive inspiration for the present and future challenges. Worrisome is the pumping of water out of aquifers with fossil water, not only in the Middle East, North Africa, China and India, but also in the United States, where the Ogallala fossil water aquifer is running out, compromising the bread basket function of the United States on the world food market. Also the Netherlands – with its difficult hydrology – has developed interesting experiences, which have been replicated elsewhere. The safe settlement and survival of the Dutch population has required highly sophisticated water infrastructure and corresponding institutions, such as the water boards with their own parliaments, which were important elements of the foundation of modern Dutch democracy (Grey and Sadoff, 2007, 554). As part of the Netherlands development cooperation the experience and expertise of the Dutch water sector is now being applied in the delta areas of, for example, Egypt (Nile), Bangladesh (Ganges/Brahmaputra), Indonesia (Jakarta Delta), Mozambique (Inkomati Delta), and Vietnam (Mekong), in order to help defend these vital economic areas in the countries against sea-level rise, (water) pollution and to assist with development of the port facilities. This programme is called Water Mondiaal.

Irrigation can be a mixed blessing as the following example from India shows. Characterized by its monsoon, India experiences extreme intra-annual rainfall variability. Nearly 70 per cent of the rural population depends on agriculture for subsistence and employment, influencing their livelihoods and increasing their vulnerability to climate variability (Kumar, 2003). The expansion of irrigation is seen by many as the key to sustaining agricultural production and food security. But the Government's investments in water infrastructure have had a positive impact on the economy. According to Grey and Sadoff (2007) there is a direct correlation between investments in irrigation and significant declines in poverty. Irrigated districts have an average of 25 per cent poverty rates, whereas those lacking irrigation show an average of 70 per cent poverty rate (Grey and Sadoff, 2007). However, irrigation systems should not be taken as the best possible solution to achieve water security. The intensive use of irrigation can cause the degradation of land and water resources. Thus, irrigation should not be

treated as a long-term solution (Reddy, 2002, 2). Furthermore, the Indian Government has been making efforts to de-link the country's economy from its climatic vulnerability by shifting away from agriculture and betting on manufacturing, communications and transport. The challenge of achieving reliable and sustainable access to water, however, still remains.

Another good example of water security policies by improving institutional arrangements is South Africa. Investments in water management infrastructure began during the apartheid period with the purpose of promoting the farming, mining and financial sectors. These investments were aimed only to serve the white population, while the rest of the country was left undeveloped. Although highly inequitable, those investments reduced vulnerability and laid a basic infrastructure base.

With the end of apartheid water management policies have an emphasis on equity. Riparian laws, which tie the right to use water to the ownership of land along rivers and groundwater aquifers, have been abolished. The South African Government is now the custodian of all water bodies and no ownership of water is allowed, except on a contact basis when they are allocated by the State (Reddy, 2002). Another example is the Vaal River System, which is located in a semi-arid region that experiences extremes of rainfall and drought. This system includes inter-basin transfers with seven river systems and sixteen dams. It is regulated by a law that states that specific flow allocations in each river basin for basic services are preferably directed to the poor and for in-stream environmental flows, before other allocations are considered (Grey and Sadoff, 2007).

4.3 Capacity development

The UN Development Programme (UNDP) has defined the concept of capacity as 'the ability of individuals, institutions and societies to perform functions, solve problems, and set and achieve objectives in a sustainable manner' (UNDP, 2009).
How can we do this in the face of climate change and the impacts it may have on migration and conflict? Individuals have to be made aware of what is happening, what may be coming towards them and what options they have in their various capacities (at home, at work, as a consumer, as a voter, as a politician) for preventative action and to cope with inevitable climate change and is impacts.

Climate change and water stress will play out differently in the various parts of the world and will be perceived differently according to the specific ecological, political, economic and cultural conditions. The Inuit communities in the Arctic Circle perceive it differently to the pastoralists in the Horn of Africa or the fishermen in the mangrove areas between India and Bangladesh. The extreme droughts, floods, cyclones and firestorms in Australia have prompted the Climate Institute (based in Melbourne and Sydney) to look into the public and mental health aspects of the impacts of climate change in the country. A recent report by the Climate Institute says, 'The emerging burden of climate-related impacts on community morale and mental health –bereavement, depression, post-event disorders, and the tragedy of self-harm – is large, especially in vulnerable rural areas' (The Climate Institute, 2011). Relocation and migration towards cities is already occurring and will increase in the future. Adequate counseling to prepare individuals and communities to cope with both the slow-onset impacts and the extreme events will have to be provided by public authorities and NGOs.

It is not possible to give a full overview of all capacity development issues related to the theme of this paper as they deal with so many aspects of human behavior on all levels, from the local to the global. Only a few concluding observations and recommendations will be given here.

Awareness-raising

This will have to be done around the world with all the diversity of experiences and perceptions. It is worrisome that in parts of the world where mitigation should be a political priority, climate science denial seems to be on the rise. People are unwilling to make the needed changes in lifestyle, especially those associated with high-energy inputs, and then discard the science behind those changes. The spread of this denial in the United States makes it unlikely that they will come with a strong and pro-active climate position to the upcoming negations on a successor to the Kyoto Protocol at the 17th Conference of the Parties in Durban. As already indicated, a lack of a strong mitigation agenda in the coming years will aggravate the adaptation challenges with resulting impacts on migration and conflicts. Positive, however, is that many young entrepreneurs see their future in designing and commercializing sustainability, and the same holds for many of the existing major corporations. Part of it is sometimes greenwash, but those in the private sector with a longer term perspective, including many (pension) fund managers, feel that in the end only climate-sound investments will pay back.

In the United States, awareness amongst the military about the security threat of climate impacts has risen over the past years. They have concerns about volatile areas in Central and South Asia, about the control of the Arctic, and about sea-level rise as it affects their low-lying naval bases on the coast of the United States and in the Indian and Pacific Oceans. Many also realise that the United States armed forces, as by far the biggest consumer of fossil fuel in the world, is very much part of the problem. Reducing the boot-print is a growing focus of attention.

More awareness is needed of the special vulnerability of women and children to impacts of climate change and water stress.

Institutional change

Institutions, like governments with their ministries, will change when society and social perceptions change, but it may take time. Organisations, especially big organisations, are resistant to change, because of bureaucratic procedures, traditional career patterns and sometimes corruption by short- term interests. Historically unprecedented rises in temperature and frequencies of extreme weather events require new thinking and collaboration within and between ministries. How can we build in proper and timely reactions to early warning signals about coming droughts or floods? How can we learn from best practices in other countries and to overcome the syndrome of 'not invented over here'?

The UNFCCC decisions contain provisions for financial and technological cooperation between the various countries. In the field of forests, the so-called Reduction of Emissions from Deforestation and Degradation (REDD) allows transfers of funds only if a strict Monitoring, Reporting and Verification system is put in place. These entail the kind of institutional innovations needed to have governments mainstream climate change, water stress and the associated social impacts in their policies.

Also the traditional development agencies such as the World Bank, the regional development banks and the bilateral donors have to 'climate-proof' their projects with the recipient countries and have mitigation and adaptation options and issues explicitly taken up in the environmental and social assessments which are part of project development. See also Klein (2007).

Independent monitoring of relevant adaptation factors such as forest cover, wetlands, mangroves, and soil moisture is a vital tool to verify compliance with international environmental agreements as a precondition to prevent conflicts and to define situations in which environmental migrants are entitled to international assistance. An important role is played here by the Soil Moisture and Ocean Salinity (SMOS) satellite programme of the European Space Agency (ESA). There is also a clear role for The Hague in its international capacity as Legal Capital of the World with its courts, tribunals and academic centres of expertise especially on the compliance and enforcement of international law. In The Hague, scien-

tific evidence of climate change, observations of social effects and insights in applicable legal arrangements should be brought together to help lay the basis for the practical solutions which have to be finalized and implemented at the local level.

Societal change

Some societies are more at risk than others and some societies have a higher liability to prevent further climate change, because of their past, than others. That liability should also stretch towards assisting vulnerable societies in coping with social and humanitarian impacts of adaptation. As mentioned above, both discouraging and encouraging signs can be observed. While the climate denialists and ecologically destructive short-term interests still are formidable obstacles to global, national and local sustainability, the growing scientific evidence of climate change, water stress and its impacts on conflict and migration and the growing body of initiatives, experiences and best practices to handle these impacts in a socially equitable way plus the enthusiasm of young entrepreneurs, farmers and students all over the world, give hope.

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Climate change-induced migrations

A research and capacity-building agenda from a human security perspective

Rolain Borel

This keynote speech is dedicated to the memory of Prof. Mahmoud El Zain Hamid, who passed away on the eve of this symposium, while teaching at the University for Peace. Prof. Hamid should have been the one presenting this keynote speech and indeed inspired several of its leading ideas.

Initial (bittersweet) remarks

I perceive that today's water stress, conflict and migration situation is largely a story of:

Climate change denial

global governance

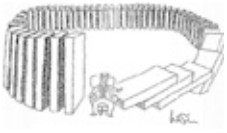
exclusion

injustice

poor resource management

un-sustaina-bility

'over'-population and…



long-term feed-backs.

In this paper, I will draw from our experience in disaster risk reduction and disaster response to show the analogies with situa-

Rolain Borel, Professor Emeritus, University for Peace.

tions that may arise out of climate change. The science and research and capacity-building aspects of these issues will be analysed.

There are a few elements that we consider particularly important for this symposium, even if I am not sure that there is a definite UPEACE position or consensus approach to these topics.[2] Among these important issues we would favor human security and human rights as compared to state-centric approaches. There is clear link between climate change and human rights, for example the right to life and the right not to be displaced; a link that the international community has been slow to recognise (Atapattu, 2010). While migrations are mostly seen as problematic (for states and people) we should not forget that they can also be considered as a human right.

In addition, the debates about the definitions of several concepts such as 'natural' or 'man-made', 'migrant', and 'across borders' seem to be driven by the notion of 'what is possible' rather than 'what is right'. For example, the exclusion of environmental IDP's from the international conventions seems to be based on the consideration of an overwhelming task, rather than on the substantive rights issue. Maybe we should distinguish between 'what is needed' and 'what is possible' and do it in stages...

Environmental refugees are a new phenomenon (maybe not completely new, but the magnitude and frequency is probably much greater than in the past). Therefore a new perspective needs to be envisaged: one that challenges the state-centric views and addresses the human security elements of the situation. We should therefore consider the issues of environmental justice from the perspective of the displaced persons and consequently adopt a stronger human rights approach.

In addition, focusing the attention away from exclusive state-centric issues would allow us to emphasise a solidarity approach in

[2] The substantial contributions of Prof. M. Hamid and Prof. M. Kanade in this regard are hereby thankfully acknowledged.

climate justice in accordance with Martin (2010), who reminds us that the essence of solidarity can already be identified in a number of different principles and mechanisms present within the legal climate change framework. And then Baskin (2009) also considers that 'might needs right'. Is it naïve? Maybe, but in the case of climate change even the powerful need a genuinely global solution, which cannot be achieved without an engagement with justice (Baskin, 2009).

The distinction between the causation of man-made vs. natural drivers of migrations is another source of concern. Whether migrants are victims of rights violations or of misfortune seems to be the criteria for deciding if certain migrants are considered 'climate change refugees' or not, and therefore qualified recipients of international help and interventions. This distinction is clearly absurd.

Disasters ('fast' and 'slow') as a model of the problems and approaches that will be needed to anticipate/respond to climate change

> *"Advocacy and humanitarian organisations that have traditionally focused on conflict-induced forced displacement have expanded their scope of work to climate change, disasters, and displacement. Additionally, organisations typically focusing on environmental issues are now including displacement induced by climate change in their agendas"*. (Albuja and Cavelier, 2011).

There are several analogies between disaster risk reduction and disaster response initiatives and those that try to address climate change. We pose that the latter may in general learn from the former.

Both need a preventive approach

States have the obligation under international human rights law to protect rights by guaranteeing the entire 'cycle of protection' (Albuja and Cavelier, 2011). Whether an obligation or not, in reality, the preventive approaches are vastly underfunded, because the 'response' types of mechanisms are much more visible and redeem higher electoral votes. It is likely that the same phenomenon will, relatively speaking, also occur in the case of climate change impacts.

Need to place the risks in a broader context

The risks from natural and man-made hazards, as well as those arising from the climate change process, need to be placed in the context of the multiple 'social hazards' that a large majority of the world population face on a daily basis (such as overcrowding; local violence in all its manifestations – domestic, gangs, police, etc. -; accidents; environmental injustice; joblessness; landlessness; political and economic exclusion and marginalisation, etc.) (Borel et al., 2011). As in the case of disasters, it is likely that the inertia of hiding these recurrent risks so-to-say 'under the carpet' is quite large.

Monitoring challenge

In a similar fashion to disasters arising from natural hazards, large events attract more international attention, but many small events cause more suffering in total (Lavell, 2003). The challenge is to fully account for the impacts to of all those small events. This task will be especially difficult when considering that most of the disasters that may arise out of climate change are likely to be 'slow', i.e. those that are created over longer periods of 'gestation' and out of the conjunction of multiple sources.

Disasters/climate change and conflicts

There are plenty of diverging evidences, whether disasters contribute to more conflicts or more peace. While the deciding factors each lie in the individual contexts, the balance seems however to weigh heavier in the direction of a negative impact. This being said, catastrophic descriptions of future climate change conflicts don't seem to match the existing knowledge ('know-how') in conflict transformation and the fact that conflicts may arise does not automatically mean that they will be violent, as many environmental conflicts of today are in fact non-violently managed and there is no reason to believe that this know-how will disappear (Borel, 2012).

Research agenda

Approaches

Need for local hard data – Even if some global phenomena might not be understandable to isolated local communities, and such communities might be unknowingly hit by these phenomena, local scientific knowledge is very relevant particularly in relation to the global climate changes. The impact of these global changes can only be understood if data from various regions and localities are collected and analysed scientifically.[3]

Scientific perspective needs to incorporate local knowledge – However, addressing the impact of these global phenomena that are understandable only through scientific scenarios is, interestingly, viewed to be only effective when incorporating the place-based forms of knowledge—indigenous and traditional forms of knowledge. Like in the case of big disasters, which are the sum of many localised disasters, climate change, a truly global phenomenon, will manifest its impacts in many localities, where a different blend of localised adaptation and mitigation measures will play their role. With this situation in mind, it is evident that local knowledge will be of

[3] M. Hamid, personal communication, 2011.

paramount importance. A recent publication on Darfur epitomises this trend (Leroy, 2009).

Need to 'delicately' understand the systems (from within) – Such studies should be multiplied, in order to avoid the recurrence of 'development' or humanitarian aid interventions that, out of ignorance of the delicate balances that take place in vulnerable environments, behave like a bull in a glass shop. Counterintuitive behaviours seem to be the rule rather than the exception. The massive digging of wells as a 'response' to drought and with the intent of settling down transhumant pastoralist populations in the Sahel in the 1970s is an illustrative example of a type of intervention that only led to their added vulnerability by counteracting their traditional migrations patterns in search of better grazing grounds.

Priority topics

Migration as adaptation – Whether migrations are a sign of positive adaptation or an indicator of failure is a matter of debate (Asapattu, 2010; Leroy, 2009). Climate change may be an important future push factor, but its effects have to be placed in the context of significant pull factors as well, which may have little to do with climate change. The tremendous rural migration to the cities in Latin America in the 20th century and in China nowadays cannot be solely attributed to changes in agricultural production patterns and in rural livelihood, but mostly to the 'attractiveness' of the cities, which offer better education, health, jobs, etc. Tarekegn (2009) reminds us about the positive elements of migration and about migratory fluxes that have been there all the time as part of the local adaptations to climate variability. In addition, outmigration may also alleviate ecological pressure (Leroy, 2009).

Some scholars believe that there are still insufficient data and, before continuing the specific debate on this matter, more research is needed[4] with a greater focus on distress migrations that can be more confidently related to climate change issues.

[4] See: http://www.gfmd.org.

Notion and numbers of environmental or climate change refugees, migrants and internally displaced people (IDPs) – The emphasis of the present symposium is on people who migrate across borders, but the most need seems to refer to IDPs. In the view of the widely varied present estimates and of the lack of precision that relates to the definition of these different categories, there is a strong need to qualify and quantify them better.

'To stay or not to stay' – Martin (2010) reminds us of the great advantage that we can derive from the identification and critical analysis of adaptation strategies that allow people to stay, as well as from the identification of resettlement strategies that protect people's lives and livelihoods at their new location.

Relationship between climate change, migration and conflict – As indicated above, there is still a lot to be learned about the likelihood of conflicts arising out of climate change. If disasters are a good 'model', we sense that quasi-invariable multi-factors are at stake. While there is some anticipation that environmental degradation due to climate change may be responsible for future conflicts, scarcity and diminished carrying capacity not always explain conflicts, as systems of power and access, which are rather independent from climatic effects, seem to be more relevant (Evans, 2011).

The possible impacts of environmental changes on human mobility are a subject of debate that needs clarification by more field studies.[5] Furthermore, so does the relationship between migrations and conflicts. While conflicts seem to restrict migrations (Leroy, 2009), additional conflict may occur when incoming people don't recognise local resource use rules (Ahmed, 2009; Manger, 2009).

[5] See: http://www.ehs.unu.edu/file/get/8538.

Capacity-building

Out of so many issues that require deeper analysis and field data (as an 'essential complement to' – and I am tempted to say 'instead of predominantly'- theoretical considerations), let me mention three topics that should receive more attention in capacity-building efforts:

Appreciation for diversity, dialogue and synergies among various forms of knowledge

The need for local interventions requires improving local capacities. This should not be done by solely trying to graft scientific knowledge, assuming it really exists, into the local setting but by valuing and integrating indigenous and traditional forms of knowledge that may help producing better informed policies. Such an approach requires incorporating inputs both from 'above' and from 'below' and facilitating a truly transformative education. The Bangladesh case (Background document 2012) shows how difficult such an approach is. However, it is not impossible, as demonstrated in the case of La Masica in Honduras during the occurrence of Hurricane Mitch in 1998 (Lavell, 2003).

Local capacity to monitor and assess migration issues that may be related to environmental change

The weaknesses of the research efforts in the migration-climate change link calls for additional approaches. One of those would be to involve more and more local actors in observing and evaluating the processes and in this manner contribute to their understanding from different angles. Of course such an effort will not be fruitful if the local actors are not trained in monitoring and assessment.

Local capacity for governance, and conflict transformation

We have seen before that existing conflicts that arise (at least partly) from environmental change issues are often resolved without violence, because there is generally enough know-how to transform them peacefully. Local capacities are however still insufficient both at the level of local conflicts and especially at the higher level of intergovernmental negotiations that invariably leave local actors out, even when they are directly involved, for example in the case of transboundary issues, such as 'Peace Parks'. This is particularly important as climate change in all likelihood will manifest itself across boundaries.

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Water stress, conflict and migration in South Asia

Major General ANM Muniruzzaman (Retd)

Introduction

At the outset of the twenty-first century, climate change has appeared as one of the greatest challenges to international peace and security. It is seriously affecting hundreds of millions of people today and in the coming decades those affected will likely more than double – making it the greatest emerging humanitarian and security challenge of our time. Climate change acts as a threat multiplier for instability in some of the most volatile regions of the world. Projected climate change will seriously aggravate already marginal living standards in many Asian, African, and Middle Eastern nations, causing widespread political instability and conflict. The matter is thus not one of individually occurring, monocausal crises and conflicts, but rather one of a great number of destabilising, mutually amplifying factors.

There is a growing realisation internationally that climate change is becoming a security issue in many parts of the world.[6] Putting an end to the debate over climate change, the UN Security Council in a presidential statement declared at its meeting on climate change on 20 July 2011 that possible adverse effects of climate change may, in the long run, aggravate certain existing threats to international peace and security.

Water stress and climate induced conflicts and migration are some of the big concerns associated with climate change. The effects of increased climate change – most particularly water scarcity,

Major General ANM Muniruzzaman is President and CEO of the Bangladesh Institute of Peace and Security Studies (BIPSS).

[6] Militarising Climate Change (2011) ANM Muniruzzaman in an Interview with Isabel Hilton, The Third Pole, July 4 2011.

increased natural disasters, food insecurity, loss of livelihood, displacement and migration, loss of marine biodiversity and fisheries – will intensify exiting conflicts and, at the same time, draw new lines of conflicts in South Asia like many regions in the world. Effective climate change mitigation and adaption efforts, dialogue and sharing of knowledge and technology and regional mechanisms can diminish climate induced consequences and thereby lessen the likelihood of conflicts in the region.

Security ramifications and conflict potentials of climate change

The security implications of climate change cover a wide spectrum. The recent scientific assessment presents a worrisome picture. According to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), 11 of the past 12 years (1995–2006) rank among the 12 warmest years since 1850.[7] The 2007 IPCC report predicts temperature rise of 1.1–6.4 °C by 2100. The number of natural disasters in the world may double during the next 10 to 15 years. Over the past 10 years, 3,852 disasters killed more than 780,000 people, affected more than two billion others and cost a minimum of US$960 billion.[8] Major vulnerabilities induced from climatic hazards include human displacement, freshwater shortages, reduced agricultural productivity and food insecurity, loss of livelihood, health hazards, energy crisis, and disaster security.

Climate change worsens water quality and availability in regions with water scarcity. Currently, 1.1 billion people are without access to safe drinking water. More than 3.5 million people die each year from water-related disease; 84% of them are children. Nearly all deaths (98%) are in the developing world.[9] This crisis may in turn fuel existing internal or inter-state conflicts and social conflict and

[7] IPCC (2007) Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change; Cambridge University Press, Cambridge.

[8] Muniruzzaman, A.N.M. (2011) Climate change: Threat to international peace and security; in: *The Daily Star,* 11 August 2011.

[9] *Ibid.*

it is feared that unresolved water issues could trigger Indo-Pak conflict, which would have unpredictable consequences internationally.

Reduced agricultural productivity and the resultant situation of food insecurity is potentially the most worrying consequence of climate change. If global warming rises to 3°C it is likely that the number of people suffering from hunger will increase by 250 million to 550 million. According to the German Advisory Council on Global Change, agricultural production from rain-fed agriculture could fall by about 50% in some regions by 2020.[10] Rising food prices could potentially push hundreds of millions of people back into poverty. This situation can undermine the economic performance of weak and unstable states, thereby aggravating destabilisation, the collapse of social systems and violent conflicts.

A changing climate affects the essential ingredients of maintaining good health: clean air and water, sufficient food and adequate shelter. Every year, the health of 235 million people is likely to be seriously affected by gradual environmental degradation due to climate change. Climate change is projected to cause over 150,000 deaths annually and almost 45 million people are estimated to be malnourished because of it.[11] Direct economic losses and human casualties of global disasters have increased in recent decades, with particularly large increases since the 1980s. According to Oxfam, developing countries will require at least US$50 billion annually to adapt to unavoidable climate change-related disasters.[12]

The impacts of climate change may damage key energy infrastructures, such as energy plants, energy routes, nuclear installations, and consequently destabilise public order. For instance, the recent earthquake in Japan caused an explosion in the Fukushima nuclear plant, causing human casualties and disruption to energy produc-

[10] Miljkovic, A. (2009) Environmental Impacts on Human Security and the Potential of Conflict, Waterwiki.Net.

[11] Global Humanitarian Forum (2009) The Anatomy of a Silent Crisis, Human Impact Report on Climate Change, Geneva.

[12] Oxfam (2007) From Weather Alert to Climate Alarm, Oxfam Briefing Paper 108, November.

tion. The decline in hydroelectric power generation may additionally reinforce competition and conflicts over fossil energy sources. Climate change could potentially trigger large-scale displacement and migration from one region to another. The 2001 World Disasters Report estimated that there were currently 25 million 'environmental refugees'.[13] The IPCC estimates that by 2050, 150 million people could become displaced by sea-level rise (SLR), desertification, increasing water scarcity, floods and storms, etc.

Climate change also has security dimensions. Climate-induced insecurities can trigger interstate tensions and conflicts. States may be stressed to the point of collapse. The potential for regional conflicts due to climate-induced condition will be extremely high. Radicalisation and terrorism may increase in many developing societies, particularly in South Asia, due to the climate-induced social and economic deprivation. When a government can no longer deliver services to its people, conditions are ripe for extremists and terrorists to fill the vacuum. Resource scarcity could be a contributing factor to conflict and instability. The 1994 genocide in Rwanda was in many ways a consequence of squabbles over agricultural resources. The 1974 Nigerian coup resulted largely from an insufficient response to famine. The situation in Darfur, which had land resources at its root, is spilling over into neighbouring Chad. The United Nations estimates 300 potential conflicts over water exist around the world today.[14]

Water stress and regional security implications in South Asia

The South Asian region is also highly sensitive to the consequences of climate change. It is known to be the most disaster prone region in the world supporting a huge population of more than 1.58 billion.[15] Major regional security implications induced from water stress include decreased water availability and water quality in many arid and semiarid regions, an increased risk of

[13] IFRC (2001) World Disasters Report 2001: Focus on Recovery; International Federation of Red Cross and Red Crescent Society, Geneva.
[14] Muniruzzaman, A.N.M. (2011), *op cit.*
[15] 2010 estimate, according to the World Bank Report released in 201.

floods and droughts in many regions, reduction in water regulation in mountain habitats, increased incidence of waterborne diseases such as malaria, dengue, and cholera, decreased agricultural productivity, adverse impacts on fisheries, adverse effects on many ecological systems, decreased reliability of hydropower and biomass production, and, importantly, increased damages and deaths caused by water-related extreme weather events.

In South Asia, climate change increases the variability of water supply, leading to floods during some parts of the year and droughts in others. Increasing water shortages relative to population growth are putting the Indus Basin irrigation and drainage system in danger of collapse. 120 million to 1.2 billion will experience increased water stress by the 2020s in South and South-East Asia.[16] Water availability on per capita cubic metre basis in the Himalayan River Basins is likely to decline from 7320 to 5700 in case of Bangladesh in 2030, from 8500 to 5500 in case of Nepal, and from 1730 to 1240 in the case of India.[17] The report assessed implications of the likely decline 275 Billion Cubic Meters (BCM) renewable fresh water in India, Nepal, Bangladesh and China by 2030 for food security, health, migration, bio-diversity, social stability and interstate relations in the region.

Melting of Himalayan Glaciers and Impacts on Indus River Basin

The Himalayan range contains high altitude glaciers that supply water to many rivers in Asia. These rivers provide water to more than half of the world's population. Many people in Asia are dependent on glacial melt water during dry season. Accelerated glacial melt questions the very perennial nature of many of the Himalayan flowing rivers. This is likely to have huge implications on those dependent on the resource affecting water availability for

[16] IPCC (2007), *op cit.*

[17] Strategic Foresight Group (2010) The Himalayan Challenge Water Security in Emerging Asia.

agricultural purposes.[18] In Northwest China, 27% of the glacier area will decline by 2050 (equivalent to an ice volume of 16,184 km3), as will 10 to 15% of the frozen soil area.[19] The current trends of glacial melt suggest that the Ganges, Indus, Brahmaputra and other rivers across the northern Indian plains could likely become seasonal rivers in the near future.[20] This poses a challenge for reducing the vulnerability of more than 1.3 billion people living in the major river basins downstream from the Hindu Kush-Himalayan region. The rapid retreat of the Himalayan glaciers has consequences for water-related hazards, such as glacier lake outburst floods, and for water stress, as a result of the decline in fresh water supplies during the lean season.[21] The conflict potential emanating from the melting of Himalayan glaciers underlies the factors leading to cross-border water-related conflicts such as per capita water availability, the level of water withdrawals for annual use in relation to its availability, and the extent of dependence on water resources that flow in from the borders.

Water stress as a driver of food insecurity

Reduced agricultural productivity, due to decreasing water availability and water-related natural catastrophes, is one of most worrisome consequences of water stress in South Asia. In the next 20 years, China, Nepal, India and Bangladesh in the Himalayan subregion will face the depletion of almost 275 billion cubic metres (BCM) of annual renewable water.[22] The agricultural sector will continue to be the major consumer of water in China, Nepal, India

[18] UNDP (2008) South Asian Regional Study on Climate Change Impacts and Adaptation: Implications for Human Development, Human Development Report 2007/2008:Fighting climate change: Human solidarity in a divided world.

[19] Singh, C.P. (2008) Alpine Ecosystem in Relation to Climate Change; in: *ISG Newsletter*, no. 14, pp 1–4.

[20] Eriksson, M. *et al.* (2009) The Changing Himalayas, Impact of climate change on water resources and livelihoods in the greater Himalayas; International Centre for Integrated Mountain Development (ICIMOD): Kathmandu.

[21] Ives, J.D., R.B. Shrestha and P.K. Mool (2010) Formation of Glacial Lakes in the Hindu Kush-Himalayas and GLOF Risk Assessment. International Centre for Integrated Mountain Development (ICIMOD), Kathmandu.

[22] Strategic Foresight Group (2010) The Himalayan Challenge Water Security in Emerging Asia, *op cit.*

and Bangladesh; although the industrial and domestic sectors will also need more water in the future. The crop yield will drop by 30–50% in the case of all the four countries by the middle of the century. In India, agriculture accounts for almost 90% of the water usage but this will decline to 70–75% by 2050. Nepal and Bangladesh presently use more than 95% of their water for agriculture and will continue to do so until 2030. According to the Ministry of Agriculture and Cooperatives, Nepal will have a food deficit of more than 316,465 tonnes in 2010, owing to the unfavorable monsoon. With changing weather patterns, erratic monsoons and rising temperatures, the 'too much water, too little water' syndrome is likely to continue in Nepal.

River management and impending violent hydro-conflict

Water flow ignores political and community boundaries; decisions in one place affect water use elsewhere. In the case of shared river basins, water use upstream can affect downstream quality and quantity, thus creating the potential for conflicts of interest.[23] Water-related issues have led to interstate tensions and significantly hampered development, such as along the Nile, Euphrates, Indus and Ganges rivers. In South Asia, the potential hydro-conflict is more severe than many parts of the world. India is hurtling water by building expensive hydroelectric dams in a remote valleys of India-controlled Kashmir.[24] Being a rapidly growing but power-starved economy, India plans to build many more dams over the next decade. There are concerns over the Indus Waters Treaty that was concluded in 1960 that sets out the legal framework for the sharing of the waters of six rivers: Indus, Chenab, Jhelum, Sutlej, Beas, and Ravi (flowing through northern India into Pakistan). But the concern is growing in Pakistan that India is controlling the

[23] Delli Priscoli, J. (year?) Case Study of River Basin Organizations. Institute for Water and Watersheds.

[24] Polgreen, L. and S. Tavernise (2010) Water Dispute Increases India-Pakistan Tension, The New York Times.

water flow of the Indus, Chenab and Jhelum rivers that pass through the India-administered state of Jammu and Kashmir.[25]

Since the Indus River provides water to over 80 percent of Pakistan's 54 million acres of irrigated land, dam and water withdrawal by India will cause desertification and would have devastating impact on Pakistan agricultural productivity leading to wide-scale food insecurity in Pakistan.

Water withdrawal and dam construction by India is the potential source of bilateral tension and conflict. Pakistan fears that India could make the country solely dependent on India in terms of war and could create draught or famine during the crucial time like war. The level of securitization went to the stage of nuclear 'red line' with a warning from Pakistan. Afghanistan plans to build 12 dams on the Kabul River with a combined storage capacity of 4.7 million acre-feet, which Pakistan frets will further diminish the Indus water supply.[26]

There is also huge potential for conflicts between Bangladesh and India over water sharing of common rivers. Bangladesh shares 54 rivers with India, but it has agreement for only one river. From 1974, India started unilateral diversions of water from the Ganges River after the construction of the Baraka Barrage. The Ganges Water Treaty, which was signed in 1996 for a period of 30 years, is also being fully implemented because of Indian unilateral withdrawal. India is violating the clauses of the Treaty by supplying more during the wet season causing flooding, and supplying less in the dry season resulting in draughts. Major impacts of this withdrawal include saltwater intrusion, vegetation damage, erosion, reduced conveyance capacity and disrupted fishing. In addition, the construction of the Tipai Mukh Dam, disagreements over the water sharing agreement for the Teesta River, and India's plan to start a country-wide river linking project will significantly

[25] Wellen, R. (2011) Will Pakistan Counter India's "Water Bomb" With a Nuclear Bomb? Foreign Policy in Focus.

[26] Daly, J. (2011) Pakistani Editorial Says Nuclear War with India "Inevitable" as Water Dispute Continues; in: *The Journal of Turkish Weekly*.

increase tension between the two countries that could be extended to the stage of military conflicts in the near future.

Implications of water stress in Bangladesh

Bangladesh is predicted to be one of the worst victims of climate-induced insecurities. The IPCC statistics shows that rising sea levels will wipe out more cultivable land in Bangladesh than anywhere in the world. By 2050, rice production is expected to drop 10 percent and wheat production by 30 percent. About 20 to 30 million people in Bangladesh alone could be on the move by 2050 because of climate change, causing the worst migration in human history.[27]

Flood is the most frequent and most intense natural disaster in Bangladesh. Every year flooding due to heavy rain thousands people suffer from loss of shelter, property and also agricultural products. Miller stated that high projected rise in sea level of about 88 cm (35 inches) would flood agricultural lowlands and deltas in parts of Bangladesh.[28] Sea-level rise will increase flood frequency and flooding duration, affecting Aman production.[29] A flood, which ravaged the southwestern part of Bangladesh in 2000 caused damage or losses of at least US$500 million to crops, fish farms, property and infrastructure. The shrimp sector was the most affected sector, losing shrimp fields of equivalent US$230 million.

The main impacts of sea-level rise on water resources in Bangladesh are fresh water availability reduction by salinity intrusion. Both water and soil salinity along the coast will be increased with the rise in sea level, destroying normal characteristics of coastal soil and water. A water salinity map for the period of 1967 and 1997 produced by the Soil Resources Development Institute shows that

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[27] UnB Dhaka (2009) Climate Change Impacts: 1.5cr people to be displaced in Bangladesh by 2050; in: *The Daily Star*.

[28] Miller, G.T. (2004) Living in the Environment; Brooks/Cole-Thomson Learning, USA.

[29] Sarwar, G.M. (2005) Impacts of Sea Level Rise on the Coastal Zone of Bangladesh; Masters thesis, Lund University, Sweden.

the problem is already on the way.[30] Soil of Jessore, Magura, Narail, Faridpur, Gopalgonj and Jhalokati was newly salinized in 24 years of time expansion. A one metre sea-level rise will expand the soil and water salinity area at a faster rate.

Reduced agricultural productivity and the resultant situation of food insecurity is another threat to Bangladesh. In Bangladesh, sea-level rise and salinity intrusion decrease agricultural production by unavailability of freshwater and soil degradation.[31] For example, loss of rice production in a coastal village of Satkhira district rice production in 2003 was 1,151 metric tons less than the year 1985, corresponding to a loss of 69 percent.[32]

Another worrisome consequence of climate-induced natural disasters is the spread of water borne diseases in the coastal areas of Bangladesh. Almost one in five people in Bangladesh still lack improved water resources making them susceptible to water borne diseases like anaemia, arsenicosis, cholera, diarrhoea, hepatitis, malaria, schistosomes, typhoid and so on. With the increased density and distribution of salinity, cholera germs are getting favorable habitat and spreading in the coastal area. Most major epidemics that have occurred during the last 50 years have originated in coastal regions. Besides, arsenic contamination in the groundwater of Bangladesh is another crucial concern for the country. The World Health Organization (WHO) described the arsenic contamination in Bangladesh as 'the largest mass poisoning of a population in history'. Half of Bangladeshis, up to 77 million people, have been exposed to the toxic arsenic.[33]

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[30] SRDI (1998) Coastal area and water salinity map of Bangladesh (1967 and 1997); Soil Resources Development Institute (SRDI), Dhaka.

[31] Rashid, M.M, A.K.F. Hoque and M.S. Iftekhar (2004) Salt Tolerances of Some Multipurpose Tree Species as Determined by Seed Germination; in: *Journal of Biological Sciences*, vol 4 (3), pp 288–292.

[32] Ali, A. (2000) Vulnerability of Bangladesh Coastal Region to Climate Change with Adaptation Option. Bangladesh Space Research and Remote Sensing Organization (SPARRSO); Dhaka.

[33] Argos, M. *et al*. (2010) Arsenic exposure from drinking water, and all-cause and chronic-disease mortalities in Bangladesh (HEALS): a prospective cohort study; in: *The Lancet*, vol 376, no 9737, pp 252–258.

Bangladesh is most vulnerable to several water-related natural disasters and every year natural calamities upset people's lives in some part of the country. The major disasters concerned here are the occurrences of floods, cyclones and storm surges, flash floods, droughts and riverbank erosion. Although this country has a monsoon climate and has enough rain, droughts frequently take a significant portion out of the agricultural economy of Bangladesh, and cause hunger, instability, and insecurity.[34] For instance, between 1991 and 2000, 93 major disasters were recorded in Bangladesh, resulting in nearly 200,000 deaths and causing US$5.9 billion in damages with high losses in agriculture and infrastructure.[35]

Climate-induced migration in South Asia

Climate change is likely to bring about significant changes in migration patterns throughout the developing world. Increases in the frequency and severity of chronic environmental hazards and sudden onset disasters are projected to alter the typical migration patterns of communities and entire countries.[36] Climate change may significantly affect human migration in three different ways: first, warming of the atmosphere in some regions will reduce the agricultural potential and undermine the ecosystem services such as fertile soil and water affecting people's livelihoods; second, increasing extreme weather events will generate mass displacement; and third, sea-level rise will destroy the low-lying coastal areas and millions of people who will have to relocate permanently.[37] For example, Cyclone Nargis that struck Myanmar in May 2008 severely affected 2.4 million people and led to the displacement of 800,000 people. Desertification affecting Mexico's dry-

[34] UNEP (2001) Bangladesh: the State of the Environment 2001 Report.

[35] According to the statistics of the Ministry of Environment and Forest, Bangladesh, as part of the Strategic Program for Climate Resistance.

[36] Raleigh, C., L. Jordan and I. Salehyan (2008) Assessing the Impact of Climate Change on Migration and Conflict. Paper presented at 'Social Dimensions of Climate Change', Social Development Department, the World Bank, Washington DC, 5–6 March 2008.

[37] Panda, A. (2011) Climate Induced Migration from Bangladesh to India: Issues and Challenges. United Nations University, Institute of Environment and Human Security.

land regions results in the annual migration of 600,000 to 700,000 people from these areas.[38]

Climate change-induced migration is going to be in acute condition in South Asia. One third of the population live under the poverty line and climate-induced vulnerabilities may cause large-scale impoverishment, loss of livelihood, shelter and food availability. Major disasters – floods, earthquakes or cyclones – may induce massive transboundaty migration. One of the riskiest places to live is in low-elevation coastal zones. Worldwide, the largest populations living on low-lying coasts are in the Asia-Pacific region, in countries like China, India, Bangladesh, Vietnam, Indonesia and the Philippines. The delta has 8.5 million hectares of agricultural lands, of which 486,000 hectares would be inundated by a 2 metre sea-level rise leading to large-scale internal and transboundary migration. Glacier melting could profoundly induce migration by affecting the livelihoods of people who are directly dependent on irrigated water, small-scale fishing and aquaculture. Mass migration due to climate change may have negative consequences including escalating humanitarian crisis, rapid urbanization and associated slum growth and stalled development.

Climate-induced migration in Bangladesh: the worst case

Climate change-induced hardships will cause large-scale displacement of a huge percentage of the population in Bangladesh. Changes in local and regional climatic conditions in the form of sea-level rise, heat stress, desertification, flooding and drought may severely restrict livelihood options for large groups in Bangladesh, and consequently cause climate-induced migration both domestically and across its borders. Most of the poor people do not own land. The potential impact of a destructive flood in Bangladesh would send hundreds of thousands of refugees streaming into

[38] Brown, O. (2007) Climate Change and Forced Migration: Observations, Projections and Implications, Background paper for the 2007 Human Development Report.

neighboring India, sparking religious conflicts, the spread of contagious diseases and vast damages to infrastructure.[39]

Climate change has already created a refugee situation in Bangladesh. We are seeing a trickle of internal migration within the country. According to several authors, between 64,000 and 1 million Bangladeshis are rendered homeless every year due to riverbank erosion alone. Myers (2002) argues that climate refugees from Bangladesh alone might outnumber all current refugees worldwide. He projected that 26 million refugees will come from Bangladesh.[40] When sea-level rise takes away about 20% of Bangladesh's land mass, then we will see a major refugee population created by climate conditions. The country is so small but densely populated that it will not be able to absorb these refugees. There will be a spill over migration, or an exodus of people walking towards India.

Conclusion and policy recommendation

Climate change-induced implications are looking more and more unpredictable causing more frequent and intense natural disasters and creating new lines of vulnerabilities and conflicts in the developing countries like Bangladesh. At this juncture, it is crucially important to recognise that climate change is pervasive and has more security implications than any other threat today. Climate-induced challenges should be placed at the core of security considerations in a rapidly changing world. Hence, effective international cooperation, as advanced by the UN Security Council, should be formed to address the unpredictable security consequences of climate change.

Mitigation and adaptation responses must go hand in hand. Just because we are adapting does not mean we can stop mitigation efforts. But in some areas of the world, for example in Bangladesh,

[39] Broder, J.M. (2009) Climate Change Seen as Threat to U.S. Security. The New York Times.

[40] Myers, N. (2002) Environmental refugees: A growing phenomenon of the 21st century; in: *Philosophical Transactions: Biological Sciences*, vol. 357 (1420), pp 609–613.

we are beyond mitigation because the negative impacts of climate change are already being felt and will become more severe in the coming years. We must start building our capacity to respond immediately. The symptoms of climate change are very clear, so we must prepare for the worst. The governments should initiate capacity-building of the states, military and the coastal communities along with adopting national and regional policy frameworks, building public awareness, and sharing and exchange of knowledge, information, technology and expertise. Strengthening and enacting legal regimes and increasing the role of international organizations should be prioritized. Above all, political will and cooperation at policy level must be in the frontline to fight against climate change driven social and political ramifications in the foreseeable future.

Environment, climate change and human displacement

From literature, through empirical evidence to policy-making

Tamer Afifi

1 Introduction

This paper gives a brief overview of the literature on environment, climate change and human displacement and the various definitions of 'environmental migration'. Moreover, it summarizes the general outcomes of the project, 'Environmental Changes, Forced Migration Scenarios (EACH-FOR)'. Finally, the paper sheds some light on the consideration of 'environmental migrants' in the negotiation text of the United Nations Framework Convention on Climate Change (UNFCCC), Conferences of Parties (COPs) and related climate talks that might have a significant influence on global, regional and national policy-making with regard to human displacement caused by environment and climate change.

2 Literature overview: predicted number of 'environmental migrants'

The literature provides numerous estimates of the number of people who might have been - or might be - displaced due to environmental and climate change throughout the upcoming decades. The International Federation of Red Cross and Red Crescent Societies (IFRC) estimates the number of 'environmental refugees' to be exceeding the number of people who have been displaced by war

Tamer Afifi is Associate Academic Officer at the United Nations University Institute for Environment and Human Security, Bonn, Germany.

(IFRC, 2003). According to the Office of the High Commissioner for Refugees (UNHCR), 24 million people around the world have fled due to floods, famine and other environmental factors (UNHCR, 2002). Four years back, Klaus Toepfer from the United Nations Environment Programme (UNEP) expected that by the end of 2010, the number of 'environmental migrants' would reach 50 million (Boano et al., 2008). At the beginning of 2011, this statement created great discussion among academics and media specialists, who questioned this estimate and the empirical proof of the statement.

The Almeria Statement (1994) suggested that 135 million people may be negatively affected by desertification and droughts, while Robert Nicholls (2004) expects the number of 'environmental migrants' to reach 200 million by the year 2080. The Intergovernmental Panel for Climate Change (IPCC) predicted in 2007 that the number of 'environmental migrants' would reach 150 million by 2050, and in the same year, the Friends of Earth anticipated a higher number, namely 200 million. Also in the same year, Christian Aid broke down its expected 0.9 billion 'environmental migrants' by 2010 into two categories: 250 million people affected by drought, floods and hurricanes; and 645 million people affected by development projects, such as dam construction.

Many of the estimates were criticized (Black et al., 2008), since they are rather speculative and based on different indicators, depending on the researchers and institutions that produce them. Therefore, the figures could make the policy-makers doubt the credibility of these estimates as, although they may all be credible, they vary across the different studies and do not all use the same definition/classification for environmentally displaced people, as will be elaborated in the next section.

3 Definitions of environmental migration

Since the issue of climate change and environmental human displacement arose, numerous publications introduced various terms

and definitions for environmental migrants; one of the earliest definitions being by the United Nations Environment Programme (UNEP) in 1985 that defines environmental refugees as "those people who have been forced to leave their traditional habitat, temporarily or permanently, because of a marked environmental disruption (...) . that jeopardised their existence and/or seriously affected the quality of their life (...)" (El-Hinnawi, 1985).

An extended definition followed 22 years later by the International Organization for Migration (IOM) that states the following:

> *"Environmental migrants are persons or groups of persons who, for compelling reasons of sudden or progressive change in the environment that adversely affects their lives or living conditions, are obliged to leave their habitual homes, or choose to do so, either temporarily or permanently, and who move either within their country or abroad"* (IOM, 2007).

This definition is more comprehensive as compared to El-Hinnawi's; firstly, it adds the time dimension to the environmental problems that might lead to human displacement by distinguishing between the sudden (such as floods and earthquakes) and slow onset (such as sea-level rise or desertification) disasters/phenomena by not limiting migration to permanent but also including temporal migration. Secondly, it is not limited to international human displacement but also includes the possibility of people being displaced within the borders of one country. This issue is essential when it comes to displacement/migration induced by climate change or environmental problems, since most of the people who rely on environmental services in their daily lives are farmers, cattle herders, fishermen and pastoralists who in fact find it very difficult to leave their homes, due to various financial, historical and cultural reasons. However, one cannot overlook them, just because they do not cross the borders and leave for another country.

A definition tree introduced by Renaud et al. (2011) does not give a unique explanation of environmentally displaced persons but classifies them into the following groups:

- Environmental emergency migrants (those fleeing the worst of an environmental impact, either permanently or temporarily, usually in the case of rapid onset hazards, such as earthquakes, floods and tsunamis). In such cases, it is hard to incorporate economic factors, since migrants belonging to this category leave immediately to survive a potentially fatal event.
- Environmentally forced migrants (those who must leave to avoid the worst of environmental deterioration, usually in the case of slow onset hazards, including water and land degradation). In these cases, economic factors could be incorporated, since migrants in this category have the opportunity to consider that their economic situation would deteriorate due to environmental degradation.
- Environmentally motivated migrants (those who may leave a progressively worsening environment as a means of pre-empting the most severe impacts, usually in the case of a progressive loss of ecosystem services, including rising sea levels and desertification). In these instances, economic factors could also be incorporated, since migrants in this category have given thought to their future economic situation and are attempting to create a new economic scenario for their future elsewhere.

These are only examples of the numerous definitions and terms related to the topic. In order to find out more about the phenomena itself, various projects have been conducted, mainly to answer the following question: To what extent does environmental and climate change affect human displacement? The question is very simplistic, as there are always other economic, political, social, demographic and cultural factors that contribute to the decision/action of human displacement and it is very hard to extract the environmental and climatic factors from this interrelation.

In general, there are three ways to look upon environmental human displacement/migration (figures 1, 2, 3). There is environmental migration (figure 1), where the environment/climate

does not have a direct impact on the displacement, and where the mechanism through which environment influences the displacement is economic.

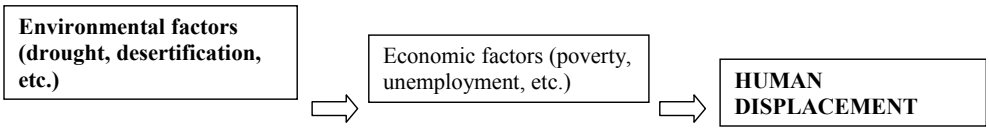

Figure 1: Horizontal environmental human displacement.

Figure 1 shows the horizontal environmental migration, where the root cause is environmental degradation/climate change, leading to economic problems (poverty, unemployment, etc.), leading in turn to displacement/migration. In this case, the environmental/climatic factor is masked by the economic factors, and it is usually slow onset environmental factors, such as drought and desertification.

In vertical environmental migration there are many factors, including the environment, that have a direct impact on the migration decision/human displacement, as shown in figure 2.

Figure 2 shows that all the combined factors have a direct impact on human displacement. For example, when landslides occur, people's livelihoods decrease enormously. If there are no other alternatives, such as working on other lands in the neighborhood or occupying alternative jobs, then people are likely to leave the village/region. There could be other social, political and demographic factors that intervene and that encourage people to leave as well. There could be cases where there is an overlap between horizontal and vertical environmental human displacement.

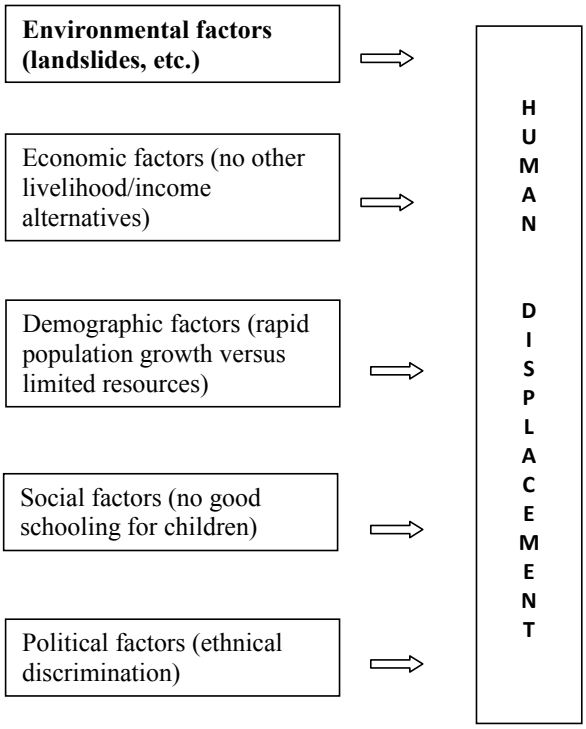

Figure 2: Vertical environmental human displacement.

The third type of environmental human displacement is one-on-one migration, where there is no other option for the people than to be displaced, such as the occurrence of floods, earthquakes and tsunamis. In this case, people's lives - and not only livelihoods -are threatened by a particular natural disaster. This is illustrated in figure 3.

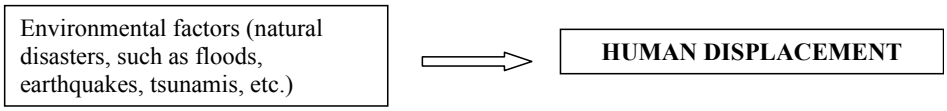

Figure 3: One-on-one environmental human displacement.

In one-on-one environmental human displacement we only have two variables that are directly connected to each other. The dependent variable is the human displacement and the independ-

ent variable is any sudden onset disaster that makes people move on the spot.

4 Evidence from the field: outcomes of EACH-FOR Research Project

This section summarizes the general outcomes of the Environmental Change and Forced Migration Scenarios (EACH-FOR) Research Project that was financed by the European Commission in the Sixth Framework Programme (EC FP6) from 2007 to 2009.

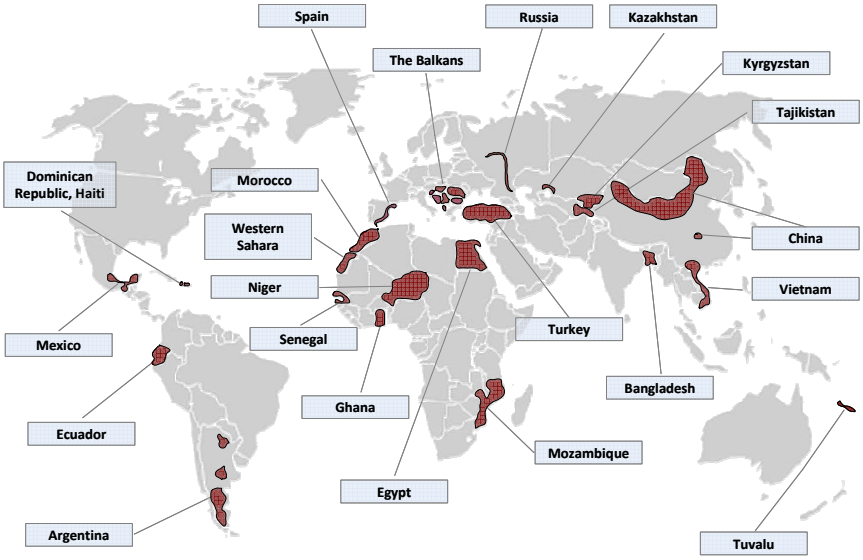

Figure 4: The geographical coverage of the EACH-FOR Research Project.

As can be seen from figure 4, the EACH-FOR Research Project covered 22 case studies worldwide. A main research objective of the project was to explore and describe the causes of forced migration in relation to environmental change. The methodology was based on expert interviews and questionnaires. The latter were divided into two categories: migrant and non-migrant questionnaires. Migrant questionnaires were conducted in order to better understand whether the environmental factors contributed to the

migration decision of the respondents and, if yes, to what extent. Non-migrant questionnaires mainly covered the broad question: What makes people resist the environmental problems and insist to stay in their villages/homes/countries?

In the framework of the project, a global econometric gravity model was applied by Afifi and Warner (2008), which comprised the pairwise assessment of the impact of 13 environmental independent variables worldwide on human migration stocks across countries. In order to account for other factors that might interfere in the relationship between the environmental factors and migration, additional independent variables were added to the model. The latter reflected cultural, religious, demographic, economic and geographic factors, such as the distances between the various countries. The results showed that there is a significant impact of environmental factors on migration stocks, bearing in mind the limitations in the model (Afifi and Warner, 2008).

The most important findings of the EACH-FOR Research Project were the following (Jäger, 2009):

- There are other potential environmental triggers for human displacement than climate change; the problems – including environmental ones – faced by migrants, potential migrants and non-migrants are very complex and very often interrelated.
- Due to global warming, the magnitude and frequency of various potential environmental problems lead to further environmental degradation, which in turn increases the probability of human displacement.
- Although migration has always been a coping mechanism in many societies and communities, the migration patterns have changed in past decades. For example, in Niger, one of the EACH-FOR case studies, what used to be internal migration is becoming international and what used to be seasonal migration is becoming permanent (Afifi, 2011a).
- Migration very often occurs only when the livelihood can no longer be sustained due to severe environmental problems

affecting the harvest for farmers or the animals for cattle herders.
- The financial means play an important role in the migration decision. The will to leave is not always sufficient.
- Ownership of the land plays an important in taking the decision to migrate or to stay. People who do not own land are more likely to be mobile and leave for better livelihoods. The case of Egypt represents a very good example for that (Afifi, 2011b).

5 Environmental human displacement in the context of policy-making and Conferences of the Parties

The Conferences of the Parties (COPs) of the United Nations Framework Convention on Climate Change (UNFCCC) bring together policy-makers, academics, NGOs, International Organizations and journalists. Therefore, including an agreed-upon paragraph on human displacement/migration in the climate negotiations text is very important for pushing further the process of considering environmentally displaced persons in the agendas of policy-makers worldwide.

COP-13 (Bali, 2007) laid out the elements of adaptation which might be considered in an international climate agreement (Warner, 2011). In COP-14 (Poznan, 2008), the word 'migration' was mentioned for the first time in the assembly document. This was greatly supported by applied research and the humanitarian community. In COP-15 (Copenhagen, 2009), a broader adaptation framework including 'migration and displacement' was adopted and paragraph 4 f was added to the negotiation text:

> *Measures to enhance understanding, coordination and cooperation related to national, regional and international climate change induced displacement, migration and planned relocation, where appropriate;*

In June 2010, informal talks about loss and damage took place and covered the potential consequences of both extreme events and

longer-term foreseeable impacts of climate change, which implicitly includes human displacement/migration.

In COP-16 (Cancun, 2010), there were no major changes in the negotiation text regarding environmental human displacement. Paragraph 14 f looked as follows:

> *Invites all Parties to enhance adaptation action under the Copenhagen Adaptation Framework [for Implementation] taking into account their common but differentiated responsibilities and respective capabilities, and specific national and regional development priorities, objectives and circumstances, [and whereby developing country Parties shall be supported by developed country Parties and in accordance with paragraph 6 below], to undertake, inter alia:*
>
> *(f) Measures to enhance understanding, coordination and cooperation related to national, regional and international climate change induced displacement, migration and planned relocation, where appropriate;*

6 Summary and conclusion

As seen from the analysis above, environmental human displacement was not yet included in advocacy plans or policy-making when researchers started addressing it in the mid 1980s. Although there was a huge debate on whether to consider people who leave their home due to environmental or climatic reasons as migrants, and although various definitions were introduced with reference to this category of people, this issue had remained in the domain of research. However, after the Tsunami of December 2004 and Hurricane Katrina in August 2005, more awareness was raised, especially as the international community realized that environmental problems are not limited to developing countries and that everyone is a potential environmentally induced displaced person.

Empirical research proves that people might be very attached to their land and would rather prefer to stay home, especially people

who rely on environmental services in their daily life to make their living. Nevertheless, environmental problems can be devastating to the extent that these people have to move to other regions, provided that they have the financial means for that. It is also important to highlight that in most cases people move due to a bundle of complex reasons that might include the environmental problems that face them in the areas of origin. The extent to which environmental problems contribute to human displacement varies throughout the different cases. In the most severe cases, such as tsunamis, earthquakes or floods, it can be the only reason why people leave.

Although there is no binding agreement in respect to environmental human displacement, including migration in the negotiation text is a big step forward, since it could serve as a basis for creating a consensus or agreement on protecting this category of people. For example, sooner or later, a solution will have to be found to support the populations living on the islands suffering from sea-level rise and, therefore, including these populations in the political agendas of the Parties of the UNFCCC prepares the international community to various scenarios for the near future.

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Letter to the Netherlands Chief Negotiator UN Climate Talks

Ministry of Infrastructure and the Environment

Marius Enthoven

Alliance for UPEACE

The Hague, 22 November 2011

To:
Mr Maas Goote
Netherlands Chief Negotiator UN Climate Talks,
Ministry of Infrastructure and the Environment
Rijnstraat 8
P.O. Box 20951
2500 EZ DEN HAAG

Dear Mr Goote,

As you will be one of the main negotiators at the upcoming 17th Conference of the Parties of the United Nations Convention on Climate Change (COP17) in Durban, I would like to ask your attention to the following.
At the COP17 the progress with the Cancun Adaptation Framework recommendations to be considered at the COP18 will be discussed.
It was very much with this discussion in mind that the Alliance for UPEACE, the Dutch foundation supporting the UN University for Peace (UPEACE) in Costa Rica, organised the symposium "Climate Change, Water Stress, Conflict and Migration" on 21 September in the Institute of Social Studies in The Hague. (I know you were fully aware of this symposium for which you were invited to give a policy response at the end, but which at the last moment you could not attend, due to a very happy event in your family, the birth of your first son – congratulations!). The symposium was attended by over 100 experts in the areas of migration, water security and peace building.

Below you will find a summary of the conclusions and recommendations of the symposium which we hope you will take into consideration during the discussions and negotiations in Durban on the progress with the Adaptation Framework.
First of all, as you know of course yourself very well, the very location-specific responses of communities and governments to the impacts of climate change have to be taken into account. At the symposium the differences between the situation in Bangladesh and in the Horn of Africa, both considerably affected by climate change, were highlighted.
In Bangladesh the impacts of climate change in the form of land loss and loss of agricultural fertility due to sea level rise, in combination with rapid population growth, will lead to strong outward migration pressure. However, the country surrounding Bangladesh on the land side, India, is building a fence to prevent the migrants from entering its territory. The fence may even become electrified in the near future, according to one of the speakers at the symposium. Already several casualties among those trying to cross the fence, have to be regretted.
One can say, therefore, that here an issue of climate-induced water security has evolved into an issue of "hard" security between the two states involved.

As to the Horn of Africa much attention at the symposium was given to the situation of the pastoralists for whom "migration" (the better term would be "mobility") with their herds is at the essence of their livelihoods. The speakers at the symposium explained the basic sustainability of mobility as a form of adaptation to climatic variability – going where the water and vegetation is, or "surfing on a green wave"– but pointed to the threats posed by limiting access to grazing grounds as a result of border policies, demarcation of reserves, and also to the limits of accessing markets for their products (butter, meat, hides). The latter are of course, strictly speaking, outside the scope of the UNFCCC, but they have to be included in the wider adaptation agenda.

The dramatic situation in Bangladesh highlights one of the main topics discussed at the symposium, namely the need for a proper international legal definition of climate or environmental migrants, especially when they have to cross national borders and when a return to their home lands in the future cannot be foreseen.
While Australia and New Zealand are willing to take in the relatively low numbers of people forced to leave the small island states in the Pacific, they and the other countries in the world will have the greatest problem to take care of the 20-30 million migrants from Bangladesh who may be on the move by 2050 due to the impacts of climate change, as mentioned by General (ret) Muniruzamman, the keynote speaker from Bangladesh at the symposium.
There seems to be a growing consensus that climate migrants should not be considered to be refugees as defined under the 1951 Geneva Convention on Refugees and its Protocol of 1967, because of the differences in motives to leave the country and because of the potentially overwhelming numbers of the climate/environment migrants.

The symposium spoke out that:

- there needs to be a practical definition of a climate migrant in order to be able to develop the necessary policy instruments,
- that the UN should take an initiative to establish the rights of climate migrants, using as much as possible existing international legal instruments,
- the legal regime for climate change migrants should contain a set of principles for rights and duties, acknowledge different categories of climate migrants and designate institutions for dealing with its implementation.

Of course the UNFCCC would have to be a major element in such a legal regime and you can be assured that UPEACE will be there to think with you about the nature and structure of the regime and the building of the national and local capacities to deal with climate-induced migration.

Alliance for UPEACE

It is to be expected that, besides the slow-onset impacts of climate change, also the frequency and intensity of extreme weather events will increase. In the background paper and during the presentations and discussions at the symposium best practices or lessons learnt on how to act in the course of such events were addressed.

Very important is the need to close the gap between early warning information systems on the national level and the local users of that information. As much as possible the information should be presented in the form of simple visuals and use should be made of the modern interactive media (WIKI, YouTube, LinkedIn, etc.). Special attention is needed to the gender aspects of warning procedures due to cultural circumstances which sometimes make it difficult to reach women in time.

Of great use will be easy-to-read maps of the countries and areas with populations at risk, comparable e.g. to the maps of the U.S. concerning shelter in case of disasters:
http://www.globaldatavault.com/natural-disaster-threat-maps.htm.

It would be highly recommendable for the UNFCCC to promote the preparation and incorporation of such maps in the operationalisation of the Cancún Adaptation Framework.

I conclude with mentioning the recommendation of the symposium to present the conclusions to Dr. Saleemul Huq of the IIED (International Institute for Environment & Development), who organises the Development and Climate Days at the COP17 on 3 - 4 of December, which will focus on "evidence based adaptation planning," with presentations covering issues such as how to generate robust evidence for informing transparent and participatory policy making under uncertainty.

I thank you for your cooperation and express my best wishes for a substantial outcome of the 17th COP negotiations,

Yours sincerely,

Marius E. Enthoven
Chairman Alliance for UPEACE


nternational

The Netherlands National Committee
IHP-HWRP

Alliance for UPEACE

Institute for Environmental Security

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