

JULY 28, 2008

**Assistant Secretary General Michèle Flournoy**  
**Threat Assessment for Long-Term Climate Change**

Thank you, Mr. Secretary General.

I appreciate the opportunity to brief all of you on our assessment of the threat to international peace and the global commons that we believe may result from global climate change. This threat assessment covers the period between now and 2050.

To help me set the context, I would like to ask my science advisor, Dr. Jay Gulledge, to start with a technical brief on the long-term environmental effects we expect to see from global climate change.

*[Dr. Gulledge presents.]*

Thank you, Dr. Gulledge. Based on this analysis, there are four climate change factors we believe are most likely to threaten the peace and prosperity of the international community in the next 35 years:

- migration
- resource scarcity
- disasters
- and emissions of greenhouse gases.

I want to emphasize that in the military planning community, 35 years is a reasonable amount of time to plan for the personnel and materiel needed to meet an anticipated threat. Indeed, when it comes to climate change, we arguably know more about the threat than we might with a more traditional long-range threat.

## **MIGRATION**

Some of the most significant threats we face concern the mass movements of people.

In the past, most global refugees and internally displaced people have fled conflict, and most – 80-90 percent – have stayed close to home within their country or in neighboring countries.

JULY 28, 2008

Historically, only about 1 percent of these people have been resettled – most have repatriated to their country of origin.<sup>1</sup>

We are already seeing a departure from these historical patterns. First, there has been a sharp rise in migrants moving for environmental reasons. We estimate the numbers of these migrants today in 2015 at more than 50 million.<sup>2</sup>

We still don't fully understand this phenomenon and these individuals have no legal standing as refugees, but it appears that people are most likely to be fleeing from resource scarcity – particularly of water and arable land – and from other climate-related effects including sea level rise and natural disasters. Compared to other migrants, our tracking suggests they are less likely to stay in their immediate region of origin and are less likely to be repatriated, depending on the conditions they are fleeing. In some cases, the environmental conditions that are impelling people to move extend beyond their immediate home region may be irreversible or may be recurring. For example, we estimate that between 25 million and 40 million people will be displaced from coastal areas due to sea level rise by 2050.<sup>3</sup>

We have two very strong concerns. One is that we can expect elevated mortality rates; in addition to these people being displaced with all the challenges that entails, they are likely to be facing exposure to other climate changes, such as heat waves, contaminated water, vulnerability to chronic disease, and an increase in vector-borne diseases, such as yellow fever, dengue, and malaria.

The second strong concern is that there is a highly elevated risk of conflict associated with such large movements of people. First, many of the states at highest risk of producing environmental refugees are also at high risk for state instability or even failure, which could produce conflict. Also, we have seen increasing levels of hostility to migrants as their numbers have increased, with a rise in border conflict and civil unrest in every nation represented here today. Based on what Dr. Gulledge just told us, we should expect these trends to intensify.

We estimate that by 2050, the number of environmental refugees could range from 200 million to as high as one billion.<sup>4</sup> Further, we estimate that the United States, Europe, India, and China

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<sup>1</sup> United Nations High Commissioner for Refugees, “2007 Global Trends: Refugees, Asylum-seekers, Returnees, Internally Displaced and Stateless Persons,” (June 2008).

<sup>2</sup> Norman Myers, “Environmental Refugees: An Emergent Security Issue,” Presented at the 13th Economic Forum, Prague (23-27 May 2005), at <http://www.populationmedia.org/wp-content/uploads/2008/03/norman-myers-environmental-refugees-an-emergent-security-issue.pdf>.

<sup>3</sup> Rachel Warren, “Impacts of Global Climate Change at Different Annual Mean Global Temperature Increases,” in *Avoiding Dangerous Climate Change*, edited by H.J. Schellnhuber and others, (Cambridge, UK: Cambridge University Press, 2006).

<sup>4</sup> *Human Tide: The Real Migration Crisis*, A Christian Aid Report (May 2007), at [http://www.christianaid.org.uk/Images/human\\_tide3\\_\\_tcm15-23335.pdf](http://www.christianaid.org.uk/Images/human_tide3__tcm15-23335.pdf).

JULY 28, 2008

will see very dramatic increases in the numbers of migrants, including internally displaced migrants.

In the U.S., we expect Americans from the West, Mountain States, Southwest, and Gulf Coast to move internally and large numbers of migrants from Central America, Mexico, and the Caribbean to cross southern borders. Consider that total migration to the United States averages more than 500,000 per year right now; if the U.S. percent of total global migration holds steady, that will mean 7 million migrants annually into the United States by 2050.<sup>5</sup>

For Europe, we expect internal migration from southern to northern Europe and dramatic increases from northern, western, and Sahelian Africa, as well as the Middle East and Central Asia.

For China, we expect internal migration from the Tibetan plateau and from several river basins, as well as cross border migration from Southeast, South and Central Asia and Korea. Vietnam is currently the single largest source of refugees and asylum seekers for China; with large parts of Vietnam facing inundation by 2050, those numbers will increase.

For India, we expect internal migration in many parts of the country as a result of droughts, disasters, and food insecurity, and sharp increases in cross-border migration from Bangladesh, Nepal, Bhutan, the Maldives, Sri Lanka, Pakistan, and Central Asia.

This leads us also to our second and third climate and conflict areas that we encourage you to focus on in your discussions. These migrants will move for two basic reasons: slow and sudden onset disasters.

## **RESOURCE SCARCITY**

As Dr. Gullede just detailed, we believe the slow-onset climate disasters now taking shape are especially related to declining access to fresh water and declining agricultural productivity, through such factors as degraded soil quality. Resource scarcity is the result.

By 2050, we estimate that between 1 and 3 billion additional people around the world will be experiencing water stress and another 132 million around the world will be at risk for hunger. Food instability, in particular, will be a problem as weather patterns become more unpredictable and volatile, which is likely to lead to more food emergencies. We are already seeing this in 2015.

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<sup>5</sup> Based on 2007 numbers, from United Nations High Commissioner for Refugees, “2007 Global Trends: Refugees, Asylum-seekers, Returnees, Internally Displaced and Stateless Persons,” (June 2008).

JULY 28, 2008

This slide [SHOW SLIDE 2] shows regions where we believe the combination of increased water stress and decreased agricultural yields will combine with existing state fragility or tension to create conflict and refugee flows.

Indeed, if you compare the map of hotspots with the map of expected population change between now and 2050 [SLIDE 3], as you see in this slide, it is clear that the highest areas of population growth, the yellow and red areas, coincide with the hotspots.

In addition to the human suffering and migration such scarcity can cause, it can also push fragile states – already marked by internal divisions and poor governance – into conflict. The nations that rank at highest risk for state failure in the Foreign Policy Failed State Index are in general states that are also highly vulnerable to climate change.<sup>6</sup> State failure or conflict rarely stays contained within national borders, and opportunistic violent groups tend to find safe havens in compromised nations.

In the past, water scarcity has brought nations together as much as it has driven them apart,<sup>7</sup> but we should keep in mind that it is only recently that we've begun to see water levels in key rivers, such as the Colorado River, the Nile, or the Euphrates, decline below levels that can actually support their dependent populations, including agricultural and industrial users. In some cases, this is directly related to population increases, as well.

We assess that there is a particularly high risk of interstate conflict over water resources, as this absolute decline relative to the size of the population continues. This will include other rivers as well, such as the Brahmaputra, rivers in the Balkans and southeastern Europe, and in several rivers within the United States.<sup>8</sup>

## DISASTERS

Sudden-onset disasters, such as floods and violent storms, have been on the rise. There has been a nearly 30 year trend of steady increases. The number of reported floods, for example, rose 7.4 percent per year on average between 1988 and 2000, and has increased at an average rate of 8.4 percent per year since 2000.<sup>9</sup>

Slide 2 [show SLIDE 4] shows a seven-year average distribution of natural disasters of all types. As you can see from the countries in red, the United States, India, and China consistently experience high numbers of disasters.

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<sup>6</sup> Based on the 2008 Failed States Index.

<sup>7</sup> David G. Victor, "What Resource Wars?" *The National Interest* (12 November 2007).

<sup>8</sup> Oak Ridge National Laboratory Memo (June 2008).

<sup>9</sup> J.M. Scheuren, et al., "Annual Disaster Statistical Review: The Numbers and Trends 2007," CRED (May 2008).

JULY 28, 2008

Although the upward trend in frequency of disasters is clear as is the geographic distribution, the cost trends, in terms of victims and damages, varies widely from year to year. We expect the trend to rise dramatically by 2050, however.

The human and financial costs increase markedly when there are mega-disasters. There have been a number of mega-disasters in recent years, including Category 4 hurricanes in 2011 and 2012 in the Atlantic, the cyclone in Bangladesh in 2013, and the Category 5 hurricane that hit parts of the Caribbean and the southeastern United States earlier this year. By 2050, we expect to see the frequency of mega disasters rise, though the science is still unclear about whether just the severity or both the severity and frequency of mega-disaster will rise. Historical data suggests both will occur.

Disasters pose conflict risks for three principal reasons. The first is the forced and sudden migration of people, and usually in circumstances that entail public health risks. Second is that weak governance structures or existing conflicts can be exacerbated by the challenges of responding to a disaster. And finally, most disasters, especially mega-disasters, require military assets for response, which may mean a diversion away from conflict situations.

## **EMISSIONS REDUCTIONS**

Finally, just a few quick words about the rise of carbon dioxide emissions and the risk of conflict. Our projections suggest that we will be able to meet the challenge of global climate change over the next 35 years, but most likely with some difficulty. As Dr. Gullede showed us, however, the world after 2050 will be far more challenging.

In recent years, we have seen some tension between nations over accountability for global climate change and who is responsible for cutting emissions and bearing the costs. If we do not succeed in reducing emissions, that tension is likely to increase as the climate effects increase.

Allow me to close with one more slide [SHOW SLIDE 5]. What that second red line tells you is where we will be in 2100, if we continue on our current emissions trajectory. As Dr. Gullede noted, that would be a 5.7 degree Celsius temperature rise.

At that level of increase, this slide tells us we can expect to see by the end of the century falling crop yields all over the world, major coastal cities all over the world threatened by sea level rise, rising numbers of species extinction, sharply rising intensity of storms, floods, forest fires, flooding and heat waves. Finally, the risk that there will be dangerous feedbacks and large-scale abrupt changes to the climate increases dramatically.

We would be seeing temperatures and conditions not seen on this planet for 50 million years. Given that human beings have only been around for about 1 million years, and human

JULY 28, 2008

civilization has thrived in the last 10,000 years, which have seen a relatively stable climate, we have no idea what to expect.

Assessing the threat of conflict in such circumstances seems beside the point, except to say that life as we know it is likely to be over.