**Submission of the United States of America**
**on the Security Implications of Climate Change**

The United States welcomes the opportunity to provide our views on the security implications of climate change as input for the Secretary General's report on that subject as requested in A/res/63/281 to be submitted to the General Assembly at its 64th session.

This past April, Secretary of State Hillary Clinton addressed representatives at the first preparatory session of the Major Economies Forum on Energy and Climate in Washington, DC. At that meeting, Secretary Clinton noted that:

"The crisis of climate change exists at the nexus of diplomacy, national security and development. It is an environmental issue, a health issue, an economic issue, an energy issue, and a security issue.... It threatens lives and livelihoods. Desertification and rising sea levels generate increased competition for food, water and resources. But we also have seen increasingly the dangers that these transpose to the stability of societies and governments. We see how this can breed conflict, unrest and forced migration. So no issue we face today has broader long-term consequences or greater potential to alter the world for future generations."

Global climate change poses enormous consequences for our planet, and it requires an urgent response and the widest possible cooperation by all countries. The United States reaffirms its commitment to lead toward a substantive and effective outcome at the United Nations Framework Convention on Climate Change (UNFCCC) negotiations in Copenhagen in December.

The Secretary General's report on the security implications of climate change can provide a useful resource for Parties. The United States envisions the report presenting robust scientific findings on linkages between climate change and security, the views of Parties and organizations on these issues, and summaries of key findings and considerations. With that in mind, please find below information drawn from the June 2008 National Intelligence Assessment on the National Security Implications of Global Climate Change to 2030,[1] which represents views from the U.S. intelligence community. Where noted, the text below also contains information from the U.S. Global Change Research Program report on Global Climate Change Impacts on the United States, 2009.[2]

## Overview

Global climate change will have wide-ranging implications for many countries' national security interests as impacts become more pronounced. Although the United States possesses better

[1] United States House Permanent Select Committee on Intelligence House Select Committee on Energy Independence and Global Warming 25 June 2008 National Intelligence Assessment on the National Security Implications of Global Climate Change to 2030 Statement for the Record of Dr. Thomas Fingar, Deputy Director of National Intelligence for Analysis and Chairman of the National Intelligence Council of the United States.
[2] U.S. Global Change Research Program, *Global Climate Change Impacts in the United States,* 2009.

adaptive capability than many nations, including strong governance and institutional capacity, climate change impacts will still be costly. Moreover, climate change impacts elsewhere in the world also have implications across international borders including for the United States.

According to the United States' 2008 National Intelligence Assessment on the National Security Implications of Global Climate Change to 2030,[3] climate change alone is unlikely to trigger state failure in any country out to 2030, but the impacts will worsen existing problems—such as poverty, social tensions, environmental degradation, ineffectual leadership, and weak political institutions. Climate change could threaten domestic stability in some states, potentially contributing to intra- state conflict, particularly over access to water resources. Interstate conflict is possible as well, although less likely. Economic migrants will potentially perceive additional reasons to migrate because of harsh climates, both within and between countries, from areas of scarcity to those with greater resources.

**Climate Change…**

Current scientific observations indicate the Earth's climate is changing. Changes cited by the Intergovernmental Panel on Climate Change (IPCC) include rising global temperatures, increasing heavy precipitation events, and rising sea levels. The global mean annual average temperature has risen 0.13 degrees Celsius (C) per decade during the period 1955-2005—double the rate observed in 1906-2005. However, temperature changes vary across the planet, and impacts vary as a function of local circumstances. Some areas are experiencing less warming or even cooling. Precipitation has generally increased over land north of 30 degrees latitude over the period 1900 to 2005, but the tropics have experienced less precipitation since the 1970s. IPCC says that intense tropical cyclone activity is likely to increase. Global sea level rose 1.7 mm per year during most of the 20th century, but has risen approximately 3 mm per year since 1993.

Many physical and biological systems are changing in ways consistent with the present warming trend. Among the most significant changes highlighted by scientists are the thawing of the northern latitude permafrost[4] which is forcing repair or replacement of buildings and pipeline infrastructure, and the increase of heat waves and droughts (both in frequency and intensity), although attribution of increased droughts to greenhouse gas (GHG) emissions remains controversial. In some cases, changes in ecosystems and natural resources are occurring faster and with larger magnitude than scientists anticipated as recently as ten years ago. Temperatures in the Arctic are rising almost twice as fast as the global rate, and temperatures are rising faster over land masses than over open oceans.

Looking out to 2030, certain broad-brush projections of climate change can be made. Global temperature change is expected to increase approximately one half degree C over the next two

[3] United States House Permanent Select Committee on Intelligence House Select Committee on Energy Independence and Global Warming 25 June 2008 National Intelligence Assessment on the National Security Implications of Global Climate Change to 2030 Statement for the Record of Dr. Thomas Fingar, Deputy Director of National Intelligence for Analysis and Chairman of the National Intelligence Council of the United States.

[4] Permafrost is soil, rock, sediment or other material with a temperature that has remained below zero degrees centigrade for two or more consecutive years.

decades and sea level rise is expected to be no greater than 75mm (.075m).[5] The IPCC and others project that water will become increasingly scarce across several regions, including parts of Asia and parts of Africa and the southwestern United States. Water scarcity can be caused by many factors—absence of precipitation, increased evaporation, demographics, land use, or reductions in river flows.

### …And National Security

From a national security perspective, climate change has the potential to affect lives (for example, through food and water shortages, increased health problems including the spread of disease, and increased potential for conflict), and property (for example, through ground subsidence, flooding, coastal erosion, and extreme weather events).

Global prosperity depends on a smooth-functioning international system ensuring the flow of trade and market access to critical raw materials. Climate change and climate change policies could affect all of these—domestic stability in a number of key states, the opening of new sea lanes and access to raw materials, and the global economy more broadly—with significant geopolitical consequences.

Anticipated impacts to the United States —including possible increases in the severity of storms in the Gulf and the Atlantic, disruptions in U.S. and Arctic infrastructure, and increases in immigration from resource-scarce regions of the world—are expected to be costly. The efforts of national governments, businesses, and the public to develop mitigation and adaptation strategies to deal with climate change—from policies to reduce greenhouse gasses to plans to reduce exposure to climate change or capitalize on potential impacts—may also affect national security interests. All countries will be affected at the regional, national and local levels.

## Regional Climate Trends to 2030

### Africa

Sub-Saharan Africa will continue to be the region most vulnerable to climate change because of multiple environmental, economic, political, and social stresses. Observed temperatures have become warmer since the 1960s. This increase has been true across the varied climates of Africa. In addition, from 1961-2000 the number of warm spells increased over southern and western Africa. Rainfall varies a good deal over most of Africa, but increased seasonal variability has been observed since 1970, with higher rainfall anomalies and more intense and widespread droughts.

Scientific studies indicate that climate change is likely to cause agricultural losses, possibly severe in the Sahel, West Africa, and southern Africa. Agricultural yields from some rainfall dependant crops could be reduced by up to 50 percent by 2020. Many African countries already challenged by persistent poverty, frequent natural disasters, weak governance, and high

[5] The change is reference to the average global temperature for the period 1980 to 1999.

dependence on agriculture probably will also face a significantly higher exposure to water stress owing to climate change.

**Asia**

Current research indicates that South, Southeast, and East Asia will face risks of reduced agricultural productivity as large parts of the region face increased risk of floods and droughts. By 2025, cereal crop yields will decrease 2.5-10 percent, according to some calculations.[6]

Observed increases in surface air temperature in recent decades range from less than 1 to 3 degrees C per decade, with the most pronounced warming in north Asia. Annual average rainfall has decreased in Russia, northeast and north China, coastal belts and arid plains of Pakistan, parts of northeast India, Indonesia, Philippines, and some areas of Japan; it has increased in western and southeastern coastal China, Bangladesh, and the western coasts of the Philippines. In parts of Asia extreme weather events[7] are more frequent and severe and intense rains and floods come more often. Droughts have intensified and/or affected more areas in Central, South and Southeast Asia.

Tropical storms are more frequent in the South China Sea, and the Bay of Bengal is experiencing fewer but more intense storms. Some projections indicate as many as 50 million additional people could be at risk of hunger by 2020, although climate change may moderate water stress in some regions of Asia. By the 2020s increases in precipitation and glacier run-off will relieve some of the water stress in Asia, but increasing consumption patterns and growing populations indicate that 120 million to 1.2 billion people will continue to experience some water stress.

**Australia and New Zealand**

Australia and New Zealand will likely see increased temperature by 2030 and continued changes in precipitation patterns. Since 1950 there has been a 0.3 to 0.7 degrees C warming in the region, with more heat waves, fewer frosts, and an increase in the intensity of Australian droughts. Recent reports indicate more rain in northwestern Australia and southwestern New Zealand, and less rain in southern and eastern Australia and northeastern New Zealand. According to scientific research, floods, landslides, droughts and storm surges are likely to become more frequent and intense, and snow and frost are likely to become less frequent. Infrastructure design criteria[8] for extreme events, here as elsewhere, are likely to be exceeded more frequently.

---

[6] This assumes no CO2 fertilization. Most plants growing in normal atmospheric CO2 exhibit higher rates of photosynthesis and elevated CO2 alone tends to increase growth and yield of most agriculture plants. Most of the studies have been conducted either under controlled environmental conditions (chambers), or under optimal field conditions. Potential CO2 effects on plant biomass depend on the nutrient and water levels. With CO2 fertilization, the Asian cereal crop yields will vary from +2.5 to –10 percent, with China and Mongolia showing the slight rise in one of three data runs.

[7] The IPCC defines an extreme weather event as an event that is rare within its statistical reference distribution at a particular place. Definitions of "rare" vary, but an extreme weather event would normally be as rare as or rarer than the 10th or 90th percentile.

[8] Infrastructure design criteria include such things as maximum and minimum temperature, rates of precipitation, snow and ice accumulation, and wind intensity and direction.

## Europe

In the coming years, Europe will likely become hotter—with more frequent and severe heat waves—and there will be greater differences in regional precipitation. Europe warmed 0.90 degrees C between 1901 and 2005. However, the rate of warming has accelerated since 1979. During this latter period, the rate was higher in central and northeastern Europe and in mountainous regions but lower in the Mediterranean regions.

Precipitation change varies in different areas of Europe. Average winter precipitation is increasing in most of Atlantic and northern Europe, while yearly precipitation trends are decreasing in eastern Mediterranean regions. Most parts of the continent are receiving more precipitation per wet day, even in some areas that are becoming drier. By the 2020s, increases in winter floods are likely in maritime regions and more flash floods are likely throughout Europe.

## Latin America and the Caribbean

By 2020, temperature increases in Latin America will vary across the region, with the highest temperatures projected to occur over tropical South America. Temperatures are likely to increase from 0.4 to 1.8 degrees C above the 1980-1999 period. Highly unusual extreme weather events have occurred in some areas of South America including intense rainfall, flooding, drought, hailstorms, and the unprecedented Hurricane Catarina in the South Atlantic. In addition, the Caribbean Basin experienced a record hurricane season in 2005. Increases in rainfall in selected regions of South America have affected land use and crop yields, and increased flood frequency and intensity. Precipitation has decreased in other regions including western Central America. Latin America may experience increased precipitation by the 2020s; by some estimates the water stress of tens of millions of people may be alleviated by climate change effects. However, despite the greater water availability from climate change, an estimated 7-77 million people are likely to remain stressed due to growing populations and increasing water consumption.

## Middle East[9]

Prospects for the Middle East are harder to anticipate because of limited climate research. By 2020 the region is expected to see an increased temperature of slightly over one degree C. Precipitation is expected to decrease between 3 and 8 percent in winter and spring, and increase 5 to 18 percent in summer and fall.[10] From 1951 to 2003, several stations in different climatological zones of Iran reported significant decreases in frost days due to a rise in surface temperatures. Surface water availability from major rivers like the Euphrates and Tigris may be affected by future alterations in river flows. River flows are likely to increase in winter and decrease in spring, which could negatively affect existing uses of river water.

## North America

Most of North America in the mid-latitudes will likely be less affected by climate change in the next few decades than either the tropics or the polar regions. Net cereal crop yields likely will

[9] The Middle East is not an IPCC region, but is generally reflected in research and reporting as the West Asia sub-region.

[10] Changes expressed are relative to 1980-1999 values.

increase by 5-20 percent,[11] for example, and most studies suggest the United States as a whole will experience modest economic benefits over the next few decades as a result. However, increased heat, pests, water stress, diseases, and weather extremes will pose adaptation challenges for crop and livestock production. Over time, impacts will increase and costs will mount. Coastal communities will be increasingly stressed by climate change impacts interacting with development and pollution. Sea level rise will exacerbate impacts of storm surge flooding and soil erosion and economic damages will rise given the likely increase in amount and value of infrastructure at risk. Rising temperatures will affect seasonal availability of water, incidence of heat-related mortality, and disturbances such as wildfire and insect outbreaks.[12] Already observed climate-related changes in the United States include: increases in heavy downpours, rising temperature and sea level, rapidly retreating glaciers, thawing permafrost, lengthening growing seasons, lengthening ice-free seasons in the ocean and on lakes and rivers, earlier snowmelt, and alterations in river flows.[13]

**Polar Regions**

Scientists state that the polar regions, which are already affected by climate change, will see further change by 2030 to include loss of land- and sea-based ice and greater exposure of bare ground. For several decades, surface temperatures in the Arctic have warmed about twice as fast as the global rate, with associated reductions of sea ice and glaciers. In addition, the duration of river and lake ice has decreased in northern latitudes, and (since 1980) permafrost has warmed in nearly all areas for which measurements are available. Evidence reported in the IPCC Fourth Assessment Report indicates that the Greenland ice sheet's interior is thickening at a decreasing rate while its edges are thinning. The Antarctic shows more variability; meteorological stations show strong and significant warming over the past 50 years, but other long-term records are mixed.

**Islands**

Small island developing states will face specific, unique challenges from climate change. They are highly vulnerable, and likely to face significant impacts from extreme climate events, as well as from continued global warming. Projections for the rest of this century suggest increases in air and ocean surface temperatures in both the Pacific and Caribbean, overall decrease in rainfall in the Caribbean, and a likely increased frequency of heavy downpours and increased rainfall during summer months in the Pacific. Islands and other low-lying coastal areas will be at increased risk from coastal inundation due to sea-level rise and storm surge, with major implications for coastal communities, infrastructure, natural habitats and resources. Changes in weather patterns and the frequency and intensity of extreme events, flooding, sea-level rise, coastal erosion, coral reef bleaching, ocean acidification, and contamination of freshwater resources by salt water are among the impacts small islands face.[14]

---

[11] The increase assumes CO2 fertilization. Without CO2 fertilization, the range is –2.5 to + 10 percent change in cereal yields, with the poorer yields in Mexico and to a lesser extent, the United States (two of three data runs).

[12] IPCC Working Group II Report, North America Chapter.

[13] U.S. Global Change Research Program, *Global Climate Change Impacts in the United States,* 2009.

[14] U.S. Global Change Research Program, *Global Climate Change Impacts in the United States,* 2009.

## Economic Impacts Projected to Rise Over Time

The U.S. National Intelligence Estimate on Security and Climate Change (2008) assess that no country will be immune to the effects of climate change, but some will be able to cope more effectively than others. Most of the developing states that will potentially suffer from adverse impacts to economic security are in Sub-Saharan Africa, the Middle East, and Central and Southeast Asia. However, the spillover—from potentially increased migration and water-related disputes—could have a harmful global impact. The global impact on economic growth to 2030 is estimated to be minimal, but the effect in particular countries or regions could be substantial.

Most estimates—including the UK commissioned Stern Review— show limited aggregate damage to the world economy by the 2030s. One model, for example shows a decline of 0.3 percent annually of global GDP by 2030. A couple of economic models yield net benefits for OECD and other countries with small increases in global mean temperature—the most likely scenario in the next decade or two. However, the negative impact on global economic growth begins to mount over time and even conservative estimates put the costs at up to 3 percent of global GDP annually if the Earth's temperature were to rise 2-3 degrees C, which many scientists believe could begin to happen as early as mid-century.

## Agricultural Production Most at Risk

Global cereal yields likely will increase through 2030, but regional differences in production are likely to grow stronger over time with declines proportionately concentrated in developing countries, particularly in Sub- Saharan Africa. Although the precise impact of climate change on agriculture production will differ by region and crop, damages broadly speaking will be greater in countries located closer to the equator and where temperatures are higher today. For many developing countries, reduced agriculture output can be devastating as agriculture represents a large share of their economy, a majority of their populations rely on subsistence farming, and their governments and people have less adaptive capacity.

## International Migration

We judge that economic migrants will perceive additional reasons to flee their homes because of harsher climates. Besides movement within countries, especially to urban areas, many displaced persons will move into neighboring developing countries, sometimes as a staging ground for subsequent movement onward to more developed or resource-richer countries with greater economic opportunities. Many likely receiving nations will have neither the resources nor capacity to host these climate migrants. Receiving nations probably will have increased concern about migrants who may be exposed to or are carrying infectious diseases that may put host nation populations at higher risk.

## Impacts from Climate Change

Most developed nations and countries with rapidly emerging economies are likely to fare better than those in the developing world, largely because of greater coping capabilities, existing institutions and strong governance. Nevertheless, states at all levels of development likely will be

negatively impacted and some states could experience economic setbacks and uneven growth leading to political change or disruption, as well as humanitarian concerns.

**Implications for the United States**

Responding to thawing in and around Alaska, water shortages in the Southwest, and storm surges on the East and Gulf Coasts will involve costly repairs, upgrades, and modifications. A warming climate also will encourage wildfires throughout the longer summers. The IPCC estimates annual costs from severe weather in damage to property and loss of economic productivity for the United States may be in the tens of billions of dollars. Current infrastructure design criteria and construction codes may be inadequate for climate change and exacerbate vulnerability to increasing storm intensity and flooding. Two dozen nuclear facilities and numerous refineries along U.S. coastlines are at risk and may be severely impacted by storms.

Current livestock production will be increasingly challenged. Although agriculture is considered one of the more adaptable sectors, increased heat, pests, water stress, diseases, and weather extremes will pose adaptation challenges for crop and livestock production.[15]

Countries, particularly developed countries including the United States, will need to anticipate and plan for growing immigration pressures. Although sea level rise is a slow and long-term development, extreme weather events and growing evidence of inundation will motivate many to move sooner rather than later. For example, almost one-fourth of the countries with the greatest percentage of population in low elevation coastal zones are in the Caribbean, so assisting these populations will be an imminent task. Broad Western hemispheric cooperation will be necessary to mitigate the impact on harder-hit countries.

As climate changes spur more humanitarian emergencies, the international community's capacity to respond will be increasingly strained. All countries will be called upon to respond and the United States anticipates a large support role in this context. The demands of these potential humanitarian responses may significantly tax global infrastructure and the ability for countries to continue to manage traditional domestic and international responsibilities. Moreover, care will need to be taken that people displaced by humanitarian emergencies are not relocated to other areas also vulnerable to the impacts of climate change.

**Research and Analysis Challenges**

The present level of scientific understanding of future climate change lacks the resolution and specificity required for detailed analysis of security implications at the country level. Most of the IPCC material is based upon an understanding of how the climate may change at the global level. Improved and better-validated regional and local models (accounting for regional and local processes) of climate change, particularly models that provide details on hydrological consequences and changes in the frequency and intensity of extreme events are required. In addition, there is a need for better information on physical, agricultural, economic, social, and political impacts from climate change at country and regional levels. Such improved modeling and information would also facilitate adaptation efforts. State stability is a critical part of

[15] U.S. Global Change Research Program, *Global Climate Change Impacts in the United States*, 2009.

determining potential threats to security. When evaluating state stability, institutional capacity and factors that stress such capacity, such as water shortages and disease outbreaks, should be considered along with other factors. In particular, climate change and security should be considered within the broader context of environment and security. The security elements of climate change are best understood and addressed in the context of preexisting social, political, and environmental conditions.

Near term, additional analysis is required to determine the world-wide potential vulnerability to storm tracks and severe weather. This analysis should consider changes in anticipated storm tracks and severe weather patterns, populations and infrastructure at risk, and local physical factors. In addition, detailed agriculture vulnerability should be studied; this would include anticipated changes in temperature, precipitation levels and patterns.

**Structure of the Report**

The Secretary General's report on the security implications of climate change can provide a resource for Parties. The United States hopes that the report will present robust scientific findings on linkages between climate change and security. The Report might usefully focus on the impacts that various regions are expected to experience, drawing on scientific literature and analyses like that presented in the sections above, and include information on what further information might be needed to aid decision-makers in crafting appropriate policies. We also envision the report summarizing key findings and considerations, such as those contained in the next section below. The United States looks forward to a comprehensive discussion of these issues.

**Key Considerations**

As described in this document, the security implications of climate change are significant and wide ranging. In light of this, we believe that it is important to take a global approach to the challenge of addressing the underlying causes of climate change. The security threats posed by climate change underscore the critical need for mitigation for all countries, both developed and developing, in accordance with their common but differentiated responsibilities and respective capabilities.

We also recognize that the most effective responses to the security implications of climate change impacts often support efforts to address other environmental concerns. For example, promoting good governance and institutions, maintaining and enhancing existing ecosystem services, and improving land-use and natural resource management can help to support a whole range of environmental objectives, of which climate change is one.

Also important are activities such as integrating climate change into development and infrastructure planning, enhancing disaster preparation, planning and response, and improving provision and use of Earth observation data and information for sound decision-making. These issues are components of negotiations under the UN Framework Convention on Climate Change,

as is mitigation and the broad issue of climate change adaptation. The UN Framework Convention on Climate Change remains a key forum for addressing climate change.

We thank the Secretary General for the opportunity to provide input into the report on the Security Implications of Climate Change and for his hard work and that of his staff on this complex issue.