The Psychological Effects of Global Warming on the United States:

And Why the U.S. Mental Health Care System Is Not Adequately Prepared

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National Forum and Research Report

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National Wildlife Federation Climate Education Program

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PREFACE

Dear Friends and Colleagues,

Having the reality of the destructive forces presented by climate change fully *register* with people, so they will to act with the needed urgency, is indeed a challenge. And, while the physical and environmental effects of global warming are studied and described, what has rarely been addressed, and is as compelling a topic as any, are the *psychological* impacts.

This report aims both to fill in the gap in our awareness of the psychological impacts of climate change, and by exposing the emotional side of the issue, to find the place in our hearts that mobilizes us to fly into action, forewarned, determined, relentless. It also is a call for professionals in the mental health fields to focus on this, the social justice issue of all times, with their capacity to work through denial and apathy, to bring insight and commitment before it is too late.

The language of science is, admittedly, not a stirring call to action. Scientists are by nature cautious, and restrained. While this report does not aim to present the forum participants as flame throwers, for this work to accomplish a primary goal, the reader will need to *feel* something in reading it. The language used here, and some of the questions asked, may feel uncomfortably probing, as they pierce our armor. After all, most of us want to be patriotic, to be optimist about the future. But we need to fully confront certain realities.

If we continue the adolescent-like disregard for the dangers we are being warned of, driving green house gasses up with only casual concern, there will be consequences. As our world begins to unravel and our role is undeniable, all eyes will be on us.

Questions beg to be asked:

- What will the rest of the world think of us?
- Where will we be safe?
- How *will we feel* about ourselves?

The interplay between the climate realities we likely face and the potential psychological fallout from them was the subject of a conference convened in Washington D.C., in March 2009. A highly respected group of experts offered insights. Their thoughts, recommendations and supporting evidence are presented in this report.

We extend our heartfelt thanks to the RWJ Foundation and to our forum participants. We also note the sad death of forum participant and friend Dr. Jerilyn Ross. She added her characteristic straight talk, practical knowledge, and bright intellect to the discussion.

Sincerely,

Lise van Susteren, MD,
Forensic Psychiatrist

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The Psychological Effects of Global Warming on the United States

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The Psychological Effects of GLOBAL WARMING on the United States

Executive Summary

CLIMATE CHANGE LESSONS FROM THE SEVERE WEATHER OF SUMMER 2011

Global warming… in the coming years… will foster public trauma, depression, violence, alienation, substance abuse, suicide, psychotic episodes, post-traumatic stress disorders and many other mental health-related conditions.

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The extreme and sometimes violent weather of the summer of 2011 can offer valuable insights into how a warming climate will affect the people in the United States and other parts of the world. The news headlines included: a worsening Texas drought, record heat in the eastern states, a rise in heat-related deaths in many U.S. cities; violent floods in the East and Midwest; an expanded range and season for some of the worst tornados on record and more.

These same headlines included the seemingly unrelated famine and refugee tragedy in Somalia, a rise in mental health difficulties among service men and women returning from war, and anomalous weather conditions and disease outbreaks in many parts of the world.

Climate scientists have begun to empirically link 2011's extreme weather events and natural disasters to climate change and report that these are representative of what science predicts the world will look like

The U.S. mental health care system is only minimally prepared to address the effects of global climate change-related disasters and incidents.

with more warming. The physical and economic harm caused by such events is evident but what will be the toll on the public's mental health?

To those who would deny, dismiss or just fail to envision the psychological impacts global warming, we urge you to take a deeper look. We may not currently be thinking about how heavy the toll on our psyche will be, but, before long, we will know only too well. A warming climate will cause many people, tens of millions, to hurt profoundly.

Global warming from increased green house gases in our atmosphere is leading to a spiral of worsening conditions that will include extreme and sometime violent weather. What we are already seeing is alarming indeed: in 2011 alone we faced devastating droughts, raging wildfires, record breaking snowstorms and rainfalls, stunning floods in the East and Midwest, higher temperatures and more frequent 100 degree days in more cities than we have ever known - with a commensurate rise in heat related deaths, an expanded range and season for some of the worst tornadoes on record, and the most costly hurricane in our history.

In November of 2011, the U.N. sponsored Intergovernmental Panel on Climate Change confirmed this in a report entitled: *Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation.* The report finds that changes in weather, due to climate warming, will be felt everywhere in the world. The *physical and economic* destruction surely boggles the mind but what is not being addressed are the human *psychological* consequences of all this devastation.

To begin with, the incidences of mental and social disorders will rise steeply. These will include depressive and anxiety disorders, post traumatic stress disorders, substance abuse, suicides, and widespread outbreaks of violence. Children, the poor, the elderly, and those with existing mental health disorders are especially vulnerable and will be hardest hit. At roughly 150 million people, these groups represent about one half of the American public.

The American mental health community, counselors, trauma specialists and first responders are not even close to being prepared to handle scale and intensity of impacts that will arise from the harsher conditions and disasters that global warming will unleash. It is not that we haven't experienced natural disasters before, but the scientific data show that what lies ahead will be bigger, more frequent, and more extreme than we have ever known.

There are even broader implications, many of them beyond our shores. As climate related disasters and burdens spread across the world, the U.S. military will increasingly be called upon to help keep order. Service members will be faced with stressful, even horrifying conditions. They will see people - the young, the old, the innocent – suffer terribly. Back home their families will experience the ripple effects, suffering vicariously and experiencing their own disruptions in finances, relationships and child-rearing. There will be the disorders from the immediate trauma, and in some cases *chronic* psychological disorders will follow.

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Another major problem for the military is a high rate of active service member suicide. Even though the numbers have recently declined after reaching a high of nearly double the rate of the civilian population, the problem persists. While suicide is the result of many complex factors, the linkage to global warming with respect to military personnel must be acknowledged. Burning fossil fuels for energy means depending on foreign areas where those supplies are most abundant. To the U.S. military this can mean sending young people into battle to protect our energy sources or to calm related unrest. Our service members will recognize that their own lives and limbs were sacrificed even though alternate renewable sources of energy could be more available. Our national need to put these young people in harm's way would also decline if we were simply more energy efficient. How will we answer these service members' questions about why we didn't work harder at fixing this problem?

Moreover, the United States is increasingly disliked, worldwide, as a global warming villain. Though representing less than 5 percent of the world's population, the U.S. emits about 25 percent of the world's green house gasses. As the link between climate disasters in other countries and the production of green house gases in the U.S. becomes clearer, Americans will be blamed for inflicting harm on other countries. Critics may point to emissions from China (now surpassing the U.S.) and India as reasons why the U.S. can "share the blame" but our per capita emissions are second to none. Alarmingly, our perceived indifference is already the subject of rallying cries against us. It is used by leaders of terrorist groups, for example, as a tool to recruit new members. The President of one African country hit hard by drought linked to climate change addressed countries emitting high levels of green house gases: "We have a message here to tell these countries, that you are causing aggression to us by causing global warming." The President of Bolivia, faced with unprecedented flooding from heavy rains, threatened to sue the U.S. in international court.

The U.S. Department of Defense predicts that events linked to climate change, such as crop failures, water shortages, disease outbreaks, and more will soon be the leading cause of world turmoil. Unstable states, faced with these stressors, are at risk of slipping into chaos, and failing. This paves the way for takeovers by groups hostile to the U.S. and is a growing reality widely feared by our military.

The forum was designed as an exploratory, interdisciplinary assessment of the relationship between global warming trends in climate and how those changes, or at least their most acute manifestations, will have significant effects on the state of American public mental health and the practice and provision of mental services in the United States.

It is not a matter of whether these problems will occur, but rather how frequently and with what intensity.

The economic costs of climate change will be high by any measure. But its specific effect on U.S. mental health, societal well being and productivity will increase current U.S. expenditures on mental health services adding to our current $300 billion annual burden. Incredibly this probable cost is overlooked in today's national public health debate and environmental discussions. The U.S. mental health care system is not prepared to address the full effects of global watming-related disasters and incidents. A comprehensive assessment of what will be required begs to be undertaken. Training health care providers and first responders to address the large-scale mental distress arising from the emergencies that are coming is imperative. Timely interventions may keep some early injuries from developing into costly, chronic, long-term conditions.

This report contains the proceedings, findings and recommendations of a national forum of experts in the fields of psychology, mental health, national security, climate change science and policy. The forum was designed as an exploratory interdisciplinary assessment of the effects that global warming will have on the state of American public mental health and the practice and provision of mental services in the United States. The forum, held on March 19, 2009 in Washington, D.C., was supported by the Robert Wood Johnson Foundation. It sought to add information and context to an overlooked aspect of global climate change: the psychological and public mental health implications.

In addition to the professional insights and advice of the forum participants, this report draws from a wide body of supplemental research to assess:

a) the most likely physical effects of climate change in the U.S.,

b) the most likely psychological effects resulting from direct experiences and also from the anticipation of future harm,

c) the subgroups of American Society most deeply affected,

d) the cost of doing nothing or doing very little,

e) the effect on the U.S. mental health care system,

f) recommendations to researchers, policy leaders, public agencies, health professionals and first responders.

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SUMMARY OF FINDINGS

An estimated 200 million Americans will be exposed to serious psychological distress from climate related events and incidents: The severity of symptoms will vary, but in many instance the distress will be great.

In the coming years, a majority of Americans will experience direct adverse effects from the impacts of global warming. Natural disasters and extreme weather events will strike many places that are densely populated: 50 percent of Americans live in coastal regions exposed to storms and sea level rise, 70 percent of Americans live in cities prone to heat waves; major inland cities lie along rivers that will swell to record heights, and the fastest growing part of the nation is the increasingly arid West.

Climate change will become a top-of-mind worry in the future: Some Americans already are or will soon experience anxiety about global warming and its effects on us, our loved ones, our ecosystems, and our lifestyles. This anxiety will increase as reports of the gravity of our condition become more clear and stark. Despite alarming evidence that environmental conditions are worsening, a majority of Americans do not feel much conscious unease about global warming. They self-report not considering it "top of mind" and most do not see that global climate change has real implications for their daily lives. They see the global warming problem as distant in both time and place. A lack of knowledge about the basics of climate change, the "point of no return" consequences of reaching atmospheric tipping points, along with innate psychological resistance are major impediments to fully grasping how dire the consequences can eventually be.

People may, indeed, suffer from anxiety about climate change but not know it. They will have a vague unease about what is happening around them, the changes they see in nature, the weather events and the fact that records are being broken month after month. But they won't be sufficiently aware of the source, and furthermore, we all conflate and layer one anxiety upon another. Not knowing exactly what bothers us is common. For this reason research, based on self-reporting, indicating that Americans do not worry about climate change is unreliable and likely underestimates the actual numbers.

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Major segments of U.S. society are more psychologically vulnerable now:

- Children: America's 70 million children will not only suffer long term effects from climate change but will also experience acute reactions to natural disasters and extreme weather events. Some children are already anxious about global warming and begin to obsess (understandably) about the future, unmoved by the small reassurances adults may attempt to put forth. In the first known "climate change delusion" a depressed 17 year old boy was hospitalized for refusing to drink water out of fear it would cause many more deaths in drought ridden Australia. The doctor who treated him has seen

…anxieties could increase with continuous and frequent media reports on the subject…

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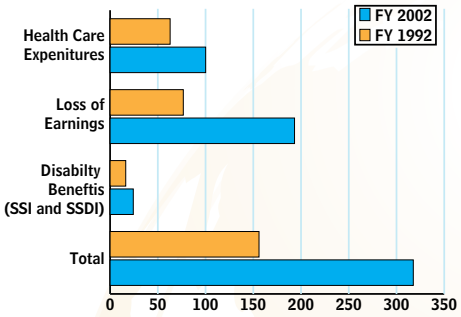
Components of the Economic Burden of Serious Mental Illness, Excluding Incarceration, Homelessness, Co-morbid Conditions and Early Mortality (in Billions)

Type of Cost	1992[a]	2002[b]
Health Care Expenitures	$62.9	$100.1[c]
Loss of earnings	$76.7[d]	$193.2[e]
Disabilty beneftis (SSI and SSDI)	$16.4[d]	$24.3[f]
Total	$156.0	$317.6



[a] Normal 1992 dollars based on general Consumer Price Index data; $1 in 1992=$128 in 2002 (www.bls.gov/cpi).
[b] Normal 2002 dollars
[c] Source: Mark etal. (4).
[d] Source: Rice et al. (7).
[e] Source: Kessler et al. (6).
[f] Author's calculations based on data from the Soical Security Administration (www.ssa.gov/policy/docs/stat-comps).

Some 50 million elderly people, and America's 35 million low-income people will suffer a disproportionate amount of physical and psychological stress.

other children suffering from climate related anxiety disorders. A body of research showing how distressed Russian and U.S. children were by the threat of nuclear bombs during the cold war era underscores the potential for global climate change to have the same destructive impact.

- The elderly and the low income people: will also be disproportionately affected, due to more fragile overall health and reduced mobility. Economic limitations will affect many of the 50 million elderly people in the U.S. and 35 million lower income people with higher levels of climate and weather-related psychological stress. They are less able to pay for goods and services, such as air conditioning, that provide additional protection from higher temperatures. The elderly often experience severe psychological distress during heats waves and low income people likewise suffer anxiety from higher exposure to the dangers of extreme weather.
- People with pre-existing mental health conditions: The estimated 60 million Americans who currently suffer from psychological disorders of varying degrees of severity will face additional challenges when confronted with the harsh realities of climate change. In addition to trying to contend with higher temperatures and more violent or extreme weather, they certainly will have a harder time finding publicly funded mental health treatment programs as these budgets shrink in favor of more basic emergency response services and community repairs. As jurisdictions struggle following natural disasters to meet the bills to clean up, replant, feed or otherwise provide basic and emergency services, funding for the needy, the sick, and the vulnerable will inevitably be cut. Funding for mental health services is among the "first to go" in economic hard times. Indeed since 2008, two thirds of U.S. states have cut funding, (as high as 47 percent in one state) though many of these services are deemed "critical." (Medscape: Psychiatry and Mental Health)

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- Members of the Military and their families: One of the most dramatic manifestations of the impact of global climate change on the mental health of Americans could originate from beyond its borders. The U.S. Military has concluded that global climate change will have destabilizing effects on economically, politically and environmentally fragile nations, putting them at risk of collapse and opening them up to conflict and war. Many of these crisis zones will draw in American fighting forces. Some of these failed states may become seedbeds of terrorism; putting Americans in danger on our own soil. U.S. military interventions in failing nations will have many serious psychological effects as evidenced by experiences with the wars in Afghanistan and Iraq. Common manifestations include anxieties and fears associated with entering or being in combat, post traumatic stress disorders, emotional reactions to injuries, suicide, painful separations from family, and the economic and emotional hardships back home that often accompany having a spouse or parent in the active military.

The mental health care system of the U.S. is not prepared to handle the wide-spread psychological stresses of climate change:
While the U.S. mental health care professions are coming to recognize and address the larger scale perils associated with climate change, no comprehensive strategies are in place to cope with the full psychological and public mental health implications. Given the foreseeable magnitude of the impacts and the rate at which the world is changing, a campaign focused on what this segment of the U.S. mental health service community can do to help is certainly needed. Examples of needs include how to address large populations (sometimes millions) who have witnessed or been displaced by violent weather, are suffering through heat waves or drought and other conditions that create the need for large scale emergency mental health interventions in affected locations.

There is also low first responder preparedness:
Due to the number of emergency situations in which global climate change and mental health issues will be connected, first responders will need additional education and training to handle the immediate psychological trauma and symptoms of climate disaster victims. Such training will support rescue operations, triage decisions, application of medications, patient safety and more.

First responders will need further education and training on handling psychological symptoms of those they are helping.

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Priority for guidelines, models, training and other support should be given to mental health professionals

Some climate change-related conditions and their psychological effects merit specific preparation:

- **Summer heat waves:** the physical distress arising from prolonged heat waves is well known. What is not widely known is the psychological distress that is caused by higher temperatures, and, in particular, the relationship between rising temperature and aggression. Research from Iowa State shows that, as the temperature rises, so does the incidence of violence. (DeLisi 2010)
- **Coastal and river flooding:** the direct adverse effects of flooding are obvious, but these weather and climate related events are especially likely to lead to psychic injury from the stress of displacement, loss of possessions (including pets), and uncertainty about interim and future housing and employment.
- **High impact and more intense storms:** the far-reaching consequences of destructive weather saw its prototype in Hurricane Katrina. The Hurricane scattered residents of New Orleans all across the U.S. It shattered a culture, broke up families, spiked outbursts of outrage and blame at a government that was slow to respond, and lead to a jump in violence in at least one city that took them in (Houston). Six years later New Orleans has yet to fully recover, and many of the victims have experienced post-incident stress and post-traumatic stress disorders (PTSD). Their shaken confidence in institutions and government is less quantifiable but also potentially damaging especially as a cumulative effect over time.
- **Severe drought and reduced snow pack:** the unrelenting day by day despair of watching and waiting for water that doesn't come will have a singularly damaging impact on the psyche of the people who have depended on Mother Nature's rainfall for their livelihood. Already underway is a 21st century dust bowl in Australia that has spawned a growing population of desperate migrants. Texas has recently experienced a drought (with accompanying wildfires) the likes of which has not been seen in more than 50 years.
- **Increased large-scale wildfires:** raging wildfires are incredibly dangerous and have a particularly savage effect on our psyches by devastating landscapes, wiping out homes and possessions, incinerating wildlife and clogging the air with pollutants that sicken people locally and can travel hundreds of miles to sicken people at a distance. Persistent psychological stress is common, with anxiety reactions recurring from unavoidable re-exposure to the odors, smoke and ash.

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- **New disease threats:** higher temperatures favor the formation of ozone which triggers asthma attacks. Anyone who has asthma and parents of children with asthma are familiar with the fears this illness engenders. People die from untreated asthma. Many other fears linked to disease are harder to "nail down." As malaria and dengue fever and other infectious diseases march northward due to warmer temperatures, inchoate fears of threat and vulnerability drift into people's consciousness. This will be compounded by a growing number of sensational media reports tied to disease outbreaks and public health warnings.

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When natural disasters are no longer truly natural:

Research shows that when a disaster is viewed as avoidable, as is the case with the harm caused by man-made carbon emissions, people find it harder to accept, become resigned to, and move on. The anger and outrage at callous, willful ignorance toward public welfare will make for incendiary, difficult to get over conditions. With increasing media coverage educating people about the causes of climate change and the ensuing extreme weather events and other disasters, we can expect more powerful and troubling responses to human-caused climate disasters than when disasters were previously experienced as natural or "acts of God".

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There is no organized discipline for the study of the psychological aspects of global warming:

While considerable research and professional literature report on psychological reactions to natural disasters, no overarching discipline or field of study connects human psychology to the many faces of global warming. A long term and disciplined approach to studying these problems within public health agencies, the academic and clinical community is needed to adequately assess and address the full meaning of global warming on the mental health of the American public.

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Persistent psychological stress is common, with anxiety reactions recurring from unavoidable re-exposure to the odors, smoke and ash.

This will require more education, persuasive messages, and consistent reinforcement from people and organizations with a reputation for trustworthiness and objectivity.

The mental health community could be more effective at communicating the threat of climate change and the urgent need to take action:

Although the field of psychology has developed policy positions in climate change, it has remained relatively silent on the depth and scale of the threat. Americans must have the threat register, in order to find the impetus and sustained interest in adopting solutions and supporting officials and policies that recognize what we stand to lose. This will require more education, persuasive messages, and consistent reinforcement from people and organizations with a reputation for trustworthiness and objectivity. The magnitude of the task is daunting, but deploying the collective influence of members of the mental health community, who have both an understanding of science and a commitment to helping people break through their resistance and denial, would be a major help.

There will be huge national price tag for ignoring the mental health implications of climate change:

The mental health care expenses of large scale events such as Hurricane Katrina in 2005, or Hurricane Irene in 2011, point dramatically to how the current estimated average annual U.S. mental health care and lost productivity. The current estimated average annual level of more than $300 billion to provide mental health services and to accommodate the indirect costs such as lost work time in the United States will increase significantly as a direct result of the physical, economic, social and psychological effects of global warming and related incidents in the coming decades.

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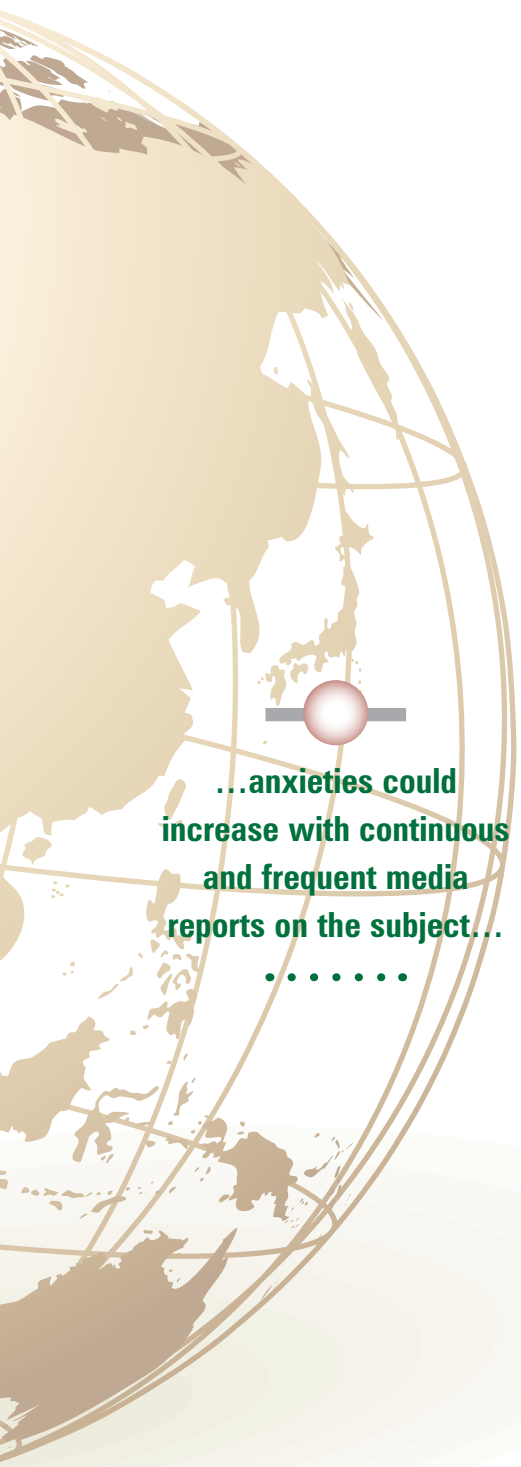
SOLUTIONS AND RECOMMENDATIONS:



…anxieties could increase with continuous and frequent media reports on the subject…

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Mental health practitioners, first responders and primary care professionals should have comprehensive plans and guidelines for climate change: The psychology and mental health fields have many well-developed tools and approaches to help respond to disasters and to take care of patients faced with emergencies. But these need to be honed and better placed in anticipation of meeting the demands of escalating large-scale crises. Increased and better targeted emergency management and disaster response training on the psychological reactions of victims to violent weather and other disasters is needed.

Priority should be given to training mental health professionals who serve the most vulnerable populations: Examples include: school counselors, pediatric health care professionals, healthcare specialists serving the aged, public clinic staff, and specialists serving patients susceptible to stress reactions.

Improve the assessment, diagnosis, and treatment of people suffering from climate related mental health problems: We need a new discipline of study and practice that will help practitioners and public health officials prepare for the foreseeable and unavoidable mental health effects of global warming. This will require research, professional development, operating centers of excellence in practice and best methods, and guidelines for interventions and treatment for those psychologically injured or in torment. This body of knowledge should also be incorporated into existing academic disciplines: environmental studies, law, business, other social sciences and medicine.

A rigorous estimate should be made of the cost of addressing the psychological effects of climate change vs. the costs of ignoring the problem: The size and scope of the problem of climate change disasters will cause mental distress requiring care on a massive scale. The existing $300 billion direct and indirect annual price tag will increase as the frequency of disasters mounts, but the greatest public costs could come from ignoring the effects. Timely interventions could reduce the number of disorders

Professionals in the American mental health community can help shape the best language and tone to help us understand, prepare for, and face the challenges of climate change.

that become chronic. An assessment should be made of what the mental health consequences of global climate change will mean to the U.S economy in the short and long term.

Governments should develop and deploy mental health incident response teams:

This would be similar to current practices used by public health agencies for disease outbreaks but would be designed for trained mental health professionals. These teams would arrive at the time of a climate or weather related incident to advise local clinics, mental health providers and first responders on what psychological responses to expect and how to address them. They would also coach them on how to deal with their own emotions.

Helpful models for positive individual and community action should be developed:

Health professions have had success changing behaviors in campaigns to stop smoking, use seat belts, and get vaccinated. The "health belief model" and its many refinements used by health institutions could be effective tools to fight global warming. A campaign to show how coal is not only driving up CO2 but sickening and killing people from cardiovascular disease, lung ailments, cancer and more, could be a test case. People feel better when they take steps to improve their lifestyle and help their communities. Lowering a home's carbon footprint, saving energy and working on collective efforts to lower green house gas emissions are all examples of behaviors that engender optimism. There are psychological barriers to taking action and hidden impediments and fears that stand in the way of these efforts. The field can help leaders to learn how to get them out of the way or break them down into components that can be corrected.

Steps to Changing your Outlook

Understanding the issue
Identifing five steps you can do in your own home or work place to reduce impact.
Surround yourself with good people
Share with others your concerns
Learn how to deal with stress from outside influences
Get hlep when you need it.

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Psychological implications of global warming should be factored into public policy development:

No public policy framework currently exists that would assess and address the capacity of U.S. public health departments, first responders and practitioners to handle disasters and other manifestations of global warming that will require large scale mental heath care responses.

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The American mental health community should help teach the public and leaders about how global warming will affect us and what we can do:
Professionals in the American mental health community can help shape the best language and tone to help us understand, prepare for, and face the challenges of climate change. Furthermore, with all the dire consequences being discussed, the populace risks becoming discouraged and avoidant, and even paralyzed. Psychologically minded messages can help counter this. America's leaders should be trained to use the most persuasive educational tools to influence people to change and to sustain their changes. The underpinnings of denial and inaction should be common knowledge and openly addressed. Being versed on how to craft messages that resonate and stick with people should be a fundamental part of any science communication training. Mental health professionals are in an ideal position to show that collective, altruistic action is an antidote to feelings of powerlessness and other painful emotions. Also in the province of professionals is the courage to tackle taboo issues, such as how and what we eat, as well as our mode of travel. These are uncomfortable questions that we need to find a better way to ask.

The American mental health community needs to become a strong public voice for protecting the public from climate change.
Ramping up and sustaining pressure on public officials is imperative. The American mental health community, with its combination of clout and expertise, could help confront public policy leaders with the full implications of inadequate action on climate change. As experts in breaking down denial, and dedicated to bringing reality and rational thinking into decision making to help people get off destructive paths, mental health professionals should be in the vanguard of the fight against global warming. With the exception of

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policy statements such as that published by the American Psychological Association, the relative silence of the mental health care community on the subject of climate change is a subliminal suggestion that danger does not abound. Given the truth of the threat, this could be a deadly misconception.

The American mental health community should have an ethical call to action:
This would include publishing and upholding a strong ethics position on climate change. Mental health practitioners are trained, indeed are ethically bound, to respond to emergencies. They are also required to report to authorities if they have reason to believe, for example, that a child is being abused. The requirement is a legal one, but it is also a moral one. We must ask, knowing full well what the science is telling us, if the call for climate change action is any less compelling than stopping child abuse or protecting the sick. In the final analysis inflicting the burden of climate change on the vulnerable is an immoral act that puts future generations in mortal danger.

The following report and forum proceedings provide the background and rationale for these findings and recommendations.

Ramping up and sustaining pressure on public officials is imperative

CHAPTER ONE:

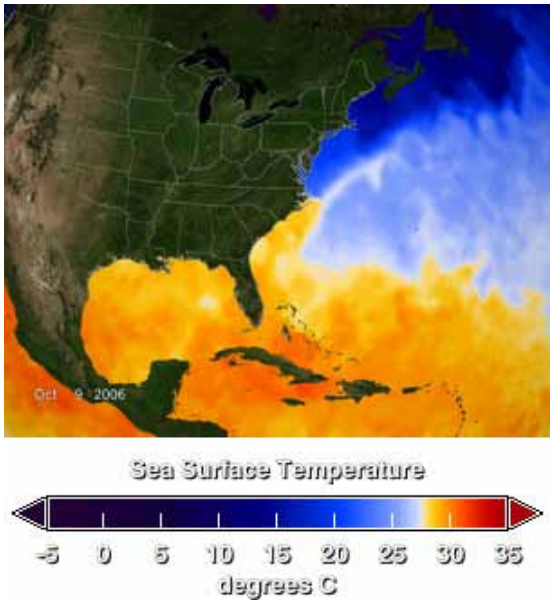
Psychological Effects of Global Warming across the U.S.

The IPCC group of 2,000 scientists and experts received the 2007 Nobel Peace Prize for their work in revealing the depth and extent of the global warming threat to policy makers and the public worldwide.

The March 2009 forum that contributed to the development of this report began with an overview of the physical impacts of climate change on the U.S. and North America. In April 2007, the Intergovernmental Panel on Climate Change (IPCC) released its' much anticipated report on how global warming will likely affect the world. It was the clearest and most detailed assessment ever of how both the global environment and human health are likely to be affected by global warming. It spelled out the *minimum* degree of warming we are likely to see by the end of the century regardless of our future success in abating greenhouse gas emissions. The IPCC group of 2,000 scientists and experts received the 2007 Nobel Peace Prize for their work in revealing the depth and extent of the global warming threat to policy makers and the public worldwide. Their report also provided a closer look at the anticipated effects of climate change on North America.

Our Last Chance

In offering welcoming remarks to the forum participants, National Wildlife Federation President and CEO, Larry Schweiger, emphasized the importance of reaching out to professionals in many disciplines, warning them about the threats from global warming and involving them in the solution. Without awareness and vigilance, he remarked, its effects can "sneak up on us like a thief in the night." The more light we shed on the climate problem, the more likely we will have an effective national conversation to address the threat, and the more likely the public will be healthy, prosperous and safe in the future." Schweiger discussed

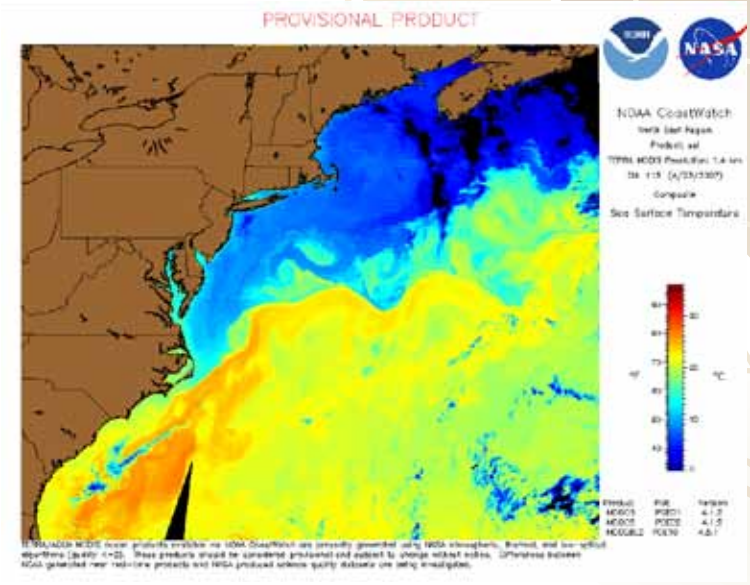


We are witnessing an unraveling of climate stability and therefore human stability and are seeing physical changes that are unprecedented in all of history.

the findings of his book, (published in September of 2009) *Last Chance: Preserving Life on Earth*, where he wrote that "all life is threatened by global warming. Humans are part of that web and will experience the threat in many ways that may be difficult to imagine in light of the relatively stable environmental conditions humanity has experienced until now." (Schweiger, 2009)

A Dissolving "Stability Assumption"

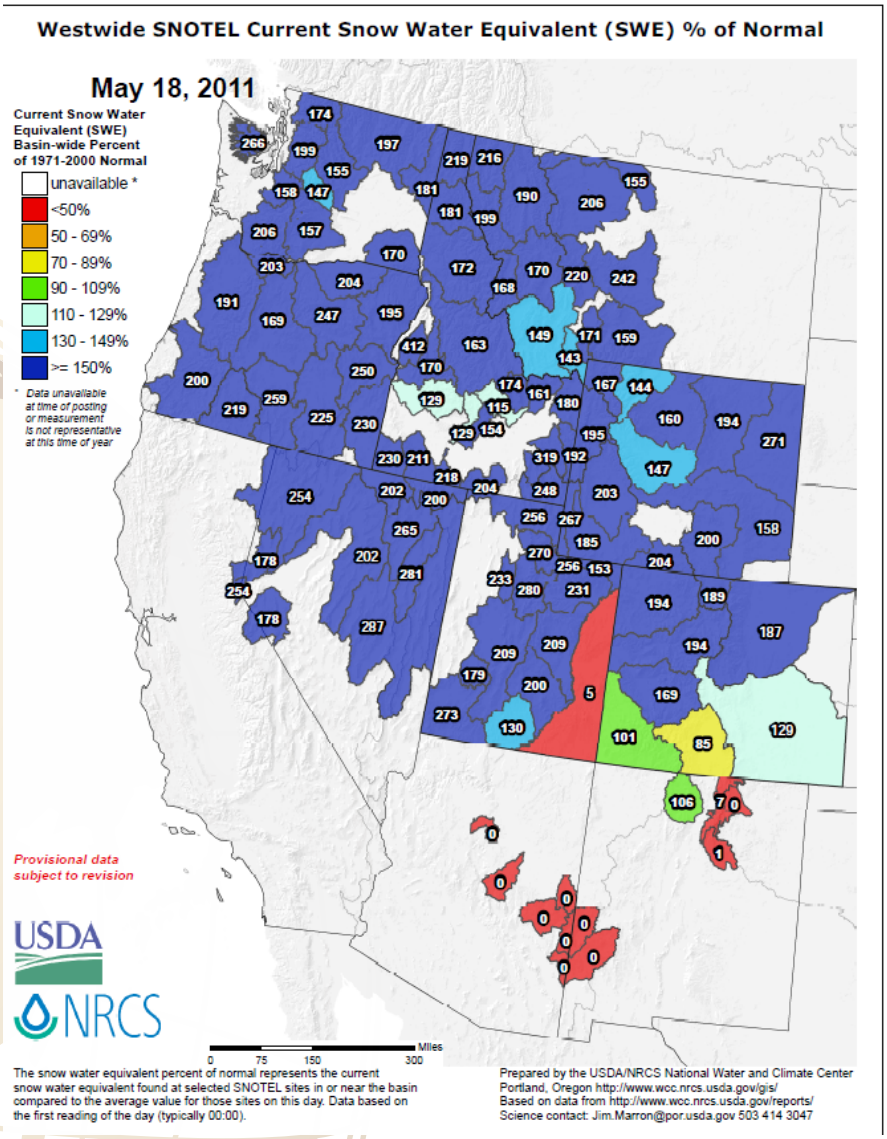
Forum participant and scientist Dr. Robert Corell offered a revealing perspective on understanding the future physical effects of global warming. He said that "as a society, we would do well to appreciate the relative climate stability we have had since the last ice age." He said that during this 10,000 year period, all of human civilization, as we know it, evolved by relying on relative climatic "calm." Having predictable temperature, precipitation and seasonal variations over long periods assured the climatic stability that was needed for the invention and initiation of organized farming, fishing and livestock husbandry, the growth of settlements, trade and other organized activities needed to form larger communities, cultures and city states. Modern society, he said, "has come to depend on a comforting sense of the permanence in our natural world."



The United States is no exception. Our entire region is highly dependent on climate predictability for economic growth and development. We are rich in natural resources and have an economy that was originally built on an abundance of good soil, water, forests, livestock, and fish. Climate science shows that global warming will profoundly alter these resources and could leave incalculable human turmoil in its wake.

To support the forum discussion, Dr. Corell presented a summary of the IPCC (2007) predictions for North America:

- Warming in western mountains is projected to cause decreased snow-pack, more winter flooding, and reduced summer flows, exacerbating already difficult and sometimes divisive competition for water resources.
- Pests, diseases and wild fires are projected to increasingly damage the health of forests. The fire seasons will be longer and more intense, with many more acres burned.
- Moderate climate change in the early decades of the 21st century is projected to increase aggregate yields of rain-fed agriculture by 5-20 percent, but this will vary greatly from region to region.
- Major challenges are projected for crops that are near the warmer end of their suitable range and for crops that require abundant water.
- Cities that currently experience hot weather are expected to face additional challenges as the number, intensity and duration of heat waves increase. The number of deaths and illnesses will rise, especially among the very young, the old, and the otherwise vulnerable. Coastal communities will be stressed by sea level rise and more intense coastal storms. (Wheaton, 2007)



The current policy and legislative proposals being discussed by public policy leaders do not reduce greenhouse gas emissions enough to restore balance to our world and avoid long term environmental damage.

Dr. Corell warned that: "We are witnessing an unraveling of climate stability and therefore human stability and are seeing physical changes that are unprecedented in all of history. We are going to a place where we humans, and all we connect with, have never been before."

Educator and environmentalist Bill McKibben describes this phenomenon provocatively as the "end of nature." He says that: "our comforting sense of the permanence of our natural world, our confidence that it will change gradually and imperceptibly, if at all, is now the result of a subtly warped perspective. Climatic changes that can affect us can happen in our lifetime. By the end of nature I do not mean the end of the world. The rain will still fall and the sun will shine, though differently from before. When I say 'nature,' I mean a certain set of human ideas about the world and our place in it." (McKibben, 2006)

Dr. Corell used several examples to illustrate that the already stunning predictions of the 2007 IPCC report may actually *underestimate* actual climate change impacts:

- The IPCC estimate of one to two feet of sea level rise by the year 2100, for example, may actually be closer to six feet. Estimates of the extent of ice melt in

Summary Rural Impact

- Prolonged drought is a serious stressor for rural communities, involving financial hardship, practical uncertainty, and anxiety about future prospects.
- Drought can affect all members – adults and children – of farming families.
- The stressful effects of drought extend to farm and nonfarm related businesses in rural communities and may increase social isolation.
- Chronic stress and uncertainty combined with relative isolation increase the risk of developing a mental disorder such as depression or anxiety.
- People are unlikely to present directly with complaints of depression or anxiety, but may appear with symptoms relating to physical complaints, injury, sleeping problems, or problems relating to 'self medication' with alcohol. They may also present with concerns about family members.
- Rural agency workers can be a good source of information about current issues and stressors in the farming community. They often receive a high degree of trust from farmers and their families. Collaboration with rural agency workers can decrease

http://www.racgp.org.au/afp/200712/200712Sartore.pdf (reference)

Greenland have been understated and may be too low. The summer flow rate from the massive ice sheets there is now three times the flow rate of the Nile River having tripled in recent years.

- Previous data showed that the north polar sea ice was at risk of a total summer melt by mid century. New data show that this could happen in a dozen years or less. That would be 30 years earlier than the original prediction. Winds blowing across polar ice cap are chilled by it and, as they continue their long path southward, they bring cool temperatures to warmer areas. The melting of the north polar ice cap will have the effect of turning off a large part of the planet's natural air conditioner.

Melting polar ice exemplifies a major concern for climatologists: that of climate change tipping points. According to NASA, about 90 percent of the sun's rays are reflected back into outer space when they hit the bright ice of the polar cap. By contrast, when the sun's rays hit darker open ocean water, as much as 90 percent of the sun's heat energy is *absorbed*. The polar ice cap serves as a massive planetary cooling system by reflecting heat away from the planet. The data that polar ice is melting faster than ever could mean a rapid shift from a cooling system to a warming system.

The arctic region holds other climate related perils. Millions of tons of carbon from plants that died millions of years ago have been trapped in the frozen tundra of the north. Cold temperatures over thousands of years have kept the gases from these ancient deposits frozen and trapped underground. Temperatures are rising quickly in this part of the world, however, and that is causing the tundra to melt. As global warming advances, the rate of warming near the poles is faster than areas closer to the equator. This releases carbon in the form of methane. Methane is a greenhouse gas that is 10 times more potent in its atmospheric heating potential than carbon dioxide.

Dr. Corell also warned that higher temperatures could very likely unleash some new disease pandemics. He pointed to how species, plants and even disease vectors are moving north into areas previously too cold to support them. We have seen recent North American examples of this with West Nile virus and dengue fever carried by insects.

We can also expect some new physical geography in North America. We can no longer assume that our coasts will remain where they are today, and we can no longer expect that it will be safe for people to live along them. In Florida, Dr. Corell indicated that a three-foot rise in sea level would flood

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and/or endanger as much as 20 percent of the State. With so many people living directly along the coast, an even greater percentage of the population would be affected. Though slightly higher elevations may not be vulnerable to permanent flooding from sea level rise, these same areas may experience increased intermittent flooding because of higher sea levels that extend the water's reach during a storm surge such as is common with a hurricane. With these new flooding events, more people will die or they will be injured, as was evident from Hurricane Irene in 2011 and over the long run, a way of life could be permanently destroyed for people in coastline regions. The clean-up costs will be major, revenues from tourism and local industry will be reduced or even lost entirely, and ecosystems such as major coastal marsh systems will increasingly be destroyed.

The National Oceanic and Atmospheric Administration (NOAA) reports that about 50 percent of Americans (over 150 million people) live in coastal counties (Tibbetts, 2002). Many major cities lie along the coasts and a sizable percentage of these people live in flood-prone areas. The Federal Emergency Management Agency (FEMA) estimates that 10 million homes lie in flood prone areas along coasts and in inland riverine flood plains (FEMA, 2003).

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To help make the connection between the physical and psychological, Dr. Corell spoke of the "difficulty we often have predicting the future in the behavioral world will, for the first time in modern history, have a closer parallel in the physical world." He emphasizes that "the current policy and legislative proposals being discussed by public policy leaders do not reduce greenhouse gas emissions enough to restore balance to our world and avoid long term environmental damage." Given the speed with which the world is changing and the potential for catastrophic climate change, he emphasized the urgency with which Congress and individual states should act to adopt policies to rein in greenhouse gas emissions.

Given the speed with which the world is changing and the potential for catastrophic climate change, he emphasized the urgency with which Congress and individual states should act to adopt policies to rein in greenhouse gas emissions.

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A Problem "Flowing Southward"

Dr. Corell concluded his remarks by relating a personal story about the indigenous people of Ilulissat, Greenland. It is a village of 3,000 inhabitants near the Arctic Circle. While on a research expedition there, he noticed that the increased melting of polar ice in the summer months had caused profound changes in the hunting habits of the people in the village. "Basically," he said, "a father can no longer teach a son to hunt. That is the traditional role played by a man as a provider to his family." This has forced young men to abandon their familial village to seek livelihoods in cities. This new urban lifestyle is foreign and alienating to them. Many experience enormous difficulty adjusting to the urban environment. They feel out of place, and end up returning home. They have few plans for the future. Others are too discouraged to muster the initiative to leave the village in search of better circumstances. On a visit there in March 2007, Dr. Corell and his team noticed that the local cemetery contained an unusually high number of graves belonging to young men. They learned that in one year alone, 2007, 17 boys committed suicide. This is a stunning suicide rate for such a small community. It is many times the norm. With their "men folk" gone, the young women have become single mothers. Even though these devastating losses and damage to the structure of the society are seemingly unique to this place and its culture, Dr. Corell says that, "as global warming spreads and takes hold, what is happening up north will eventually flow southward."

as global warming spreads and takes hold, what is happening up north will eventually flow southward

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CHAPTER TWO:

Most Americans Will Experience the Stresses of Climate Change as Specific Weather Incidents or Disasters

"Solastalgia"... researchers described a "palpable sense of dislocation and loss that people feel when they perceive changes to their local environment as harmful."

The Acute Manifestations of Climate Change in America

Though many Americans will experience the effects of climate change quite directly, they may not make an immediate connection. Instead, they will have distress and anxieties from such occurrences as "nature turning bizarre" and will not likely perceive the real culprit: climate change due to increased greenhouse gas emissions. When they do link them, those connections will be striking and potentially psychologically painful.

When the Centre for Rural and Remote Mental Health at the University of Newcastle in Australia conducted interviews in drought-affected communities in New South Wales in 2005, some of the interviewees seemed to suffer from a psychological condition that has come to be described as "solastalgia." Researchers described a "palpable sense of dislocation and loss that people feel when they perceive changes to their local environment as harmful." Glenn Albrecht, an environmental philosopher at the University of Newcastle's School of Environmental and Life Sciences in 2003, named the condition after observing communities damaged by large-scale coal mining. Albrecht believes that shifts in the health of an ecosystem, as evidenced by the desolate wastelands created by large-scale strip mining to the landscape changing impacts of global warming, diminish the mental health of the people who live there. (Albrecht, 2005)

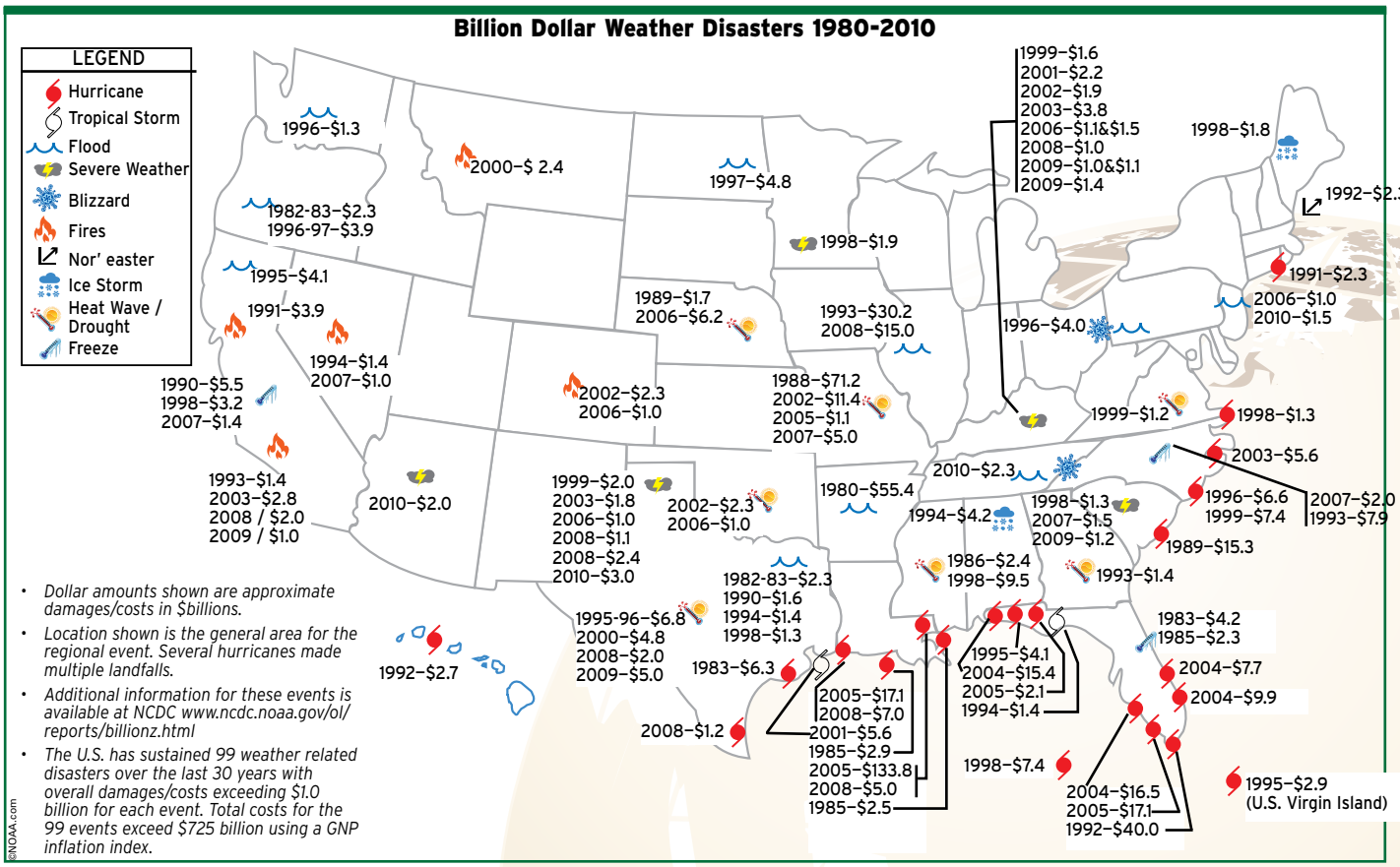
Common Psychological Reactions to Climate-Related Incidents

In the aftermath of events linked to global warming, many of the affected people will experience fears, feelings of guilt, anger, and despair. How people "carry on" will be determined by their background, current mental state, personality, life experiences and other factors. The nature of the climate-related event they experienced will, itself, carry some weight in determining their psychological reaction. The degree of the sense of powerlessness, the sheer force of the incident, the

Weather Phobias 2011

Phobia	Fear of...
lilapsophobia	tornadoes or hurricanes
brontophobia	lightning and thunder
antlophobia	floods
chionophobia	snow
ombrophobia	rain
ancraophobia	wind
heliophobia	sun
thermophobia	heat
cryophobia	cold
homichlophobia	fog
nephophobia	clouds
pagophobia	ice or frost
cymophobia	waves

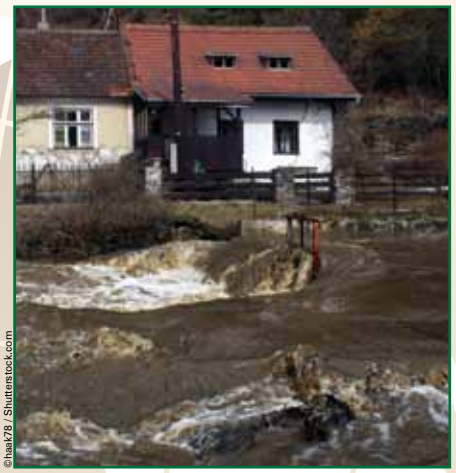
Courtesy: phobialist.com



The degree to which the event hits home on a personal level will also make a difference.

event's suddenness, degree of damage, loss of life and injury and the extent to which people personalize these incidents will determine the depth and extent of the psychopathology that results. Mental health experts expect an increase in depressive, anxiety and aggressive disorders generally.

The degree to which the event hits home on a personal level will also make a difference. For example, the loss of a bird greatly appreciated in one's "neck of the woods" (e.g., Baltimore oriole) will be experienced differently for those who simply enjoy the sight of birds. A coral reef bleached or covered in sediment could make the person who simply hears about it sad, while the scientist who has studied that particular reef most of hisor her career or the fisherman who relies on it for livelihood would be devastated. The more personally involved one is, the more psychologically destructive the event will become. For some it could mean loss of livelihood, property, and even life.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Along the Coasts

More than 150 million Americans live in coastal counties and the Federal Emergency Management Agency estimates there are millions of U.S. homes situated in highly flood prone areas along coasts. In Florida, for example, where 35 percent of the state is classified as wetlands, and most people live along the coasts. A high percentage of residents live at risk from storms and flooding.

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In the Heartland

Even though summers may be generally drier due to climate change, climatologists estimate that winter rains will be more intense and create more flood conditions throughout the Midwest. Moreover, farming and food production, so key to this region, will be subject to many more uncertainties.

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In the West

The arid and semi-arid parts of the American West are likely to become drier. Predicted droughts and catastrophic wildfires also threaten to create emergency conditions in many western and southwestern states. (Wheaton, 2007)

Psychological Responses to Violent Weather Generally

Extreme weather events can lead to immediate psychological problems relating to loss, economic disruption and physical displacement. Fear, grief, depression, anxiety, problems sleeping, eating disorders and self medication with alcohol and drugs are common responses. Symptoms may subside when safety and security have been reestablished, but sometimes they do not. Post traumatic stress disorder is frequently seen in populations exposed to violent disasters, particularly of course, those that recur. The psychological toll is cumulative.

Hurricane Katrina is illustrative. Affected communities showed high rates of depression, domestic violence and significantly higher rates of suicide and suicide attempts (14.7 and 78.6 times above the area's baseline rate, respectively). This population also showed high rates of post-traumatic stress disorder. These mental health injuries were a consequence not only of exposure to the event itself, but also to the subsequent general displacement, uncertain housing and employment, insufficient access to support services, and the belief that those in authority who could have done something, did not do enough or adequately prepare.

Responses can be direct or indirect. A study following North Carolina's Hurricane Floyd concluded, for example, that children are more likely to be abused by family members following disasters. This is undoubtedly one among the many potential manifestations of the breakdown of the family that disasters can precipitate. People with severe pre-existing mental illnesses are especially vulnerable to the challenges of handling and responding to a disaster. Additionally, the urgent care that this segment of the population needs is already hard to come by (Keenan et. al., 2004).

Research shows that some people are constantly in fear of the possibility of extreme weather events. Dr. John Westefeld, a University of Iowa

Hurricane Katrina is illustrative. Affected communities showed high rates of depression, domestic violence and significantly higher rates of suicide and suicide attempts

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He studied 81 individuals who had expressed serious worries about extreme weather to assess their reactions to thunderstorms and tornadoes and found that even a weather forecast a week in advance could leave some participants "prisoners in their own homes."

professor of psychology who lives where tornados and tornado warnings are common, sees cases of fear of severe weather that are so extreme it could be considered a phobia. He studied 81 individuals who had expressed serious worries about extreme weather to assess their reactions to thunderstorms and tornadoes and found that even a weather forecast a week in advance could leave some participants "prisoners in their own homes." (Westefeld, 1996)

In order to relate better to disaster victims, the American Academy of Experts in Traumatic Stress describes the need for first responders and health care providers to understand their own internal responses to disasters and emergencies in stages:

- *STAGE OF ANTICIPATION* comes right after we are notified of the incident. Anticipatory stress deals with the unknown. We have no idea of what we are facing and no idea of what to expect. The media plays an important part in this stage and can often terrify our psyche into believing we are incompetent because the incident is "too overwhelming".
- *STAGE OF REALITY SHOCK* develops when we arrive at the site. Often we are overwhelmed by the task at hand. This stage brings anxiety, a sense of shock, a feeling that we cannot do enough to help. Also, this stage can lead to the need to work feverishly.
- *STAGE OF DESPERATION/ STAGE OF ACUTE REACTIONS* develops after the job is completed. It is normal to push physical and psychological stress out of the way until the job is done. Feelings of depression, anguish, remorse and sadness can result. Talking about the incident becomes difficult, and we become introspective. We may feel guilty because we did not do enough. We become vulnerable, and our world as we knew it has collapsed. These post-traumatic stress reactions are normal responses to abnormal events.

  It is also this stage that can lead to affect disintegration: chronic illness emerges, psychotic episodes develop, loss of trust shatters meaningful attachments, chronic guilt and self-blame becomes intrusive. What can emerge is Posttraumatic Stress Disorder (PTSD). The degree of stress experienced is proportional to these five factors:

  1. The amount of empathy one possesses,
  2. Past traumatic events one has experienced,
  3. Unresolved traumatic conflicts one may harbor,
  4. The amount of exposure to family, children's or friends' trauma,

5. The degree of maladaptive responses one uses as a survival strategy.

- *STAGE OF RECONCILIATION/ STAGE OF ACUTE POSTTRAUMATIC STRESS* is when we live through and learn from our stress. In this stage we can grow from the traumatic event and incorporate it into our psyche, or we can develop acute stress symptoms. Distress during the days that follow the incident resemble those of PTSD; however, it is difficult to differentiate between normal responses to an abnormal incident and responses that develop into PTSD" (Neudeck-Dicken, 2000).

The global impact of climate change assures that the psychological damages from disasters cited above will likely be seen on a massive scale. Dr. David Satcher, former U.S. Surgeon General and member of the Commission on Social Determinants of Health, and Drs. Sharon Friel and Ruth Bell, members of the Commission Secretariat, wrote, in the Journal of the American Medical Association, that 39 percent of Hurricane Katrina evacuees experienced moderate symptoms of post-traumatic stress disorder and 24 percent experienced severe symptoms. Studies indicate that similar long-term conditions should be expected among survivors of Hurricane Rita (Satcher et al., 2007).

Hurricane Katrina showed that climate change and extreme weather events will displace significant numbers of people living in already vulnerable communities. Two hundred thousand people ended up leaving the Gulf coast after Katrina. The U.S. Geological Survey and other governmental organizations predict that sea level rise and more intense storms will affect as many as a billion people worldwide in the coming century.

Post-traumatic stress disorder (PTSD) is an intense physical and emotional response to thoughts and reminders of a particular event. Forum participant, Dr. Spencer Eth, discussed the symptoms of PTSD and noted that the disorder was added to the mental health lexicon in the 1980s even though the phenomenon has been around for millennia. PTSD occurs when people exposed to a life threatening occurrence cannot stop reliving the experience. The memory of the event is a constant source of psychic "re-injury." The more powerless an individual feels at the time of the event, the more likely he or she is to suffer from PTSD. Early treatment is more likely to be effective than treatment initiated later on. Despite appropriate and well-timed interventions, PTSD can become a chronic and debilitating disease. Symptoms can last months and even years after the precipitating event.

The symptoms fall into three broad types: re-living, avoidance and increased arousal.

- *RE-LIVING:* flashbacks, nightmares, and extreme emotional and physical reactions to reminders of the event. Feelings of guilt, fear verging on panic, and emotional numbing are common reactions. Uncontrollable shaking, racing heart, debilitating headaches and more are common physical reactions.
- *AVOIDANCE:* conscious or unconscious avoidance of activities, places, thoughts, or feelings evoking the trauma, detachment from customary behaviors and events and estrangement from others.
- *INCREASED AROUSAL:* heightened watchfulness, increased startle reflex, irritability, explosive anger, difficulties sleeping and concentrating.

Other symptoms linked with PTSD include: panic attacks, depression, suicidal thoughts, substance abuse, and emotional paralysis impeding the performance of activities of daily life.

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39 percent of Hurricane Katrina evacuees experienced moderate symptoms of post-traumatic stress disorder and 24 percent experienced severe symptoms.

©Larry Lerner / FEMA News Photo

Agencies that were responsible for providing psychological support and treatment were unprepared and overwhelmed by the magnitude of the sudden need for services.

Human Caused vs. Natural Disasters

Report co-author and forum organizer Dr. Lise Van Susteren remarked to the forum participants that "people suffer more from disasters that are 'man made' than they do from natural disasters. The pain caused by intentional or avoidable acts is much harder to get over than those caused by events perceived as accidental or uncontrollable." Most natural disasters have an identifiable low point, after which "the worst is over" and the recovery process can begin. In contrast, a human-caused disaster elicits a sense of outrage that encumbers the grieving process, making recovery more difficult. Global Warming, though an apparent manifestation of nature, is triggered by the actions of humans. The knowledge and pain of having "done it to ourselves" will be especially deep and hard to accept for many disaster victims.

Dr. Van Susteren then re-introduced Dr. Eth who was present during and in the aftermath of the attack on the World Trade Center.

Lessons From America's Searing Moment

Dr. Eth, of St. Vincent's Hospital in Lower Manhattan, reviewed the mental health lessons from the September 11, 2001 attack on the World Trade Center in New York. He describes the attack as a searing or "flashbulb" moment, forever fixed in the observing public's mind.

"St. Vincent's is the closest hospital in lower Manhattan to ground zero." Eth said. "The relative number of people killed (versus injured) in this attack was proportionately very high. On hearing that the towers had been struck, the Hospital immediately mobilized, and within the first two hours, a few hundred patients arrived. But they were treated mostly for minor injuries. Not a single surgery was performed and, contrary to expectations, everyone at St. Vincent's noted that, after the first two hours, the ambulances stopped coming".

Later that day the traumatized began to arrive and soon they literally surrounded the Hospital, causing the emergency rooms to overflow. Their needs were emotional rather than physical. Some of them were looking for loved ones. Some were undone by

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terrible events they had seen. Many had been in the zone of danger and were reacting. St. Vincent's needed to borrow extra treatment space from the nearby New School to handle the large numbers. Seven thousand people displayed acute emotional reactions in that initial time period. Agencies that were responsible for providing psychological support and treatment were unprepared and overwhelmed by the magnitude of the sudden need for services. Dr. Eth noted "Even in a highly sophisticated city such as New York, it took weeks and, for some interventions, even *months* to assemble and mobilize the right psychological treatment resources."

Not surprisingly the closer people were to the site of the disaster the more likely they were to suffer acute symptoms. But the suffering was not limited to those in close *physical* proximity, many people felt close to it *emotionally*, and suffered the psychological fallout accordingly. Additionally, although the 9-11 attack occurred in lower Manhattan, the people who were killed or injured lived throughout the metro area. Whether from the pain of their loss or suffering or the trauma of the incident generally, finding the people most in need of help and treating them was difficult. They were spread out over a large geographic area. Dr. Eth also described the "toxic" effect of the continuous graphic coverage of the attack, explaining that this made the experience worse for those directly affected as well as for those who were witnessing it from a distance.

Though the initial reactions of fear and anxiety were normal, Eth said that many who were unable to work through their feelings would go on to develop PTSD. For a health care system called upon to address what will be a growing number of large-scale disasters, this has serious implications. Dr Eth concluded his comments by emphasizing that the 9-11 first-responders were themselves deeply affected by what they had experienced, and did not always fully consider their own emotional struggles with the horror and panic they experienced. He pointed out the potential to overlook more subtle traumatizing effects, such as in children attending a school that faces the site.

Heat Waves and Mental Health

Many Americans may not recall or have paid attention to the reality that some 70,000 people died during the heat wave in Europe in 2003. This was the largest heat-related death toll on record. During an average summer in the U.S., 400 people will die from heat related causes (Ho, 2004). During the record breaking heat of the summer of 2010, that number was even higher, particularly in the normally cooler East and Midwest where people were less acclimated to hot temperatures.

The IPCC, in its 2007 report, predicted that average temperatures in the U.S. will increase 4 to 5 degrees Fahrenheit within the next century. We are already a degree or two hotter than in the last century. Importantly, this increase in temperatures will occur even if we were able to get immediate control of global greenhouse gas emissions. While one to five degrees Fahrenheit may not seem to be a huge change from where we are today, in many areas of the nation it will bring a significant increase in the number of days above 90 to 100 degrees.

Areas that are generally cooler today (Chicago is an example) will be hit hardest since they are not currently braced to fight the heat the way traditionally warmer locations are. When Chicago had an extraordinary heat wave in the 1990s, 700 people, mostly residing in places without air conditioning, died. Many of the Chicago-area people who were most

Ecosystems are already showing negative impacts under current levels of climate change … which is modest compared to future projected changes…. In addition to warming temperatures, more frequent extreme weather events and changing patterns of rainfall and drought can be expected to have significant impacts on biodiversity. Secretariat of the Convention on Biological Diversity (2010), Global Biodiversity Outlook 3, May, 2010

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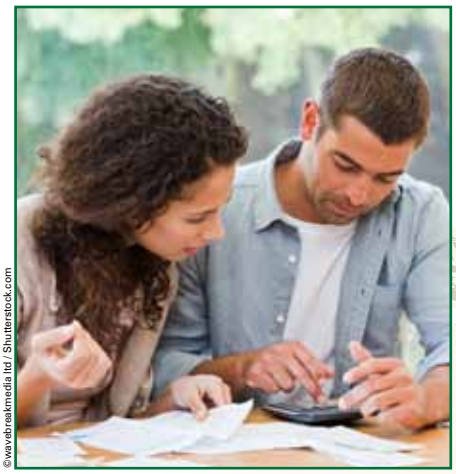
Climate change is already having an impact on biodiversity, and is projected to become a progressively more significant threat in the coming decades. Loss of Arctic sea ice threatens biodiversity across an entire biome and beyond. The related pressure of ocean acidification, resulting from higher concentrations of carbon dioxide in the atmosphere, is also already being observed.

affected were the elderly or poor. They did not have the money or sufficient opportunity to find cooler, life saving environments. For many people around the world, air conditioning is a luxury they cannot begin to or imagine affording. In "The Long Hot Summer", his article on the 2003 European heat wave, Norman Ho wote: "heat waves are a horrific phenomenon, killing thousands around the world annually, more than any other meteorological catastrophe." (Ho, 2004)

U.S. public health services consistently report that hot summer temperatures and prolonged heat waves have unhealthy effects on people's mental status. A link has been shown between heat and different types of human behavior, especially aggression, with an increase in the number of murders, assaults, and domestic violence incidents when the weather is hot (Rotton & Cohn, 2004; Cohn & Rotton, 2005; Anderson, 1987). Studied since the early 1970s, the connection between temperature and aggression was initially disputed. Now it is no longer a question of *if*, but rather a question of *how strong* the link is.

Other studies report a connection between higher temperature and suicide. (Deisenhammer et al, 2003). This association appears to be stronger for violent suicides than for non-violent suicides (e.g., Maes et al, 1994).

People who have pre-existing mental disorders are especially vulnerable to the effects of heat waves. During these hotter periods, they appear to get sicker than expected, show greater dangerousness towards others and require more frequent use of restraints (Severity of Psychiatric Illness (SPI) Scale for Dangerousness and Bulbena, et al., 2006).



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Economic Disruption and Mental Distress

Many sectors of the U.S. economy are particularly vulnerable to a changing climate. American agriculture, the seafood and forest products industries or tourism-related enterprises such as recreational beaches and ski resorts are examples. Some of the effects on these industries are being felt now and some will emerge more as the years pass. The BP oil spill in the Gulf of Mexico in 2010 is, by analogy, instructive. Though a man-made disaster, the oil spill demonstrated how certain types of large scale events can upset the balance of nature in key natural resource areas and cause the loss of jobs, the displacement of people and economic disruption costing billions of dollars.

For an illustration of how global warming is likely to affect identified regions of the U.S., we can draw upon the impacts of the multi year drought that has been plaguing Australia (Fritze et al, 2008). The report states: "The interaction of climate related economic impacts and mental health is already being felt in drought affected rural Australia. Reduced income security due to ongoing drought has contributed to a number of social impacts including stress, social isolation, strains on relationships, and evidence of increased rates of suicides. Farm families are employing a number of economic coping strategies, such as seeking work outside the agricultural sector and reducing household expenditures. However, without adequate support,

these strategies, in themselves, may have mental health impacts. Reducing participation in 'optional' activities such as social events can contribute to isolation, while increased workloads and separation of families to access employment opportunities creates additional emotional stress. Inadequate service and policy responses to support communities economically affected by climate change and necessary economic restructuring are likely to increase the negative impacts on well-being at both an individual and community level."

Feelings about the Loss of Nature and Species:

The United Nations Environment Program (UNEP) and organizations such as the World Wildlife Fund have looked at how global warming could affect the survival of global species and estimate that as many as one third could go extinct. It would include millions of plant and animal species. The loss of this diversity and the disappearance of species forever is a matter of concern to many Americans.

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global warming could affect the survival of global species and estimate that as many as one third could go extinct.

CHAPTER THREE:

Affect of Global Warming on Vulnerable Populations

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Research consistently shows that people who have pre-existing mental health problems (from 5 to 15 percent of the population) are more dramatically affected by traumatic weather events.

The American Psychological Association points out in its climate-related emergency response guidelines that "there is greater understanding that the effects of climate change will be disproportionately felt by already vulnerable communities, including people with low incomes and communities directly dependent on their local environment for survival." Other segments of American society will experience disproportionate adverse effects as well.

People with Pre-existing Mental Health Needs

Research consistently shows that people who have pre-existing mental health problems (from 5 percent to 15 percent of the population) are more dramatically affected by traumatic weather events. An uptick in the incidence of psychosis, suicides, and other mental disorders is common during such times.

Brief reactive psychoses are often seen in the face of natural disasters. (See, for example, WebMed's Schizophrenia Guide for a review of the subject.) (http://www.webmd.com/schizophrenia/guide/mental-health-brief-psychotic-disorder)

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Low-income People

According to the U.S. Census Bureau, about 12 percent of U.S. residents (36 million people) live below the poverty line. This segment of the population has less capacity to adapt to the trials

that climate change presents: they are less able to get out of the way of natural disasters and are more exposed to harmful environmental conditions such as heat waves and poor air quality. Many poor people in the U.S are employed in climate-dependent sectors, such as agriculture, or they live in crowded, hot urban areas or flood zones or other hazardous areas.

Again, Hurricane Katrina surely demonstrated how the natural hazard of an intense coastal storm, for example, can have a disproportionate effect on poor people who are unable to evacuate in an emergency. At the time, more well off people wondered why other residents did not leave when they were told to evacuate. Society seems to fail to grasp the degree to which such people are vulnerable and can be quickly "cornered" by a disaster that puts them in harm's way. For years experts had warned that the "big one" could drown New Orleans unless the levees were upgraded.

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The Elderly

Nearly 50 million Americans are over 60 years of age. As people get older, their capacity to withstand environmental pressures declines. Higher rates of untreated depression and physical ailments contribute to their overall vulnerability, adding to the challenge of responding to climate change. As noted above, the majority of the 70,000 deaths that occurred as a result of the European heat wave of 2003 were among the elderly. (Robine et al, 2008) In the U.S. it is no different: a disproportionately high number of fatalities from urban heat waves occurs among the elderly.

Children

There are 70 million children in the United States. They will certainly be affected when the consequences of today's energy choices come "home to roost" in their lifetimes. The experience in drought-hammered Australia provides a glimpse of this: In a 2007 survey of Australian children, researchers Tucci, Mitchell and Goddard found that "a quarter are so troubled about the state of the world that they honestly believe it will come to an end before they get older" (Tucci, et al. 2007). Children are also more emotionally vulnerable to increased family violence, natural disasters and other dramatic manifestations of climate change.

Some of the stresses can be quite acute. Rising air pollution is an example. A warming planet will present humans with significant challenges to their respiratory systems. These will be stressful to all of us. But children will be particularly affected (Shea, 2007). There are few traumas as great as a child having a life threatening respiratory attack. The child and everyone in the vicinity are profoundly affected. Children are especially vulnerable to both short-term illness and long-term damage to their lungs from air pollution. They breathe at a faster rate than adults, and some spend more time outdoors engaging in vigorous physical activity. Additionally, the developing lungs of children are more sensitive to irritation. Air pollution (such as ozone and particulate matter) causing respiratory illnesses and asthma are already an enormous burden

Asthma among pre-school children is already at epidemic levels, having more than twice the growth rate (75 percent) of the overall U.S. population.

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For some professionals global warming amounts to a daily confrontation with a deadly and devastating existential threat. The emotional toll can be overwhelming.

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to our health care system and result in many more emergency room visits, hospitalizations, absences from school and work for parents. Air pollutants can cause a life-long reduction in lung function. Children who are active in outdoor sports in communities with chronic high levels of ozone are at increased risk of developing asthma.

Shea and others at the American Academy of Pediatrics have compiled research that shows a relationship between global warming, hotter weather and children's health. The studies show an increase in a number of respiratory illnesses, including asthma. Higher temperatures favor the formation of ozone, the major component of smog. Ozone is toxic to lungs and bronchial tubes. Exposure can cause inflammation, infection and decreased lung development.

According to warnings issued by Harvard researchers and the American Public Health Association (APHA), millions of poor and minority children in America's cities will suffer even higher rates of asthma and other respiratory illnesses as discussed above. Asthma among pre-school children is already at epidemic levels, having more than twice the growth rate (75 percent) of the overall U.S. population. And, the Centers for Disease Control, reports that nearly one in five of all pediatric emergency room visits is asthma-related. This is an increase of approximately 45 percent in the past decade. While these numbers are not wholly attributable to climate change, some are.

The 1970 Clean Air Act (CAA) developed six criteria to define air pollutants (CAPs). Amendments to the CAA in 1990 identified 188 hazardous air pollutants and set standards to protect human health and the environment. With warming temperatures, many of these pollutants increase, resulting in an increased incidence of allergy and asthma.

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Carbon dioxide was recently determined to be a pollutant under the Clean Air Act. This designation will help the government to monitor and control CO2 pollution levels that contribute to respiratory illnesses.

Smoke from wildfires is also likely to increase in the face of global warming. Higher temperatures, increased evaporation and new weather patterns are causing larger regions of drought, drying out forests and greatly raising the risk of fire. Smoke typically

contains a mix of respiratory irritants including: carbon monoxide, carbon dioxide, nitrous oxide, particulate matter, and volatile organic compounds. Epidemiologic studies, many of which have been conducted in Australia where there have been major drought-related fires, have shown short-term increases in hospitalizations for cardiac and respiratory illnesses resulting from acute exposure to wildfire smoke, particularly in the elderly (Johnston et al. 2007).

Anyone who has asthma knows what it is like to gasp for air. Anyone who has seen a person fighting for air knows how terrifying this can be. And that doesn't count the worry in between. It is difficult to conceive of a more elementary battle to fight as a parent than for our children to breath air that will not harm them.

The "Working Wounded"

For some professionals global warming amounts to a daily confrontation with a deadly and devastating existential threat. The emotional toll can be overwhelming. Forum participant Gillian Caldwell, former head of a national campaign to fight global warming as the Executive Director of 1 Sky, has been consistently exposed to the often alarming climate-related findings that surface regularly. She is among many of the scientists and professionals in the environmental and technical fields who are in actual anguish about the future. She says: "As I started to immerse myself in the science and early impacts of global warming, I became increasingly distraught. But I soldier on, hoping against hope that I will be so busy in an ambitious new campaign and so relieved to be trying to do something about it that I will not be able to feel the angst or despair."

Caldwell hopes that an enlightened public and political mobilizing will result in policies that lower the planet's global warming risks, but she is also deeply distressed at the stark vision of the harm that will come to the planet and to people if we fail to act in time. Caldwell knows things most people do not about the risks, and reflects on the possibility of a global Katrina remarking that sea level rise of a meter would displace more than a 100 million people.

Mike Tidwell, Director of the Chesapeake Climate Action Network, shares her fears. "As a byproduct of their professional work struggling with worries about global warming, many government officials, academics, public interest advocates and scientists are frustrated and burned out."

Biologist Camille Parmesan of the University of Texas at Austin has said: "I don't know of a single scientist that's not having an emotional reaction to what is being lost. Some of these people have been studying a particular reef or a particular bird or a particular mammal for 40 to 50 years. And to start seeing it die off is a very hard thing." Referring to an ocean reef she has studied since 2002: "It's gotten to be so depressing that I'm not sure I'm going to go back to this particular site again, because I just know I'm going to see more and more of it dead, and bleached, and covered with brown algae." For the majority of the public the unspooling tragedy taking place in our oceans is out of sight and out of mind, but not for Camille and people like her who are studying and trying to address the climate problem.

For the majority of the public the unspooling tragedy taking place in our oceans is out of sight and out of mind, but not for scientists who are studying and trying to address the climate problem.

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CHAPTER FOUR

Global Warming and the Stresses of War

As the U.S. military looks ahead to the likely causes of war in the next 30 years... global warming is front and center.

The link between global warming and future military conflicts may not be immediately apparent, but it is now a major factor in the policies and strategies of the U.S. military's Joint Chiefs. At our forum, Dr. Lise Van Susteren introduced the sobering subject of the relationship of global climate change to war and national security, quoting the findings of the Military Advisory Board that climate change is a bigger threat to national security than terrorism in itself. The Military Advisory Board report recognizes "that unabated climate change could bring an increased frequency of extreme storms, more drought and flooding, rising sea levels, and the rapid spread of disease. These projected effects are more than environmental challenges, the military sees them as security risks brought on by "massive human evacuations and migrations, increased border tensions, greater demands for rescue and evacuation efforts, and conflicts over essential resources, including food and water." Many of these conflicts could lead to direct U.S. military involvement.

Forum participant William Becker added that military leaders believe the U.S. military must do its part to help the nation shift away from fossil fuels but national security is not solely the responsibility of our military. Civilians must do their part in this time of need. "Pursuing and promoting wise energy choices should be the primary goal of the authentic American patriot," he said.

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Climate Change Literacy Will Mean Not Fighting the "Last War"

Lt. General Dan Christman (Ret.), Vice-President for International Affairs for the U.S. Chamber of Commerce, spoke to the forum participants about steps the military has already taken to address Global Warming. He reminded the group that the military continually strives to operate on up-to-date assumptions and not engaged in "fighting the last war." Several examples showed what a challenge this has been in the face of changing technologies and world ideologies and conditions. He sees addressing global warming as a critical means and opportunity to avoid fighting the "last war." By this he means

acknowledging how global warming has risen to the top of conflict causes in recent years and suitable responses to these climate-driven conflicts will not be found in past experience.

"As the U.S. military looks ahead to the likely causes of war in the next 30 years," Christman noted, "global warming is front and center." In the view of the Army and other branches of the armed forces, climate change will be the number one underlying reason that the U.S. goes to war. Scarce resources exacerbated by global warming will be the major reason that conflicts arise in the world. "Fragile states will become failed states" according to Christman. Both the Iraq and Afghanistan wars are examples of states that, destabilized, have become seedbeds of terrorism. From now on we will need to keep an eye out for those places becoming destabilized by climate change. The devastating 2011 drought in Somalia is a recent example.

"Since 2006, the leaders of today's army have been working to incorporate a deep understanding of the importance of climate change into its proactive and defensive strategies." Christman said. He specifically pointed out how service-wide doctrinal manuals have redefined stability operations to take climate change into consideration. When it comes to global warming, the risks are immense and disasters such as Hurricane Katrina are modest in comparison to what could lie ahead for many nations. The destabilizing effect these disasters would have on nations is indisputable. The U.S. military, Christman warns, "must learn how to prepare for and respond to the human suffering that will be on a scale not seen before."

Christman presented evidence of the military's concern about global climate change, beginning with the new Unified Command Plan that covers how the military is organized geographically. Recognizing how global warming will be the driving force behind the destabilization of nations, the U.S. military has realigned its strategic regions to coincide with

those of the State Department. Because preventive measures and economic and environmental factors will be critical to avoid conflict, the U.S. military recognized that a military response alone will not achieve lasting security.

Army manuals 3-27 and 3-07 address military operations around this subject. They include guidance on how to insure that young officers understand global climate change through the lens of stability, and follow guidance on the proper training, equipping and planning of military operations and services. (Department of the Army, 2008)

To Illustrate, Army Manual 3-07 states: "Peace becomes sustainable when the sources of conflict have been reduced to such an extent that they can be largely managed by developing host-nation institutions. This facilitates the subsequent reduction of external actors to levels that foster the development effort with minimal outside presence." The main threats to world security and U.S. security will come from countries that are fragile and become destabilized. The instability leaves a country open to takeover by external, even criminal forces.

The doctrinal manual uses the following definitions:

The U.S. military, Christman warns, "must learn how to prepare for and respond to the human suffering that will be on a scale not seen before.

The most profound danger to world peace in the coming years will stem not from the irrational acts of states or individuals but from the legitimate demands of the world's dispossessed. Of these poor and disenfranchised, the majority live a marginal existence in equatorial climates. Global warming, not of their making but originating with the wealthy few, will affect their fragile ecologies most. Their situation will be desperate and manifestly unjust."

A *fragile* state is a nation that suffers from institutional weaknesses serious enough to threaten the stability of the central government. These weaknesses arise from several root causes, including ineffective governance, criminalization of the state, economic failure, external aggression, and internal strife due to disenfranchisement of large sections of the population. Fragile states frequently fail to achieve any momentum toward development. They can generate tremendous human suffering, create regional security challenges, and collapse into wide, ungoverned areas that can become safe havens for terrorists and criminal organizations.

A *crisis state* is a nation in which the central government does not exert effective control over its own territory. It is unable or unwilling to provide security and essential services for significant portions of the population. In crisis states, the central government may be weak, nonexistent, or simply unable or unwilling to provide security or basic services. This includes states that are failing or have failed altogether and where violent conflict is a reality or a great risk.

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States on the brink of economic and political collapse can become destabilized by a number of climate-related factors including: crop failures, water shortages, disease outbreaks, natural disasters, and long term droughts. Many of these conditions will be caused by or made worse by global warming.

One example of the destabilizing force of climate change is the diminishing snow pack in the Himalayas. Each spring warmer temperatures partially melt the ice and snow on the "roof top of the world." Scientists are finding increasing water flow to hundreds of rivers that supply one billion people downstream in the short run causing flood damage and misery but this ice mass is expected to shrink dramatically by the end of the century and cause water shortages.

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Forum participant Sherri Goodman, JD, is a former Deputy Under Secretary of Defense for Environmental Security. Because it underlies many of the major national security issues we face today, Goodman emphasizes that global warming is a "threat multiplier." She quotes retired head of the Senate Armed Forces Committee, Senator John Warner, who stated that after his many years in working with military strategy, he considers climate change as important in today's security and intelligence environment as nuclear weapons were during the Cold War. During a time when Policy leaders often become paralyzed by the slightest gap in scientific information, Goodman praised our military leaders who did not "wait" for 100 percent certainty to decide that the Unified Command Plan realignments should be made. Goodman notes the new

official "big four" determining US strategy: proliferation, terror, energy, and now, global climate change.

In fitting emphasis to Goodman's point, in January of 2010, the Central Intelligence Agency established a new CIA Center for Climate Change and National Security to look at how droughts, rising seas, mass migrations, and competition for resources will affect the nation's military and economic priorities.

In December 2001, even in the immediate aftermath of the World Trade Center and Pentagon disasters, 100 Nobel Laureates declared in a public statement: "The most profound danger to world peace in the coming years will stem not from the irrational acts of states or individuals but from the legitimate demands of the world's dispossessed. Of these poor and disenfranchised, the majority live a marginal existence in equatorial climates. Global warming, not of their making but originating with the wealthy few, will affect their fragile ecologies most. Their situation will be desperate and manifestly unjust." (Science, 2001)

Goodman cited the National Intelligence Assessment on Climate Change and the report of National Intelligence Council under Admiral Dennis Blair as additional examples of how the impacts of climate change have been incorporated into military strategy, planning and operations. In testimony before the US Senate in 2009, Admiral Blair warned of the need to address the dangers posed by energy issues and global warming. Other examples of the military's concern can be found in the National Defense Strategy and the Quadrennial Defense Review.

Forum participant Peter Bourne stressed the significance of the U.S. military's verification of the threat of global warming. While some Americans might perceive the idea of fighting global warming as reflecting a political agenda, a "lefty" one at that, the alignment of the Joint Chiefs and the military in their assessment of the dangers presented by climate change and their efforts to prepare for the consequences should dispel this notion with force. Their work should be understood for what it is: a practical response to the reality and science of global climate change.

The U.S. Mental Health Toll of War and Conflict

The psychological toll from war and conflicts is profoundly heavy. Forum participant Dan Christman stated that "the U.S. military knows that both acute and chronic psychological stress has hurt soldiers and families deeply." As climate change ravages the planet, destabilizing fragile nations and causing chaotic conditions elsewhere, more battles and more strife will be unleashed. The U.S. needs better preventative measures and more funds for treatment of military personnel. Addressing sound policies to reverse global warming and to reduce greenhouse gas emissions would get

According to the Army, roughly 20 out of 100,000 soldiers have killed themselves.

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Health professionals who have worked with war veterans know that war produces mental health injuries as debilitating as wounds from bullets or explosions.

at the underlying problem. Absent recognition of climate realities, experts wonder if the U.S. military will be able to continue to function with an all volunteer army if more frequent, climate-driven, conflicts were to occur.

Wars have profound psychological effects on service members, their familes and friends. At a congressional hearing by the House Committee on Oversight and Government Reform (May 2007), it was concluded that: "hundreds of thousands of military personnel will likely need mental health screening and/or treatment. Experts report that a sizable percentage of the 1.5 million soldiers that have been deployed to Iraq or Afghanistan either have returned or will return from battle suffering from mental health difficulties. U.S. Army surveys from 2004 indicate that 20 percent of returning soldiers suffered from clinical anxiety, depression, or post-traumatic stress disorder. More recent assessments have found that half of National Guard troops returning from battle report mental health concerns. The problems are made worse because of a shortage of troops; an increasing number of soldiers are serving second and even third deployments in Iraq and Afghanistan, and deployment times are increasing to as long as fifteen months." Dan Christman told forum participants that the U.S. Army is working to increase the overall size of the recruiting pool so there are more ground troops and therefore fewer and shorter terms of combat duty to try to relieve the stress on military personnel and their families.

At the May 2007 oversight hearing it was likewise reported that the number of combat deployments: "dramatically increases the risk that soldiers will come home with mental health problems." One of the witnesses at the hearing, Dr. John Fairbank, testified that "multiple tours and extended tours increase the probability of developing adverse psychological reactions." The House Veterans' Health Care Oversight Committee heard the testimony of one soldier, Army Specialist Thomas Smith, who was diagnosed with PTSD but was ordered to return to Iraq. Independent experts have identified numerous problems with treatment of mental health conditions by the Department of Defense and the Veterans Administration, with the Department of Defense Mental Health Task Force concluding that "the military system does not have enough resources or fully trained people to fulfill its broad mission of supporting psychological health in peacetime and fulfill the greater requirements during times of conflict." Army Specialists Michael Bloodworth and Thomas Smith described another key barrier to adequate psychological care for ailing soldiers: the stigma admitting the need for mental health support prevents many soldiers from seeking help. (House of Representatives, 2007)

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Suicide Rates: More Dangerous to Ourselves Then the Enemy

A 2010 report by the Army on Health Promotion, Risk Reduction, and Suicide Prevention found that suicide rates among active duty soldiers were at their highest rate since records began to be kept in 1980. While the civilian rate remained relatively stable between 2001 and 2007, both the Army and Marine Corps rates have increased steadily. The report's presenter, U.S. Army General Peter Chiarelli, said he "believed, but could not prove

statistically, that the overall Army suicide rate had been driven up by the 21 percent of suicides committed by soldiers with multiple deployments."

The report also said that if the Army included accidental deaths, which it said are often the result of high-risk behavior involving drinking and drugs, "fewer young men and women die in combat than die by their own actions." It concluded: "We are often more dangerous to ourselves than the enemy." According to the Army, roughly 20 out of 100,000 soldiers have killed themselves (U.S. Army, 2010).

The suicide rate among Americans as a whole is about 8.9 per 100,000, but the level among veterans has been at least 18.7. That figure rose to a minimum of 22.9 per 100,000 among veterans aged 20 to 24, almost 2.5 times the nonveteran average for people of the same age. The psychological suffering among returning soldiers not only hurts them, their families, and communities, but it drives up the scramble for already scarce health care dollars.

Dr. Thomas Insel, Director of the National Institute of Mental Health, described the "ripple effect of mental illnesses on family members," noting that "this is not simply a problem for the Veterans Administration or the Department of Defense. The burden of illness will spill over from the public sector to mental health care in the civilian sector." (U.S. House of Representatives, 2007)

Health professionals who have worked with war veterans know that war produces mental health injuries as debilitating as wounds from bullets or explosions. Troops with mental health problems from wars often feel traumatized in ways they themselves cannot fully express.

National Guard members' families experience the same stressors as active duty families before, during, and after deployment, although they do not have anywhere near the same level of support. Many Guard members and their families report being shunned by the active duty mental health system.

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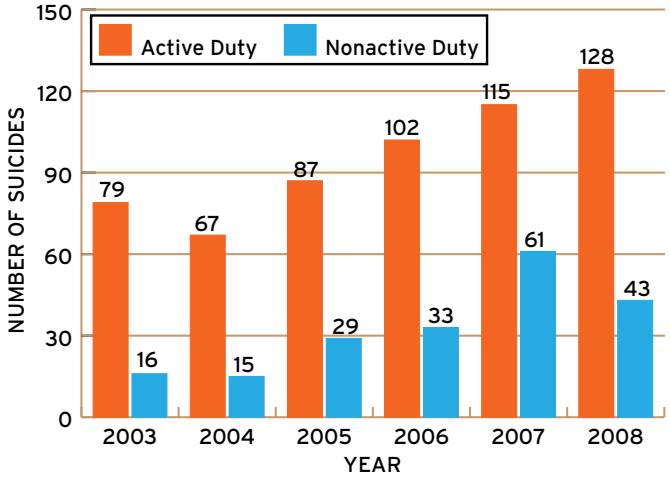
Army National Guard Specialist and Iraq War veteran Brandon Jones said that when he and his wife sought post-deployment counseling, they were "made to feel we were taking up a resource meant for active duty soldiers from the base." In addition to regular service members, a large percentage of military personnel come from the National Guard. These families typically experience a significant drop in household income when their loved ones are deployed. This financial pressure is an added stressor.

Army Suicides Rise As Wars Continue

Both the number and rate of U.S. Army soldiers committing suicide have risen steadily over the last five years, despite attempts at prevention.



Levin A. Combat just one cause of Army suicide. Psychiatr News. 2009 SMAR 44(5)4. Accesed 06Mar2009

Source: U.S. Army

CHAPTER FIVE:

Nationwide Anxiety or Hope?

Apathy arising from too many reports about consequences and too little emphasis on solutions breeds a feeling of powerlessness. This can cause people to distance themselves from the subject.

In the introduction to this report, the authors said they initiated the inquiry into the psychological aspects of global climate change by wondering if, in the face of increasing media coverage and public awareness, Americans would become generally more anxious about it and what effect that would have on the provision of mental health care in the U.S.

Forum participant Dr. Jerilyn Ross, then head of the Anxiety Disorders Association of America, asked the group for their views on "how many people in the public are thinking much about global warming and how top-of-mind is the climate change threat to most people"? Dr. Ross's organization studies, treats and educates people about anxiety and related disorders. At the time of the forum she said that concerns about global warming are not being reported (2009) although that does not mean that individuals are not "getting the message" on some level.

Roughly 40 million Americans suffer from anxiety disorders. They cost our health care system about $42 billion per year in direct expenses and lost productivity. According to findings published in the May, 2008 American Journal of Psychiatry, serious mental illnesses, which afflict about 6 percent of American adults, cost our society $193.2 billion in lost earnings per year. Dr. Thomas Inse, Director of the National Institute of Mental Health, in 2008 stated that the national burden of mental health care and problems in America is in excess of $317 billion per year. That averages to about $1,000 per person per year (Insel, 2008).

Dr. Ross also stated that, in her experience, global warming is not a top issue of concern for most people. Research bears this out. Though people may be aware that global warming is happening, they do not see its violent and disastrous implications and say they feel it will not affect them much.

Seriously Concerned but not Scared

Ross pointed out that fear can motivate people to take action against global warming, but that too much fear can be paralyzing. Striking the right balance with messages about the dangers of climate changes requires skillful balance. Our levels of sensitivity vary so what alarms and energizes some to take action may shut others down. Apathy arising from too many reports about consequences and too little emphasis on solutions breeds a feeling of powerlessness. This can cause people to distance themselves from the subject.

Forum participant Dr. Edward Maibach confirms this in his research. "People are aware," he says, "but they are largely indifferent." His team's 2009 public survey found that while 17 percent of people in the U.S. express some worry about global warming but most people do not. When asked, "how

much they thought global warming would hurt them personally," just 10 percent thought that it would. His research also shows that more people see global warming as having adverse effects on plants and non-human species but that "even if something bad is happening to the environment, it will not necessarily happen to people." In his words, people see this "as about penguins and polar bears and not about them or their loved ones." This reinforces the commonly held notion that humans somehow stand outside the biosphere looking in rather than depending on it for their very existence.

Maibach's and his colleagues' research also shows this is not so much about active denial of the problem. The surveys find fewer "denialists" around today than in previous years. (The term denialist refers to people who actively disbelieve the existence of global warming or that it is human-caused.) But, these days, Maibach believes that people are just not connecting to the issue. Fully 80 percent of Americans say that global warming will affect them either "a little, or not at all." Just 5 percent, or one-in-20, feel that they will be affected by global warming "very often." (Leiserowitz, 2009)

A small percentage of Americans definitely worries about the larger threat of global warming and the continuing news that the earth is overheating, oceans are threatened, prolonged droughts are predicted and people will be driven from their homes in search of refuge.

Global Warming's Cold War Parallels

Forum panelist Dr. Eric Chivian drew comparisons between the threat of global climate change and the threat of global nuclear war. In the 1980's he co-founded International Physicians for the Prevention of Nuclear War. It received the Nobel Peace Prize in 1985 for making the threat of a nuclear holocaust more understandable and vivid to the public. He says this was accomplished "by helping people grasp what a nuclear war would really be like and by translating technical language and abstractions into real terms so people could develop a vision of what "nuclear winter" would mean.

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Dr. Chivian stated that the destructive potential of global warming is, in many ways, "greater than what we faced with nuclear war." Public health experts must focus on this reality and respond to it. But it is more difficult to draw their attention to a threat that is harder to see and comparatively slower-moving. Global warming, says Chivian, does "not yet have a Hiroshima or Nagasaki to serve as a model." Unlike nuclear war, however, where individuals have no influence over what happens, people can take action individually and collectively to stop or reduce the carbon emissions that are causing global warming.

Most Americans aged 50 or older remember the palpable threat of nuclear war. That is especially true for those who remember the 1950s and 1960s when it appeared imminent. Children then were shown films of nuclear explosions and their effects. Drills were held in school to practice putting their heads down and under their desks during mock air raids. Homes had their own bomb shelters and food and medical supplies were

Dr. Chivian stated that the destructive potential of global warming is, in many ways, "greater than what we faced with nuclear war."

stored in public buildings. Dr. Chivian and others studied children in the United States and the former Soviet Union and found that nearly one half of children thought that nuclear war would directly affect their lives and reacted with despair and loss of motivation. Many believed the world would soon end. (Chivian et al., 1985)

Communication: Dreams and Nightmares

Discussing the question about the best way to "awaken" people, to the threat of global warming, the forum participants reviewed public education strategies that focus on dangers as opposed to those that emphasize solutions.

Forum participant Andrew Light advocated for communicating positive outcomes or what he described as an "I have a dream" framework versus "I have a nightmare." He referred to a 2005 examination of the disadvantages of using fear-based approaches in a paper provocatively titled, "The Death of Environmentalism" by Ted Nordhaus and Michael Shellenberger. The paper recommends presenting a positive vision of the future rather than attempting to motivate the public to take environmental action motivated by fear(Shellenberger, 2005). The fear-oriented approach emerges from the belief that warnings about pending catastrophes would shock people into taking action. This approach works for some people but not others.

The mental health professions have much to contribute to this discussion. Forum participant Victor Balaban from the Centers for Disease Control underscored the role of research in identifying the factors most effective in persuading people to take action. Research could show what kind of public education would be most effective at persuading people to change to behaviors that lower their carbon footprint. The national campaigns to stop smoking and to use seat belts are two examples of efforts that took advantage of the psychology of messaging to accomplish their goals.

Maibach noted other public education campaigns that have been successful: HIV prevention, teen drug use, control of high blood pressure, sun safety, birth control, immunizations, infant survival (SIDS, ORT) and others. But, Maibach also said that most public education programs are only mildly successful. The work of Dr. John Krosnick, of Stanford University, has offered a framework that might help.

Dr. Krosnick says a public health campaign must be,

- Real: scientifically supported and actually happening

a new green economy would provide opportunities for struggling Americans workers and some stalled or outmoded enterprises dependent on older industries and burning fossil fuels.

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- Caused by humans
- Bad for people
- Solvable: it can be fixed or the consequences mitigated

Maibach recommended focusing on the "solvable" part of the message which shifts the image from a bleak future to that of a better life.

While not a "feel good" message, showing how global warming makes people sick dispels the notion that it will be felt "later" and somewhere else. Also, portraying climate change victims, in their own voices, sharpens public capacity to identify with them. Social psychologists know that this identification added with a single, compelling voice, is more deeply moving than a stack of statistics. Climate fighters have not taken full advantage of this human communications reality.

Coal provides abundant energy and has a reputation for being inexpensive. But few analysts fully consider the health care and environmental costs of extracting and burning it for power. The late Dr. Paul Epstein and associates at Harvard Medical School's Center for Health and the Global Environment show that once the extrinsic costs of coal are included, estimates of the actual cost of coal should be doubled or even more likely tripled. When the true cost of coal is presented, it's easy to see that coal is anything but cheap. Showing what alternative forms of energy can do for us, particularly in terms of jobs, in addition to preserving or restoring the vitality of the environment, and protecting our health, are messages that subscribe to Dr. Krosnick's work and could help shape thinking into lasting behavior change.

Psychology of a Vision of a Positive Future

Forum participant Dr. Douglas LaBier indicated that the psychological health community could help to define a promising and healthy future. Patrice Simms added that people may embrace something conceptually but stop short of changing because of fear of change itself. Forum participant Dr. Steven Moffic described this as relating to the "anxiety of loss." William Becker felt that a focus on the "new energy economy" might resonate with the public as a message of hope especially during tough financial times. "Green jobs and a green economy would be a useful way to frame the issue." Kevin Coyle of the National Wildlife Federation and report co-author discussed how a new green economy would provide opportunities for struggling Americans workers and some stalled or outmoded enterprises dependent on older industries and burning fossil fuels.

Timothy Warman, also of the National Wildlife Federation, suggested that the mental health community could help explain how a physical healing model could be used to promote healing the planet.

one potential challenge is that the psychology of happiness, with its focus on self, can be highly motivating to individuals but it is often at odds with a broader support of the common good, such as making the world better for our children.

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Americans are walking away from the public square because leaders no longer reflect the reality of the average people's daily lives in their words and actions.

The Motivation in Making A Better World for the Kids

Andrew Light said public education campaigns should look at the large body of research that reviews how motivating it is for people to be called upon to protect children. A number of public interest causes have explored the types of personal concerns that will motivate people to act to address global climate change in their personal lives. Light pointed out that many people will not take steps to make things better for themselves personally but they will become highly motivated and active if they feel they are making better world for their children and are meeting their obligations to future generations.

Light described this as a "moral motivator" that may have particular effectiveness in addressing global warming. He believes that "our children's long-term mental health will suffer" if they are exposed to poor climate conditions, catastrophic weather events, and such and that they will likely look at their parents and grandparents and ask "why was more not done to leave a safer and healthier planet for them to live in"? Light reminded the group that a "plea for the kids" could be an important pathway into significant societal change.

Serving One's Self Interest: Positive Psychology

Research about changing people's behaviors shows that many people must feel a benefit to themselves personally in order to change. Asking people to sacrifice for the sake of the planet may be motivating for some but it will not work for everyone. Dr. James Bray remarked that trying to get people to diet was an example of a practice that people felt mostly involved sacrifice, even when they understood it was good for them overall.

An example of how the mental health disciplines can support public education was offered by Steven Moffic who saw the opportunity to draw from the basic area of study of personal "positive psychology" which is a part of the overall modern field of the psychology of happiness. The message here is that "going green is good for your mental health and for you." Ed Maibach said this is an example of where the research would support that idea because 25 percent of American adults feel strongly that their lifestyle would improve by going green, and that by a two to one majority they feel that making green changes in their lifestyle will allow them to live a higher quality of life.

Dr. Moffic pointed out that one potential challenge is that the psychology of happiness, with its focus on self, can be highly motivating to individuals but it is often at odds with a broader support of the common good, such as making the world better for our children. Ways to combine these dual goals may be found. (Seligman et al., 2005)

FREQUENCY OF VARIOUS GREEN BEHAVIORS

"How often do you do each of the following in your daily life?"
Summary of those saying "Always" or "Often"

Base: All adults

	2009 Total %	2010 Total %
Keep unneeded lights off or turn lights off when leaving a room	83	81
Recycle	68	68
Reuse things that I have instead of throwing them away or buying new items	65	63
Make an effort to use less water	60	57
Unplug electrical appliances when I am not using them	40	39
Purchase locally grown produce	39	33
Buy food in bulk	33	32
Purchase locally manufactured products	26	23
Purchase used items rather than new	25	24
Purchase all-natural products	18	16
Purchase organic products	17	15
Compost food and organic waste	17	15
Carpool or take public transportation	16	16
Walk or ride a bike instead of driving or using public transportation	15	15

Note: percentages may not add to 100% due to rounding.
Source: Harris Interactive

ENVIRONMENTAL ACTIVITIES IN LAST YEAR

"Which of the following environmental activities, if any, have you done within the past year?"
Base: All adults

	2009 Total %	2010 Total %
Energy-Efficient Lighting/Appliances (NET)	69	66
Replaced regular light bulbs with more energy-efficient lighting (e.g., CFLs, LEDs)	63	61
Purchased energy-efficient (e.g., Energy Star) appliances	36	30
Paperless Statements/Online Bill Pay (NET)	53	54
Started paying bills online for my personal financial accounts	46	44
Switched to paperless statements for my personal financial accounts	40	41
Donated or recycled a computer, cell phone or other electronic device or its parts	41	32
Switched from bottled water to filtered tap water	29	23
Low-Flow Showerhead/Toilet (NET)	25	20
Installed a low-flow showerhead	17	13
Installed a low-flow toilet	16	13
Patronized/Avoided a Business (NET)	15	15
Patronized a business because of their environmental activities	11	10
Avoided patronizing a business because of their environmental activities (or lack thereof)	9	10
Made home improvements that enabled me to take advantage of a "green" government tax credit (e.g., installed dual-pane windows, solar panels, insulation)	14	13
Hybrid/Fuel-Efficient Car (NET)	13	8
Purchased a more fuel-efficient car that is not a hybrid	11	7
Purchased a hybrid car	2	1
None	13	16

Note: percentages may not add to 100% due to rounding, the acceptance of multiple responses, and the exclusion of "other."
Source: Harris Interactive

Clarity on the Real Barriers to Behavior Change

Ed Maibach reminded the forum participants to "listen to the research." Those designing public education programs that prompt change need to be experts on what thw research shows are real barriers to taking action. The work of Doug McKenzie-Mohr stresses this. Mohr advocates for "community-based social marketing approaches" that specifically focus on understanding and reducing the barriers to desirable behavior. While different avenues may theoretically lead to a desired public benefit, such as reducing a personal carbon footprint, or changing a safety or dietary habit, the path may be fraught with hidden barriers. (McKenzie-Mohr, 2002)

One example of subtle barriers is in public education campaigns recommending the installation of programmable thermostats. Underlying these simple and economically advantageous activities are a number of hidden barriers. These include: fears of using technology (consider the number or programmable video players in America that have never been programmed), or the fear of choosing the wrong apparatus, or the fear of finding an installer who will have a fair and reasonable price. People also worry about having people they don't know come into their homes. As a way to overcome these barriers in Austin Texas, where a large percentage of homes have programmable thermostats, the utility company there installs them for free.

The discipline of psychology can be used to uncover what the barriers are to reducing our carbon footprint and adopting a green lifestyle. Large and small ticket items should be assessed. Many, according to McKenzie-Mohr, are specific to the action being recommended. Hidden surprises abound and reflect the full complexity of people's minds, beliefs, emotions and lifestyles.

The discipline of psychology can be used to uncover what the barriers are to reducing our carbon footprint and adopting a green lifestyle.

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Psychology of Empowered Civic Action

Psychology can help us understand what ignites an environmental consciousness and steers it into action. What motivates individuals to make their personal life style contribute to what is good for them, future generations, and the planet. The various disciplines can shed light on what makes people feel "empowered," moving them to address public issues, take action at the community level and advocate for policy reform.

That Americans can "stand up and be heard" is a But, how often do we actually practice this?

That Americans can "stand up and be heard" is a broadly held value in the U.S. But, how often do we actually practice this? What are the barriers to speaking out on issues of community concern that could be addressed with support from the psychological disciplines?

We need people to learn about and support positive steps at home and in their communities in order to lower carbon footprints. But research indicates that people born in the 1930s through the 1940s were the last generation to be truly engaged in civic participation. Since then there has been an overall decline.

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In its 2006 report called Broken Engagement, the National Conference on Citizenship used 40 different indicators of civic involvement to measure how Americans are engaging in community and civic affairs, including politics. The report included "indicators of community participation (such as belonging to groups and attending meetings); trust of other people and major institutions (such as the government and the press); volunteering and charitable contributions; voting and other political activities; political expression (for instance, making speeches and contacting the media); and following and understanding the news and public affairs."

These indicators were woven into a Civic Health Index by the Conference. It showed that "Americans' participation had dropped substantially from the 1970s into the 1990s, and then recovered somewhat in the 2000s. Overall, there were alarming trends, [of decline] but also a few signs of hope, particularly in the voting and volunteering patterns of young people."

In the book, Civic Responsibility and Higher Education, Thomas Erlich and co-authors Anne Colby, et al, discuss the decline of Civic Engagement in America. They refer to "a growing sense that Americans are not responsible for or accountable to each other; a decline in civility, mutual respect, and tolerance; and the preeminence of self-interest and individual preference over concern for the common good. Goals of personal advancement and gratification dominate our culture, frequently at the expense of broader social, moral, or spiritual meaning. Though this emphasis on individual success has some social benefits, it can also entail high social costs by promoting a world view in which there is no basis for enduring commitment beyond the self." In his book, Hope Unraveled, Richard Harwood stated that: "Americans are walking away from the public square because leaders no longer reflect the reality of the average people's daily lives in their words and actions. This is a retreat that transcends race, class, gender, socioeconomic status, and even political party. People are angry with the conduct of their leaders at

the national and even local level, but feel powerless to do anything about it." (Harwood, 2005.)

Attitudinal Profile: The Six Americas of Global Warming

In his team's work, the "Six Americas of Global Warming," Ed Maibach shows how social research can tailor public education to the characteristics of specific groups to motivate them to take action. Consideration of motivational differences enhances the effectiveness of public education campaigns. Effective messages consider where people "are." Some have little or no awareness of the threat that global climate change presents, while others are alarmed and want to know what to do. Audience research in Maibach's work corroborates what the civic engagement research shows: citizens have almost no trust in community leaders and government agencies. (Leiserowitz et al, 2009)

Maibach spelled out some of the characteristics of the "Six Americas."

The Alarmed (18 percent) are fully convinced of the reality and seriousness of climate change and are already taking individual, consumer, and political action to address it.

The Concerned (33 percent) – the largest of the six Americas – are also convinced that global warming is happening and a serious problem, but have not yet engaged the issue personally.

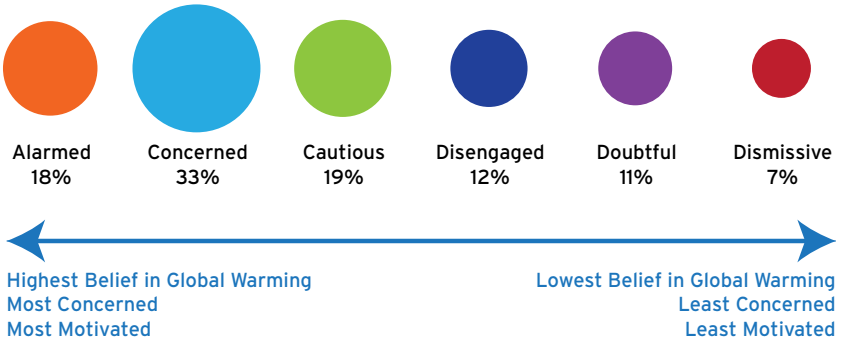
Three other Americas – the Cautious (19 percent), the Disengaged (12 percent) and the Doubtful (11 percent) – represent different stages of understanding and acceptance of the problem, and none are actively involved.

The final America – the Dismissive (7 percent) – are very sure it is not happening and are actively involved as opponents of a national effort to reduce greenhouse gas emissions.

Maibach also pointed out that 22 percent were in the "concerned" category in 2007 but that this category increased to 33 percent by 2009; which suggests that Americans understand there is a problem but do not yet know specifics or what to do

Proportion of the U.S. Adult Population in the Six Americas

Proportion represented by area



Source: center for American progress

The study also finds that relatively few Americans (7 percent) were negatively engaged, a group denying the threat of climate change and taking steps to prevent public action on the issue.

When looking at trends in civic engagement from a motivational and psychological stance, research shows that relatively few people feel that taking actions on their own will make much of a difference in addressing global climate change. But when the research drills down further and asks how people would feel if they knew that most people in the U.S. were taking steps to address energy usage and global warming 40 percent will say they believe their personal actions will matter. And, fully 60 percent feel their personal actions would matter if they knew most people worldwide were taking steps.

75 percent of Americans feel that more good than bad will occur if we work together on this issue. About a third feel it would make a large positive difference while another third feel it would make a medium positive difference.

Most assumptions on the subject of motivating behavior change are that people will respond to education and in many circumstances that is, indeed,

22 percent were in the "concerned" category in 2007 but that this category increased to 33 percent by 2009; which suggests that Americans understand there is a problem but do not yet know specifics or what to do

that often happens. But, there is also a "backwards" approach that has been evident in some behavior-change efforts such as stop-smoking campaigns. In those instances the development and passage of new policies, such as smoking bans in public buildings, instigate the behavior change. Ideally behavior change come from positive motivations but several of the forum participants also noted that even if the public resists a legislated response to a behavioral problem, once it is passed, they will often see its benefits and embrace it.

Many agencies and business choose to locate polluting facilities in low income areas because they will usually encounter less opposition

Individual and Community Empowerment

Forum participant Steven Shapiro of Johns Hopkins University's Community Psychiatry Program pointed out that many people affected by climate change are reluctant to stand up and protest in public forums. This is especially true of residents of lower income communities who feel their protests don't pack sufficient "punch" to be worth the effort. Of course the areas they live in are often the most environmentally unhealthy and this makes their situation particularly bad. Helping residents overcome barriers to effective civic engagement is a compelling opportunity for the mental health community.

Shapiro stressed the need to stoke the public fervor to protest the disregard for pollutants that damage the environment and make people sick. Many agencies and businesses choose to locate polluting facilities in lower-income areas because they know they will (usually) encounter less opposition. Shapiro works in impoverished neighborhoods in Baltimore with people who are frequently hurt by government and business policies. These populations need to be empowered to defend themselves in the short term rather than waiting for larger societal-scale reforms.

Maibach agreed and mentioned that the segment identified in his research as the most "alarmed" about global warming, are not nearly as civically engaged as the 'dismissives', who, though just a third their numbers, are more vocal and active in public settings - such as town meetings. He says the 'dismissives' are "very political": involved with elections, governmental decision making, communicating with the media and more.

The Head of the Global Warming Serpent

Coal plants are often described as the "head" of the carbon dioxide or greenhouse gas emitting "serpent." They produce electricity by burning huge amounts of coal and are a major factor, worldwide, in planetary warming. Patrice Simms of the Natural Resources Defense Council says stopping the building and operation of coal-fired power plants in the United States is a key to reducing our nationwide carbon emissions and to lowering toxic pollution. With more than 100 coal plants still in the planning stage for the U.S., he stated that much civic activism is needed to fight their being built and insread to find alternatives.

Shapiro observed that the people who live in communities with less financial and political clout need professionals and the mental health care community to help them voice their outrage. Psychologists for Social Responsibility, a group he helped organized, has set this as a goal. Academic research is surely needed but waiting for the outcome can mean harmful delays. Many of these issues need to be addressed now.

Seeing a parallel with community engagement, Dr. LaBier says that American business culture could be improved by enlightened workers mobilized to demand a healthier environment. Huge opportunities exist for U.S. business to present environmentally sound products that will steer the consumer to make ethical purchases.

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CHAPTER SIX:

The High Cost of Ignoring Mental Health and Climate Change

Not all of the costs are direct. The American Journal of Psychiatry estimates that mental illness results in lost earnings of $193.2 billion per year.

The U.S. Department of Health and Human Services (HHS) reports that roughly one in four Americans has a diagnosable mental disorder. Six percent suffer from schizophrenia, bipolar disorder, or some other serious mental illness. The cost to the American economy is estimated at $317 billion per year. According to the American Psychiatric Association (APA), in a one-year period, about 50 million Americans are diagnosed with a mental disorder serious enough to interfere with their daily functioning. This represents close to 20 percent of the population. Nearly one-fourth of elderly people suffer some form of mental illness and about 20 percent of the complaints for which Americans seek medical care are related to anxiety disorders such as: panic attacks, phobias, or obsessive-compulsive disorder. A. Langlieb et al. indicate that 29 percent of Americans will be affected by an anxiety disorder at some time in their lives (Langlieb, 2005).

Not all of the costs are direct. The American Journal of Psychiatry estimates that mental illness results in lost earnings of $193.2 billion per year.

Depression has become one of America's most costly illnesses. Untreated, it is as costly to the US economy as heart disease or AIDS and ranks among the top three workplace problems for employee assistance professionals, after only family crisis and stress. The World Health Organization reports that one in every 20 Americans will be depressed in a given year and that by the year 2020, depression will become the second leading cause of disability.

Anxiety and depressive disorders can be as debilitating as any major chronic illness" (Langlieb, 2005). It was estimated that in 2000, the United States spent $83.1 billion for costs associated with depression and $63.1 billion in 1998 for costs associated with anxiety disorders. According to Langlieb's review, "such costs include not only direct health care costs, but also "indirect" costs stemming from suicide, increased medical morbidity, reduced adherence to outpatient treatment leading to relapse and hospitalization, lost wages caused by missed work, and decreased workplace productivity."

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Mental health professionals will need a new focus and new energy to help those who will be hurt most grievously by global warming.

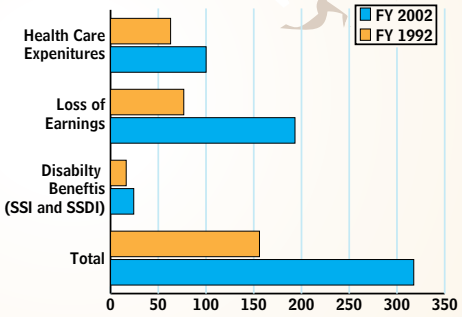
The Mental Health Cost of Global Climate Change

It is beyond the scope of this forum and report to estimate exactly how much the effects of climate change in the United States will add to current mental health care costs. But as natural disasters, heat waves, dislocations, job shifts and other climate-related changes increase in frequency and become more obviously caused by global warming, it is reasonable to assume that the costs will increase dramtically.

- More people in the United States will be exposed to natural disasters such as hurricanes, flooding, wind storms, large-scale wildfires, and more. Incidents such as these produce very serious and very persistent mental health conditions, including brief reactive psychoses and PTSD.
- Droughts: More people in the United States will experience longer term and more intense drought which can cause agricultural failures, job loss, and municipal water shortages which in turn can cause a series of stresses and mental health problems.
- Dislocation: will increase through increased incidents of coastal flooding, water supply failures in some areas, and sea level rise.

Components of the Economic Burden of Serious Mental Illness, Excluding Incarceration, Homelessness, Co-morbid Conditions and Early Mortality (in Billions)

Type of Cost	1992[a]	2002[b]
Health Care Expenitures	$62.9	$100.1[c]
Loss of earnings	$76.7[d]	$193.2[e]
Disabilty beneftis (SSI and SSDI)	$16.4[d]	$24.3[f]
Total	$156.0	$317.6



[a] Normal 1992 dollars based on general Consumer Price Index data; $1 in 1992=$128 in 2002 (www.bls.gov/cpi).
[b] Normal 2002 dollars
[c] Source: Mark etal. (4).
[d] Source: Rice et al. (7).
[e] Source: Kessler et al. (6).
[f] Author's calculations based on data from the Soical Security Administration (www.ssa.gov/policy/docs/stat-comps).

On the positive side, focusing on solving the global warming problem in ways large and small may itself be a healthy way to lower anxiety over its effects.

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Global Warming's Hidden Opportunity Costs

A cost to mental health that is not included in most assessments of the troubles that lie ahead is cited by Dr. Eric Chivian. Eric and his team study the capacity of nature to provide medicines that would cure or treat some of the world's most intractable, costly, and widespread diseases. Many of these potential treatments have been identified in species that are at risk of extinction. Some, like the gastric brooding frog that likely held the key to curing gastric ulcers, are already extinct. With their work on at risk species, scientists see themselves as in a race against time. Repeating often reported warnings, Dr. Chivian reminded the group that we are, today, in the clutches

of a planetary wide mass extinction. In earth's 4 to 5 billion year past, it is only the 6th mass extinction our earth has seen. The last one occurred 65 million years ago. Although habitat loss and pollution are factors, it is global warming that will deliver the deadliest blow to species. It will wipe them out at the rate of 1 every 20 minutes. Compare this to a much slower rate in the past. Over the past millions of years, scientists find, through fossil records, an extinction rate of 1 species every 5 years. Biologist E. O. Wilson, in 2002, estimated that, should current rates of human destruction of the biosphere continue, one-half of all species of life on earth will be extinct in 100 years. Eminent biodiversity specialists all over the world have implored governments to establish a political framework to save the species of the planet.

Of a magnitude that elicits near panic in experts, the reality is that most people do not even know that the world is experiencing a mass die-off of species. Nor do they realize that the interplay of species is the nurturing force that sustains our ecosystems. Even less known is the role some of these at risk species could have on biomedical research. The results of this research could cure or treat diseases, lower health care costs, and reduce human suffering.

While not at risk, the Pacific Yew tree provides an example of a substance found in nature, in this case coming from the tree bark, that has served as the basis for the development of powerful anticancer drugs that treat breast, lung and ovarian cancers. Dr. Chivian cited a number of species that may hold the biological keys to treating a variety of diseases but are at risk of extinction. Some of these "at risk" species and what they might provide: dog sharks produce substances that can block the growth of cancerous tumors; the African clawed frog produces a substance that kills bacteria in ways that could help researchers develop a powerful new line of antibiotics for which there is no known bacterial resistance. Amphibians have the capacity to regenerate lost limbs and other body parts. Humans have this capacity too but it lies hidden somewhere in our DNA. It awaits the discovery of the key that will unlock it. Brown bears become hugely overweight before "retiring" for their winter hibernation, and while they present the same insulin levels as their obese human counterparts, in contrast they never become ill with type II diabetes. Polar bears remain immobile for months during hibernation and though massive amounts of calcium are lost from their bones during this time - as with humans who are immobilized - something causes the bones to re-calcify.

Imagine treatments that could control cancer, diabetes, osteoporosis, deadly infections and possibly restore lost limbs. Research on cone snails, their habitat in coral reefs threatened by die offs all around the world, is already providing opportunities to treat intractable pain with substances 1,000 times more powerful than morphine, without causing tolerance problems. These biological potentials often disappear when animals are in captivity. So, while efforts to preserve species through captive breeding is admirable, it is far from an answer even in the extremely unlikely event that it could be secured on as widespread a basis as would be needed to accomplish the research. Other fascinating but not yet clinically useful data abound, and researchers are in a race against time to capture the data before they are lost forever. Dr. Chivian identifies, for example, the gastric brooding frog - which developed offspring in its stomach and held valuable clues to the treatment of gastric ulcers - but is now extinct. The psychological costs of losing opportunities to ease suffering, as well as grappling with the feeling of profound failure as stewards of the environment, is of course, incalculable. (Chivian, 2008)

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Dr. Chivian cited a number of species that may hold the biological keys to treating a variety of diseases but are at risk of extinction.

Conclusion

Mental health professionals will need a new focus and new energy to help those who will be hurt most grievously by global warming.

The threat of global climate change to the psychological wellbeing of Americans has yet to become a priority concern of the U.S. mental health community, but it surely will become one as the damages from climate change mount in its many compelling and disastrous forms. Mental health providers and their professional associations are making note of the problem and responding with new guidelines and policies, but more is needed. The looming disaster that is global warming begs for greater public and professional attention. The sheer scale of mental health impacts from violent weather, crop failures, water shortages and more will put pressure on the nation's mental health care systems as never before.

The economic costs of ignoring the real impact that climate-related disasters will have on our national psyche and the American spirit are potentially immense. The human suffering associated with these disasters will be widespread and run very deep. The national security implications are likewise as yet inconceivable.

American mental health care needs to be ready for the coming climate-related pressures it must address. It can begin with improved training and preparation and can add its credible and important voice to stopping the problem at is source by supporting the lowering of greenhouse gas emissions. The health community stepped up on the threat of nuclear war some 30 years ago and it had a huge effect on making the world safer from physical and mental harm.

Our hope is that this message will help address the global warming problem while professionals prepare for the unavoidable mental health problems we will undoubtedly see. Mental health professionals will need a new focus and new energy to help those who will be hurt most grievously by global warming.

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