Introduction: The Context of Our Work

The CDC (Centers for Disease Control and Prevention) is currently working with 16 states and 2 cities as part of its “Climate-Ready States and Cities Initiative." The goal of this initiative is to “investigate, prepare for, and respond to the health effects that climate change may have on people.”¹ These health effects can be dramatic and visible, or subtle and less easily recognizable including (among others):

- the physical health challenges posed by heat waves and extreme weather events (such as droughts and hurricanes)
- the effects of increased air pollution (particularly on children, asthmatics and the elderly)
- a rise in vector-borne and other infectious diseases.

These physical health effects are often also accompanied by threats to emotional health and wellbeing, whether in connection to the limitations created by disease or temperature extremes (for instance, the emotional effects of suffering with Lyme disease or asthma), or in response to the psychological effects of the losses and dislocations associated with extreme weather events (e.g. PTSD).

The CDC is paying attention to both the geographic areas and particular population groups most vulnerable to the wide range of possible climate change effects. Recent work in environmental justice has emphasized the extent to which gender, race, ethnicity, class and ability/disability are all factors in determining who suffers most in the face of climate change effects.

Seminar Focus and Community Partner

The task of the Fall 2014 Environmental Studies Senior Seminar (Section A) is to engage in a Vermont-focused analysis of the costs of climate change to physical and emotional health and the pursuit of wellbeing and resilience in the face of these challenges. We will pay particular attention to differences across populations and the question of how climate change effects will impact the most vulnerable populations. Our primary community partner is David Grass, Environmental Health Surveillance Chief for the Vermont Department of Health.

Vermont is one of the 16 states participating in the CDC’s Climate-Ready States and Cities Initiative and this represents just one of a number of initiatives on climate change adaptation that are currently active in Vermont.² The Vermont Department of Health (VDH) is the lead state agency participating in the CDC initiative and has begun identifying the most pressing health impacts of climate change and developing public health adaptations strategies.

¹ [http://www.cdc.gov/climateandhealth/climate_ready.htm](http://www.cdc.gov/climateandhealth/climate_ready.htm)
² [http://www.anr.state.vt.us/anr/climatechange/Adaptation.html](http://www.anr.state.vt.us/anr/climatechange/Adaptation.html) - see “Public Health” whitepaper
VDH’s work follows the CDC’s “Building Resilience Against Climate Effects” (BRACE) framework, which is comprised of 5 steps:

1) Forecasting climate impacts and assessing vulnerabilities
2) Projecting the disease burden
3) Assessing public health interventions
4) Developing and implementing a climate and health adaptation plan
5) Evaluating the impact of the process (i.e. internal evaluation and self-study) and improving the quality of its activities

To date, the VDH has developed an initial 2014 “Climate Health and Profile Report” to address the first step of the BRACE framework. Other important work on the intersection of climate change and public health includes the development of the climate change sections of Vermont’s new "Environmental Public Health Tracking Initiative."³

Our partner, David Grass, also serves on the Human Health and Community Development Subgroup of the White House Task Force on Climate Preparedness and Resiliency, whose goal is “to advise the Administration on how the Federal Government can respond to the needs of communities nationwide that are dealing with the impacts of climate change.”⁴ In this connection, while student projects are rooted in Vermont, the results of their research will have wider implications.

**Project Research**

Students in the Senior Seminar will work on one of two possible projects concerning climate change and public health. *This community-connected research will provide students with a unique opportunity to integrate and the knowledge and skills they have gained through the various disciplines (and related foci) they have pursued in the Middlebury College Environmental Studies Program.* This research (and the reports and related work emerging from it) will address several of the challenges identified, and recommendations suggested, at both the state and national level. This work on the intersection of climate and health calls for research, writing and public education that brings together — and cuts across — traditional disciplinary boundaries. In addition, this research demands attention to differences among populations (differences of age, race, class, gender and so on) and calls for the identification of the risks and needs of Vermont's most vulnerable populations.

³ [http://healthvermont.gov/tracking/enviro_climate.aspx](http://healthvermont.gov/tracking/enviro_climate.aspx)
⁴ [http://www.whitehouse.gov/administration/eop/ceq/initiatives/resilience/taskforce](http://www.whitehouse.gov/administration/eop/ceq/initiatives/resilience/taskforce)
Project Team #1: Exploring Environmental Health Communication & Behavior Change

The Vermont Department of Health’s (VDH) Environmental Public Health Tracking Initiative (http://healthvermont.gov/tracking) brings together data on environmental hazards, exposures, and health outcomes in a standardized format to help Vermonters, policymakers, health professionals, and scientists make informed decisions and reduce the burden of environmentally-related health effects in Vermont. The data produced by the VDH tracking program focus on heat stress and heat-related deaths, the incidence and abundance of ticks and mosquitoes (examples of disease-bearing vectors whose numbers are exacerbated by warmer temperatures and changing moisture conditions), the incidence and location of blue-green algae blooms (can cause a range of negative health effects) and the frequency of which is exacerbated by warmer water temperatures.5

The goal of the VDH tracking program is to help people reduce their exposure to these new or exacerbated health risks. Reduction of risk usually takes the form of behavior change related to outdoor activities— e.g. avoiding an activity or taking precautions before engaging in that activity. While Project Team #2 will consider the potential impacts of reduced time outdoors as part of a suite of mental health/ psychological well-being implications related to climate change this project will:

1) Assess to what extent adaptive behavior changes are actually occurring (this could also entail researching how the perception of risk varies from person to person).
2) Identify whether and how people use public health information to make (or not make) adaptive behavior change, as well as to examine other factors that may influence behavioral change.
3) Compare responses to map-based portrayals of data vs. responses to other means of communicating information (the Public Health Tracking Initiative and VDH web pages are just two examples of a range of possible communication strategies on this topic).
4) Evaluate whether and how climate-related behavioral change varies across different population groups (race, class, age, non-English speakers). This will contribute to understanding how messages are reaching vulnerable populations.

Your research will take the form of both quantitative and qualitative work — determining the variety and balance of which is part of your task as a research team.

In addition to providing crucial information to the VDH, your findings may well contribute to a range of recommendations made at the national level as part of the Human Health and Community Development Subgroup of the White House Task Force on Climate Preparedness and Resiliency.

These include:

- Developing a stronger connection between climate change impacts and actions in response to these impacts.
- Evaluating climate messaging and communications efforts and their effectiveness for different audiences.
- Identifying how resilience efforts might be developed, deployed and integrated into available resources.
- Determining actions and communications strategies for informing and protecting vulnerable populations (including vulnerability determined by geography/ bioregion) from the health effects of climate change.
- Developing and assessing user-friendly formats for disseminating the best available information on climate-related health, with attention to risk, impact and population vulnerability.

**Project Team #2: Exploring the Psycho-social Costs (and possible benefits) of Climate Change Effects**

This second project team will explore the mental health and psycho-social aspects of facing climate change. In the VDH’s 2014 BRACE Climate and Health Profile Report, the authors note the following ways that climate change can pose mental health implications:

1) The traumatic effects of catastrophic weather events  
2) The impact of extreme temperature on those with pre-existing mental illnesses  
3) Distress associated with environmental degradation and displacement (e.g. separation from a loved home through displacement, environmental degradation changing a loved home or place to the point where the psychological impacts are similar to leaving that home or not having access to that place)  
4) Anxiety and despair about climate change, the chronic stress of anticipating a rapidly and potentially dangerously changing world, the chronic stress of not knowing the timing or extent of such potentially dangerous changes

While there is a growing body of research on the relationship between climate change and emotional health, the initial Vermont report goes on to state that for all of the above categories (except for the impact of extreme heat events on mental illness), “information on the relationship between current climate threats in Vermont and mental health impacts is virtually nonexistent.” This is a topic that the VDH is eager to address.

Additional reports from the National Institute of Environmental Health Sciences and the National Climate Assessment echo these concerns about the mental health implications of climate change and the data gaps that currently exist.  

Further, in recognition of these implications, the Human Health and Community Development Subgroup of the White House Task Force on Climate Preparedness and Resiliency recommends, “expanding programs that [will] . . . . increase the capacity of individuals and families to deal with stresses related to the impacts of climate change.” The research, reports and related products (i.e. possible written and/or audio-visual forms of public education) produced by Project Group #2 will help significantly to fill these gaps and address these recommendations.

Students will explore the direct effects of climate change on mental health (the priority for the VDH). As time and research feasibility allow, students may choose additionally to explore the potential secondary effects of climate change on mental health, assessing the potential mental health/emotional wellbeing impacts of recommended climate change adaptations and interventions. For instance, if increased algae blooms interfere with one's former recreation patterns on Lake Champlain, how does this effect wellbeing? If concerns about vector borne disease change the frequency of time spent outdoors and/or time spent in particularly meaningful places, how does this change the wellbeing of certain populations (e.g. young adults, parents and their children, etc.)?

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6 The NIEHS explicitly identifies the need to gain “[an] understanding of how psychological stress acts synergistically with other forms of environmental exposures to cause adverse mental health effects.”

7 The National Climate Assessment authors note that “additional potential mental health impacts, less well understood, include the possible distress associated with environmental degradation and displacement, and the anxiety and despair that knowledge of climate change might elicit in some people.”

8 Health and Community Development Workgroup: Consolidated Recommendations for Ranking, April 17, 2014
Project #2 research questions/topics may include:

- Identifying the cumulative mental health impacts of repeated stress of natural disasters. Identifying the particular populations/demographic groups are especially vulnerable to disaster-related PTSD (children, elderly, those with underlying mental health disorders, the chronically stressed)?
- Identifying (through a combination of qualitative and quantitative research) the level of mental stress and anxiety that Vermonters (across a range of populations) may be already feeling about climate change.
- Through both qualitative and quantitative approaches, assessing how peoples’ emotional/psychological connection with the natural world may be changing through either environmental degradation or displacement (e.g. from extreme weather events) or by adaptations recommended by the state — see Project #1.9
- Exploring whether and how the restorative function of spending time outdoors changes if the natural environment is perceived as “less natural,” more threatening and so on.10
- Identifying (through conversations and interviews) positive practices of resilience that people are living out in response to their concerns. Exploring how these resilient practices and outlooks can be better identified and understood. Determining ways to communicate and share these practices of resilience to help counteract the potential mental health stressors related to current and future climate change.

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9 Understanding the mental health implications of these changes will help the VDH get a better grasp of the total costs of climate change, compared to the costs averted when particular adaptation strategies are implemented.
10 There is a growing body of literature on this topic.