

Although this report covers a broad range of topics related to understanding, assessing, and responding to global change as required by the Global Change Research Act,<sup>1</sup> it is not possible to provide a comprehensive analysis of every topic in a single

report. The following are important topics that could not be adequately covered in this report. In preparation for future synthesis reports, these are some topics that could be considered.

### Economic Analyses

Documenting the costs of climate change impacts is extremely challenging because these impacts occur across multiple regions and sectors and over multiple time frames. The impacts include physical, ecological, and social components, and many are difficult to extract from underlying sources of vulnerability not caused by climate change. Also, while some types of extreme weather events are made more frequent and/or intense by climate change, it is rare that any event has a single cause. Since such events generally result from a combination of natural variability and climate change, it is difficult to assign a precise proportion of the costs associated with a particular event to climate change. Further, many impacts occur in ways that are difficult to translate into precise economic costs; for example, impacts to biodiversity, changes in quality of life, or

social stresses are likely to be valued differently by different individuals and communities. Finally, it is challenging to assess the economic implications of rare events, which have low probability but high consequence – especially in cases where there is limited or non-existent data about the costs of such events in the past.

A number of studies have produced estimates of the economic damages expected from future climate change. However, there are currently no total economic damage estimates that are based on valuing and aggregating the various regional and sectoral impacts that are the focus of this assessment. Understanding these impacts in more detail could provide important input for adaptation and mitigation decisions.

### National Security

The implications of climate change for U.S. national security are significant, but they have not been analyzed in detail in this report because there are a number of recent unclassified U.S. Department of Defense (DoD) reports and reports of other groups that have rigorously addressed this topic. In 2010, the DoD released the Quadrennial Defense Review (QDR), for the first time acknowledging that climate change will play a “significant role in shaping the future security environment.”<sup>2</sup> Based on the QDR, the DoD is now incorporating and considering the consequences of climate change in its long-range strategic plans, including potential impacts to its facilities and missions. Other recent reports by the National Intelligence Council and the National Research Council (NRC) analyze the security implications of climate change.<sup>3</sup> The NRC found that “It is pru-

dent to expect that over the course of a decade some climate events...will produce consequences that exceed the capacity of the affected societies or global systems to manage and that have global security implications serious enough to compel international response.” National security concerns are highly integrated with a variety of other economic, health, policy and resource management issues. The findings of the National Climate Assessment reports, as well as other environmental assessments, are influential in determining threats to national security. It will be useful in future reports to advance the state of knowledge of climate impacts in a manner that would improve the ability of the appropriate government institutions to determine how such impacts are integrated in complex ways with national security concerns and emergency preparedness.

### Interactions between Adaptation and Mitigation Activities

An additional topic that requires further investigation is the state of knowledge of the intersections of adaptation and mitigation activities. Although adaptation, preparedness, and resilience are all related concepts, the emissions implications across the life of an adaptation project, including full assessment of the emissions associated with “supply chains” for manufactured goods and services, are difficult to assess for any project, and even more challenging on larger scales. In addition, there are options where mitigation and adaptation

strategies have co-benefits and other combinations of strategies that can cause unintended negative consequences. For example, the water resource implications of increased production of biofuels are substantial in some regions of the United States, and may result in negative impacts on ecosystems, power production, or residential water supply (see Ch. 6: Agriculture; Ch. 10: Energy, Water, and Land; Ch. 27: Mitigation; and Ch. 28: Adaptation). It would be useful to explore these and related topics in more detail in future assessments.

## APPENDIX 6: FUTURE ASSESSMENT TOPICS

### REFERENCES

1. GCRA, 1990: Global Change Research Act (Public Law 101-606, 104 Stat. 3096-3104), signed on November 16, 1990. [Available online at <http://www.gpo.gov/fdsys/pkg/STATUTE-104/pdf/STATUTE-104-Pg3096.pdf>]
  2. DOD, 2010: Quadrennial Defense Review, 128 pp., U.S. Department of Defense. [Available online at <http://www.defense.gov/qdr/qdr%20as%20of%2029jan10%201600.pdf>]
  3. Fingar, T., 2008: National Intelligence Assessment on the National Security Implications of Global Climate Change to 2030, 21 pp., U.S. Office of the Director of National Intelligence. [Available online at [http://www.fas.org/irp/congress/2008\\_hr/062508fingar.pdf](http://www.fas.org/irp/congress/2008_hr/062508fingar.pdf)]
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