

# Water Sustainability and Climate (WSC)

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## Program Solicitation

NSF 11-551

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Replaces Document(s):  
NSF 10-524

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### National Science Foundation

Directorate for Geosciences

Directorate for Engineering

Directorate for Social, Behavioral & Economic Sciences

National Institute of Food and Agriculture

**Full Proposal Deadline(s)** (due by 5 p.m. proposer's local time):

October 19, 2011

## IMPORTANT INFORMATION AND REVISION NOTES

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A revised version of the *NSF Proposal & Award Policies & Procedures Guide (PAPPG)*, [NSF 11-1](#), was issued on October 1, 2010 and is effective for proposals submitted, or due, on or after January 18, 2011. Please be advised that the guidelines contained in [NSF 11-1](#) apply to proposals submitted in response to this funding opportunity.

**Cost Sharing:** The PAPPG has been revised to implement the National Science Board's recommendations regarding cost sharing. Inclusion of voluntary committed cost sharing is prohibited. In order to assess the scope of the project, all organizational resources necessary for the project must be described in the Facilities, Equipment and Other Resources section of the proposal. The description should be narrative in nature and must not include any quantifiable financial information. Mandatory cost sharing will only be required when explicitly authorized by the NSF Director. See the PAPP Guide Part I: *Grant Proposal Guide (GPG)* [Chapter II.C.2.g\(xi\)](#) for further information about the implementation of these recommendations.

**Data Management Plan:** The PAPPG contains a clarification of NSF's long standing data policy. All proposals must describe plans for data management and sharing of the products of research, or assert the absence of the need for such plans. FastLane will not permit submission of a proposal that is missing a Data Management Plan. The Data Management Plan will be reviewed as part of the intellectual merit or broader impacts of the proposal, or both, as appropriate. Links to data management requirements and plans relevant to specific Directorates, Offices, Divisions, Programs, or other NSF units are available on the NSF website at: <http://www.nsf.gov/bfa/dias/policy/dmp.jsp>. See [Chapter II.C.2.j](#) of the GPG for further information about the implementation of this requirement.

**Postdoctoral Researcher Mentoring Plan:** As a reminder, each proposal that requests funding to support postdoctoral researchers must include, as a supplementary document, a description of the mentoring activities that will be provided for such individuals. Please be advised that if required, FastLane will not permit submission of a proposal that is missing a Postdoctoral Researcher Mentoring Plan. See [Chapter II.C.2.j](#) of the GPG for further information about the implementation of this requirement.

## SUMMARY OF PROGRAM REQUIREMENTS

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### General Information

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**Program Title:**

Water Sustainability and Climate (WSC)

**Synopsis of Program:**

One of the most urgent challenges facing the world today is ensuring an adequate supply and quality of water in light of both burgeoning human needs and climate variability and change. Despite water's importance to life on Earth, there are major gaps in our basic understanding of water availability, quality and dynamics, and the impact of both a changing and variable climate, and human activity, on the water system. The goal of the Water Sustainability and Climate (WSC) solicitation is to understand and predict the interactions between the water system and climate change, land use (including agriculture, managed forest and rangeland systems), the built environment, and ecosystem function and services through place-based research and integrative models. Studies of the water system using models and/or observations at specific

sites singly or in combination that allow for spatial and temporal extrapolation to other regions, as well as integration across the different processes in that system are encouraged, especially to the extent that they advance the development of theoretical frameworks and predictive understanding. Specific topics of interest include:

- Developing theoretical frameworks and models that incorporate the linkages and feedbacks among atmospheric, terrestrial, aquatic, oceanic, and social processes that can be used to predict the potential impact of (1) climate variability and change, (2) land use and (3) human activity on water systems on decadal to centennial scales in order to provide a basis for adaptive management of water resources.
- Determining the inputs, outputs, and potential changes in water budgets and water quality in response to (1) climate variability and change, (2) land use and (3) human activity, and the effect of these changes on Biogeochemical cycles, water quality, long-term chemical transport and transformation, terrestrial, aquatic and coastal ecosystems, landscape evolution and human settlements and behavior.
- Determining how our built water systems and our governance systems can be made more reliable, resilient and sustainable to meet diverse and often conflicting needs, such as minimizing consumption of water for energy generation, industrial and agricultural/forest rangeland production and built environment requirements, reuse for both potable and non-potable needs, ecosystem protection, and flood control and storm water management.

This activity enables interagency cooperation on one of the most pressing problems of the millennium--water sustainability --how it is likely to affect our world, and how we can proactively plan for its consequences. It allows the partner agencies--National Science Foundation (NSF) and the United States Department of Agriculture National Institute of Food and Agriculture (USDA/NIFA) -to combine resources to identify and fund the most meritorious and highest-impact projects that support their respective missions, while eliminating duplication of effort and fostering collaboration between agencies and the investigators they support

Successful proposals are expected to study water systems in their entirety and to enable a new interdisciplinary paradigm in water research. Proposals that do not broadly integrate across the biological sciences, geosciences, engineering, and social sciences may be returned without review. Proposals may establish new observational sites or utilize existing sites and facilities already supported by NSF (National Science Foundation) or other federal and state agencies (e.g. USGS (US Geological Survey), USEPA (US Environmental Protection Agency) , USDA/ARS/FS (US Department of Agriculture/Agricultural Research Station/Forest Service), NOAA(National Oceanic and Atmospheric Administration)).

#### **Cognizant Program Officer(s):**

*Please note that the following information is current at the time of publishing. See program website for any updates to the points of contact.*

- Enriqueta C. Barrera, Program Director, Division of Earth Sciences, telephone: (703) 292-8551, email: [ebarrera@nsf.gov](mailto:ebarrera@nsf.gov)
- Paul Bishop, Program Director, Division of Chemical, Bioengineering, Environmental, and Transport Systems, telephone: (703) 292-216, email: [pbishop@nsf.gov](mailto:pbishop@nsf.gov)
- Cheryl Eavey, Program Director, Division of Social and Economic Sciences, telephone: (703) 292-7269, email: [ceavey@nsf.gov](mailto:ceavey@nsf.gov)
- Bruce Hamilton, Program Director, Division of Chemical, Bioengineering, Environmental, and Transport Systems, telephone: (703) 292-8320, email: [bhamilto@nsf.gov](mailto:bhamilto@nsf.gov)
- Robert O'Connor, Program Director, Division of Social and Economic Sciences, telephone: (703) 292-7263, email: [roconnor@nsf.gov](mailto:roconnor@nsf.gov)
- Mary Ann Rozum, National Program Leader, Institute of Bioenergy, Climate, and Environment-NIFA, telephone: (202) 401-4533, email: [mrozum@nifa.usda.gov](mailto:mrozum@nifa.usda.gov)
- Thomas Torgersen, Program Director, Division of Earth Sciences, telephone: (703) 292 4738, email: [ttorgers@nsf.gov](mailto:ttorgers@nsf.gov)

#### **Applicable Catalog of Federal Domestic Assistance (CFDA) Number(s):**

- 10.310 --- Agriculture and Food Research Initiative
- 47.041 --- Engineering
- 47.050 --- Geosciences
- 47.075 --- Social Behavioral and Economic Sciences

#### **Award Information**

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**Anticipated Type of Award:** Standard Grant or Continuing Grant or Cooperative Agreement

**Estimated Number of Awards:** 12 to 26 Three categories of awards are anticipated for this solicitation. Category 1 Awards:

Small exploratory or incubation grants to develop teams, identify sites, hold workshops and develop plans for establishment or operation of a study site or modeling effort. These will be 1-2 years in duration for up to \$150,000. An estimated 4-10 awards are expected to be made for Category 1 proposals. Category 2 Awards: Place-based observational and modeling studies, up to 5 years in duration and for a maximum of \$5 million for each award. An estimated 2-4 awards are expected to be made for Category 2 proposals. Category 3 Awards: Synthesis, modeling and integration grants that will use existing data to integrate and synthesize across watershed and groundwater sites. Both NSF and USDA/NIFA funds will be used to support this category. Some projects may be funded directly by USDA/NIFA. Project duration of 3-5 years for a maximum of \$1.5 million for each award. An estimated 6-12 awards are expected to be made for Category 3 proposals.

**Anticipated Funding Amount:** \$31,000,000 Approximately \$31,000,000 is expected for the FY2012 competition, pending availability of funds. Of this amount, NIFA anticipates contributing approximately \$5,000,000 which will be available for this program pending appropriation action to make standard grants.

## Eligibility Information

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### Organization Limit:

Proposals may only be submitted by the following:

- Universities and Colleges - Universities and two- and four-year colleges (including community colleges) accredited in, and having a campus located in the US, acting on behalf of their faculty members. Such organizations also are referred to as academic institutions.
- Non-profit, non-academic organizations: Independent museums, observatories, research labs, professional societies and similar organizations in the U.S. associated with educational or research activities.
- For-profit organizations: U.S. commercial organizations, especially small businesses with strong capabilities in scientific or engineering research or education.
- Other Federal Agencies and Federally Funded Research and Development Centers (FFRDCs): Contact the appropriate program before preparing a proposal for submission.
  
- USDA-NIFA only : Eligible applicants for the grant program implemented under WSC include: (1) State agricultural experiment stations; (2) colleges and universities (including junior colleges offering associate degrees or higher); (3) university research foundations; (4) other research institutions and organizations; (5) Federal agencies, (6) national laboratories; (7) private organizations or corporations; (8) individuals who are U.S. citizens, nations, or permanent residents; and (9) any group consisting of 2 or more entities identified in (1) through (8). Eligible institutions do not include foreign and international organizations.

### PI Limit:

None Specified

### Limit on Number of Proposals per Organization:

None Specified

### Limit on Number of Proposals per PI:

An individual may appear as Principal Investigator (PI), co-PI, other senior personnel or investigator on only one Category 2 or Category 3 proposal submitted for FY 2012 in response to this solicitation. An individual may participate in only one Category 1 proposal. This limitation includes proposals submitted by a lead organization, any sub-award submitted as part of a proposal, or any collaborative proposal. Proposals that do not meet this requirement will be returned without review.

## Proposal Preparation and Submission Instructions

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### A. Proposal Preparation Instructions

- **Letters of Intent:** Not Applicable
- **Preliminary Proposal Submission:** Not Applicable
- **Full Proposals:**
  - Full Proposals submitted via FastLane: NSF Proposal and Award Policies and Procedures Guide, Part I: Grant Proposal Guide (GPG) Guidelines apply. The complete text of the GPG is available electronically on the NSF website at: [http://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=gpg](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg).
  - Full Proposals submitted via Grants.gov: NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov Guidelines apply (Note: The NSF Grants.gov Application Guide is available on the Grants.gov website and on the NSF website at: [http://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=grantsgovguide](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide))

### B. Budgetary Information

- **Cost Sharing Requirements:** Inclusion of voluntary committed cost sharing is prohibited.

- **Indirect Cost (F&A) Limitations:**

For awards made by USDA/NIFA, Section 1462(a) of the National Agricultural Research, Extension, and Teaching Policy Act of 1977 (7 U.S.C. 3310(a)) limits the recovery of indirect costs to 22 percent of total federal funds awarded. Revised budgets will be solicited if these guidelines are not met by an application to be awarded by USDA/NIFA.

- **Other Budgetary Limitations:** Not Applicable

### C. Due Dates

- **Full Proposal Deadline(s)** (due by 5 p.m. proposer's local time):

October 19, 2011

### Proposal Review Information Criteria

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**Merit Review Criteria:** National Science Board approved criteria. Additional merit review considerations apply. Please see the full text of this solicitation for further information.

### Award Administration Information

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**Award Conditions:** Additional award conditions apply. Please see the full text of this solicitation for further information.

**Reporting Requirements:** Additional reporting requirements apply. Please see the full text of this solicitation for further information.

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## I. INTRODUCTION

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One of the most urgent challenges facing the world today is ensuring an adequate supply and quality of water in light of both burgeoning human and ecosystem needs and climate variability and change. Variations in evaporation and precipitation patterns due to climate and land use changes, as well as increasing water usage to meet human needs, are fundamentally changing the availability, quality, and temporal variability of water across the globe. Despite its importance to life on Earth, there are major gaps in our basic scientific knowledge of the water cycle, including the impact of a changing climate and human activity on water availability and quality. Forces shaping the vulnerability/sustainability of water as an essential resource include, but are not limited to, extreme events such as floods and droughts; watershed disturbances such as

deforestation, desertification, and urbanization; construction of engineered infrastructure such as dams and irrigation systems; and threats such as pollutants, invasive species, and climate change.

Water connects physical, geochemical and ecological processes occurring at the Earth's surface, and in the atmosphere and oceans, and links and integrates the natural environment with human, social and engineered systems at multiple scales of space and time. Water systems are distribution networks for natural and anthropogenic chemicals, living organisms, and particles, encompassing complex and interacting suites of chemical, biological, and physical processes that alter and are altered by water and its constituents. On this foundation, humans add engineered and social systems to control, manage, utilize, and alter the water environment for a variety of uses and through a variety of organizational and individual decisions. The central role that water plays in human existence, and the challenges that face our society in adapting to our altered water resources, lead to an overarching question that links societal needs with fundamental science:

How can we protect ecosystems and better manage and predict water availability for future generations given alterations to the water cycle caused by climate variability and change and human activities?

In order to address this question, we require a holistic, predictive understanding of complex water cycle and water resource processes, the feedbacks associated with the water system, and the vulnerability and resilience of water systems to climate and anthropogenic change. In this context, a water system comprises the drainage basin and its physical, chemical, and biological constituents, including water networks, ecosystems, the built environment, the oceanic and atmospheric systems that govern evaporation and precipitation in the basin, and the source water bodies and terminal lakes or seas into which the water flows. There have been few attempts to study an entire water system with an integrative, systems science approach or even study similar aspects of different water systems in a comparative sense that will develop such a framework. Scaling from the leaf or engineered infrastructure element level to transboundary basin level as well as transferability of our understanding from one system to the next are significant challenges in water systems science and engineering. A systems analysis of the planet's water system focused on aspects such as feedbacks and linkages among climate change, ecosystems, built environments requirements, and human activity can provide a common theoretical framework that can transcend disciplinary boundaries and lead to improved understanding, prediction, and management of water resources and protection of ecosystems.

A number of technical reports that have influenced the scope of science for this particular solicitation and may be of interest to prospective investigators are listed in the FAQ section of this solicitation. See Appendix in Section X of this solicitation. The FAQ's contain additional important information.

## II. PROGRAM DESCRIPTION

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The goal of the Water Sustainability and Climate (WSC) solicitation is to understand and predict the interactions between the water system and climate change, land use (including agriculture and forest production systems), the built environment, and ecosystem function and services through place-based research and integrative models. Studies of a water system in its entirety using models and/or observations at specific sites, singly or in combination that allow for spatial and temporal extrapolation, as well as integration across the different processes in that system are encouraged, especially to the extent that they advance the development of theoretical frameworks and predictive understanding. Water systems may include relatively pristine systems, built or engineered water environments or anthropogenically modified ecosystems and may range from a built environment site or a single watershed to the basin scale. Proposals may involve field observations and data collection (specifically Category 2 and possibly Category 1) and the installation of advanced sensor arrays, in situ instrumentation and equipment at facilities and sites already supported by NSF (e.g., Long-Term Ecological Research (LTER) sites, Critical Zone Observatories (CZOs), WATERS Network Test Beds, Cyberinfrastructure for Environmental Observatories: Prototypes (CEOPs) or sites supported by other federal, regional, private or state agencies (e.g., USEPA, USDA (including NIFA, the Forest Service and ARS), USGS, NOAA).

Successful proposals are expected to broadly integrate across the biosciences, geosciences, engineering and social sciences enabling a new interdisciplinary paradigm in water research using a systems science and engineering approach to develop theoretical frameworks for a predictive understanding. Specific topics of interest include:

- \* Developing theoretical frameworks and models that incorporate the linkages and feedbacks among atmospheric, terrestrial, aquatic, oceanic, and social processes that can be used to predict the potential impact of (1) climate variability and change, (2) land use and (3) human activity on the water cycle and water availability on decadal- to centennial-scale in order to provide a basis for adaptive management of our water resources.

- \* Determining the inputs, outputs and potential changes in water budgets and water quality in response to (1) climate variability and change, (2) land use and (3) human activity, and the effect of these changes on biogeochemical cycles, water quality, long-term chemical transport and transformation, terrestrial, aquatic and coastal ecosystems, landscape evolution and human settlements and behavior.

- \* Determining how our built water systems and our governance system can be made to be reliable, resilient and sustainable to meet diverse and often conflicting needs such as minimizing consumption of water for energy generation, industrial and agricultural production and built environment requirements, reuse for both potable and non-potable needs, as well as, for flood control and storm water management.

Projects that incorporate rich legacy data or remote sensing data are highly encouraged. Generation of new data/measures is not an allowable budget item for Category 3.

This solicitation seeks proposals to build interdisciplinary research teams to pursue topics such as those listed above that cannot readily be addressed by traditional disciplinary programs within the National Science Foundation.

This activity enables interagency cooperation on one of the most pressing problems of the millennium--water sustainability --

how it is likely to affect our world, and how we can proactively plan for its consequences. It allows the partner agencies-- National Science Foundation (NSF) and the USDA National Institute of Food and Agriculture --to combine resources to identify and fund the most meritorious and highest-impact projects that support their respective missions, while eliminating duplication of effort and fostering collaboration between agencies and the investigators they support.

#### **USDA-NIFA Areas of Interest:**

Agricultural modeling needs related to the sustainability of water resources through climate change arise from the necessity to project crop, livestock, forestry, rangeland, and aquaculture yields at multiple watershed and ground water scales while balancing ecosystem needs. Increasing air temperature, wide swings of air temperature over short periods of time (e.g., warm conditions followed by a hard frost early during the growing season), increased precipitation or drought in different areas, changing intensity and timing of precipitation and snowmelt patterns increasing length of growing season, conditions accelerating crop maturation, and severe weather are factors that are likely to affect hydrologic processes on different scales, and in different parts of the country. In addition to climate and precipitation downscaling to the farm and ranch scale, further temporal downscaling to sub daily time intervals is needed for precipitation intensities to drive hydrology, erosion, and water quality process-based models where infiltration, excess runoff, or manmade drainage mechanisms are dominant.

USDA seeks research projects that clearly demonstrate the linkages between water sustainability for agriculture and forestry and the broader program goals described in this solicitation (please refer to synopsis). Within these broader goals, USDA aims to support projects that increase knowledge of water sustainability and climate variability and change at the watershed and groundwater scale. In particular, successful projects will focus on the creation of hydrologic and climate models that are 1) integrated with or can later be coupled to models on agricultural production or natural resource management; or 2) that can be used to describe and predict thresholds or trends in water quality and quantity, resilience of agricultural lands, forests or rangelands to changes in water availability that affect their ability for food, feed, fiber and fuel production or provide ecosystem services under altered seasonal or extreme climate-driven conditions. Approaches include but are not limited to:

- Scenario-based analysis of the hydrological, climatological, environmental, resource, technological, and economic implications of different climate impacts on the sustainability of water resources in agroecosystems.
- Spatially explicit hydrologic and climate-ecosystem models at regional to global scales, to improve our understanding of contemporary and historical changes in agroecosystem structure and functioning, and synthesis of known effects of increasing CO<sub>2</sub>, warming, and changes in the hydrologic cycle.

Developing the next comprehensive integrated watershed/groundwater and climate model is a major challenge requiring engagement by researchers from many disciplines. The next generation hydrologic and climate models will need to be high resolution, enabling predictions in the decadal timeframe and at regional scales. They will need to incorporate and advance sophisticated understanding of natural and human-moderated systems; not only their physical aspects, but also biological and human, including contributions from the built environment. USDA will support research to develop watershed and groundwater and climate models that can be linked to crop, forestry, aquaculture, and livestock models to assess risks and potential outcomes of management strategies so that development and yields can be projected reliably at different spatial and temporal scales. These types of models include:

- Hydrologic models for watersheds and groundwater yielding data on water availability and quality that can interact with new or existing climate and crop models that can be down-scaled to predict impacts on agricultural production and processing systems, forests, rangelands and grasslands.
- Hydrologic models that can be used to predict the potential impact of climate variability and change, land use, and human activity on water availability for agricultural lands, forests or rangelands and rural community needs.
- Coupled climate and hydrologic models to help manage water allocations from snowmelt, reservoirs, ground water, and surface water, to deal with competing demands from agricultural, energy, environmental, urban/industrial, and western land management uses.
- Hydrologic models that can estimate the impacts of climate variability, changing land use and changing land management practices on agricultural lands, forests, or rangelands, with enough specificity to identify and account for environmentally sensitive "hot spots" on the landscape that may indicate areas of low water quality or water shortage, or increased flooding.
- Watershed and groundwater models addressing how social and economic factors affect the quality and quantity of surface and groundwater in agricultural production and processing systems, urban/urbanizing environments, and rural communities.
- Coupled climate, agronomic, water quality and quantity, resource conservation and economic impact models suitable for the development and assessment of planning and management strategies that exploit opportunities and mitigate adverse impacts of anticipated, yet uncertain, climate change scenarios.

Projects are encouraged to be trans-disciplinary incorporating physical, biological, economic, and social sciences to address the interconnectivity of agricultural practices and environmental and social impacts and responses. This includes mechanisms to coordinate and support regional land use changes to improve water sustainability, stabilize agricultural productivity, and marketing of ecosystem services to economically enhance producers. A system science approach that incorporates the natural, mathematical, engineering and social sciences is an integral part of modeling to understand the impacts of climate change on agroecosystems and the human interventions for adapting to and mitigating these impacts.

For more information on this solicitation, you may view the Frequently Asked Questions (FAQ's) in Appendix X.

### III. AWARD INFORMATION

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**Anticipated Type of Award:** Continuing Grant or Cooperative Agreement or Standard Grant

**Estimated Number of Awards:** 12 to 26 Three categories of awards are anticipated for this solicitation. Category 1 Awards: Small exploratory or incubation grants to develop teams, identify sites, hold workshops and develop plans for establishment or operation of a study site or modeling effort. These will be 1-2 years in duration for up to \$150,000. An estimated 4-10 awards are expected to be made for Category 1 proposals. Category 2 Awards: Place-based observational and modeling studies, up to 5 years in duration and for a maximum of \$5 million for each award. An estimated 2-4 awards are expected to be made for Category 2 proposals. Category 3 Awards: Synthesis, modeling and integration grants that will use existing data to integrate and synthesize across watershed and groundwater sites. Both NSF and USDA/NIFA funds will be used to support this category. Some projects may be funded directly by USDA/NIFA. Project duration of 3-5 years for a maximum of \$1.5 million for each award. An estimated 6-12 awards are expected to be made for Category 3 proposals.

**Anticipated Funding Amount:** \$31,000,000 Approximately \$31,000,000 is expected for the FY2012 competition, pending availability of funds. Of this amount, NIFA anticipates contributing approximately \$5,000,000 which will be available for this program pending appropriation action to make standard grants.

Estimated program budget, number of awards and average award size/duration are subject to the availability of funds and quality of proposals. This program is expected to have a final call for proposals in FY 2014 subject to availability of funds and programmatic considerations.

This is an interagency partnership between NSF and USDA, therefore meritorious proposals may be funded by one or more agencies at the option of the agencies, not the proposer. For proposals selected for funding entirely by USDA, PIs will be asked to withdraw their proposal from NSF and resubmit it to USDA-NIFA in accordance with instructions given by the cognizant USDA-NIFA Program Officer. Subsequent grant administration procedures will be in accordance with the individual policies of the awarding agency.

### IV. ELIGIBILITY INFORMATION

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**Organization Limit:**

Proposals may only be submitted by the following:

- Universities and Colleges - Universities and two- and four-year colleges (including community colleges) accredited in, and having a campus located in the US, acting on behalf of their faculty members. Such organizations also are referred to as academic institutions.
- Non-profit, non-academic organizations: Independent museums, observatories, research labs, professional societies and similar organizations in the U.S. associated with educational or research activities.
- For-profit organizations: U.S. commercial organizations, especially small businesses with strong capabilities in scientific or engineering research or education.
- Other Federal Agencies and Federally Funded Research and Development Centers (FFRDCs): Contact the appropriate program before preparing a proposal for submission.
  
- USDA-NIFA only : Eligible applicants for the grant program implemented under WSC include: (1) State agricultural experiment stations; (2) colleges and universities (including junior colleges offering associate degrees or higher); (3) university research foundations; (4) other research institutions and organizations; (5) Federal agencies, (6) national laboratories; (7) private organizations or corporations; (8) individuals who are U.S. citizens, nations, or permanent residents; and (9) any group consisting of 2 or more entities identified in (1) through (8). Eligible institutions do not include foreign and international organizations.

**PI Limit:**

None Specified

**Limit on Number of Proposals per Organization:**

None Specified

**Limit on Number of Proposals per PI:**

An individual may appear as Principal Investigator (PI), co-PI, other senior personnel or investigator on only one Category 2 or Category 3 proposal submitted for FY 2012 in response to this solicitation. An individual may participate in only one Category 1 proposal. This limitation includes proposals submitted by a lead organization, any sub-award submitted as part of a proposal, or any collaborative proposal. Proposals that do not meet this requirement will be returned without review.

**Additional Eligibility Info:**

Individual researchers and researchers at ineligible organizations (including foreign universities and

colleges) may be included on proposals from eligible institutions through subawards or as consultants.

Projects involving USDA FFRDC or National Laboratories will only be considered for co-funding by NSF if they are collaborative efforts that involve non-federally funded institutions. Proposals for FFRDCs must obey NSF budget guidelines and may not include costs already covered by federal funds. To facilitate possible interagency funding of such collaboratives, an institution other than the USDA FFRDC facility must serve as the lead institution.

## V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

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### A. Proposal Preparation Instructions

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**Full Proposal Preparation Instructions:** Proposers may opt to submit proposals in response to this Program Solicitation via Grants.gov or via the NSF FastLane system.

- Full proposals submitted via FastLane: Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the general guidelines contained in the NSF Grant Proposal Guide (GPG). The complete text of the GPG is available electronically on the NSF website at: [http://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=gpg](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg). Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from [nsfpubs@nsf.gov](mailto:nsfpubs@nsf.gov). Proposers are reminded to identify this program solicitation number in the program solicitation block on the NSF Cover Sheet For Proposal to the National Science Foundation. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.
- Full proposals submitted via Grants.gov: Proposals submitted in response to this program solicitation via Grants.gov should be prepared and submitted in accordance with the NSF Grants.gov Application Guide: A Guide for the Preparation and Submission of NSF Applications via Grants.gov. The complete text of the NSF Grants.gov Application Guide is available on the Grants.gov website and on the NSF website at: ([http://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=grantsgovguide](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=grantsgovguide)). To obtain copies of the Application Guide and Application Forms Package, click on the Apply tab on the Grants.gov site, then click on the Apply Step 1: Download a Grant Application Package and Application Instructions link and enter the funding opportunity number, (the program solicitation number without the NSF prefix) and press the Download Package button. Paper copies of the Grants.gov Application Guide also may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from [nsfpubs@nsf.gov](mailto:nsfpubs@nsf.gov).

In determining which method to utilize in the electronic preparation and submission of the proposal, please note the following:

Collaborative Proposals. All collaborative proposals submitted as separate submissions from multiple organizations must be submitted via the NSF FastLane system. Chapter II, Section D.4 of the Grant Proposal Guide provides additional information on collaborative proposals.

**Please note: All materials should be submitted to NSF. NSF will share all submitted materials with USDA-NIFA.**

All proposals should explain how the proposed activity would address the goals of this program. Successful proposals are expected to broadly integrate across the biosciences, geosciences, social sciences, and engineering enabling a new interdisciplinary paradigm in water research using a systems science and engineering approach. Principal Investigators should carefully identify within the proposal the innovative aspects that are the focus of their project. They should also provide clear explanation and justification of the importance (within the context of the water system science and engineering) of the predictive understanding that will be generated by their project. In addition, Category 2 proposals should clearly lay out the arguments for why their proposed water system is best to accomplish this goal and how they expect to transfer the knowledge they gain more broadly to other sites or systems. Proposals should have a brief, but compelling description of how the proposed work integrates across the biosciences, geosciences, social sciences, and engineering and the expertise that each team member would bring to the project.

#### Title of Proposal

The title of a WSC proposal must be preceded by the words "WSC-Category 1, 2 or 3" as appropriate (followed by Collaborative, if appropriate). The title should state clearly and succinctly the focus of the project.

#### Conflicts of Interest Table Required (single copy documents)

Proposals must include a conflicts of interest table, in the single copy documents section of FastLane, as a list in a single alphabetized table, with the full names and institutional affiliations of all people with conflicts of interest for all senior personnel (PI and co-PIs) and any named personnel whose salary is requested in the project budget. Conflicts to be identified are (1) Ph.D. thesis advisors or advisees, (2) collaborators or co-authors, including postdoctoral researchers, for the past 48 months, and (3) any other individuals with whom or institutions with which the senior personnel (PI, co-PIs, and any named personnel) have financial ties, including advisory committees (please specify type). (This list generally replicates information that should be provided in the biographical sketches, but it is collated into one alphabetized table to facilitate the identification of individuals who would have conflicts of interest in the review of the proposal.) If submitting via Grants.gov, complete the information and attach as a PDF file (see Field 5, Additional Single Copy Documents, on the NSF Grant Application Cover Page).

Each Project should submit ONE COI matrix table for their PROJECT: the COI matrix will include the names of all individuals associated (named) with that project and their COI according to the following template.



Column A: PI, coPI or Senior Personnel on project or any individual or organization providing a letter of collaboration (last name, first name).

Column B: Institution of PI, coPI or senior personnel on project

Column C: name of person with whom there is a conflict for the person in column "A" (last name, first name)

Column D: institution of person in column "C"

Column E: type of COI

Please provide COI matrix alphabetized by Column A then Column C:

## Supplementary Documents

### Data Management Plan

Provide a description of the project's data management plan, as a maximum 2-page supplementary document. This information should be clearly identified by the subheading "Data Management Plan." NSF realizes that individual cases may differ widely and that an absolute timeline or rigid set of rules is not possible. However, plans should address some or all of the following issues:

- The types of data, samples, physical collections, software, curriculum materials, and other materials to be produced in the course of the project;
- The standards to be used for data and metadata format and content (where existing standards are absent or deemed inadequate, this should be documented along with any proposed solutions or remedies);
- Policies for access and sharing including provisions for appropriate protection of privacy, confidentiality, security, intellectual property, or other rights or requirements;
- Policies and provisions for re-use, re-distribution, and the production of derivatives; and
- Plans for archiving data, samples, and other research products, and for preservation of access to them.

The data management plan is considered an integral part of the project and therefore subject to reviewer, panel, and program evaluation. Successful applicants will be expected to address this issue in annual and final project reports.

If no data will be generated or assembled during the conduct of a project (such as possibly from a workshop), this section must state that fact.

### Post Doctoral Mentoring Plan (where applicable)

As a reminder, each proposal that requests funding to support postdoctoral researchers must include, as a supplementary document, a description of the mentoring activities that will be provided for such individuals. Please be advised that if required, FastLane will not permit submission of a proposal that is missing a Postdoctoral Researcher Mentoring Plan. See [Chapter II.C.2.j](#) of the GPG for further information about the implementation of this requirement.

### Letters of Collaboration

This section should include any letters of collaboration from individuals or organizations that are integral parts of the proposed project, such as the involvement of collaborator organizations that are not supported by subawards or documentation of permission to access sites, materials, or data for research or other associated project activities. Letters of collaboration should focus solely on affirming that the individual or organization is willing to collaborate on the project as specified in the project description of the proposal. No additional text, especially elaboration of the nature of activities to be undertaken by the collaborator and endorsements of the potential value or significance of the project for the collaborator, may be included.

Letters of collaboration are not required for any individual designated as a principal investigator or senior personnel, nor are letters of collaboration required for any organization that will be a subawardee in the proposal budget. (Inclusion of biographical sketches and current and pending support statements for individuals and subaward budgets for organizations are considered to be implicit statements affirming involvement in the proposed project.) However, individuals and organizations providing letters of collaboration must be included in the COI matrix.

The project description should document the nature and need for all collaborations. Each statement must be signed by the designated collaborator. Requests to collaborators for letters of collaboration should be made by the PI well in advance of the proposal submission deadline, because they must be included at the time of the proposal submission.

### Other Considerations

Where appropriate, investigators are encouraged to work in association with existing projects, observational networks, experimental watersheds, long-term ecological research sites or research centers, or testing and evaluation facilities, whether supported by NSF or other agencies, such as USEPA, USGS, USDA/NIFA, ARS or NOAA. In such proposals, the project description should make clear how the proposed work differs from and augments activities already supported. A letter stating the specifics of cooperation or support from the ongoing activity for the proposed project should be included as Supplementary Documentation.

Education and outreach must be addressed and integrated effectively. Competitive projects must integrate research and

education and PIs are encouraged to extend their education and outreach efforts beyond the traditional university setting, especially when partnering with other agencies or groups. Investigators are encouraged to include students as active participants on interdisciplinary teams. Informal education channels, such as science centers, aquariums, and similar facilities may be used to help enhance the public's ability to deal with complex environmental information related to water systems science and engineering to make informed decisions.

Proposals are encouraged to use innovative instrumentation, observational technologies, and associated software for observing, modeling and analyzing complex water cycle and water resource processes, and to coordinate with partnering organizations on their methodologies. Proposals should clearly discuss how the instrumentation and the field measurement techniques or strategies would be used. However, proposals for the development of specific in situ instrumentation or remote sensing technologies should be directed to other programs.

## B. Budgetary Information

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**Cost Sharing:** Inclusion of voluntary committed cost sharing is prohibited

### Indirect Cost (F&A) Limitations:

For awards made by USDA/NIFA, Section 1462(a) of the National Agricultural Research, Extension, and Teaching Policy Act of 1977 (7 U.S.C. 3310(a)) limits the recovery of indirect costs to 22 percent of total federal funds awarded. Revised budgets will be solicited if these guidelines are not met by an application to be awarded by USDA/NIFA.

### Budget Preparation Instructions:

**Research Platforms and Facilities:** Questions regarding costs and use of NSF shared-use facilities should be directed to one of the NSF program directors named in the solicitation.

Budgets should include all costs appropriately charged to the project for platforms and facilities required for the proposed research supported by NSF (e.g. UNOLS research vessels, research aircraft, or field equipment) or other agencies (e.g., USGS, USDA/NIFA, ARS, NOAA, USEPA) except where those costs are explicitly waived (in writing) by the operating agency. Please contact a cognizant NSF program officer for information on which platform or facility costs must be included in the proposal. Principal investigators are responsible for filing the appropriate requests with the operators of such major research platforms; a copy of the request (e.g. a UNOLS ship time request) must be attached as an appendix to the proposal.

**Grantee Conference:** All PIs funded through this program are required to attend a 3-day annual grantee conference to be held in the Washington DC region and should include the travel costs for this in their budget.

## C. Due Dates

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- **Full Proposal Deadline(s)** (due by 5 p.m. proposer's local time):

October 19, 2011

## D. FastLane/Grants.gov Requirements

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- **For Proposals Submitted Via FastLane:**

Detailed technical instructions regarding the technical aspects of preparation and submission via FastLane are available at: <https://www.fastlane.nsf.gov/a1/newstan.htm>. For FastLane user support, call the FastLane Help Desk at 1-800-673-6188 or e-mail [fastlane@nsf.gov](mailto:fastlane@nsf.gov). The FastLane Help Desk answers general technical questions related to the use of the FastLane system. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this funding opportunity.

**Submission of Electronically Signed Cover Sheets.** The Authorized Organizational Representative (AOR) must electronically sign the proposal Cover Sheet to submit the required proposal certifications (see Chapter II, Section C of the Grant Proposal Guide for a listing of the certifications). The AOR must provide the required electronic certifications within five working days following the electronic submission of the proposal. Further instructions regarding this process are available on the FastLane Website at: <https://www.fastlane.nsf.gov/fastlane.jsp>.

- **For Proposals Submitted Via Grants.gov:**

Before using Grants.gov for the first time, each organization must register to create an institutional profile. Once registered, the applicant's organization can then apply for any federal grant on the Grants.gov website. Comprehensive information about using Grants.gov is available on the Grants.gov Applicant Resources webpage: [http://www07.grants.gov/applicants/app\\_help\\_reso.jsp](http://www07.grants.gov/applicants/app_help_reso.jsp). In addition, the NSF Grants.gov Application Guide provides additional technical guidance regarding preparation of proposals via Grants.gov. For Grants.gov user support, contact the Grants.gov Contact Center at 1-800-518-4726 or by email: [support@grants.gov](mailto:support@grants.gov). The Grants.gov Contact Center answers general technical questions related to the use of Grants.gov. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this solicitation.

**Submitting the Proposal:** Once all documents have been completed, the Authorized Organizational Representative (AOR) must submit the application to Grants.gov and verify the desired funding opportunity and agency to which the application is submitted. The AOR must then sign and submit the application to Grants.gov. The completed

application will be transferred to the NSF FastLane system for further processing.

## VI. NSF PROPOSAL PROCESSING AND REVIEW PROCEDURES

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Proposals received by NSF are assigned to the appropriate NSF program where they will be reviewed if they meet NSF proposal preparation requirements. All proposals are carefully reviewed by a scientist, engineer, or educator serving as an NSF Program Officer, and usually by three to ten other persons outside NSF who are experts in the particular fields represented by the proposal. These reviewers are selected by Program Officers charged with the oversight of the review process. Proposers are invited to suggest names of persons they believe are especially well qualified to review the proposal and/or persons they would prefer not review the proposal. These suggestions may serve as one source in the reviewer selection process at the Program Officer's discretion. Submission of such names, however, is optional. Care is taken to ensure that reviewers have no conflicts of interest with the proposal.

### A. NSF Merit Review Criteria

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All NSF proposals are evaluated through use of the two National Science Board (NSB)-approved merit review criteria: intellectual merit and the broader impacts of the proposed effort. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

The two NSB-approved merit review criteria are listed below. The criteria include considerations that help define them. These considerations are suggestions and not all will apply to any given proposal. While proposers must address both merit review criteria, reviewers will be asked to address only those considerations that are relevant to the proposal being considered and for which the reviewer is qualified to make judgements.

#### **What is the intellectual merit of the proposed activity?**

How important is the proposed activity to advancing knowledge and understanding within its own field or across different fields? How well qualified is the proposer (individual or team) to conduct the project? (If appropriate, the reviewer will comment on the quality of the prior work.) To what extent does the proposed activity suggest and explore creative, original, or potentially transformative concepts? How well conceived and organized is the proposed activity? Is there sufficient access to resources?

#### **What are the broader impacts of the proposed activity?**

How well does the activity advance discovery and understanding while promoting teaching, training, and learning? How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)? To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships? Will the results be disseminated broadly to enhance scientific and technological understanding? What may be the benefits of the proposed activity to society?

Examples illustrating activities likely to demonstrate broader impacts are available electronically on the NSF website at: <http://www.nsf.gov/pubs/gpg/broaderimpacts.pdf>.

Mentoring activities provided to postdoctoral researchers supported on the project, as described in a one-page supplementary document, will be evaluated under the Broader Impacts criterion.

NSF staff also will give careful consideration to the following in making funding decisions:

#### ***Integration of Research and Education***

One of the principal strategies in support of NSF's goals is to foster integration of research and education through the programs, projects, and activities it supports at academic and research institutions. These institutions provide abundant opportunities where individuals may concurrently assume responsibilities as researchers, educators, and students and where all can engage in joint efforts that infuse education with the excitement of discovery and enrich research through the diversity of learning perspectives.

#### ***Integrating Diversity into NSF Programs, Projects, and Activities***

Broadening opportunities and enabling the participation of all citizens -- women and men, underrepresented minorities, and persons with disabilities -- is essential to the health and vitality of science and engineering. NSF is committed to this principle of diversity and deems it central to the programs, projects, and activities it considers and supports.

#### **Additional Review Criteria:**

In responding to the standard NSF review criteria, reviewers will be asked to place emphasis on the following:

- The extent to which the proposal addresses the three topics listed under Program Description (Section II of this Solicitation). Novel approaches that will result in a theoretical framework for a predictive understanding of one or more of these topics will be given priority.
- Proposals that are interdisciplinary and broadly integrate across the biological sciences, geosciences, social sciences, and engineering. This breadth of interdisciplinary research is expected to be reflected in the Principal Investigators involved in this project.
- Sites proposed for Category 2 awards that are of sufficient size to address socially and scientifically significant water processes, encompassing surface earth, ecosystem, and engineering problems with ties to issues of climate change or sustainability. Each site should present well-defined, but poorly understood, processes that can be measured and studied with potential for significant advances in understanding expected in a 5 year time frame. It is anticipated that such sites will have background measures and data that will provide context to additional new measures.

- For Category 3 (synthesis) proposals, a high priority should be "scaling" the results from observations made at individual sites and "integrating" observations made at multiple sites, to obtain better understanding of processes at the regional scale.
- The extent to which data and results of the proposed work will be freely and openly available to other researchers and the general public.
- The extent to which the project provides for recruitment, education and training of the future scientific, engineering, technical, and policy workforce needed to pursue basic research on water systems;
- The extent to which the project provides for tools and infrastructure to provide government and industry policymakers with current knowledge on issues related to water systems, so as to better inform decisions on adaptation and mitigation;
- The extent to which the project provides for improving public awareness and understanding of interconnections between water systems, climate change and sustainability and the impacts, and technical strategies for adaptation and mitigation;
- The extent to which the project provides for opportunities to engage a diverse community of learners and educators in WSC research; and,
- The extent to which the project provides for development and dissemination of water systems-related education resources for formal (K-16) and informal settings that have been informed by research in the learning sciences.

## B. Review and Selection Process

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Proposals submitted in response to this program solicitation will be reviewed by Panel Review.

Reviewers will be asked to formulate a recommendation to either support or decline each proposal. The Program Officer assigned to manage the proposal's review will consider the advice of reviewers and will formulate a recommendation.

After scientific, technical and programmatic review and consideration of appropriate factors, the NSF Program Officer recommends to the cognizant Division Director whether the proposal should be declined or recommended for award. NSF is striving to be able to tell applicants whether their proposals have been declined or recommended for funding within six months. The time interval begins on the deadline or target date, or receipt date, whichever is later. The interval ends when the Division Director accepts the Program Officer's recommendation.

A summary rating and accompanying narrative will be completed and submitted by each reviewer. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers, are sent to the Principal Investigator/Project Director by the Program Officer. In addition, the proposer will receive an explanation of the decision to award or decline funding.

In all cases, after programmatic approval has been obtained, the proposals recommended for funding will be forwarded to the Division of Grants and Agreements for review of business, financial, and policy implications and the processing and issuance of a grant or other agreement. Proposers are cautioned that only a Grants and Agreements Officer may make commitments, obligations or awards on behalf of NSF or authorize the expenditure of funds. No commitment on the part of NSF should be inferred from technical or budgetary discussions with a NSF Program Officer. A Principal Investigator or organization that makes financial or personnel commitments in the absence of a grant or cooperative agreement signed by the NSF Grants and Agreements Officer does so at their own risk.

Applicants selected for funding by NIFA will be required to provide additional information in accordance with policies and procedures of the AFRI program. Applications selected for funding by NIFA will be forwarded to the USDA/NIFA Awards Management Division for award processing in accordance with the USDA/NIFA procedures.

## VII. AWARD ADMINISTRATION INFORMATION

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### A. Notification of the Award

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Notification of the award is made to *the submitting organization* by a Grants Officer in the Division of Grants and Agreements. Organizations whose proposals are declined will be advised as promptly as possible by the cognizant NSF Program administering the program. Verbatim copies of reviews, not including the identity of the reviewer, will be provided automatically to the Principal Investigator. (See Section VI.B. for additional information on the review process.)

#### NIFA:

The award document will provide pertinent instructions and information including, at a minimum, the following:

- (1) Legal name and address of performing organization or institution to whom the Director has issued an award under the terms of this request for applications;
- (2) Title of project;
- (3) Name(s) and institution(s) of PDs chosen to direct and control approved activities;
- (4) Identifying award number assigned by the Department;
- (5) Project period, specifying the amount of time the Department intends to support the project without requiring recompetition for funds;
- (6) Total amount of Departmental financial assistance approved by the Director during the project period;

- (7) Legal authority(ies) under which the award is issued;
- (8) Appropriate Catalog of Federal Domestic Assistance (CFDA) number;
- (9) Applicable award terms and conditions (see <http://www.nifa.usda.gov/business/awards/awardterms.html> to view NIFA award terms and conditions);
- (10) Approved budget plan for categorizing allocable project funds to accomplish the stated purpose of the award; and
- (11) Other information or provisions deemed necessary by NIFA to carry out its respective awarding activities or to accomplish the purpose of a particular award.

## B. Award Conditions

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An NSF award consists of: (1) the award letter, which includes any special provisions applicable to the award and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award letter; (4) the applicable award conditions, such as Grant General Conditions (GC-1); \* or Research Terms and Conditions \* and (5) any announcement or other NSF issuance that may be incorporated by reference in the award letter. Cooperative agreements also are administered in accordance with NSF Cooperative Agreement Financial and Administrative Terms and Conditions (CA-FATC) and the applicable Programmatic Terms and Conditions. NSF awards are electronically signed by an NSF Grants and Agreements Officer and transmitted electronically to the organization via e-mail.

\*These documents may be accessed electronically on NSF's Website at [http://www.nsf.gov/awards/managing/award\\_conditions.jsp?org=NSF](http://www.nsf.gov/awards/managing/award_conditions.jsp?org=NSF). Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from [nsfpubs@nsf.gov](mailto:nsfpubs@nsf.gov).

More comprehensive information on NSF Award Conditions and other important information on the administration of NSF awards is contained in the NSF *Award & Administration Guide* (AAG) Chapter II, available electronically on the NSF Website at [http://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=aag](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=aag).

### Special Award Conditions:

Standard NSF award conditions apply to all awards funded by NSF.

- All NSF projects will be subject to the NSF Data Policy, a copy of which can be found on the solicitation's companion website (<http://www.nsf.gov/crssprgm/climate/>).
- For each award, one or more project representatives will be required to attend an annual PI meeting where they will report on project progress to other awardees, the funding agencies, and other interested parties, as well as to work to integrate their efforts with those of other awardees.
- Meritorious proposals that are deemed to be competitive may be funded by NSF and/or USDA-NIFA. No funds will be transferred between agencies. Therefore, for awards funded by USDA-NIFA, PIs will be asked to withdraw their proposal from NSF and resubmit it to USDA-NIFA according to that agency's policies and procedures under the guidance of the cognizant USDA Program Officer listed in the solicitation.

More comprehensive information on NSF Award Conditions and other important information on the administration of NSF awards is contained in the NSF Award & Administration Guide (AAG) Chapter II, available electronically on the NSF Website at [46][http://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=aag](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=aag).

## USDA

Awards issued as a result of this solicitation will have designated the Automated Standard Applications for Payment System (ASAP), operated by the Department of Treasury's Financial Management Service, as the payment system for funds. For more information see [http://www.nifa.usda.gov/business/method\\_of\\_payment.html](http://www.nifa.usda.gov/business/method_of_payment.html).

Several Federal statutes and regulations apply to USDA/NIFA grant applications considered for review and to project grants awarded under this program. These include, but are not limited to:

2 CFR Part 215 - Uniform Administrative Requirements for Grants and Agreements With Institutions of Higher Education, Hospitals, and Other Non-Profit Organizations (OMB Circular A-110).

2 CFR Part 220 - Cost Principles for Educational Institutions (OMB Circular A-21).

2 CFR Part 230 - Cost Principles for Non-Profit Organizations (OMB Circular A-122).

7 CFR Part 1, subpart A-USDA implementation of the Freedom of Information Act.

7 CFR Part 3-USDA implementation of OMB Circular No. A-129 regarding debt collection.

7 CFR Part 15, subpart A-USDA implementation of Title VI of the Civil Rights Act of 1964, as amended.

7 CFR Part 331 and 9 CFR Part 121-USDA implementation of the Agricultural Bioterrorism Protection Act of 2002.

7 CFR Part 3015-USDA Uniform Federal Assistance Regulations, implementing OMB directives (i.e., OMB Circular Nos. A-21 and A-122, now codified at 2 CFR Parts 220 and 230) and incorporating provisions of 31 U.S.C. 6301-6308 (formerly the Federal Grant and Cooperative Agreement Act of 1977, Pub. L. No. 95-224), as well as general policy requirements applicable to recipients of Departmental financial assistance.

7 CFR Part 3017-USDA implementation of Governmentwide Debarment and Suspension (Nonprocurement) and 7 CFR Part 3021-Governmentwide Requirements for Drug Free Workplace (Grants).

7 CFR Part 3018-USDA implementation of Restrictions on Lobbying. Imposes prohibitions and requirements for disclosure and certification related to lobbying on recipients of Federal contracts, grants, cooperative agreements, and loans.

7 CFR Part 3019-USDA implementation of OMB Circular A-110, Uniform Administrative Requirements for Grants and Other Agreements With Institutions of Higher Education, Hospitals, and Other Nonprofit Organizations.

7 CFR Part 3052-USDA implementation of OMB Circular No. A-133, Audits of States, Local Governments, and Non profit Organizations.

7 CFR Part 3407-NIFA procedures to implement the National Environmental Policy Act of 1969, as amended.

7 CFR Part 3430 - NIFA Competitive and Noncompetitive Nonformula Grant Programs-General Grant Administrative Provisions.

29 U.S.C. 794 (section 504, Rehabilitation Act of 1973) and 7 CFR Part 15b (USDA implementation of statute) -prohibiting discrimination based upon physical or mental handicap in Federally assisted programs.

35 U.S.C. 200 et seq. -Bayh Dole Act, controlling allocation of rights to inventions made by employees of small business firms and domestic nonprofit organizations, including universities, in Federally assisted programs (implementing regulations are contained in 37 CFR Part 401).

#### **Other Requirements**

##### **USDA:**

###### **1. Delegation of Fiscal Responsibility**

Unless the terms and conditions of the grant state otherwise, the grantee may not, in whole or in part, delegate or transfer to another person, institution, or organization the responsibility for use or expenditure of grant funds.

###### **2. Changes in Project Plans**

a. The permissible changes by the grantee, PD(s), or other key project personnel in the approved project grant shall be limited to changes in methodology, techniques, or other similar aspects of the project to expedite achievement of the project's approved goals. If the grantee or the PD(s) is uncertain as to whether a change complies with this provision, the question must be referred to the Authorized Departmental Officer (ADO) for a final determination. The ADO is the signatory of the award document, not the program contact.

b. Changes in approved goals or objectives shall be requested by the grantee and approved in writing by the ADO prior to effecting such changes. In no event shall requests for such changes be approved which are outside the scope of the original approved project.

c. Changes in approved project leadership or the replacement or reassignment of other key project personnel shall be requested by the grantee and approved in writing by the ADO prior to effecting such changes.

d. Transfers of actual performance of the substantive programmatic work in whole or in part and provisions for payment of funds, whether or not Federal funds are involved, shall be requested by the grantee and approved in writing by the ADO prior to effecting such transfers, unless prescribed otherwise in the terms and conditions of the grant.

e. Changes in Project Period: The project period may be extended by NIFA without additional financial support, for such additional period(s) as the ADO determines may be necessary to complete or fulfill the purposes of an approved project, but in no case shall the total project period exceed ten years. Any extension of time shall be conditioned upon prior request by the grantee and approval in writing by the ADO, unless prescribed otherwise in the terms and conditions of a grant.

f. Changes in Approved Budget: Changes in an approved budget must be requested by the grantee and approved in writing by the ADO prior to instituting such changes if the revision will involve transfers or expenditures of amounts requiring prior approval as set forth in the applicable Federal cost principles, Departmental regulations, or grant award.

#### **C. Reporting Requirements**

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##### **NSF:**

For all multi-year grants (including both standard and continuing grants), the Principal Investigator must submit an annual project report to the cognizant Program Officer at least 90 days before the end of the current budget period. (Some programs or awards require more frequent project reports). Within 90 days after expiration of a grant, the PI also is required to submit a

final project report, and a project outcomes report for the general public.

Failure to provide the required annual or final project reports, or the project outcomes report will delay NSF review and processing of any future funding increments as well as any pending proposals for that PI. PIs should examine the formats of the required reports in advance to assure availability of required data.

PIs are required to use NSF's electronic project-reporting system, available through FastLane, for preparation and submission of annual and final project reports. Such reports provide information on activities and findings, project participants (individual and organizational), publications, and other specific products and contributions. PIs will not be required to re-enter information previously provided, either with a proposal or in earlier updates using the electronic system. Submission of the report via FastLane constitutes certification by the PI that the contents of the report are accurate and complete. The project outcomes report must be prepared and submitted using Research.gov. This report serves as a brief summary, prepared specifically for the public, of the nature and outcomes of the project. This report will be posted on the NSF website exactly as it is submitted by the PI.

#### **NIFA:**

Grantees are to submit initial project information and annual summary reports to NIFA's electronic, Web-based inventory system that facilitates both grantee submissions of project outcomes and public access to information on Federally-funded projects. The details of these reporting requirements are included in the award terms and conditions.

**Any additional reporting requirements will be identified in the terms and conditions of the award (see Part VI, B.9. for a link to view the NIFA award terms and conditions).**

For informational purposes, the "Federal Financial Report," Form SF-425, consolidates into a single report the former Financial Status Report (SF-269 and SF-269A) and the Federal Cash Transactions Report (SF-272 and SF-272A). The [NIFA Agency-specific Terms and Conditions](#) include the requirement that Form SF-425 is due on a **annual basis no later than 90 days following the award's anniversary date (i.e., one year following the month and day of which the project period begins and each year thereafter up until a final report is required)**. A final "Federal Financial Report," Form SF-425, is due 90 days after the expiration date of the award.

#### **Additional Reporting Requirements**

- For awards funded by NSF, PIs will be required to include descriptions of their project milestones and their data management activities in their annual reports. Data reporting should conform to current NSF data policy guidelines; PIs should consult with the GPG.
- For awards funded by USDA/NIFA, reporting requirements for awards funded will conform to those specified by USDA/NIFA.
- For multi-proposal collaborative projects that are funded by NSF and USDA-NIFA, the annual report of the lead project in the collaborative must be resident at NSF and must include a description of the activities and milestones of the parts of the project that are funded by the other agencies.

## **VIII. AGENCY CONTACTS**

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*Please note that the program contact information is current at the time of publishing. See program website for any updates to the points of contact.*

General inquiries regarding this program should be made to:

- Enriqueta C. Barrera, Program Director, Division of Earth Sciences, telephone: (703) 292-8551, email: [ebarrera@nsf.gov](mailto:ebarrera@nsf.gov)
- Paul Bishop, Program Director, Division of Chemical, Bioengineering, Environmental, and Transport Systems, telephone: (703) 292-216, email: [pbishop@nsf.gov](mailto:pbishop@nsf.gov)
- Cheryl Eavey, Program Director, Division of Social and Economic Sciences, telephone: (703) 292-7269, email: [ceavey@nsf.gov](mailto:ceavey@nsf.gov)
- Bruce Hamilton, Program Director, Division of Chemical, Bioengineering, Environmental, and Transport Systems, telephone: (703) 292-8320, email: [bhamilto@nsf.gov](mailto:bhamilto@nsf.gov)
- Robert O'Connor, Program Director, Division of Social and Economic Sciences, telephone: (703) 292-7263, email: [roconnor@nsf.gov](mailto:roconnor@nsf.gov)
- Mary Ann Rozum, National Program Leader, Institute of Bioenergy, Climate, and Environment-NIFA, telephone: (202) 401-4533, email: [mrozum@nifa.usda.gov](mailto:mrozum@nifa.usda.gov)
- Thomas Torgersen, Program Director, Division of Earth Sciences, telephone: (703) 292 4738, email: [ttorgers@nsf.gov](mailto:ttorgers@nsf.gov)

For questions related to the use of FastLane, contact:

- FastLane Help Desk, telephone: 1-800-673-6188; e-mail: [fastlane@nsf.gov](mailto:fastlane@nsf.gov).

For questions relating to Grants.gov contact:

- Grants.gov Contact Center: If the Authorized Organizational Representatives (AOR) has not received a confirmation message from Grants.gov within 48 hours of submission of application, please contact via telephone: 1-800-518-4726; e-mail: [support@grants.gov](mailto:support@grants.gov).

## IX. OTHER INFORMATION

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The NSF Website provides the most comprehensive source of information on NSF Directorates (including contact information), programs and funding opportunities. Use of this Website by potential proposers is strongly encouraged. In addition, National Science Foundation Update is a free e-mail subscription service designed to keep potential proposers and other interested parties apprised of new NSF funding opportunities and publications, important changes in proposal and award policies and procedures, and upcoming NSF Regional Grants Conferences. Subscribers are informed through e-mail when new publications are issued that match their identified interests. Users can subscribe to this service by clicking the "Get NSF Updates by Email" link on the [NSF web site](#).

Grants.gov provides an additional electronic capability to search for Federal government-wide grant opportunities. NSF funding opportunities may be accessed via this new mechanism. Further information on Grants.gov may be obtained at <http://www.grants.gov>.

### About the National Institute of Food and Agriculture

The National Institute of Food and Agriculture (NIFA) is an agency within the U.S. Department of Agriculture (USDA), part of the executive branch of the Federal Government. Congress created NIFA through the Food, Conservation, and Energy Act of 2008. NIFA replaced the former Cooperative State Research, Education, and Extension Service (CSREES), which had been in existence since 1994. NIFA's unique mission is to advance knowledge for agriculture, the environment, human health and well-being, and communities by supporting research, education, and extension programs in the Land-Grant University System and other partner organizations. NIFA doesn't perform actual research, education, and extension but rather helps fund it at the state and local level and provides program leadership in these areas. Through grants offered by NIFA, the USDA enables researchers throughout the United States to solve problems critical to our farmers, consumers, and communities. NIFA is the USDA's major extramural research agency, funding individuals, institutions, and public, private, and non-profit organizations. NIFA's education programs supports and promotes teaching excellence, enhances academic quality, and develops tomorrow's scientific and professional workforce. In cooperation with public institutions, private sector partners, and the Land-Grant University System, NIFA provides national leadership to address critical educational issues. NIFA's extension projects deliver science-based knowledge and informal educational programs to people, enabling them to make practical decisions.

NIFA Web site:

<http://www.nifa.usda.gov/>

Phone: 202-720-4423

Street Address:

National Institute of Food and Agriculture  
Waterfront Centre  
800 9th St. SW., Washington, DC 20024

Mailing Address:

United States Department of Agriculture  
National Institute of Food and Agriculture  
1400 Independence Avenue SW., Stop 2201  
Washington, DC 20250-2201

## ABOUT THE NATIONAL SCIENCE FOUNDATION

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The National Science Foundation (NSF) is an independent Federal agency created by the National Science Foundation Act of 1950, as amended (42 USC 1861-75). The Act states the purpose of the NSF is "to promote the progress of science; [and] to advance the national health, prosperity, and welfare by supporting research and education in all fields of science and engineering."

NSF funds research and education in most fields of science and engineering. It does this through grants and cooperative agreements to more than 2,000 colleges, universities, K-12 school systems, businesses, informal science organizations and other research organizations throughout the US. The Foundation accounts for about one-fourth of Federal support to academic institutions for basic research.



NSF receives approximately 40,000 proposals each year for research, education and training projects, of which approximately 11,000 are funded. In addition, the Foundation receives several thousand applications for graduate and postdoctoral fellowships. The agency operates no laboratories itself but does support National Research Centers, user facilities, certain oceanographic vessels and Antarctic research stations. The Foundation also supports cooperative research between universities and industry, US participation in international scientific and engineering efforts, and educational activities at every academic level.

*Facilitation Awards for Scientists and Engineers with Disabilities* provide funding for special assistance or equipment to enable persons with disabilities to work on NSF-supported projects. See Grant Proposal Guide Chapter II, Section D.2 for instructions regarding preparation of these types of proposals.

The National Science Foundation has Telephonic Device for the Deaf (TDD) and Federal Information Relay Service (FIRS) capabilities that enable individuals with hearing impairments to communicate with the Foundation about NSF programs, employment or general information. TDD may be accessed at (703) 292-5090 and (800) 281-8749, FIRS at (800) 877-8339.

The National Science Foundation Information Center may be reached at (703) 292-5111.

The National Science Foundation promotes and advances scientific progress in the United States by competitively awarding grants and cooperative agreements for research and education in the sciences, mathematics, and engineering.

To get the latest information about program deadlines, to download copies of NSF publications, and to access abstracts of awards, visit the NSF Website at <http://www.nsf.gov>

- **Location:** 4201 Wilson Blvd. Arlington, VA 22230
- **For General Information** (NSF Information Center): (703) 292-5111
- **TDD (for the hearing-impaired):** (703) 292-5090
- **To Order Publications or Forms:**
  - Send an e-mail to: [nsfpubs@nsf.gov](mailto:nsfpubs@nsf.gov)
  - or telephone: (703) 292-7827
- **To Locate NSF Employees:** (703) 292-5111

## PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; and project reports submitted by awardees will be used for program evaluation and reporting within the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the proposal review process; to proposer institutions/grantees to provide or obtain data regarding the proposal review process, award decisions, or the administration of awards; to government contractors, experts, volunteers and researchers and educators as necessary to complete assigned work; to other government agencies or other entities needing information regarding applicants or nominees as part of a joint application review process, or in order to coordinate programs or policy; and to another Federal agency, court, or party in a court or Federal administrative proceeding if the government is a party. Information about Principal Investigators may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See Systems of Records, *NSF-50*, "Principal Investigator/Proposal File and Associated Records," 69 Federal Register 26410 (May 12, 2004), and *NSF-51*, "Reviewer/Proposal File and Associated Records," 69 Federal Register 26410 (May 12, 2004). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

An agency may not conduct or sponsor, and a person is not required to respond to, an information collection unless it displays a valid Office of Management and Budget (OMB) control number. The OMB control number for this collection is 3145-0058. Public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding the burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to:

Suzanne H. Plimpton  
Reports Clearance Officer  
Division of Administrative Services  
National Science Foundation  
Arlington, VA 22230

## X. APPENDIX

## Water Sustainability and Climate Solicitation Frequently Asked Questions (WSC FAQ's)

1. Question: What is meant by a water system?

Answer: In this context, a water system comprises the drainage basin and its social, physical, chemical, and biological constituents, including water networks, ecosystems, the built environment, the atmospheric system that governs evaporation and precipitation in the basin, and the source water bodies and terminal lakes or seas into which the water flows.

2. Question: What is meant by "place-based research"?

Answer: Studies of a water system (as defined above) using observations at specific locations in combination with models that allow for spatial and temporal interpolation within the system as well as extrapolation beyond the specific system understudy to other systems.

3. Question: Are there any restrictions on the sites that may be proposed for Category 1 or 2 proposals? Should they be located only in the U.S.?

Answer: No. The sites may be located anywhere in the world, but there must be a clear justification for why a particular site best suits the goals of the proposal and this solicitation. Sites may include relatively pristine systems, built or engineered water environments or anthropogenically modified ecosystems and may range from a built environment site or a single watershed to the basin scale. Sites should be of sufficient size to address socially significant water, surface earth, ecosystem and engineering problems with ties to issues of climate change or sustainability.

4. Question: Can sites build upon existing observational and engineering infrastructure?

Answer: Yes, proposers are encouraged, where appropriate, to build upon existing observational and engineering infrastructure (e.g. NSF-funded LTER sites, CZOs, WATERS Network Test Beds, Cyberinfrastructure for Environmental Observatories: Prototypes (CEO-Ps) sites or facilities operated by other agencies such as USEPA, USGS, USDA, ARS, USFS or NOAA).

5. Question: The solicitation is entitled "Water Sustainability and Climate." Does this mean that all proposals must include climate research?

Answer: Proposed research must take an integrative systems approach to study water dynamics and take into account the feedbacks and linkages amongst a number of facts. While water sustainability is often connected to climate change and variability, this need not be an explicit component or focus of every proposal, as long as the proposed research addresses sustainability issues and spans the bioscience, engineering, geoscience, and social science disciplines.

6. Question: Can proposals submitted to this solicitation include the cost of developing and testing new sensors or instrumentation?

Answer: No. While proposers are encouraged to utilize advanced in situ sensor and instrumentation and new remote sensing technology, proposals for the development and testing of new sensors and instrumentation, and other remote sensing techniques should be directed to other NSF programs.

7. Question: I am interested in developing integrated, regional scale climate and water system models. Is it appropriate to submit to this solicitation?

Answer: Your work might be appropriate for a Category 3 (Synthesis and Modeling) proposal for this solicitation, but the NSF Solicitation on Decadal and Regional Scale Climate Prediction Using Earth System Models (ESMP) might be more appropriate for your project. Please talk with the relevant Program Officers.

8. Question: Category 1 proposals seem to be planning proposals. Does this mean that the "Water Sustainability and Climate" solicitation will be re-issued in future years?

Answer: It is the intent to re-issue a final solicitation again for 2014, subject to availability of funds and programmatic considerations.

9. Question: My co-proposers and I would like to involve industry in our WSC proposal, and we have an industry partner who wants to participate. Is a GOALI proposal permitted under the WSC solicitation?

Answer: Yes. the title of a WSC GOALI proposal must be preceded by the words "WSC-Category (1, 2, or 3, as appropriate)-GOALI:". Make sure to comply with the instructions posted for GOALI. In particular, intellectual property (IP) requirements must be addressed.

10. Question: What types of sites should I be working in?

Answer: This solicitation includes all types of watersheds and no one type is specifically emphasized and/or eliminated. However, NIFA is particularly interested in urban/urbanizing, agricultural, managed forest and rangeland systems.

11. Question: My project will need to make a few measurements and generate some new data. Do I have to write a proposal

for a Category 2 grant?

Answer: Category 2 proposals should focus on place-based observational and modeling studies. The Category defines a maximum duration and dollar amount but allows a scope of project design with a broad range. Projects for less than the maximum are considered on their merit within their self-defined scope. Some data collection is also allowable under Category 1.

12. Question: I do not understand if my project is a Category 2 or a Category 3. How do I tell the difference?

Answer: Generation of new data/measures is not an allowable budget item for Category 3. Category 2 projects fundamentally include place-based observational and modeling studies where new observational data are required for the project. There are also dollar and duration limits which further serve to differentiate Category 2 from 3.

13. Question: My colleagues and I wish to explore the possibility of submitting a proposal that involves USEPA facilities and/or researchers. How can we do this? What about utilization of facilities operated by other Federal agencies (e.g. USGS, USDA, NOAA)?

Answer:

For NRMRL/USEPA, contact Thomas Speth at [61][Speth.Thomas@epamail.epa.gov](mailto:Speth.Thomas@epamail.epa.gov). Also refer to the material at [62]<http://www.epa.gov/nrmrl/wswrd/facilities.html>. For other units of USEPA, contact Jennifer Orme-Zavaleta at [63] [Orme-Zavaleta.Jennifer@epa.gov](mailto:Orme-Zavaleta.Jennifer@epa.gov); 919.541.2283.

For Dept. of Agriculture contact Mary Ann Rozum, NIFA, telephone (202) 401-4533, email [mrozum@nifa.usda.gov](mailto:mrozum@nifa.usda.gov).

For other Federal agencies talk to one of the cognizant NSF program officers identified in this solicitation for appropriate contact information.

14. Question: I would like to conduct a Category 3 study but I would also like to conduct a social survey to provide a context for the analysis. Is this allowable?

Answer: Conducting a survey constitutes the collection of new data and is not allowed as a budget item within Category 3 project. You can submit your project as a Category 1 or 2.

15. Question: What defines "to broadly integrate across the biological sciences, geosciences, social sciences, and engineering"?

ANSWER: Integration can occur at many levels of research. This solicitation competition is particularly interested in discovery and elucidation of the coupling of process level interactions that occur among these disciplinary processes. Thus, not only must all components be fully integrated but all components must also be sufficient to convey their disciplinary processes and to convey the coupling of those disciplinary processes to the other necessary components.

16. Question: What defines the biological sciences, geosciences, social sciences, and engineering research?

ANSWER: This should be drawn from the types of programs currently existing within the participating directorates (BIO, ENG, GEO, SBE).

### **Suggested Technical Reports for Reference**

Landscapes on the Edge: New Horizons for Research on Earth's Surface, National Research Council, National Academy Press, Washington, D.C., 2010.  
[http://www.nap.edu/openbook.php?record\\_id=12700&page=R1](http://www.nap.edu/openbook.php?record_id=12700&page=R1)

Hydrologic Science Priorities for the U.S. Global Change Research Program, An Initial Assessment, National Research Council, Washington, D.C. 1999.  
[http://www.nap.edu/openbook.php?record\\_id=9659&page=R1](http://www.nap.edu/openbook.php?record_id=9659&page=R1)

WATERS Network Science Plan [www.watersnet.org/docs/WATERS\\_Network\\_SciencePlan\\_2009May15.pdf](http://www.watersnet.org/docs/WATERS_Network_SciencePlan_2009May15.pdf)

Climate Change and Water Resources Management: A Federal Perspective. Circular 1331, U.S. Geological Survey Circular 1331, 65p. 2009  
<http://pubs.usgs.gov/circ/1331/>

GEO Vision Report (Water: Changing Perspectives)  
<http://www.nsf.gov/geo/acgeo/geovision/start.jsp>

2001 Water and Watersheds Progress Review  
[http://www.epa.gov/ncer/publications/workshop/pdf/2001\\_water\\_watersheds.pdf](http://www.epa.gov/ncer/publications/workshop/pdf/2001_water_watersheds.pdf)

Transitions and Tipping Points in Complex Environmental Systems

[http://www.nsf.gov/geo/ere/ereweb/ac-ere/nsf6895\\_ere\\_report\\_090809.pdf](http://www.nsf.gov/geo/ere/ereweb/ac-ere/nsf6895_ere_report_090809.pdf)

NSF-EPA WATERS Workshop (May 2008)<http://www.epa.gov/ord/NRMRL/pubs/600r08073/600r08073pt1.pdf>

Energy Demands On Water Resources: Report To Congress On The Interdependency Of Energy And Water  
<http://www.sandia.gov/energy-water/docs/121-RptToCongress-EWwEIAcomments-FINAL.pdf>

NAE Grand Challenges (March 1, 2009 Summit on the National Academy of Engineering Grand Challenges at Duke University)  
<http://www.engineeringchallenges.org/cms/challenges.aspx>

WATERS Network Social/Behavioral/Economic Science Agenda Workshop Final Report  
<http://www.watersnet.org/docs/WATERS-SBE-Workshop-Report-Final-20091123.pdf>

Subcommittee on Water Availability and Quality Strategic Plan  
<http://www.ostp.gov/galleries/NSTC/Fed%20ST%20Strategy%20for%20Water%209-07%20FINAL.pdf>

NOAA Hydrology program Strategic Science Plan [http://www.weather.gov/oh/src/docs/Strategic\\_Science\\_Plan\\_2007-Final.pdf](http://www.weather.gov/oh/src/docs/Strategic_Science_Plan_2007-Final.pdf)

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