**The effects of climate change on ecosystems and societies: A Focus on Native American and Hispanic communities**

**Western Tri-State Consortium Innovation Working Group (IWG) Summary Report**


- **Jan Boll**, Associate Professor, Biological and Agricultural Engineering, Univ. of Idaho
- **Karletta Chief**, Post-Doctoral Fellow, Div. of Hydrologic Sciences Desert Research Institute
- **Julie Coonrod**, Associate Professor, Civil Engineering, Univ. of New Mexico
- **Barbara Cosens**, Associate Professor, College of Law, Univ. of Idaho
- **Terry Fisk**, PhD Student, Graduate Program of Hydrologic Sciences, Univ. of Nevada Reno
- **Alex Fremier**, Assistant Professor, Fish and Wildlife Resources, Univ. of Idaho
- **Mahesh Gautam**, Post-Doctoral Fellow, Div. of Hydrologic Sciences Desert Research Institute
- **Susan Kelly**, Interim Director, Utton Transboundary Resources Center, Univ. of New Mexico
- **Asako Stone**, Post-Doctoral Fellow, Div. of Hydrologic Sciences, Desert Research Institute
- **Mark Stone**, Assistant Professor, Civil Engineering, Univ. of New Mexico


The Tri-State Innovation Working Group (IWG) focusing on "*The effects of climate change on ecosystems and societies: A Focus on Native American and Hispanic communities*" convened on October 19-21, 2009 at Hyatt Regency Tamaya in Albuquerque, New Mexico. The workshop was co-hosted by the Desert Research Institute (DRI), the University of Idaho (UI), and the University of New Mexico (UNM) and was funded by the National Science Foundation Western Tri-State Consortium Innovation Working Group Program (Appendix A). The purpose of this Innovation Working Group (IWG) was to develop research ideas that will couple the effects of climate change on ecosystems and societies while focusing on potential impacts to Native American and Hispanic communities. The objective of the IWG was to host a workshop where hydrologists, ecologists, and social scientists convene to (1) invite stakeholders and experts to offer their perspectives and concerns on potential impacts, and how potential impacts and mitigation can be incorporated into long-term planning related to climate change; (2) discuss how climate and hydrological models can be improved to identify and mitigate risks to these vulnerable populations; and (3) jointly write a cross-cutting proposal to NSF that takes a holistic approach to addressing complex interactions of socio-political and biophysical systems affected by climate change. To facilitate open discussion and brainstorming, the first day was open to stakeholders and experts representing Native American tribes and Hispanic acequias. Eleven stakeholders and experts representing 4 tribes (Nez Perce, Navajo, Pyramid Lake Paiute, and Zia Pueblo); acequias (New Mexico Acequias Association and University of New Mexico acequias researcher) and Indian water rights experts and attorneys (University of Arizona, Aberly Law Firm, JA Affiliates, and Blane Sanchez). Three students attended including one undergraduate from Dine College (a Navajo tribal college located in Shiprock, New Mexico), and two PhD students from University of Nevada Reno and University of New Mexico. Six principal investigators from Desert Reseach Institute (3) and University of New Mexico (3) attended the IWG workshop. In total, there were 20 participants and 1 facilitator who attended the IWG workshop.

The presentation by the stakeholders and experts were very informative and provided a background on Indian water rights and major milestones; incorporating climate change into water and natural resources agreements; potential impacts of climate change on the land and water rights of the Navajo, Nez Perce, and Pyramid Lake Paiute Nations; climate change and moral economy of water for acequias; traditional and communal restoration methods for waterways for Zia Pueblo and acequias; and spiritual and cultural importance of water for tribes and acequias.

The major common and unique facts were identified. With the increasingly limited water supplies due to droughts, climate change, and urban growth, there will be an increasing competition for water by tribes, cities, agriculture, and endangered species. This demand will be amplified by stresses caused by climate variability. Tribes are most vulnerable to detrimental impacts of these stressors especially since their culture, religion, and ways of life are directly tied to land and water and tribes are permanently located within their reservation boundaries. Federal law and treaties require protection of Indian resources because of the United States' trust responsibility and tribal sovereignty or nation to nation relationship. Most tribal water rights are governed by priority doctrine, however, this can be a mixed blessing because on the positive side, the Indian water rights are senior rights in the basin but on the negative side, this doctrine lends itself to be a rigid system that is a barrier to the flexibility needed to

respond to climate change. Because of these federal Indian laws, major decisions and actions of various tribal nations regarding water rights are often not isolated and can have an impact on other tribes dealing with their water rights. However, there is a wide diversity in tribal communities – including geography, size, culture, and language and it is important to consider water rights, policy, and management that accounts for this diversity. Furthermore, there is little research conducted on tribal lands that can strengthen the case for a tribal nation regarding their water rights and water resources. Major complexities include water shortages even without fully exercised or defined tribal water rights due to non-Indian growth (i.e. pueblo water rights). A similar complexity exists for acequias in that their water rights are associated with unlined ditches and thus it is unknown what contribution/recharge exists to alluvial aquifers.

There were several needs that were identified by the tribes and acequias. First is that a reliable and good quality water supply is needed as well as a diversified sources of water. Acquisition of water resources also requires adequate storage and energy to treat, pump, and transport the water. Tribes and acequias would like more local control over natural resources and major decisions revolving around it. Specifically, this means that water planning is conducted by tribes. One idea is to pursue a holistic perspective of water rights which would allow tribal water planning according to watershed boundaries and consider different components of the water cycle. There is an overwhelming need for local and specific research focusing on tribes and impacts to their land and water due to climate change and tribes need to individually identify these research needs. These research efforts could be supported through cooperative and shared partnerships between the stakeholder and a research institution, and preferably tribal scientists if they can be identified. An example is to initiate a demonstration project on the Navajo Nation to build research microsites to study the impacts of climate change on erosion, drought, and dust production. Because individuals belonging to tribes and acequias are closely tied to the land and water, their natural and inherent perceptions and climate change indicators should be incorporated into research efforts. This type of research effort would support the desire of tribes to have a role in the development of federal laws and policies that deal with climate variability and provide them with supportive concrete studies. It is apparent that the general tribal and acequias population have little information or knowledge on climate change and it is critical for individuals to be knowledgeable on climate change in order to gain support for research and mitigation efforts. Finally, it is important to involve youth in research and restoration efforts to not only facilitate climate change education but also to expose them to higher learning opportunities and to foster a commitment to their tribe and natural resources issues.

There was a consensus that local communities have sensitivity to the environmental changes that they observe and that this traditional knowledge should be acquired, utilized, and incorporated in scientific climate models. This type of effort would strengthen the case for tribes. One example was the Nez Perce tribe who recently used scientific evidence to support their case and it benefited their case. Tribes are uniquely posed to assert themselves as ‘authorities through partnerships, managers of fisheries, etc. For example the Mescalero tribe was prepared with research surveys and assessments for the management of spotted owls. This type of research would serve as a driving force for planning. Research that is conducted requires tribes building relationships with scientists especially since the success of obtaining grants are increased with partnerships with stakeholders. Once relationships are established, finding common themes could direct research needs while addressing common issues that tribes and acequias face due to impacts by climate change on their natural resources.

The IWG synthesized the results of the presentations and discussions led by the stakeholders and decided to produce a Desert Reseach Institute publication entitled “Climate Change Impacts to Vulnerable Indigenous Communities in Synthesis, Review and State of Knowledge.” This paper will serve as a guide for Native American and Hispanic leaders and resources managers and scientists to address climate change impacts on tribal water resources. This paper will summarize the barriers to awareness, adaptation, approaches, preparation, and research needs of and for climate change.

In addition, a proposal will be submitted to the National Science Foundation in November 2010 that examines the coupling effects of urban growth and climate change on the social and natural systems using a comparative study of indigenous and non-indigenous communities in the Jemez Watershed. Indigenous communities have lived sustainably from hundreds to thousands of years on their ancestral lands and have a wealth of local and historical knowledge of their environment which is deeply embedded in their cultural and religious practices. Recently, these indigenous communities have been threatened by urban and climate change. Historically, many indigenous communities have survived environmental catastrophes through adaption and migration. However, government policies, land ownership, and

permanent residency now forces indigenous communities to not only live sustainably but to live sustainably under the stressors of local urban population growth and short- and long-term climate change. Migration as a people is no longer an option. The challenges that face these communities are access to clean water, management of water resources, lack of financial resources to fund water infrastructure, political and legal barriers to defining water rights, and protection of springs and water sources that are spiritually and culturally important to the people. Traditional scientific models used in water management to model watersheds are based on one-dimensional processes of inputs and outputs and often do not consider the complexities of human effects on the natural system and the feedback loops between the natural and human systems. This one-dimensional modeling approach is not conducive to water management for indigenous communities because of the uniqueness of the indigenous communities' sustainable water use, their cultural and religious implications for the use of water, and their dependency on the environment. On the other hand, system dynamics modeling (SDM) is a more effective model that can capture the complex inter-linkages and feedback loops that exist in a watershed (natural system and climate change) and the associated impacts and to a community (indigenous and non-indigenous). SDM is a non-linear and dynamic simulation model that is based on a causal-descriptive framework, and relates output with the state of the system. Given the complexity of socio-ecological systems, approaches based on SDM can be an ideal choice to any participatory multi-stakeholder-based decision making. With the opportunity to consider inter-linkages and feedback loops, the SDM approach can also test the resiliency of the indigenous community to thrive and survive presently and in the future under the pressure of the major external factors of adjacent urban growth and climate change.

In the proposed research, we will develop a System Dynamics Model (SDM) to investigate the complex variables that interplay in a study watershed (The Jemez Watershed, New Mexico) and investigate the relative strength of external drivers and feedback loops on natural and human systems and we will also demonstrate the global applicability of this approach to other indigenous communities facing urban and climate change impacts in order to show how lessons be transferred among indigenous communities. To accomplish the research goal, the following hypotheses will be tested: 1) (a) in the short term, the Pueblo of Zia (located in the Jemez Watershed) will be more vulnerable to impacts of urban growth in the adjacent cities of Albuquerque and Rio Rancho, NM, and (b) in the long term, the pueblo will be more vulnerable to the impacts of climate change with respect to the their sustainability and culture. However, the people's elasticity and adaptability to change will allow them to survive as long as the minimal amounts of water needed for domestic purposes and cultural and religious purposes are met; 2) in the short term, stunting of economic growth is likely to impact non-indigenous communities in the Jemez Watershed more strongly than changes in water resources. In the long term, climate change will impact the sustainability of the non-indigenous communities because the lack of water will disrupt their accustomed ways of life, and their lack of adaptability will have a devastating impact on their survival; 3) local and traditional knowledge of past and future changes in the watershed's ecosystems, including changes in spring flow, are correlated to present conditions and such knowledge can be used to improve model predictions; and 4) the rates and types of change will determine the behavioral thresholds (i.e. arrow A is stronger than arrow B).

In order to produce a competitive research proposal, preliminary research should be conducted. Therefore, it is our intention to pursue small grants to conduct preliminary research particularly to pursue efforts to develop a preliminary SDM model. In general, there is limited research addressing the impacts of climate change to tribes and acequias. Therefore, there is a great potential for research that would have a profound impact on water policies for tribes and acequias.

## APPENDIX A: EPSCoR IWG Program

Experimental Program to Stimulate Competitive Research (EPSCoR)
Tri-State Innovative Working Group (IWG)
Workshop

# *"The effects of climate change on ecosystems and societies: A Focus on Native American and Hispanic communities"*

October 19-21, 2009

Hyatt Regency Tamaya Resort & Spa

1300 Tuyuna Trail,
Santa Ana Pueblo, NM 87004
W: 505-867-1234/F: 505-771-6180
http://tamaya.hyatt.com

Funded by:

# Information

Workshop Contact: Dr. Karletta Chief
Cell Number: 702-501-9515
Email: karletta.chief@dri.edu
Travel Reimbursements: Please turn in travel claim with original receipts to Karletta Chief.

**Albuquerque Sunport Shuttle**
http://www.sunportshuttle.com
For Reservations: (505) 883-4966 or (866) 505-4966
Individual Reservations: reservations@sunportshuttle.com
Group Reservations: sales@sunportshuttle.com
One- WAY: $40.00 / RT: $78.00 / EX PAX: $7.00

**Ground Transportation Group Reservations:**

## ARRIVAL

**Group 1: Pick up Sunday, 10/18/09 at 7:15 PM** (confirmation 2147553827, $54)
1 Alexander K. Fremier
2 Gwendolyn Carter
3 ~~Mervin Wright Jr.~~

Group 2: Pick up Sunday, 10/18/09 at 11:30 PM (Call ABQ Sunport Cab 505-883-4888 upon arrival. WHITE cabs are stationed outside baggage claim.)
1 Michael Lopez
2 Mahesh Guatum

## DEPARTURE

~~**Group 1: Drop off Tuesday, 10/20/09 at 5:30 AM**~~
1 ~~Mervin Wright Jr.~~

**Group 2: Drop off Tuesday, 10/20/09 at 2:00 PM** (confirmation 2147553830 $47)
1 Gwendolyn Carter
2 Michael Lopez

**Group 3: Drop off Wednesday, 10/21/09 at 11 AM** (confirmation 2147553831 $40)
1 Mahesh Guatum

**Group 4: Drop off Thursday, 10/22/09 at 6 AM** (confirmation 2147553832 $47)
1 Karletta Chief
2 Terry Fisk

**Group 5: Drop off Thursday, 10/22/09 at 4 PM** (confirmation 2147553833 $40)
1 Alexander K. Fremier

# Agenda

**Monday, Oct. 19, 2009: Presentation by Native American and Acequia Stakeholders and Experts**

**07:00 AM** **Registration and Continental Breakfast**

**08:00 AM** **Pueblo Blessing** by Peter Pino, Governor, Zia Pueblo

**08:05 AM** **Welcome** by Lucy Moore, Facilitator

**08:10 AM** **Introductions** by Karletta Chief, Hydrologist, Desert Reseach Institute

**08:15 AM** 1. **Incorporating climate change into water and natural resource management agreements** by Bonnie G. Colby, Indian Water Rights Expert, AZ Department of Agricultural & Resource Economics, University of Arizona

**08:55 AM** 2. **Acequia: Water, Sanctity and Place about water sharing customs** by Sylvia Rodriguez, Professor, Anthropology, University of New Mexico

**09:35 AM** 3. **El Agua es la Vida, Water is Life Campaign** by Paula Garcia, Executive Director, NM Acequia Association

**10:15 AM** **10 min BREAK**

**10:25 AM** 4. **Impacts of climate change on Nez Perce water rights and culture in the Columbia River Basin** by Gwendolyn Carter, Director, Nez Perce Water Resources

**11:05 PM** 5. **Efforts by Nez Perce Legal Counsel to address impacts of climate on availability of clean water** by Michael Lopez, Attorney, Nez Perce Legal Counsel

**11:45 PM** **LUNCH** (provided)

**12:45 PM** 6. **Vulnerability of Paiute water rights in the Truckee-Carson-Pyramid Lake Water Rights Settlement Act of 1990 under climate change** by Mervin Wright Jr., Chairman, Executive Branch, Pyramid Lake Paiute

**01:25 PM** 7. **Potential impacts of climate change on Navajo water availability and water rights** by John Leeper, Director, Water Management Branch of Navajo Department of Water Resources, Navajo Nation

**02:05 PM** 8. **Determining water rights in the face of climate change** by Herb Becker, Water Rights Attorney, JA Affiliates

**02:45 AM** **10 min BREAK**

**02:55 PM** 9. **Restoration of springs through tribal and non-tribal partnership and changes in water rights in the face of climate change** by Peter Pino, Governor, Zia Pueblo

**03:35 PM** 10. **The Rio Grande Compact: It's the Law – But What About Pueblo Water and Impacts of Climate Change?** by Blane Sanchez, Isleta and Laguna

**04:15 PM** 11. **Climate change impacts on Pueblo Indian Water Rights settlements along Rio Grande tributaries** by Jessica Aberly, Water Rights Attorney, Aberly Law Firm

**04:55 PM** **Research Needs Discussion**
**05:25 PM** **Conclusion and Survey**

**Tuesday, Oct. 20, 2009: EPSCoR IWG Team Discussion and Recommendation for improvement of climate and hydrological models to identify and mitigate risks to vulnerable populations**

**08:00 AM** **Recap and Discussion**

**08:30 AM** **Roundtable Discussion 1:** "Summary of vulnerability and priorities of tribal and Hispanic water rights under climate change and outline outcomes publication"

**10:00 AM** **15 min BREAK**

**10:15 AM** **Roundtable Discussion 2:** "Identification of effective methods to integrate natural, physical, and human science, and ways to utilize proposed research to achieve ultimate objective"

**12:00 PM** **Lunch** (on your own)

**01:00 PM** **Roundtable Discussion 3:** "Incorporation into a NSF Proposal to "Dynamics of Coupled Natural and Human Systems (NSF Proposal Outline and Tasks)"

**02:30 PM** **15 min BREAK**

**02:45 PM** **Roundtable Discussion 4:** "NSF Proposal Project Summary and research questions"

**05:00 PM** **Conclusion**

**Wednesday, Oct. 21, 2009: EPSCoR IWG Team NSF Proposal**

**08:00 AM** **Recap and Discussion**

**08:30 AM** **Work Session 1:** "NSF Proposal Outline and Tasks"

**10:00 AM** **15 min BREAK**

**10:15 AM** **Work Session 2:** "NSF Proposal Project Summary and research questions"

**12:00 PM** **Lunch** (on your own)

**01:00 PM** **Work Session 3:** "Finalize publication"

**02:30 PM** **15 min BREAK**

**02:45 PM** **Work Session 3:** "Finalize NSF Proposal Draft"

**05:00 PM** **Conclusion and Survey**

# Biographies of Presenters

**Aberly, Jessica. "Climate change impacts on Pueblo Indian Water Rights settlements along Rio Grande tributaries."** Water Rights Attorney, Aberly Law Firm, 611 Lead SW, Suite 811, Albuquerque, NM, 87102, aberlylaw@swcp.com.

Ms. Jessica Aberly has been practicing law in New Mexico since 1994 on behalf of Indian Tribes and Pueblos, with a special focus on the protection, restoration, and development of Tribal water resources. From 1994-2000, Ms. Aberly assisted the Jicarilla Apache Nation in the litigation, negotiations, and lobbying related to completing that Nation's water rights settlement, the first Indian water rights settlement achieved in New Mexico. She also assisted, from 2002-2008, as special counsel for the Pueblo of Tesuque, one of the four Pueblos in the Pojoaque River Basin in Northern New Mexico, in settling the Pueblo of Tesuque's water rights claims in the Aamodt litigation, litigation that previously has been referenced as the lead case for establishing Pueblo Indian water rights and as one of the oldest unresolved Indian water rights cases in federal court history. Ms. Aberly has worked for numerous Pueblos and with inter-Pueblo organizations on water issues. In addition, Ms. Aberly has assisted Tribal governments in crafting long-term strategies to address Endangered Species Act issues and in addressing environmental and environmental justice impacts associated with operations of Los Alamos National Laboratory. Ms. Aberly obtained her B.A. in International Relations from Brown University and her J.D. from Northeastern University School of Law.

**Becker, Herb.** "**Determining water rights in the face of climate change**." Water Rights Attorney, JA Affiliates, 2016 Gabaldon Drive NW, Albuquerque, NM 7104-281, herb.becker@jaaffiliates.com.

Mr. Herb Becker received his B.S. and B.A. from University of North Dakota in 1967 and his juris doctorate from Texas Tech University School of Law and University New Mexico School of Law. Since 1970, Mr. Becker has worked in the field of Federal Indian law with emphasis on Indian water rights both as a private consultant and public employee. During the past 30 plus years, he has developed an expertise in American Indian, federal and state water rights. During this time, he appeared before federal, state and tribal legislative bodies, judicial and administrative tribunals, and public policy groups on issues involving water rights determination, and to advocate for the protection and development of water resources. He has tried water rights cases for tribes in Arizona and New Mexico and handled offers of judgment for all non-Indian water claimants in the Jemez Stream system in New Mexico. He also has authored articles for professional publications in the area of water rights. Lastly, he taught water law at the University of New Mexico School of Law as an adjunct professor and has lectured at Universities, and Continuing Legal Education conferences on water law and water policy as they concerns litigation, negotiations, development and conservation. Mr. Herb Becker will present on Indian water rights and how climate change could impact them. The presentation will provide: a historical overview of the law regarding Indian water rights; the standards for establishing and quantifying Indian water rights; a discussion of the latest federal statute dealing with climate change, the Omnibus Public Lands Management Act, Act of 30 March 2009, P.L. 111-11, and Secretarial Order 3289 issued on the 14 September 2009 by Secretary of the Interior, Ken Salazar; and the possible impacts of them and climate change on water adjudications cases and in the administration of water right decrees of both tribes and non-Indians.

**Carter, Gwendolyn.** "**Impacts of climate change on Nez Perce water rights and culture in the Columbia River Basin."** Director, Water Resources Program, Nez Perce, P.O. Box 365, Lapwai, ID, 83540, waterresources@nezperce.org,http://www.nezperce.org.

Ms. Gwendolyn Carter is the director of the Nez Perce Water Resources Program. The mission of the Water Resources Program is to manage, protect, develop and restore the Nez Perce Tribe's surface and ground water resources and watershed environments in the treaty-reserved homelands for the benefit, health, culture and welfare of the tribal public.

**Colby, Bonnie G. "Incorporating climate change into water and natural resource management agreements."** Indian Water Rights Expert, Department of Agricultural & Resource Economics, University of Arizona, Tucson, AZ 85721, bcolby@ag.arizona.edu, http://ag.arizona.edu/AREC/dept/faculty/colby.html

Dr. Bonnie G. Colby is a professor at the University of Arizona in Agricultural and Resource Economics and received her PhD in natural resource economics and public policy at the University of Wisconsin in 1983. Dr. Colby's research is in natural resource and environmental economics and in public policy. Some of her current projects involve nonmarket valuation of natural amenities, analyzing transactions costs generated by regulatory policies, evaluating the reallocation of water resources among economic sectors, economic tools to resolve environmental conflicts, and identifying strategies to promote efficient allocation of risk associated with variability in water supply and water quality. Dr. Colby publication on tribal water rights include "Negotiating Tribal Water Rights" 2005 by B.G. Colby, J.E. Thorson, and S. Britton seek to provide a generalist's overview of the legal landscape of tribal water rights. They introduce the differing perspectives of the important actors, describe the stages of the negotiation and litigation settlement process, and make recommendations for more effective resolution of inter-jurisdictional water conflicts. Another publication is entitled "Tribal Water Rights: Essays in Contemporary Law, Policy, and Economics", University of Arizona Press, 2006 by J.E. Thorson, S. Britton, and B.G. Colby.

**Garcia, Paula.** "**El Agua es la Vida, Water is Life Campaign."** Executive Director, NM Acequia Association, 430 W Manhattan Ave. Suite 5, Santa Fe, NM 87501-3768, lamorena@lasacequias.org, www.lasacequias.org

Paula Garcia is Executive Director of the New Mexico Acequia Association, a grassroots organization of communal irrigation systems that works to sustain a land-based way of life by protecting acequia water rights and promoting agricultural revitalization. In that capacity, Garcia coordinates projects aimed at strengthening local water governance and the practices intertwined with food, land, and cultural traditions. During her years of service to the New Mexico Acequia Association, acequias have built a movement around the principle that "el agua es la vida – water is life" and have achieved major policy changes to protect water locally and statewide. The Association also launched a program, Sembrando Semillas – Growing Seeds, to involve youth in agricultural traditions. She is co-founder of La Asociacion de las Acequias del Valle de Mora, a watershed-based council of community acequias and an active parciante (irrigator) on the Acequia del Alto del Norte. As President of La Merced de Santa Gertrudis de lo de Mora, she was co-founder of the New Mexico Land Grant Council, an organization that advocates the recognition of the common lands of the Spanish and Mexican community land grants. She is also a founding member of the New Mexico Food and Seed Sovereignty Alliance which seeks to increase the cultivation of native seeds that are spiritually and culturally significant to the Pueblo, tribal, and acequia communities of New Mexico and to protect seeds from genetic engineering. Garcia also has served on numerous policy-making boards and currently serves as a member of the Governor's Blue Ribbon Task Force on Water. She lives with her six year old son Joaquin in Mora County where her extended family continues to operate a small-scale ranching and forestry business.

**Leeper, John. "Potential impacts of climate change on Navajo water availability and water rights**." Director, Water Management Branch of Navajo Department of Water Resources, Navajo Nation, P.O. Drawer 678, Fort Defiance, AZ, 86504, johnleeper@navajo.org, http://www.frontiernet.net/~nndwr_wmb/.

Dr. John W. Leeper received a B.S. in civil engineering from the University of California at Davis, M.S. in civil engineering from California State University at Los Angeles, and Ph.D. from Colorado State University in Fort Collins. Dr. Leeper worked for the Peace Corps for three years in rural Nepal building suspension bridges and domestic water systems. Later he worked on Peace Corps agroforestry training for trainees assigned to Rwanda, Mali, Senegal and Lesotho. He spent five years working for Stetson Engineers in San Rafael, California, where he worked on technical water rights studies for the Campo Bands in Southern California; the Flathead and Fort Belknap Indian Reservations in Montana; the Nez Perce Reservation in Idaho; the Warm Springs Reservation in Oregon; and the Hopi, Zuni, and Navajo Reservations in Arizona and New Mexico. Dr. Leeper spent another five years working for Natural Resources Consulting Engineers in Fort Collins, Colorado providing technical support to the Office of the Tribal Water Engineer of the Shoshone and Arapaho Tribes in Fort Washakie, Wyoming, technical studies in support of the Little Colorado River general stream adjudication, and water development projects for the Government of Eritrea. For the last 14 years, Dr. Leeper has been a civil engineer with the Navajo Department of Water Resources in Fort Defiance, AZ. He is the branch manager of the Water Management Branch, which is responsible for providing technical support to the Navajo Nation's water rights efforts in five ongoing general stream adjudications in Utah, Arizona, and New Mexico. The Branch also provides technical support for the Navajo Nation's drought response, flood plain management, regional water planning, and watershed restoration.

**Lopez, Michael.** **"Efforts by Nez Perce Legal Counsel to address impacts of climate on availability of clean water** by Attorney, Nez Perce Legal Counsel, Nez Perce Tribe, P.O. Box 305, Lapwai, Idaho 83540, mikel@nezperce.org, http://www.nezperce.org.

**Pino, Peter.** **"Restoration of springs through tribal and non-tribal partnership and changes in water rights in the face of climate change."** Governor, Zia Pueblo, 135 Capitol Square Dr., Zia Pueblo, NM 87053, tammylpino@yahoo.com, http://www.zia.com/home/zia_info.html.

Mr. Peter Pino is the governor of the Pueblo of Zia and the tribal administrator since 1977. He is also one of the Pueblo's traditional spiritual leaders. The Pueblo of Zia is a very traditional tribe – one that has retained its language and cultural identity despite the fact that just 100 years ago they only had 97 members, and the fact that today Albuquerque and its suburbs are less than 30 minutes away. Today, the Pueblo of Zia has approximately 800 members, virtually all of whom live on our Reservation. Though they are a non-gaming tribe with limited financial resources, they have prospered as a tribe and as a people because of their strong culture and traditions. They strongly encourage self-sufficiency and subsistence activities. Most of the tribe still hunt, gather, cultivate food crops, and raise livestock, just as we have for centuries. However, these activities, given the desert environment in which they live in, require a substantial land area and conservation-minded management of our animal, plant, water and mineral resources. They have taken unique steps to ensure that all of tribal members have an equal opportunity to utilize these resources, and that no one exploits them. As their population has grown, so has their need for an adequate land base to sustain our people. They have been fortunate in recent years to be able to acquire some private lands in and around our reservation, and to utilize adjacent BLM lands for grazing purposes under a cooperative management agreement. However, they have not been able to maximize the full utilization and effective management and protection of our reservation lands because they lie in two, non-contiguous pieces, separated by an area of rugged, BLM-controlled lands that were once an integral part of our aboriginal homelands and are still actively used by their people today. For over a decade, Mr. Pino has been intimately involved in the Pueblo's long-standing quest to connect the two separate pieces of our Reservation and to ensure the preservation of this rugged and beautiful area. Its lands and resources are of enormous cultural importance to their people and have been utilized by them since time immemorial. They contain significant archeological resources, natural materials used by their people in pottery making, and innumerable shrines and sacred sites. As part of our decade-long efforts to reacquire these important ancestral lands, the Pueblo has taken steps to ensure that private property owners in and around the Ojito area will not be displaced or otherwise adversely impacted.

**Rodriguez, Sylvia.** **"Acequia: Water, Sanctity and Place about water sharing customs."** Professor, Department of Anthropology, University of New Mexico, Albuquerque, NM 87131 sylrodri@unm.edu, http://www.unm.edu/~anthro/people_faculty_sylvia_rodriguez.html

Dr. Sylvia Rodriguez is a professor of Anthropology in ethnology and linguistics at University of New Mexico. Dr. Rodriguez is also the director of the Alfonzo Ortiz Center for intercultural studies. She received her PhD from Stanford University in 1981 and her dissertation was entitled, "Ecstacy: Map and Threshold, A Cross-Cultural Study of Dissociation." Her focus has been on culture in Northern New Mexico, water and the effects of tourism. She is the author of Acequia: Water-sharing, Sanctity, And Place. In the book Rodriguez examines the traditional acequia or irrigation ditch associations in northern New Mexico and the way people work together to share the available water. She shows how the traditional cooperative approach to using the limited amounts of available water is a reasonable alternative to court actions to resolve competing claims. Rodriguez has been with UNM since 1988. She currently teaches a course in the "Principles of Cultural Anthropology" and a seminar on Southwestern ethnology in addition to her writing and research.

**Sanchez, Blane.** **"The Rio Grande Compact: It's the Law – But What About Pueblo Water and Impacts of Climate Change?"** Isleta and Laguna Pueblo member, P.O. Box 134, Isleta, NM 87022, indnh2o@aol.com.

Mr. Blane M. Sanchez is from both Acoma and Isleta Pueblos. Mr. Sanchez has a B.S. in agriculture from New Mexico State University and has completed graduate courses in the Water Resources Program at the University of New Mexico. He also has taken EPA technical training courses. Currently he is employed with the All Indian Council Pueblo. Previously, Mr. Sanchez worked for the Pueblo of Isleta and served as their environmental point of contact and Water Quality Officer. Prior to working in the water quality/environment area, Mr. Sanchez spent 12 years dedicated to natural resources and wildlife management with the BIA/Southern Pueblos Agency. Mr. Sanchez's background has provided

him the opportunity to work on a number of Rio Grande related issues stemming from bosque management/restoration to silvery minnow recovery efforts.

**Wright, Mervin Jr.** "**Vulnerability of Paiute water rights in the Truckee-Carson-Pyramid Lake Water Rights Settlement Act of 1990 under climate change**." Tribal Chairman, Pyramid Lake Paiute Tribe, 208 Capitol Hill, P.O. Box 256, Nixon, NV, 89424, mwright@plpt.nsn.us, www.plpt.nsn.us.

Mr. Mervin Wright Jr. is the tribal chairman of the Pyramid Lake Paiute Tribe. He served his first term as tribal chairman from 1997-98 and was re-elected in 2008. He was also the tribal vice-chairman 1995-97. Since March 2007, he has been serving a consecutive term as tribal chairman. Mr. Wright received a B.S. in Agriculture Engineering in 1990 from California State University at Chico and a M.S. in Hydrology in 2006 from the University of Nevada Reno. From 1991-97, Mr. Wright was the director of the Pyramid Lake Paiute Water Resources, a tribal GIS specialist from 1999 to 2006, and tribal environmental director from 2006-07. Mr. Wright has also been directly involved with preserving cultural and traditional interests for tribes through the NAGPRA, ARPA, and NHPA. In addition, he worked with understanding the Indian Reorganization Act of 1934 and its application to modern tribal governments as compared to traditional governing styles. He currently serves on the Indian Lands Working Group – Indian Water Working Group. The Pyramid Lake Paiute tribe is located 35 mi NE of Reno, NV and has approximately 2,454 members. The reservation is 476,000 acres of which 112,000 acres cover the terminal lake, Pyramid Lake. Pyramid Lake is one of the most valuable assets of the Tribe and is entirely enclosed within the boundaries of the Reservation. Pyramid Lake is approximately 15 mi long and 11 mi wide. Much of the economy on the Pyramid Lake Reservation is centered around fishing and recreational activities at Pyramid Lake. The Truckee-Carson-Pyramid Lake Water Rights Settlement Act of 1990 is an agreement to establish equitable apportionment of the Truckee River, Carson River, and Lake Tahoe waters between California and Nevada which include water rights for fish and wildlife, protection of wetlands, and enhancement and recovery of the Pyramid Lake fishery under the Endangered Species Act, and acquisition of Pyramid Lake Paiute Indian Water Rights. In 2008, the Truckee River Operating Agreement (TROA) was signed after decades of litigations and 18 years of negotiations. Since 1991, tribal water rights has been an exclusive interest in understanding the federal, state, and private status directly associated with the application and enforcement of the Western Water Policy.

## Biographies of ESPCoR Facilitator, Researchers, and Students

**Boll, Jan**. Director Waters of the West, Assoc. Professor of Water Quality Engineering, Biological and Agricultural Engineering, University of Idaho, P.O. Box 443002, Moscow, ID, 83844-3002, JBOLL@uidaho.edu, http://www.water.uidaho.edu/.

Dr. Jan Boll is Associate Professor in Biological and Agricultural Engineering with specialization in Hydrology and Water Quality. He teaches Hydrology, Environmental Water Quality, Hydrologic Processes and Modeling, and Irrigation Systems and Water Management. A strong emphasis in Dr. Boll's research program is the transport of water, sediment, nutrients and pathogens in overland flow (from source to stream). He develops and uses GIS-based distributed models to translate findings from field and laboratory studies to computer tools for watershed assessment. Dr. Boll also is Director of the Water Resources Graduate Program, an interdisciplinary program in the College of Graduate Studies. This Program draws faculty from six colleges at the University of Idaho, and its development is funded by the University of Idaho Strategic Initiatives Program call Water of the West, which Dr. Boll leads.

**Chief**, **Karletta.** Post-Doctoral Fellow, Division of Hydrologic Sciences, Desert Reseach Institute, 755 East Flamingo Rd, Las Vegas, NV 89119, karletta.chief@dri.edu, http://www.dri.edu/People/Karletta.Chief/

Dr. Karletta Chief is originally from Black Mesa, Arizona and grew up on the Navajo Nation. Dr. Chief received a B.S. and M.S. in Civil and Environmental Engineering from Stanford University in 1998 and 2000. As a National Science Foundation Doctoral Fellow, Chief received her Ph.D. in Hydrology and Water Resources in the School of Engineering at the University of Arizona (UA) in 2007. Her Ph.D. minor was Soil, Water, and Environmental Science. Her primary advisor was Dr. Ty P.A. Ferré and her dissertation is entitled "*Soil Air Permeability and Saturated Hydraulic Conductivity: Development of Soil Corer Air Permeameter, post-fire soil physical changes, and 3D air flow model in anisotropic soils*." Chief is currently a Post Doctoral Fellow in the Division of Hydrologic Sciences at Desert Research Institute in Las Vegas, Nevada. She is working with Dr. Michael Young on the Scaling Environmental Processes in Heterogeneous Arid Soils (SEPHAS) Project in Boulder City (www.sephas.dri.edu). SEPHAS constructed a new underground lysimeter lab, at a cost of $1.2 million. Dr. Chief's research interests focus on the movement of air and water through the vadose zone. In particular, Dr. Chief is interested in soil air permeability, changes in soil physical properties, and the use of air permeability to estimate saturated hydraulic conductivity. Her current research interests include the spatial and temporal characterization of soil air permeability and hydraulic properties of arid soils to improve our understanding of the dynamic processes that control the movement of air, water, $CO_2$, and contaminants in the soils.

**Coonrod, Julie.** Associate Professor, Civil Engineering, University of New Mexico, MSC01 1070, 1 University of New Mexico, Albuquerque, NM, 87131-0001, jcoonrod@unm.edu, http://www.unm.edu/~jcoonrod/.

Dr. Julie Coonrod obtained her BE in Civil Engineering from Vanderbilt University in 1987, her M.S. in Civil Engineering from the University of New Mexico in 1991, and her PhD in Environmental and Water Resources Engineering from the University of Texas at Austin in 1998 under Dr. Ed Holley and Dr. David Maidment. Prior to her doctoral work, Dr. Coonrod spent 5 years working as a consultant with Scanlon & Associates in Albuquerque and Santa Fe, New Mexico. She worked on a variety of projects (drainage plans, open channels, roads, dams) around the state. She is a registered professional engineer in the state of New Mexico. Since starting at the University of New Mexico in 1997, Dr. Coonrod's research has focused on issues relating to the Middle Rio Grande. She initiated 12 new teaching experiments in the Fluid Mechanics Laboratory. She started a research program with GIS and is teaching a graduate level course that emphasizes the modeling capabilities of GIS. Dr. Coonrod is a member of the American Society of Civil Engineers and the American Water Resources Association.

**Cosens**, **Barbara.** Associate Professor, College of Law, University of Idaho, P.O. Box 442321, Moscow, ID, 83844-2321, bcosens@uidaho.edu, http://www.law.uidaho.edu/bcosens.

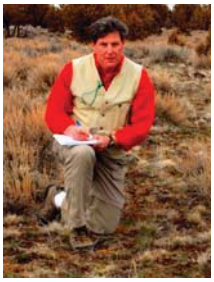
Dr. Consens recently joined the law faculty at the University of Idaho as an Associate Professor. She will be teaching Water, Environmental and Property Law. She was previously an Assistant Professor in the Environmental Studies Program at San Francisco State University. She is also currently mediating efforts to settle water distribution disputes on the Walker River in California and Nevada. Dr. Consens is a member of the Montana, Colorado and California bars. She received her LL.M. from Northwestern School of Law at Lewis and Clark College in 2003, and her J.D. from the University of California, Hastings

College of the Law in 1990, where she graduated Magna cum laude. As a law student, Dr. Consens worked for the California Attorney General's Office in Environmental Law. She also worked for the Natural Heritage Institute researching the legal/policy aspects of proposed technical solutions to the agricultural drainage problem in the San Joaquin Valley, as part of the San Joaquin Valley Drainage Project. Her research focused on solutions requiring integrated management of surface and groundwater. Following law school she clerked for Justice Lohr of the Colorado Supreme Court Dr. Consens joined the staff of the Montana Reserved Water Rights Compact Commission in 1991. She served as chief legal counsel for water right negotiations between the Commission and the National Park Service, which resulted in protection of the hydrothermal system within Yellowstone National Park. She also served as chief legal counsel to Montana on negotiations with the U.S. Fish and Wildlife Service, the Chippewa Cree Tribe of the Rocky Boy's Reservation, the Gros Ventre and Assiniboine Tribes of the Fort Belknap Reservation and the Blackfeet Tribe. Law is her second career. Dr. Consens received her M.S. in Geology from the University of Washington in 1982, and her B.S. in Geology from the University of California at Davis in 1977. As a geologist, she did applied research in the exploration and development of geothermal energy in California, Japan and the Philippines, focusing in particular on the effect of geothermal development on surface hydrothermal systems.

**Fremier**, **Alexander K.** Assistant Professor, Fish and Wildlife Resources, University of Idaho, P.O. Box 441136, Moscow, ID 83844-1136, afremier@uidaho.edu, http://www.cnrhome.uidaho.edu/default.aspx?pid=110986.

Dr. Alex Fremier received his PhD from the University of California Davis in 2007 in Ecology. He was a post doctoral fellow in 2007-2008 in Japan Society for the Promotion of Science. His professional interests include riparian ecology and river restoration, landscape ecology of large rivers, semi-arid river systems, watershed scale dynamics of large woody debris, modeling of landscapes genetics, geographic information systems, and ecoagriculture. He teaches course in riparian ecology and river forum. His current research includes modeling river channel migration in large semi-arid river systems, California and France; drivers of riparian stand heterogeneity and species composition using field data and LiDAR technology; modeling physical drivers and age structure of cottonwood forest habitat: an integrated systems approach; watershed connectivity of large woody debris, Japanese archipelago; and landscape genetic modeling to predict dispersal patterns in pond-breeding, terrestrial salamanders.

**Fisk**, **Terry.** PhD student, Division of Hydrologic Sciences, Desert Research Institute, 2215 Raggio Parkway, Reno, NV 89512, Terry.Fisk@dri.edu, www.dri.edu.



Mr. Terry Fisk is a graduate student with the Desert Research Institute, Division of Hydrologic Sciences, and the University of Nevada, Reno. His research interests are related primarily to groundwater, and range from the affects of climate change on groundwater resources to modeling groundwater systems to understanding groundwater – surface water interaction. In particular, he extremely interested in applying science to formulating policy and implementing management decisions regarding water and other natural resources. Mr. Fisk entered graduate school in August 2008 after many years working in both government and the private sector. Most recently, Mr. Fisk was the hydrogeologist for Death Valley National Park between June 2001 and July 2008. He managed the Park's water resources program including water rights protection and research into local and regional water resources. Before becoming an employee of the National Park Service, Mr. Fisk worked for almost 14 years for a consulting engineering company in Washington and Oregon. His work focused on evaluation of water resources, and environmental contaminant investigation and remediation. He also spent 4 years with a small water well drilling company in Washington State after graduating from the University of Washington. Mr. Fisk has a Bachelor of Science in geology from the University of Washington and is a registered professional geologist in Oregon.

**Gautam**, **Mahesh.** Post-Doctoral Fellow, Desert Reseach Institute, 755 E. Flamingo Road, Las Vegas, NV 89119, mahesh.gautam@dri.edu, www.dri.edu.

Dr. Gautam obtained his BE in Civil Engineering from Panjab Engineering College, India in 1990, Master of Engineering from Asian Institute of Technology (AIT) in Water Engineering and Management in 1997, and Ph.D. in hydrology from Saitama University, Japan in 2000. Prior to joining Desert Research Institute in 2008, he has worked in different roles and responsibilities in both developing and developed world. He began his career as a water supply and sanitation engineer in Nepal and worked for almost 5 years in the design, planning and management of rural water supply and sanitation projects. Before continuing his Ph.D. research in Japan, he worked for a brief period as a JICA (Japan International Cooperation Agency) research fellow in AIT and developed flood forecasting models of various basins in Thailand. While his Ph.D. works in Japan was related to understanding runoff generation processes in forested catchments and modeling of hydrological processes in such basins, his post-doctoral

research works were mainly focused in development of environmental monitoring and decision support systems. From 2004 to 2008 he worked both as a lecturer in the civil engineering department of Institute of Engineering, Nepal and as a co-coordinator of water resources program in Nepal Development Research Institute. He has contributed in research and consulting works related to public-private partnership in solid waste management, community-based flood disaster management, and integrated water resources management and modeling of a river basin in Nepal. His major research interests are watershed modeling, development of decision support systems for water and environmental problems, climate change impact assessments, mitigation and adaptation measures. He is currently working with Dr. Kumud Acharya in the stormwater management Best Management Practices, river restoration and other research activities of Urban Flood Demonstration Program. Similarly, he is also working with Dr. Zianting Zhu in the flood frequency analysis of arid and semi-arid regions under climate change scenarios, and application of artificial neural networks in the development of pedo-transfer function for soil-hydraulic properties estimation. He is a member of International Association of Hydrologic Sciences (IAHS), American Geophysical Union (AGU), and Nepal Engineering Association.

**Jia**, **Lijuan.** PhD student, Civil Engineering, University of New Mexico, lijuan@unm.edu.

Ms. Lijuan Jia began her PhD program in UNR's Graduate Program for Hydrologic Sciences in the fall of 2008. Prior moving to the U.S., she earned master's degree in June 2008 from Hohai University, China. Ms. Jia has a strong background in agricultural and environment engineering, remote sensing, hydrologic modeling. After one year in the Hydrologic Sciences program at DRI, she joined the Water Resources Group in the Civil Engineering Department at UNM. Ms. Jia's research is focused on the influence of surface water and groundwater interactions on riparian evapotranspiration.

**Johns**, **Ryan.** College student, Environmental Science, Diné College, P.O.Box 1092, Waterflow, NM 87421, jons421@hotmail.com, www.dinecollege.edu.

**Kee, Tanya.** College student, Environmental Science, Diné College, P.O. Box 865, Shiprock, NM 87420, kee_tanya@yahoo.com, www.dinecollege.edu.


**Kelly**, **Susan.** Interim Director, School of Law, Utton Transboundary Resources Center, University of New Mexico, School of Law, 1117 Stanford NE, MSC11 6070, 1, Albuquerque NM 87131-0001, skelly@law.unm.edu, http://lawschool.unm.edu/faculty/directors/kelly/index.php.

Susan Kelly received her B.A. in 1977 from Arizona State University, and her J.D. 1981 from University of New Mexico School of Law. Susan Kelly joined the Utton Center in 2003 as associate director and became interim director in July 2009. As interim director of the Utton Center, she is responsible for the overall operations of the center, which includes working on projects related to the center's mission of helping stakeholders who share a water resource manage the resource instead of litigating over it. Kelly works with all of the major water institutions in New Mexico – nonprofit, federal and state. She also works with law students on projects related to water rights. During the Spring 2009 semester, she co-taught a law school course, Practical Application of Water Law. Kelly, with co-author Geoff Klise, wrote "How Science Can Provide Pathways to Solutions — The Technical Toolbox", published in the 2007 New Mexico Tech Decision-Makers Field Guide. In 2009, she wrote "Urban Water Administration in the Albuquerque Urban Area" and moderated the New Mexico Tech Decision-Makers conference. As a follow-up to an earlier symposium on the reservoirs along the Rio Grande, Kelly organized a special edition of the Natural Resources Journal (Summer 2007, Vol. 47, No. 3) that was devoted to the laws and policies of the Rio Grande reservoirs in New Mexico. Her article, "Modeling Reservoir Storage Scenarios by Consensus", was included in that edition. Kelly is a member of New Mexico State Bar Association, Natural Resources Section, the American Planning Association and the American Institute of Certified Planners. Prior to joining the Utton Center in 2003, she was the water rights manager for the City of Albuquerque, where she managed the city's water rights portfolio, including the acquisition and transfer of water rights and administration of the city's well permits and water storage contracts. She was part of a team implementing the city's

future water strategy, including surface water diversion and non-potable water permitting. She also represented the city in regional and statewide water resource planning projects. Kelly worked in community and regional planning for eight years, including policy development and infrastructure capital planning. In private practice, she primarily dealt with real estate and business clients. She occasionally serves as an arbitrator for New Mexico's Second Judicial District Court, hearing small claims as referred by the court.

**Moore**, **Lucy.** Facilitator, Lucy Moore Associates, Incorporated, 5 Seton Plaza, Santa Fe, NM, 87508, Albuquerque, NM, lucymoore@lucymoore.com, http://www.lucymoore.com.

Ms. Lucy Moore, President of Lucy Moore Associates, Inc. is pleased to offer mediation, facilitation, consultation and training services. In practice since 1985, Ms. Moore has a depth of experience and wisdom in the field of natural resource and public policy dispute resolution that is hard to equal. Her professionalism and ability to communicate across a variety of differences and barriers enable her to help find solutions to complicated issues. Clients include Federal, State, Local and Tribal governments and agencies, as well as organizations and private interests. Although her practice has included cases involving a wide range of environmental and public policy issues, her focus in recent years has been on water (rights, quality and management), air quality, hazardous waste disposal, management of noise, endangered species, Indian education and other tribal issues. Ms. Moore's dedication and passion comes from her own experiences, particularly those working across cultures, and her deep belief in the right of those impacted by a decision to have a voice in that decision. Throughout her life she has had a desire to find the common ground and make things better for those in conflict. After graduating from college, she made a cultural leap from Cambridge, Massachusetts, to Chinle, Arizona, where she spent over seven years in the heart of Navajo country. This experience is the subject of her memoir, "Into the Canyon: Seven Years in Navajo Country. Those formative years gave her invaluable insights into the role of an "outsider" in another culture, and helped her understand her own strengths and weaknesses -- both personally and professionally. This kind of honest reflection is key to Ms. Moore's success as a mediator, author, and citizen. Ms. Moore is also an accomplished writer and author. Her book, Into the Canyon: Seven Years in Navajo Country, was the recipient of the "Willa Award for Best Memoir 2005" from Women Writing the West. In addition to the paperback version, the book is now available in a beautifully bound 9CD set. To further add to the authenticity, this unabridged CD version was recorded in her own voice. Ms. Moore adds that personal touch and professionalism to all that she does.

**Stone**, **Mark.** Assistant Professor, Civil Engineering, University of New Mexico, MSC01 1070, 1 University of New Mexico, Albuquerque, NM 87131-0001, stone@unm.edu.

Dr. Mark Stone received a B.S. in 1998 in biological systems engineering from the University of Nebraska; a M.S. in 2000 in civil engineering from Washington State University; and a PhD in 2005 in civil engineering from Washington State University. Dr. Stone's research interests are in the ecological engineering aspects of riverine processes. His goal is to improve understanding of the quantitative influences of abiotic parameters (river form, nutrient content, temperature, sediment load, oxygen content, and contaminant load) on ecological processes. Specific interest is in engineering applications to restoration and management impacts in urban, forested, agricultural, and impounded settings. Experience is primarily in field observations and numerical investigations related to fish passage at hydroelectric dams.

**Stone**, **Asa B.** Social Psychologist, Desert Research Institute; Central New Mexico Community College, asako.stone@dri.edu or asastone@unm.edu.

Dr. Asa B. Stone is from Japan, and she moved to the U.S. after she graduated from high school in 1997. She obtained her Ph.D. in experimental psychology with a minor in political science at Washington State University in 2006. She completed her postdoctoral fellowship in social psychology at the Desert Research Institute in Las Vegas, Nevada. She currently teaches at Central New Mexico Community College where her research interests include effects of social identity on intergroup relationships, effects of communication patterns on decision making, and on fostering sustainable behavior. Dr. Stone's research interests also include social-political aspects of environmental issues, especially of global climate change. She is interested in understanding effects of environmental uncertainty on human reactions (i.e., perception, attitudes, and behavior) in order to promote pro-ecological behavior (e.g., water and utility conservation, recycling). Dr. Stone is interested in alleviating and preventing inter-group (e.g. inter-states, inter-basins, and international) conflict stemmed from social identity of involved parties.

# Innovation Working Group (IWG) Workshop Stakeholder Survey

**The Effects of Climate change on Ecosystems and Societies: A Focus on Native American & Hispanic Communities**

**Please help us maintain our high standards by filling out this evaluation completely.**

**I. Please rate the workshop facilitator from 1 to 5 (1 poor, 3 satisfactory, 5 excellent).**

| Please rate **the facilitator's** | **Poor** | | **Satisfactory** | | **Excellent** |
|---|---|---|---|---|---|
| Knowledge of the effects of climate change | 1 | 2 | 3 | 4 | 5 |
| Understanding of Native American communities | 1 | 2 | 3 | 4 | 5 |
| Understanding of Hispanic communities | 1 | 2 | 3 | 4 | 5 |
| Understanding of rural communities | 1 | 2 | 3 | 4 | 5 |
| Ability to hold your attention | 1 | 2 | 3 | 4 | 5 |
| Use of relevant examples | 1 | 2 | 3 | 4 | 5 |
| Skill at using questions to improve understanding | 1 | 2 | 3 | 4 | 5 |
| Effectiveness in addressing your questions | 1 | 2 | 3 | 4 | 5 |
| Facilitation of participants' dialogue | 1 | 2 | 3 | 4 | 5 |
| Overall facilitator rating | 1 | 2 | 3 | 4 | 5 |

**II. Please rate the effectiveness (1 to 5, 1 not at all effective, 3 moderately effective, 5 highly effective) of this workshop in meeting these two objectives.**

| | | | | | |
|---|---|---|---|---|---|
| Provide a dialogue with Native American and Hispanic populations in order to identify research priorities that will better protect these vulnerable communities | **1** | **2** | **3** | **4** | **5** |
| To identify strategies for applying climate, hydrological, and ecological models to improve understanding of possible ecosystem changes and mitigation options in the face of climate change. | **1** | **2** | **3** | **4** | **5** |

**III. In your opinion, what are the environmental research priorities important to Native American and/or Hispanic communities?**

**IV. In which of these areas do you work? (Please circle all that apply):**

HYDROLOGY SOCIAL SCIENCE ENGINEERING POLICY

**Comments about your work:**

**V. How much did you benefit from participating in this workshop?**

**Not much** **A little** **Some** **Quite a bit** **A great deal**

**VI.** Rate the **overall quality** of this workshop from **1 to 5** (1 poor, 3 satisfactory, 5 excellent): _____

**VII. We welcome comments or recommendations** that would be helpful for improving future IWG workshops (use the back of this sheet if you need more space).

# Innovation Working Group (IWG) Workshop Researcher Survey

**The Effects of Climate change on Ecosystems and Societies: A Focus on Native American & Hispanic Communities**

**Please help us maintain our high standards by filling out this evaluation completely.**

**I. Please rate the workshop facilitator from 1 to 5 (1 poor, 3 satisfactory, 5 excellent).**

| Please rate **the facilitator's** | **Poor** | | **Satisfactory** | | **Excellent** |
|---|---|---|---|---|---|
| Knowledge of the effects of climate change | 1 | 2 | 3 | 4 | 5 |
| Understanding of Native American communities | 1 | 2 | 3 | 4 | 5 |
| Understanding of Hispanic communities | 1 | 2 | 3 | 4 | 5 |
| Understanding of rural communities | 1 | 2 | 3 | 4 | 5 |
| Ability to hold your attention | 1 | 2 | 3 | 4 | 5 |
| Use of relevant examples | 1 | 2 | 3 | 4 | 5 |
| Skill at using questions to improve understanding | 1 | 2 | 3 | 4 | 5 |
| Effectiveness in addressing your questions | 1 | 2 | 3 | 4 | 5 |
| Facilitation of participants' dialogue | 1 | 2 | 3 | 4 | 5 |
| Overall facilitator rating | 1 | 2 | 3 | 4 | 5 |

**II. Please rate the effectiveness (1 to 5, 1 not at all effective, 3 moderately effective, 5 highly effective) of this workshop in meeting these two objectives.**

| | | | | | |
|---|---|---|---|---|---|
| Provide a dialogue with Native American and Hispanic populations in order to identify research priorities that will better protect these vulnerable communities | **1** | **2** | **3** | **4** | **5** |
| To identify strategies for applying climate, hydrological, and ecological models to improve understanding of possible ecosystem changes and mitigation options in the face of climate change. | **1** | **2** | **3** | **4** | **5** |

**III. Do you plan to generate a competitive research proposal to NSF focused on the interactions between natural and human systems?** If yes, please briefly describe.

**IV. In which of these areas do you do research (please circle all that apply):**

HYDROLOGY SOCIAL SCIENCE ENGINEERING POLICY

**Comments about your research:**

**V. How much did you benefit from participating in this workshop?**

**Not much** **A little** **Some** **Quite a bit** **A great deal**

**VI.** Rate the **overall quality** of this workshop from **1 to 5** (1 poor, 3 satisfactory, 5 excellent): _____

**VII. We welcome comments or recommendations** that would be helpful for improving future IWG workshops (use the back of this sheet if you need more space).

**I. The effects of climate change on ecosystems and societies: A Focus on Native American and Hispanic communities**

**Western Tri-State Consortium IWG Proposal**

**Lead Investigator:**

Nevada:
- Karletta Chief Ph.D., Division of Hydrologic Sciences, Desert Research Institute (karletta.chief@dri.edu)

**Co-Investigators:**

Idaho:
- Jan Boll, Ph.D., Department of Biological and Agricultural Engineering, University of Idaho (jboll@uidaho.edu)
- Barbara Cosens, J.D., School of Law, University of Idaho (bcosens@uidaho.edu)
- Alexander Fremier, Ph.D., Department of Fish and Wildlife Resources, University of Idaho (afremier@uidaho.edu)

Nevada:
- Terry Fisk, the Graduate Program of Hydrologic Sciences, University of Nevada, Reno (terry.fisk@dri.edu)
- Asako Stone Ph.D., Division of Hydrologic Sciences, Desert Research Institute (asako.stone@dri.edu)

New Mexico:
- Julie Coonrod, Ph.D., Department of Civil Engineering, University of New Mexico (jcoonrod@unm.edu)
- Susan Kelly, J.D., The Utton Transboundary Resources Center, School of Law, University of New Mexico (skelly@law.unm.edu)
- Mark Stone, Ph.D., Department of Civil Engineering, University of New Mexico (stone@unm.edu)

**Date of Submission:**

July 1, 2009

## II. Project Summary

Current and future shifts in meteorological conditions caused by global climate change will substantially alter hydrologic regimes in the western US. Anticipated effects include likely increases in the frequency, duration, and magnitude of drought, and the frequency and magnitude of flooding. Vulnerability to these hydrologic shifts may be highest for minority communities at the margins of the dominant society who have undefined water rights, and who have less political and economic power. Thus, it is vital that hydrologic models and water policies consider the effects of climate change on at-risk communities in their development stages. The purpose of this Innovation Working Group (IWG) is to develop research ideas that will couple the effects of climate change on ecosystems and societies while focusing on potential impacts to Native American and Hispanic communities. The objective of the IWG is to host a workshop where hydrologists, ecologists, and social scientists convene to (1) invite stakeholders and experts to offer their perspectives and concerns on potential impacts, and how potential impacts and mitigation can be incorporated into long-term planning related to climate change, (2) discuss how climate and hydrological models can be improved to identify and mitigate risks to these vulnerable populations, and (3) jointly write a cross-cutting proposal to NSF. To facilitate open discussion and brainstorming, the initial two days will be open to the public. In particular, stakeholders and experts representing Native American tribes and Hispanic acequias will be invited as active workshop participants. The proposed IWG is composed of diverse institutions and expertise (i.e. ecological engineering, water resources engineering, psychology, environmental law, and Indian water rights) and includes significant participation by women, underrepresented groups, early-career scientists, postdoctoral fellows, and students. The proposed research to NSF will take a holistic approach to address complex interactions of socio-political and biophysical systems affected by climate change. The proposed IWG is transformative in nature due to its application of science to policy and decision making with an emphasis on populations at the margins of the dominant society. Given the projected impact of climate change on water resources, the proposed research is envisioned as a model study that can be extended to other Native American tribes throughout the country. It can also be used for the evaluation and protection of rights of minority groups during negotiations regarding allocation and use of water resources or other resources.

## III. Project Description

### Problem Statement

Western U.S. water has been controlled for decades by the "iron triangle" of (1) the U.S. Congress, (2) federal and state agencies, and (3) private interest groups. Throughout the west, the goal of the dominant society has been to conquer nature and extract natural resources. Nearly unfettered private resources development was allowed and encouraged, and often subsidized. However, "Indians and Hispanics were resolutely dealt out" of water projects large and small (Wilkinson 1992). The Public Trust Doctrine has been added recently to the vocabulary of westerners. The public trust is the concept that the public has overriding interests in major water resources that cannot be granted away to any single segment of the population (Wilkinson 1992). Despite this recent doctrine and the recognition of Indian reserved water rights in 1908 (*Winters v. United States*), most Indian water rights remain undefined. Today, Indian water rights are quantified through stream adjudication, and/or negotiated settlement. Tribes often pursue negotiated settlements, because they result in authorization of state and federal funding to develop infrastructure for implementation of the settlement. Additional challenges facing Indian water rights include legal uncertainty concerning tribal rights to groundwater, limitations on development following settlement due to environmental protection such as the Endangered Species Act, jurisdictional disputes between tribes and states regarding control and administration of water, and tribes' right to water marketing. In addition, recent economic concerns have resulted in a backlog of settlements awaiting authorization by Congress. Despite the seniority of most tribal water rights, the lag in federal assistance for development have moved tribal projects to the end of the line where they will bear the greatest impact with a reduced water supply. Another minority group struggling to maintain and define historical and cultural water rights are the acequia communities in New Mexico. These acequias consist of Hispanic farmers who built irrigation canals along the Rio Grande and its tributaries and for centuries, used it as a method to share water resources for irrigation and domestic purposes for which today, continue to be vital to their cultural and economic survival. Acequia organizations seek to protect not only water rights, but to protect their communities by trading on the strengths of self-governance and by increased involvement in water and land policy. Currently as water becomes more of a commodity in New Mexico, acequias face competition for water from industry, growth of cities, and commercial agricultural uses. Therefore, it is clear that for these two minority groups, Native Americans and Hispanic, protection of water rights is very important and thus it is critical for consideration of their water rights be considered and implemented for water management policies designed to consider climate change scenarios.

### Project Purpose

The proposed Innovation Working Group (IWG) has the following three objectives:

1) To host a workshop that includes participation from Native American tribes and acequias, experts and researchers working in water rights for tribes and acequias and a diverse group of climate change researchers from Idaho, New Mexico, and Nevada. The workshop has two clear sub-objectives: a) To provide a dialogue with Native American and Hispanic populations in order to identify research priorities that will better protect these vulnerable communities, and b) to identify strategies for applying climate, hydrological, and ecological models to improve understanding of possible ecosystem changes and mitigation options in the face of climate change.
2) To generate a competitive research proposal to NSF focused on the interactions between natural and human systems; and
3) To catalyze research between the Tri-State Consortium climate change researchers including hydrologists, social scientists, engineers, and policy experts.

The proposed IWG is question-driven and product-oriented: we attempt to improve our understanding of Native American and Hispanic water resources issues from primary sources in order to produce a competitive cross-cutting NSF proposal with application values to Dynamics of Coupled Natural and Human Systems (CNH), Science of Science and Innovation Policy (SciSIP), or Cross-Directorate Activities (CDA). The proposed IWG is collaborative and synthesis oriented and it addresses the objectives of all three of the states' EPSCoR programs.

### Participating States

All three western tri-state EPSCoR states will participate in the proposed IWG. The four participating institutions include the University of Idaho (Idaho), Desert Research Institute (Nevada), University of Nevada Reno (Nevada), and University of New Mexico (New Mexico). Included in the proposal is participation from two undergraduates studying environmental science at Diné College, a tribal college on the Navajo Nation, and who have recently completed a watershed restoration course offered by DRI.

### Proposed IWG Topics and Activities

Topics: The proposed IWG will focus on ways to identify the effects of climate change on ecological and social systems and to develop mitigation strategies. Specifically, we will focus on changes in water resource regimes and

surrounding ecosystems due to climate change and the affects on communities at the margins of the dominant culture in Idaho (Nez Perce), Nevada (Southern Paiutes), and New Mexico (Navajo, Pueblos, and acequias). The proposed research topics were selected based on their susceptibility and vulnerability to changing water resource regimes. For example, the Nez Perce Tribe faces destruction of salmon on the Snake, Clearwater, and Salmon rivers in Idaho, while Southern Paiute, Navajo and Pueblo tribes, and acequias of New Mexico face water rights issues. Water rights affected include groundwater and surface water in the Lake Tahoe, Rio Grande, Colorado, and San Juan rivers and their tributaries. It is apparent that the concerns of these communities and effects of climate change must be incorporated into future negotiations regarding water resources.

The IWG will examine a number of science- and policy-based strategies for minimizing the effects of climate change on these vulnerable communities. Strategies identified to date include enhancing storage of mountain runoff through meadow and riparian system restoration; considering low-impact off-channel storage and aquifer recharge; changes in irrigation methods and possibly crop varieties; revising aspects of western water law to favor conservation, reuse, banking, and aquifer storage; increasing the visibility of tribes, pueblos and acequia organizations with regard to the iron triangle of water institutions; education of community and political leaders across the spectrum of local, state, and federal agencies active in the states; and growth control boundaries to reduce or prevent continued urban sprawl that puts unwarranted pressure on aquatic systems and water resources.

Activities: The proposed IWG includes three major activities: a workshop, development and submission of a cross-cutting NSF proposal, and development of experience/results sharing strategies. The workshop will be held for three days (with the first two days open to the public) and will be convened at Hyatt Regency Tamaya Resort & Spa in Santa Ana Pueblo, NM. The objective of the workshop is to better understand Native American water rights issues in the participating states from primary sources. Thus, stakeholders and subject experts from Nez Perce tribe in Idaho, Walker Lake and Pyramid Lake Paiute tribes in Nevada, and Navajo and Pueblo tribes in New Mexico will be invited to share their knowledge, perceptions, and concerns regarding climate change and water resources. Representatives of the New Mexico Acequia Association and The Acequia Institute will be invited to discuss similar issues related to their specific circumstances. For the last day of the workshop, the Tri State Consortium researchers will strategize on how to best utilize the teams combined modeling expertise to address the priorities addressed through the first two days' discussions. The researchers will also identify techniques for more directly addressing stakeholder concerns encompassed by this project. For example, Nevada researchers are currently investigating the potential impacts of climate change on water re-allocation strategies now being developed for the Walker River Basin using climate change model results in conjunction with a hydrologic model of the watershed and an ecological model of the lake. Such an approach can be used to answers questions such as: "Will current and proposed water allocation decisions be sustainable under a changing climate?" and "Will proposed mitigation actions be robust enough to account for the full range of potential climate change scenarios?"

Development and submission of a cross-cutting NSF proposal will be based on information gathered through the workshop and on identified strategies in which science could be applied to improve conditions of vulnerable communities. We anticipate that we will submit our proposal to one of the following identified cross-cutting NSF programs: Dynamics of Coupled Natural and Human Systems (CNH), Science of Science and Innovation Policy (SciSIP), or Cross-Directorate Activities (CDA). Incorporating the workshop results and proposal development and submittal experiences into the IWG participants' expertise, experience/results sharing strategies will be developed. We anticipate that our strategies will take the form of campus seminar newsletters for participating institutes, and online materials for the state EPSCoR websites.

**IWG Convening Dates and Participants**

The proposed IWG will convene on October 19 through October 21 at Hyatt Regency Tamaya Resort & Spa in Santa Ana Pueblo, NM. The proposed IWG participants include the investigators of the proposal, stakeholder representatives from each state, and researchers in water rights. The first two days of the proposed convening is a workshop that is open to the public. During the workshop, we anticipate participation of graduate students in relevant areas of studies. In order to foster their attendance to the proposed workshop, we will advertise the event throughout the participating institutions. The table summarizes participating stakeholders.

| Stakeholders & Experts | | State | Position |
|---|---|---|---|
| 1 | Gwendolyn Carter | ID | Nez Perce |
| 2 | Ryan Sudbury | ID | Nez Perce Attorney |
| 3 | Jason John | NM | Navajo Nation Hydrologist |
| 4 | Stanley Pollack | NM | Navajo Nation Water Rights Attorney |
| 5 | Derrith Watchman-Moore | NM | Cabinet Secretary, NM Environmental Dept. |
| 6 | Everett Chavez | NM | Santo Domingo Pueblo Governor; EPA National Tribal Operations Comm. Member |
| 7 | Jessica Alberly | NM | Pueblo water rights Attorney |
| 8 | Mervin Wright, Jr. | NV | Pyramid Lake Paiute Tribal Chairman |
| 9 | Dr. Bonnie G. Colby | AZ | Indian Water Rights Expert |
| 10 | Pamela Garcia | NM | Acequia Association |
| 11 | Dr. José A. Rivera | NM | Acequia Researcher and Author |

**Timetable**

Pre-meeting Coordination (8/15/09 – 10/16/09): Pre-meeting coordination includes but not limited to

- Formally invite and confirm stakeholder participants from each state
- Advertise the workshop (open to public)
- Secure meeting facility space, reserve hotel rooms, book the flights for the participants

Working Group Agenda (10/19/09 – 10/23/09): General agenda for the convening is the following

Day 1 (10/19/09)

- Workshop: presentations from Native American stakeholders
  - Environmental justice: water rights, equity, and stakeholder environment
  - Human aspects of water resource management: economy, culture, society
  - Indian Water Rights: definition, current state, challenges, future strategies
  - Discussions and proposal research question generation

Day 2 (10/20/09)

- Workshop: presentation from the participants, discussion, and proposal research task development

Day 3 (10/21/09):

- Discussion and finalization of proposal research tasks and proposal details (intellectual merit, transformativeness), and discussion and development of education/ dissemination strategies

Post-meeting Coordination (10/26/09 – 11/30/09): List of the deliverables include but not limited to

- Summary report of the workshop including education, outreach, and dissemination strategies
- Submission of a NSF proposal
- Final project report (due December 1, 2009)

**Anticipated outcomes and benefits**

Anticipated outcomes of the proposed IWG include initiation of effective communications with vulnerable communities in Idaho, Nevada, and New Mexico, submission of a competitive proposal to a cross-cutting program of NSF, and development of strategic plans to collaborate with the participants in research and education efforts in the future. Anticipated benefits of the proposed IWG include: improving the competitiveness of the three EPSCoR states, fostering success of the tri-state EPSCoR climate change efforts, measurably benefiting tribes and acequias, developing solid concepts for research and education regarding water resources and climate change, encouraging underrepresented scientists and institutes to engage in cross-cutting research and education efforts, and exposing young scientists such as MS and Ph.D. students and postdoctoral fellows with cross-cutting research projects and education efforts.

**Reference**

Wilkinson, C. 1992. Crossing the Next Meridian, Land, Water and the Future of the West. Island Press. Washington D.C. 376 pg.

## IV. Budget and Budget Justification

| BUDGET CATEGORIES | YEAR 1 | | |
|---|---|---|---|
| **A. SENIOR PERSONNEL** | *MONTHS* | *RATE* | *AMOUNT* |
| a. J. Boll, UI | 0.15 | $ - | $ - |
| b. J. Coonrod, UNM | 0.15 | $ - | $ - |
| c. B. Cosens, UI | 0.15 | $ - | $ - |
| d. A. Fremier, UI | 0.15 | $ - | $ - |
| e. S. Kelly, UNM | 0.15 | $ - | $ - |
| f. M. Stone, UNM | 0.15 | $ - | $ - |
| **TOTAL SENIOR PERSONNEL** | | | **$ -** |
| **B. OTHER PERSONNEL** | *MONTHS* | *RATE* | *AMOUNT* |
| **1. Post Doctoral Associates** | | | |
| a. Karletta Chief, DRI | 0.15 | $ - | $ - |
| b. Asako B. Stone, DRI | 0.15 | $ - | $ - |
| **2. Other Professionals** | | | |
| **3. Graduate Students** | | | |
| a. Terry Fisk, UNR | 0.15 | $ - | $ - |
| b. Lijuan Jia, UNM | 0.15 | $ - | $ - |
| **4. Undergraduate Students** | | | |
| a. Environmental Science Undergrad, Diné College | 0.15 | $ - | $ - |
| b. Environmental Science Undergrad, Diné College | 0.15 | $ - | $ - |
| **5. Secretarial - Clerical** | | | |
| **6. Other** | | | |
| a. Gwendolyn Carter, Nez Perce Water Resources Director, ID | 0.10 | $ - | $ - |
| b. Ryan Sudbury, Nez Perce Attorney, ID | 0.10 | $ - | $ - |
| c. Jason John, Navajo Hydrologist, NM | 0.10 | $ - | $ - |
| d. Stanley Pollack, Navajo Attorney, NM | 0.10 | $ - | $ - |
| e. Derrith Watchman-Moore, Cabinet Secretary, NM | 0.10 | $ - | $ - |
| f. Everett Chavez, Santo Domingo Governor, NM | 0.10 | $ - | $ - |
| g. Jessica Alberly, Pueblo Water Rights Attorney, NM | 0.10 | $ - | $ - |
| g. Mervin Wright Jr., Pyramid Lake Paiute Chairman, NV | 0.10 | $ - | $ - |
| h. Dr. Bonnie G. Colby, Indian Water Rights Expert, AZ | 0.10 | $ - | $ - |
| i. Pamela Garcia, Director, Acequia Assoc., NM | 0.10 | $ - | $ - |
| j. Dr. José A. Rivera, Director, Acequia Researcher, NM | 0.10 | $ - | $ - |
| **TOTAL OTHER PERSONNEL** | | | **$ -** |
| **TOTAL SALARIES & WAGES (A + B)** | | | **$ -** |
| **C. FRINGE BENEFITS** | | *RATE* | *AMOUNT* |
| a. Professional staff | | 43.5% | $ - |
| b. Graduate student | | 12.3% | $ - |
| c. Post Doc | | 34.5% | $ - |
| d. Technical | | 49.8% | $ - |
| e. Hourly | | 2.4% | $ - |
| **TOTAL FRINGE BENEFITS** | | | **$ -** |
| **TOTAL SALARIES, WAGES, & FRINGE BENEFITS (A+B+C)** | | | **$ -** |
| **D. EQUIPMENT** | | | $ - |
| **TOTAL EQUIPMENT** | | | $ - |
| **E. TRAVEL** | | | |
| **1. Domestic** | | | |
| a. Trips for workshop | | | |
| i. Lodging | 28 | $ 151 | $ 4,215 |
| ii. Per diem | 28 | $ 49 | $ 1,372 |
| iii. Airfare | 8 | $ 300 | $ 2,400 |
| iv. Car Rental | 8 | $ 50 | $ 400 |
| v. Mileage | 3,020 | $ 0.55 | $ 1,661 |
| **2. Foreign** | | | |
| **TOTAL TRAVEL** | | | $ 10,048 |
| **G. OTHER DIRECT COSTS** | | | |
| **1. Materials & Supplies** | | | $ 250 |
| **2. Publication Costs/Documentation/Dissemination** | | | $ 250 |
| **3. Consultant Services** | | | $ - |
| **4. Computer Services** | | | $ - |
| **5. Subawards** | | | $ - |
| **6. Other** | | | |
| a. large conference room | 3 | $ 850 | $ 2,550 |
| b. food | 50 | $ 40 | $ 2,000 |
| c. audio, mic, projector, and screen | 1 | $ 600 | $ 600 |
| **Indirect Rate** | | | |
| **TOTAL OTHER DIRECT COSTS** | | | $ 5,050 |
| **H. TOTAL DIRECT COSTS (A THROUGH G)** | **$** | | **15,098** |

### JUSTIFICATION

**Travel:**
We request funding to cover 8 roundtrip airfare, hotel, car rental, and per diem for out-of-state participants and for per diem and mileage for Albuquerque residents. In addition, we request lodging for four in-state but out-of-town participants. A total of 9 faculty and students (including the PIs) will participate for 3 days and the remaining 12 stakeholders and water rights experts will participate for 2 days.

**Materials & Supplies:**
We request funds to cover registration packets that consist of a badge, presentation and other handouts, paper, and pencil.

**Publication Costs:**
We request funds to cover publication costs for the printing and dissemination of meeting results.

**Other:**
We request funds for a large conference room that will hold 25 persons for 3 days estimated at $850 per day. Also, we request funds for a continental breakfast and snack break on two days that stakeholders are present at $20 per event for 4 events for 25 persons. Finally, we request funds to cover costs of audio, microphone, projector, and screen for presentations which is $600.

**I. The effects of climate change on ecosystems and societies: A Focus on Native American and Hispanic communities**
**Western Tri-State Consortium IWG Proposal**

**RESPONSE TO REVIEWERS COMMENTS:**

**1) The proposed IWG agenda has 2 days of public meetings, and 1 day for the IWG participants to work together on a final product. The reviewers felt that 1 day was not enough time to make significant progress on a final product. In addition, the original concept of the IWG was not public outreach as much as collaboration among scientists and experts.**

- The proposed IWG agenda was revised so that the first day was devoted to presentations by Native American and Hispanic stakeholders and experts in Indian and acequias water rights. In addition, the second and third days are now devoted to a closed session where IWG participants work together to develop a NSF proposal, and produce a publication regarding "The effects of climate change on ecosystems and societies: A Focus on Native American and Hispanic communities" which includes a recommendation on how these high risk communities water needs in the face of climate change could be incorporated in climate and ecological models.

**2) It was suggested that the open public meeting be reduced to 1 day. The findings from this day would then be incorporated into the working groups efforts for the following 2 days.**

- The suggestion was incorporated into the IWG schedule and the open public meeting was reduced to 1 day. The second and third day are devoted to incorporating results and lessons learned from Day 1 into producing a proposal and a publication.
- A revised schedule is as follows:

**Timetable**
Working Group Agenda (10/19/09 – 10/23/09): General agenda for the convening is the following
Day 1 (10/19/09)
- Workshop: presentations from Native American stakeholders
- Environmental justice: water rights, equity, and stakeholder environment
- Human aspects of water resource management: economy, culture, society
- Indian Water Rights: definition, current state, challenges, future strategies
- Discussions and proposal research question generation
- Closing session

Day 2 (10/20/09)
- Identification of hypotheses and research tasks based on Day 1
- Outline results of the workshop and identify and prioritize action items based on Day 1
- Identify ways to effectively integrate natural, physical, and human science
- Identify ways to utilize proposed research to achieve ultimate objective
- Incorporate what we learned from the workshop into a NSF Proposal to "Dynamics of Coupled Natural and Human Systems"
- Identify action items beyond NSF proposals
- Begin to develop an informal publication stating results and outcomes of workshop

Day 3 (10/21/09):
- Discuss and finalize proposal research tasks and proposal details (intellectual merit, transformativeness), and discuss and develop education/ dissemination strategies
- Identify and allocate tasks to complete the identified proposal.

Post-meeting Coordination (10/26/09 – 11/30/09): List of the deliverables include but not limited to:

- Summary report of the workshop including education, outreach, and dissemination strategies
- Submission of a NSF proposal
- Final project report (due December 1, 2009)

**3) Reviewers felt that a professional facilitator would increase the productivity of the public stakeholders meeting and assist the lead investigator in conducting that portion of the IWG. The facilitator could be added to the budget.**

- In order to increase the productivity of the public stakeholders meeting, a professional facilitator, Julie Scanlin, with Idaho Water Resources Research Institute (IWRRI), was added to the budget. A facilitator's charge of $3800/mo including 39% at 0.25 months effort, per diem, airfare, car rental, and hotel was added to the budget. The revised budget is below. The change is highlighted in grey and is reflected in the revised total.

**4) The review committee seeks to remind all proposers that delivering the specified IWG product(s) is taken seriously by the Management Team. Significant progress towards a proposal or a paper is an anticipated result. Reviewers requested that consideration be given to the dissemination of this very important information either in peer reviewed or informal publication.**

- There are two goals of the IWG. The first is to produce a NSF Proposal to "Dynamics of Coupled Natural and Human Systems" (intellectual merit, transformativeness, educational outreach, and dissemination strategies). The second is to produce a publication regarding "The effects of climate change on ecosystems and societies: A Focus on Native American and Hispanic communities" that includes results form the workshop which will include a recommendation on how these high risk communities water needs in the face of climate change could be incorporated in climate and ecological models.

## IV. Budget and Budget Justification

| BUDGET CATEGORIES | YEAR 1 | | |
|---|---|---|---|
| **A. SENIOR PERSONNEL** | *MONTHS* | *RATE* | *AMOUNT* |
| a. J. Boll, UI | 0.15 | $ - | $ - |
| b. J. Coonrod, UNM | 0.15 | $ - | $ - |
| c. B. Cosens, UI | 0.15 | $ - | $ - |
| d. A. Fremier, UI | 0.15 | $ - | $ - |
| e. S. Kelly, UNM | 0.15 | $ - | $ - |
| f. M. Stone, UNM | 0.15 | $ - | $ - |
| **TOTAL SENIOR PERSONNEL** | | | **$ -** |
| **B. OTHER PERSONNEL** | *MONTHS* | *RATE* | *AMOUNT* |
| **1. Post Doctoral Associates** | | | |
| a. Karletta Chief, DRI | 0.15 | $ - | $ - |
| b. Asako B. Stone, DRI | 0.15 | $ - | $ - |
| **2. Other Professionals** | | | |
| a. Julie Scanlin, Facilitator, IWRRI | 0.25 | $ 5,282 | $ 1,321 |
| **3. Graduate Students** | | | |
| a. Terry Fisk, UNR | 0.15 | $ - | $ - |
| b. Lijuan Jia, UNM | 0.15 | $ - | $ - |
| **4. Undergraduate Students** | | | |
| a. Environmental Science Undergrad, Diné College | 0.15 | $ - | $ - |
| b. Environmental Science Undergrad, Diné College | 0.15 | $ - | $ - |
| **5. Secretarial - Clerical** | | | |
| **6. Other** | | | |
| a. Gwendolyn Carter, Nez Perce Water Resources Director, ID | 0.10 | $ - | $ - |
| b. Ryan Sudbury, Nez Perce Attorney, ID | 0.10 | $ - | $ - |
| c. Jason John, Navajo Hydrologist, NM | 0.10 | $ - | $ - |
| d. Stanley Pollack, Navajo Attorney, NM | 0.10 | $ - | $ - |
| e. Derrith Watchman-Moore, Cabinet Secretary, NM | 0.10 | $ - | $ - |
| f. Everett Chavez, Santo Domingo Governor, NM | 0.10 | $ - | $ - |
| g. Jessica Alberly, Pueblo Water Rights Attorney, NM | 0.10 | $ - | $ - |
| g. Mervin Wright Jr., Pyramid Lake Paiute Chairman, NV | 0.10 | $ - | $ - |
| h. Dr. Bonnie G. Colby, Indian Water Rights Expert, AZ | 0.10 | $ - | $ - |
| i. Pamela Garcia, Director, Acequia Assoc., NM | 0.10 | $ - | $ - |
| j. Dr. José A. Rivera, Director, Acequia Researcher, NM | 0.10 | $ - | $ - |
| **TOTAL OTHER PERSONNEL** | | | **$ 1,321** |
| **TOTAL SALARIES & WAGES (A + B)** | | | **$ 1,321** |
| **C. FRINGE BENEFITS** | | *RATE* | *AMOUNT* |
| a. Professional staff | | 43.5% | $ - |
| b. Graduate student | | 12.3% | $ - |
| c. Post Doc | | 34.5% | $ - |
| d. Technical | | 49.8% | $ - |
| e. Hourly | | 2.4% | $ - |
| **TOTAL FRINGE BENEFITS** | | | **$ -** |
| **TOTAL SALARIES, WAGES, & FRINGE BENEFITS (A+B+C)** | | | **$ 1,321** |
| **D. EQUIPMENT** | | | $ - |
| **TOTAL EQUIPMENT** | | | $ - |
| **E. TRAVEL** | | | |
| **1. Domestic** | | | |
| a. Trips for workshop | | | |
| i. Lodging | 31 | $ 151 | $ 4,666 |
| ii. Per diem | 31 | $ 49 | $ 1,519 |
| iii. Airfare | 9 | $ 300 | $ 2,700 |
| iv. Car Rental | 9 | $ 50 | $ 450 |
| v. Mileage | 3,020 | $ 0.55 | $ 1,661 |
| **2. Foreign** | | | |
| **TOTAL TRAVEL** | | | $ 10,996 |
| **G. OTHER DIRECT COSTS** | | | |
| **1. Materials & Supplies** | | | $ 250 |
| **2. Publication Costs/Documentation/Dissemination** | | | $ 250 |
| **3. Consultant Services** | | | $ - |
| **4. Computer Services** | | | $ - |
| **5. Subawards** | | | $ - |
| **6. Other** | | | |
| a. large conference room | 3 | $ 850 | $ 2,550 |
| b. food | 50 | $ 40 | $ 2,000 |
| c. audio, mic, projector, and screen | 1 | $ 600 | $ 600 |
| **Indirect Rate** | | | |
| **TOTAL OTHER DIRECT COSTS** | | | $ 5,050 |
| **H. TOTAL DIRECT COSTS (A THROUGH G)** | | | **$ 17,367** |

**JUSTIFICATION**

**Personnel:**
We request funding to hire a professional facilitator to increase the productivity of the IWG.

**Travel:**
We request funding to cover 9 roundtrip airfare, hotel, car rental, and per diem for out-of-state participants and for per diem and mileage for Albuquerque residents. In addition, we request lodging for four in-state but out-of-town participants. A total of 10 faculty, facilitator, and students (including the PIs) will participate for 3 days and the remaining 12 stakeholders and water rights experts will participate for 2 days.

**Materials & Supplies:**
We request funds to cover registration packets that consist of a badge, presentation and other handouts, paper, and pencil.

**Publication Costs:**
We request funds to cover publication costs for the printing and dissemination of meeting results.

**Other:**
We request funds for a large conference room that will hold 25 persons for 3 days estimated at $850 per day. Also, we request funds for a continental breakfast and snack break on two days that stakeholders are present at $20 per event for 4 events for 25 persons. Finally, we request funds to cover costs of audio, microphone, projector, and screen for presentations which is $600.

National Science Foundation
WHERE DISCOVERIES BEGIN

# Dynamics of Coupled Natural and Human Systems (CNH)

## CONTACTS

| Name | Dir/Div | Name | Dir/Div |
|---|---|---|---|
| Sarah Ruth-Lead Pgm. Director | GEO/AGS | Thomas Baerwald-Program Director | SBE/BCS |
| Nancy J. Huntly-Program Director | BIO/DEB | | |

## PROGRAM GUIDELINES

Solicitation 07-598

As announced on May 21st, proposers must prepare and submit proposals to the National Science Foundation (NSF) using the NSF FastLane system at http://www.fastlane.nsf.gov/. This approach is being taken to support efficient Grants.gov operations during this busy workload period and in response to OMB direction guidance issued March 9, 2009. NSF will continue to post information about available funding opportunities to Grants.gov FIND and will continue to collaborate with institutions who have invested in system-to-system submission functionality as their preferred proposal submission method. NSF remains committed to the long-standing goal of streamlined grants processing and plans to provide a web services interface for those institutions that want to use their existing grants management systems to directly submit proposals to NSF.

**Please be advised that the NSF Proposal & Award Policies & Procedures Guide (PAPPG) includes revised guidelines to implement the mentoring provisions of the America COMPETES Act (ACA) (Pub. L. No. 110-69, Aug. 9, 2007.) As specified in the ACA, each proposal that requests funding to support postdoctoral researchers must include a description of the mentoring activities that will be provided for such individuals. Proposals that do not comply with this requirement will be returned without review (see the PAPP Guide Part I: Grant Proposal Guide Chapter II for further information about the implementation of this new requirement).**

## *DUE DATES*

Full Proposal Deadline Date: November 17, 2009
Third Tuesday in November
Third Tuesday in November, Annually Thereafter

## SYNOPSIS

The Dynamics of Coupled Natural and Human Systems competition promotes quantitative, interdisciplinary analyses of relevant human and natural system processes and complex interactions among human and natural systems at diverse scales.

## EDUCATIONAL OPPORTUNITY

This program provides educational opportunities for Undergraduate Students, Graduate Students, K-12 Educators . Individuals interested in applying for funding should see the program guidelines above.

Source: http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=13681

# Dynamics of Coupled Natural and Human Systems (CNH)

***Program Solicitation***
***NSF 07-598***

## Replaces Document(s):
***NSF 06-587***

**National Science Foundation**

Directorate for Social, Behavioral & Economic Sciences

Directorate for Biological Sciences

Directorate for Geosciences

USDA Forest Service

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

January 08, 2008

November 18, 2008

Third Tuesday in November, Annually Thereafter

Third Tuesday in November

## REVISION NOTES

Dynamics of Coupled Natural and Human Systems (CNH) has been established as a multi-directorate program through coordination action by the Directorate for Biological Sciences, the Directorate for Geosciences, and the Directorate for Social, Behavioral, and Economic Sciences.

Starting with this solicitation, the Forest Service of the U.S. Department of Agriculture (USDA) will participate as a partner in the conduct of annual CNH competitions.

Please be advised that the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) includes revised guidelines to implement the mentoring provisions of the America COMPETES Act (ACA) (Pub. L. No. 110-69, Aug. 9, 2007.) As specified in the ACA, each proposal that requests funding to support postdoctoral researchers must include a description of the mentoring activities that will be provided for such individuals. Proposals that do not comply with this requirement will be returned without review (see the PAPP Guide Part I: *Grant Proposal Guide* Chapter II for further information about the implementation of this new requirement).

As announced on May 21st, proposers must prepare and submit proposals to the National Science Foundation (NSF) using the NSF FastLane system at http://www.fastlane.nsf.gov/. This approach is being taken to support efficient Grants.gov operations during this busy workload period and in response to OMB direction guidance issued March 9, 2009. NSF will continue to post information about available funding opportunities to Grants.gov FIND and will continue to collaborate with institutions who have invested in system-to-system submission functionality as their preferred proposal submission method. NSF remains committed to the long-standing goal of streamlined grants processing and plans to provide a web services interface for those institutions that want to use their existing grants management systems to directly submit proposals to NSF.

## SUMMARY OF PROGRAM REQUIREMENTS

## General Information

**Program Title:**

Dynamics of Coupled Natural and Human Systems (CNH)

**Synopsis of Program:**

The Dynamics of Coupled Natural and Human Systems competition promotes quantitative, interdisciplinary analyses of relevant human and natural system processes and complex interactions among human and natural systems at diverse scales.

**Cognizant Program Officer(s):**

- Sarah Ruth-Lead Pgm. Director, Lead Program Director, telephone: (703) 292-7594, email: sruth@nsf.gov
- Thomas Baerwald-Program Director, Program Director, telephone: (703) 292-7301, email: tbaerwal@nsf.gov
- Laura Gough-Program Director, DEB, telephone: (703) 292-7137, email: lgough@nsf.gov
- Nancy J. Huntly-Program Director, DEB, telephone: (703) 292-8481, email: nhuntly@nsf.gov

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

- 10.652 --- Forestry Research
- 47.041 --- Engineering
- 47.049 --- Mathematical and Physical Sciences
- 47.050 --- Geosciences
- 47.070 --- Computer and Information Science and Engineering
- 47.074 --- Biological Sciences
- 47.075 --- Social Behavioral and Economic Sciences
- 47.076 --- Education and Human Resources
- 47.078 --- Office of Polar Programs
- 47.079 --- Office of International Science and Engineering
- 47.080 --- Office of Cyberinfrastructure

- 47.081 --- Office of Experimental Program to Stimulate Competitive Research

## Award Information

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

**Estimated Number of Awards:** 7 to 12

**Anticipated Funding Amount:** $9,000,000 This total is for awards to be made annually, pending availability of funds.

## Eligibility Information

**Organization Limit:**

None Specified

**PI Limit:**

None Specified

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

None Specified

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

None Specified

## Proposal Preparation and Submission Instructions

**A. Proposal Preparation Instructions**

- **Letters of Intent:** Not Applicable
- **Preliminary Proposal Submission:** Not Applicable
- **Full Proposal Preparation Instructions:** This solicitation contains information that supplements the standard NSF Proposal and Award Policies and Procedures Guide, Part I: Grant Proposal Guide (GPG) proposal preparation guidelines. Please see the full text of this solicitation for further information

**B. Budgetary Information**

- **Cost Sharing Requirements:** Cost Sharing is not required under this solicitation.
- **Indirect Cost (F&A) Limitations:** Not Applicable
- **Other Budgetary Limitations:** Other budgetary limitations apply. Please see the full text of

this solicitation for further information.

**C. Due Dates**

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

  January 08, 2008

  November 18, 2008

  Third Tuesday in November, Annually Thereafter

  Third Tuesday in November

## Proposal Review Information Criteria

**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

**Award Conditions:** Standard NSF award conditions apply.

**Reporting Requirements:** Standard NSF reporting requirements apply.

## TABLE OF CONTENTS

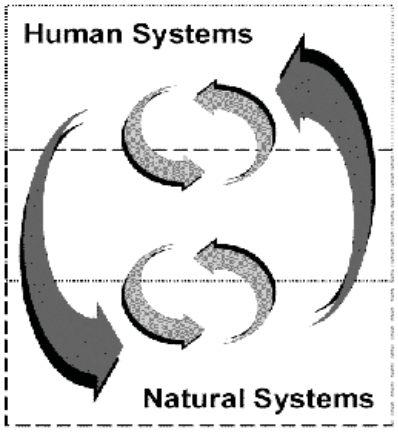
## I. INTRODUCTION

The Dynamics of Coupled Natural and Human Systems (CNH) is a multidirectorate program jointly operated by three NSF directorates (Biological Sciences; Geosciences; and Social, Behavioral, and Economic Sciences). In addition to those three directorates, other NSF units (including the Directorate for Engineering, the Directorate for Education and Human Resources, the Office of International Science and Engineering, and the Office of Polar Programs) participate in evaluation of proposals. Starting in FY 2008, the Forest Service of the U.S. Department of Agriculture (USDA) will participate as a partner in the conduct of annual CNH competitions. CNH is a direct successor of a special competition that was part of the Biocomplexity in the Environment emphasis area.

The CNH Program aims to support basic research and related activities that enhance fundamental understanding of the complex interactions within and among natural and human systems. Through its annual competition, CNH intends to make awards across a range of sizes from roughly $500,000 to no more than $1,500,000. Budgets should be developed at scales appropriate for the project to be conducted.

## II. PROGRAM DESCRIPTION

The Dynamics of Coupled Natural and Human Systems (CNH) Program supports basic research and related activities that enhance fundamental understanding of the complex interactions within and among natural and human systems. CNH focuses on the complex interactions among human and natural systems at diverse spatial, temporal, and organizational scales. CNH seeks to advance basic knowledge about the system **dynamics** -- the processes through which systems function and interact with other systems. CNH-supported projects must examine relevant **natural AND human systems**. Proposals cannot focus solely or largely on either human systems or on natural systems. Projects also must examine the full range of **coupled** interactions and feedbacks among relevant systems. The arrows in the accompanying figure symbolize these relationships.




In order to be most competitive, CNH proposals must demonstrate how the proposed research is well grounded in relevant theory from a range of appropriate fields. They generally will focus on one or a limited number of specific questions that emanate from the theoretical discussion and review of relevant literature. They must outline and specify a scientifically sound research plan, typically cast in terms of testable hypotheses, and they must show considerable promise that the research results will contribute to enhancement of theory within and across relevant fields. To the extent possible, projects should try to improve capabilities for predicting the responses of systems to endogenous and exogenous changes, including appropriate estimates of uncertainty in model predictions.

To attain project goals, the investigative teams conducting CNH research should have expertise that matches the range of systems to be examined and activities to be undertaken. The team should include expertise from the natural sciences (biological sciences, geosciences, and/or physical sciences) and human sciences (social sciences, behavioral sciences, and/or engineering). Involvement of individuals with expertise in quantitative approaches and in education is also expected.

The CNH Program fully supports the overall goals of the Biocomplexity in the Environment priority area from which it evolved. Biocomplexity refers to the dynamic web of often-surprising interrelationships that arise when biological, physical, and human components of the global ecosystem interact. Special characteristics of biocomplexity research studies in an environmental context include a high degree of interdisciplinarity and a focus on systems that likely exhibit highly non-linear behavior.

In addition to basic new knowledge and enhanced theory regarding the complex ways that people and natural systems interact, CNH seeks to develop the capabilities of people and tools needed to advance these areas of research in the future. CNH seeks to foster and develop interdisciplinarity by bringing researchers from different disciplines into teams, by developing new methods and expertise, and by reaching beyond the borders of the United States for partners in inquiry. In the process, the next generation of researchers will learn to work in diverse teams, cross disciplinary boundaries, and use advanced sensing and monitoring, communication, and information technologies to work across many scales of time and space.

CNH projects include three integrative elements:

- An integrated, quantitative, systems-level method of inquiry is essential. Because of the complex nature of systems under investigation, treatment of non-linearities, feedback processes, and integration across temporal or spatial scales is necessary. Qualitative and other approaches may complement quantitative approaches, but projects must use appropriate quantitative methods, and teams should include one or more individuals with demonstrated expertise in the quantitative methods to be used during the conduct of the project. Quantitative methods may include conceptual, mathematical, or computational models; numerical simulation; artificial intelligence techniques; statistics; visualization; or database development. Mathematical models should include appropriate estimates of uncertainty, and experiments should assess power and precision.
- Education must be addressed and integrated effectively. Competitive projects must integrate research and education. Those benefiting from educational experiences can include participants (such as undergraduates, graduate students, teachers, and postdoctoral associates) and individuals beyond those directly involved in the project. 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 and make informed decisions about the environment. Educational efforts at the K-12 level should promote the acquisition of scientific inquiry skills and take advantage of technology and use it appropriately. Investigators may target their education plans at any groups for which they believe their educational activities can be especially effective, but they must identify clearly what those groups are, what educational activities will be undertaken, who on the project team has the expertise to conduct the educational activities successfully, and how the performance of the educational activities will be evaluated. Investigators are encouraged to disseminate information about their educational activities (including assessment of the effectiveness of those activities) through publications and other appropriate media.
- A global perspective is encouraged. When appropriate and practical, specific international collaborations and networks for research and education are encouraged. CNH research projects may offer excellent opportunities for students at U.S. and foreign institutions to gain experience in the conduct of research in other countries. NSF awards normally are limited to the support of the U.S. portion of the collaboration. In the case of some developing countries, limited funds may be available to support the involvement of the foreign collaborator.

CNH-supported projects may be totally independent activities, or they may be conducted in association with existing projects or activities, including Long-Term Ecological Research sites, NSF Science and Technology Centers or NSF Engineering Research Centers, or similar group efforts. If the proposed activity is associated with other activities currently supported by NSF or other funders, the project description should make clear how the proposed work is different from but complimentary to activities for which support has already been acquired. A letter from the director of the ongoing activity or center agreeing to the proposed project should be included as Supplementary Documentation.

As part of the CNH competition, the U. S. Forest Service encourages proposals focused on

forest or grassland ecosystems at multiple spatial scales and across a continuum of human systems and densities ranging from urban to rural. Of particular interest are studies at the landscape to regional scale, where changes in both natural and human systems are occurring actively and interactively. Proposals are desired that focus on the dynamics of coupled human-forest/grassland systems and on multiple, interacting perturbations and stressors (local to global in scale) that are central to the ecological and human sustainability challenges faced by forest and/or grassland communities. Questions for Forest Service personnel regarding proposals may be directed to Ed Dickerhoof (edickerhoof@fs.fed.us) or Anne Hoover (ahoover@fs.fed.us).

A full list of awards supported in past CNH competitions can be accessed at http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=13681&from=fund.

## III. AWARD INFORMATION

Estimated program budget, number of awards and average award size/duration are subject to the availability of funds.

NSF and USDA Forest Service expect to have at least $9,000,000 available to support awards resulting from this competition. Support provided through this competition for awards across a range of sizes from roughly $500,000 to no more than $1,500,000. Budgets should be developed at scales appropriate for the project to be conducted.

Projects should be conducted for the length of time necessary to effectively conduct the project. No award may be more than five years in duration. Depending on the quality of proposals for projects of different size and the availability of funds, NSF anticipates making 7 to 12 awards.

## IV. ELIGIBILITY INFORMATION

The categories of proposers eligible to submit proposals to the National Science Foundation are identified in the Grant Proposal Guide, Chapter I, Section E.

**Organization Limit:**

None Specified

**PI Limit:**

None Specified

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

None Specified

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

None Specified

## V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

## A. Proposal Preparation Instructions

**Full Proposal Instructions:** Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the guidelines specified 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. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-PUBS (7827) or by e-mail from nsfpubs@nsf.gov.

**The following information deviates from the Grant Proposal Guide (*GPG*)**:

### Proposal Format

***Proposals not in conformance with the proposal-preparation requirements of the GPG will be returned without review. Please note, however, that the page limits contained in this solicitation take precedence over those given in the GPG.***

Proposals submitted for this competition should clearly specify all relevant parts of the proposed project. With respect to the proposed research, the proposal should outline the theoretical foundations of the project as based in relevant literature. It should specify the questions on which the research will focus, the research methods that will be used, the expertise that different researchers will bring to different facets of the project, and how and where results will be disseminated. With respect to education, the proposal should specify educational goals, what methods will be used to attain those goals, and the expertise of individuals who will participate in educational efforts. The proposal should also identify the proposed educational products, how those products will be disseminated, and how the effectiveness of educational activities will be evaluated.

This program solicitation requests material about the personnel involved in the project. Please use the following definitions to provide the corresponding information.

- ***Principal Investigators*** -- Individuals who would assume responsibility for an award resulting from this competition, would manage the award, and are listed on the cover sheet of the proposal.
- ***Senior Personnel*** -- All Principal Investigators, as well as any named other senior personnel who will receive salary support, as well as non-salaried senior investigators who will play lead roles in the conduct of the project. This group may include active participants in the research team from outside the U.S.
- ***Project Participants*** -- Every person involved with the research project, including students.

### Proposal Cover Sheet

Work on the Cover Sheet first. Check that the Awardee and Performing Organizations are correct. Highlight the Program Solicitation Number and click on the "Select" button. Your proposal will automatically be assigned to the correct directorate and division on the Cover Sheet. Prepare the remainder of the Cover Sheet.

**Project Description**

***All project descriptions are limited to 20 pages in length***. With the exceptions noted below, proposers may organize the different components of the project description as they wish.

The following sections **MUST** be included under separate headings in the project description:

- ***Results from Prior NSF Support.*** This section is required only for principal investigators and co-investigators who have received NSF funding in the last five years. (This section may be up to five pages in length.)
- ***Education Plan***. The research plan should include integrated educational activities as a part of the narrative. Highlight these integrated activities in this section by specifying the project's educational goals, the methods that will be used to attain those goals, how the educational activities will be evaluated, and the role of project personnel in educational efforts. If educational products are expected to result, describe those products and indicate how they will be disseminated. (This section is usually between 1 and 2 pages in length).
- ***Management Plan***. The following information should be provided: (1) a description of the management structure that will enable the team to work effectively; and (2) specification of the qualifications of each of the senior personnel as well as the contribution they are expected to make to the project. This section increases in importance as the number of senior personnel or institutions involved in the project increases. (This section is usually between 1 and 2 pages in length).
- ***Expected Project Significance***. This section should clearly specify what proposers expect will be the results and contributions of the project. The section should describe both the anticipated intellectual merit of the proposed work as well as its anticipated broader impacts. Intellectual merit and broader impacts are NSF's two primary merit review criteria, and major items to be considered in each one are specified in Section VI.A. of this solicitation. Examples illustrating activities likely to demonstrate broader impacts also are available electronically at http://www.nsf.gov/pubs/gpg/broaderimpacts.pdf. Education and international activities are among the examples. (This section is usually about 1 page in length.)

**Biographical Sketches**

A biographical sketch with a 2-page limit must be provided for each investigator and each person identified as senior personnel.

**Current and Pending Support**

Each person identified as a principal investigator or as senior personnel must submit a current and pending support form. This proposal is considered a pending support activity.

**Supplementary Documentation**

Items 1 and 2 below are required to be included in this section for all proposals. Items 3 and

4 should be included here if needed.

1. Provide a list in a single, alphabetized table with the full names and institutional affiliations of all people in conflict of interest with any of the senior personnel (PI, Co-PIs, and any named personnel whose salary is requested in the project budgets). Conflicts to be identified are (a) primary Ph.D. thesis advisors and advisees, (b) collaborators or co-authors, including postdocs, for the past 48 months, and (c) any other individuals or organizations with which the investigator has financial ties (please specify type).

2. Provide a description of the project's data management and access plan, as a maximum 2-page supplementary document. This information should be clearly identified by the subheading "Data Management and Access." NSF realizes that individual cases may differ widely and recognizes that any 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 and samples to be produced in the project;
- The standards for data format and metadata content that will be used (where existing standards are absent or inadequate, this should be pointed out for the benefit of the program and the reviewing community);
- Policies for access including provisions for appropriate protection of privacy, confidentiality or intellectual property rights;
- Policies for re-use, distribution, or the production of derivatives; and
- Plans for archiving data and samples and preservation of access.

The data management and access plan will be 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 and within the Results of Prior Research section when they submit subsequent proposals to NSF.

3. Include in this section letters of commitment from any entity that is an integral part of the proposed project, such as the involvement of an international collaborator or permission to access sites, materials, or data for research or other associated project activities. Generic letters of endorsement are not allowed, however.

4. If you wish to do so, you may include in this section IRB certifications associated with the use of human subjects or IACUC certifications associated with the use of animals subjects.

Unless authorized here or in the *Grant Proposal Guide*, no other materials should be included in this section. Survey or interview protocols are not permitted in this section, nor are reprints of articles previously published by the investigators. Proposals that include materials in this section that belong in the project description may be returned without review.

**Appendices**

No appendices are permitted.

**Proposals Involving Multiple Institutions**

Proposals involving multiple organizations may be submitted in one of two ways: (1) as a single proposal with one organization serving as the lead organization and with support to other organizations provided through subawards, or (2) as separate submissions from eligible organizations. See Chapter II, D.3 of the *GPG* for instructions regarding the preparation of collaborative proposals and carefully follow on-line instructions regarding their preparation.

**Proposals Involving Collaborators at Foreign Organizations**

Proposers are reminded they must provide biographical sketches of all senior project personnel, including those at foreign institutions. In addition, as supplementary documentation, proposals involving foreign collaborators must provide letters of commitment from the foreign counterpart institutions. Please note that although eligibility for this competition is restricted to U.S. organizations, as described in the *GPG*, collaborations with foreign institutions may be considered. Any funding for non-U.S. organizations must be made through subawards. Those subawards to non-U.S. organizations may not include any indirect costs.

**Human Subjects**

If the project involves human subjects, the Institutional Review Board (IRB) of the submitting organization must certify that the proposed project is in compliance with the Federal Government's "Common Rule" for the protection of human subjects. If IRB approval has been obtained and the date of approval is listed on the cover sheet, no other certification is required. If IRB approval is still pending, submit certification of IRB approval in electronic form as soon as approval is obtained to the cognizant program officer. (The name of this program officer will be listed in the Proposal Status module of FastLane.) Delays in obtaining IRB certification may result in NSF being unable to make an award. For more information regarding the protection of human subjects, consult http://www.nsf.gov/bfa/dias/policy/human.jsp.

**Pre-Submission Checklist**

CNH proposals must be in compliance with the *GPG* and special requirements in the solicitation in order to be considered for review. Proposals not in compliance with these requirements will be returned without review. Please refer to the following checklist to address some of the items required in all proposals:

- Font and margin requirements
- Page numbers on pages
- Project summary that includes a description of broader impacts
- Project description that is 20 pages or less and includes separate sections for Results from Prior Support, Education Plan, Management Plan, and Project Significance
- Biographical Sketches (including collaborators and advisors/advisees) for all senior personnel
- Conflict of Interest spreadsheet submitted in the Supplementary Documentation section
- Data Management and Access Plan submitted in the Supplementary

Documentation section

Proposers are reminded to identify the program solicitation number (NSF 07-598) 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.

## B. Budgetary Information

**Cost Sharing:** Cost sharing is not required under this solicitation.

**Other Budgetary Limitations:**

Almost all CNH funding is expected to be available for awards to be made based on evaluation of proposals submitted for this competition. NSF intends to make awards across a range of sizes from roughly $500,000 to no more than $1,500,000. Support for any award in this category will not exceed a cumulative total of $1,500,000 for the duration of the award. Budgets should be developed at scales appropriate for the project to be conducted. No award may be more than five years in duration.

**Budget Preparation Instructions:**

Budgets should include travel funds for Principal Investigators to attend a workshop or meeting of those supported in this program every 1 to 2 years.

**Research Platform Support:**

Specific amounts for research cruises, polar logistics, arctic logistics, or use of aircraft or other atmospheric sciences field facilities should not be included in the budget request. However, the PI should submit the UNOLS request, OPP logistics form, or ATM facilities form with the proposal.

## C. Due Dates

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

  January 08, 2008

  November 18, 2008

  Third Tuesday in November, Annually Thereafter

  Third Tuesday in November

## D. FastLane Requirements

Proposers are required to prepare and submit all proposals for this program solicitation through use of the NSF FastLane system. Detailed instructions regarding the technical aspects of proposal preparation and

support, call the FastLane Help Desk at 1-800-673-6188 or e-mail 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.

## VI. NSF PROPOSAL PROCESSING AND REVIEW PROCEDURES

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

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:**

Successful CNH proposals must be highly interdisciplinary, address the inherent complexity and highly coupled nature of natural and human systems, be well grounded in theory, and show great promise for enhancing basic theoretical understandings. Quantitative approaches, education, and global perspectives also are important. Research projects must include quantitative approaches or advanced conceptual models to study the systems chosen for investigation. Projects must also include specific plans for education. If appropriate, projects will be given consideration if they promote the development of long-term international partnerships.

In the evaluation of proposals submitted by teams of investigators, considerations in addition to standard NSF review criteria are:

- Strength of the collaborations planned and degree of interdisciplinarity
- Effectiveness of the group organization and management plan
- Quality and expected significance of the educational activities
- Strength of the dissemination plans
- Extent, effectiveness, and long-term potential of collaborations with industries, national laboratories, and researchers outside the U.S., when appropriate.

Descriptions of educational activities should specify goals, methods to attain those goals, and the expertise of individuals to accomplish them. Thus, they will be evaluated based on:

- Potential interest to and appropriateness for the audience targeted
- Quality of planning and appropriateness of personnel

- Feasibility and potential for resulting in a disseminable product
- Integration and complementarity to the research efforts
- Focus on integrated learning and discovery and the preparation of U.S. students for a broad set of careers in environmental fields.

## B. Review and Selection Process

Proposals submitted in response to this program solicitation will be reviewed by Ad hoc Review and/or 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.

# VII. AWARD ADMINISTRATION INFORMATION

## A. Notification of the Award

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.)

## B. Award Conditions

An NSF award consists of: (1) the award letter, which includes any special provisions applicable to the

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. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from 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.

## C. Reporting Requirements

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.

Failure to provide the required annual or final project reports 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.

# VIII. AGENCY CONTACTS

General inquiries regarding this program should be made to:

- Sarah Ruth-Lead Pgm. Director, Lead Program Director, telephone: (703) 292-7594, email: sruth@nsf.gov
- Thomas Baerwald-Program Director, Program Director, telephone: (703) 292-7301, email: tbaerwal@nsf.gov
- Laura Gough-Program Director, DEB, telephone: (703) 292-7137, email: lgough@nsf.gov
- Nancy J. Huntly-Program Director, DEB, telephone: (703) 292-8481, email: nhuntly@nsf.gov

For questions related to the use of FastLane, contact:

- FastLane Help Desk, telephone: 1-800-673-6188; e-mail: fastlane@nsf.gov.

## IX. OTHER INFORMATION

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 SCIENCE FOUNDATION

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

  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

National Science Foundation
WHERE DISCOVERIES BEGIN

# Science of Science and Innovation Policy (SciSIP)

**Additional Funding Opportunities**

In addition to the research funding opportunities described in this program description, the SciSIP program has two NSF Dear Colleague Letter publications. One is Dear Colleague Letter: Grants for Rapid Response Research (RAPID) to Study the Impact of the Economic Stimulus Package and to Advance the Scientific Understanding of Science Policy and the other one is Dear Colleague Letter: for Creating New Cyber-enabled Data on Innovation in Organizations.

**CONTACTS**

| Name | Email | Phone | Room |
|---|---|---|---|
| **Julia I. Lane** | jlane@nsf.gov | (703) 292-5145 | |

**PROGRAM GUIDELINES**

Apply to PD 09-7626 in FastLane. (standard Grant Proposal Guidelines) apply.)

As announced on May 21st, proposers must prepare and submit proposals to the National Science Foundation (NSF) using the NSF FastLane system at http://www.fastlane.nsf.gov/. This approach is being taken to support efficient Grants.gov operations during this busy workload period and in response to OMB direction guidance issued March 9, 2009. NSF will continue to post information about available funding opportunities to Grants.gov FIND and will continue to collaborate with institutions who have invested in system-to-system submission functionality as their preferred proposal submission method. NSF remains committed to the long-standing goal of streamlined grants processing and plans to provide a web services interface for those institutions that want to use their existing grants management systems to directly submit proposals to NSF.

**Please be advised that the NSF Proposal & Award Policies & Procedures Guide (PAPPG) includes revised guidelines to implement the mentoring provisions of the America COMPETES Act (ACA) (Pub. L. No. 110-69, Aug. 9, 2007.) As specified in the ACA, each proposal that requests funding to support postdoctoral researchers must include a description of the mentoring activities that will be provided for such individuals. Proposals that do not comply with this requirement will be returned without review (see the PAPP Guide Part I: Grant Proposal Guide Chapter II for further information about the implementation of this new requirement).**

***DUE DATES***

Full Proposal Deadline Date: September 9, 2010
September 9, Annually Thereafter
September 09, Annually Thereafter

**SYNOPSIS**

The Science of Science & Innovation Policy (SciSIP) program supports research designed to advance the scientific basis of science and innovation policy. Research funded by the program thus develops, improves and expands models, analytical tools, data and metrics that can be applied in the science policy decision making process. For example, research proposals may develop behavioral and analytical conceptualizations, frameworks or models that have applications across a broad array of

SciSIP challenges, including the relationship between broader participation and innovation or creativity. Proposals may also develop methodologies to analyze science and technology data, and to convey the information to a variety of audiences. Researchers are also encouraged to create or improve science and engineering data, metrics and indicators reflecting current discovery, particularly proposals that demonstrate the viability of collecting and analyzing data on knowledge generation and innovation in organizations.

Among the many research topics supported are:

- examinations of the ways in which the contexts, structures and processes of science and engineering research are affected by policy decision,
- the evaluation of the tangible and intangible returns from investments in science and from investments in research and development,
- the study of structures and processes that facilitate the development of usable knowledge, theories of creative processes and their transformation into social and economic outcomes,
- the collection, analysis and visualization of new data describing the scientific and engineering enterprise.

The SciSIP program invites the participation of researchers from all of the social, behavioral and economic sciences as well as those working in domain-specific applications such as chemistry, biology, physics, or nanotechnology. The program welcomes proposals for individual or multi-investigator research projects, doctoral dissertation improvement awards, conferences, workshops, symposia, experimental research, data collection and dissemination, computer equipment and other instrumentation, and research experience for undergraduates. The program places a high priority on interdisciplinary research as well as international collaboration.

Investigators are encouraged to submit proposals of joint interest to the SciSIP Program and other NSF programs and NSF initiative areas. The program places a high priority on broadening participation and encourages proposals from junior faculty, women, other underrepresented minorities, Research Undergraduate Institutions, and EPSCoR states. The program also supports small grants that are time-critical and small grants that are high-risk and of a potentially transformative nature (see Grants for Rapid Response Research (RAPID) and EArly-concept Grants for Exploratory Research (EAGER).)

For program specific guidelines on the Doctoral Dissertation Improvement Grants in SciSIP, please visit: Doctoral Preparation Checklist. The Division of Science Resources Statistics (SRS) will provide special support for Doctoral Dissertation Research Improvement Grants that utilize SRS datasets.

Source: http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=501084&org=SBE&sel_org=SBE&from=fund

National Science Foundation
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# Cross-Directorate Activities (CDA)

**CONTACTS**

| Name | Dir/Div | Name | Dir/Div |
|---|---|---|---|
| Fahmida Chowdhury | SBE/OAD | Monique Moore | SBE/SES |

## PROGRAM GUIDELINES

Apply to PD 04-1397 in FastLane. (standard Grant Proposal Guidelines) apply.)

As announced on May 21st, proposers must prepare and submit proposals to the National Science Foundation (NSF) using the NSF FastLane system at http://www.fastlane.nsf.gov/. This approach is being taken to support efficient Grants.gov operations during this busy workload period and in response to OMB direction guidance issued March 9, 2009. NSF will continue to post information about available funding opportunities to Grants.gov FIND and will continue to collaborate with institutions who have invested in system-to-system submission functionality as their preferred proposal submission method. NSF remains committed to the long-standing goal of streamlined grants processing and plans to provide a web services interface for those institutions that want to use their existing grants management systems to directly submit proposals to NSF.

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**DUE DATES:** Full Proposal Accepted Anytime

Due Date Clarification

- Unsolicited CDA proposals: accepted any time.
- Other Programs: deadlines according to relevant solicitations.

## SYNOPSIS

The Cross-Directorate Activities (CDA) program encompasses a collection of SBE and Foundation-wide activities that provide support for human resource development and infrastructrue improvement in the SBE sciences. The CDA program office directly administers the SBE Minority Postdoctoral Research Fellowships and Follow-up Research Starter Grants(MPRF) and the SBE Research Experiences for Undergraduates (REU) Sites competitions. In addition to the traditional disciplinary areas, the SBE CDA Program is interested in receiving REU Site proposals and MPRF applications that focus on the following emerging and/or multidisciplinary themes as they involve human behavior and social and economic systems: renewable energy, climate change, extreme weather events, water resources, dynamics and quality, cyberinfrastructure, computer simulation and algorithms, virtual organizations, cyber-enabled learning and discovery, complex adaptive systems, learning theories, computation and cognition, computational social science, etc. The CDA Program Director also acts as the SBE representative to a number of NSF-wide, crosscutting programs such as CAREER, GK-12, ADVANCE, and EPSCoR. The CDA Program may fund **unsolicited** proposals for special studies, analyses, and workshops on topics affecting social, behavioral, and economic sciences, particularly issues that span divisional boundaries. *Interested persons should discuss their ideas with the program director prior to submitting proposals. These proposals may be submitted any time.*

Source: http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5412&org=NSF&sel_org=XCUT&from=fund