Environmental and Natural Research Funding at Universities: Patterns and Responses

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www.ncseonline.org
Outline of talk

• Introduction to NCSE
• Recent federal funding trends of environmental and conservation research.
• Impacts on universities
  – Trends
  – Responses
• National Science Foundation – Science, Engineering and Education for Sustainability (SEES)
I. Introduction to NCSE

Mission:
to improve the scientific basis of environmental decisionmaking.
Mission – improving the scientific basis for environmental decision-making
Programs – foster collaboration between diverse institutions and individuals (research, education, environmental, and business organizations as well as governmental bodies)
  ▪ Education and Careers
  ▪ Science Solutions
  ▪ Science Policy
  ▪ International Council for Science and Environment

Environmental Internship Clearinghouse
STRENGTHENING EDUCATION & CAREER DEVELOPMENT

University Affiliate Program
Council of Environmental Deans and Directors (CEDD)

http://www.ncseonline.org/cedd

- Top Environmental Leaders at Affiliate Universities
- Curriculum, including Climate Solutions Curriculum
- Careers, including Environmental Alumni Career Study and Campus to Careers Program
- Program Administration
- Interdisciplinary Hiring, Tenure and Promotion
Council of Energy Research and Education Leaders (CEREL)

http://www.ncseonline.org/cerel

- Top Academic Energy Leaders
- Research Funding Advocacy
- Curriculum and Careers
- Program Administration
- Communications and Outreach
- In partnership with APLU
- 33% discount for affiliates
National Conference on Science, Policy and the Environment

Goal: develop pathways to solutions on conference theme

Partners – All communities
• “the Davos of the Environment”
• 2-3 days, 800-1,200 participants
• Multi-sector: research, education, business, civil society, government
• Learn, network, and develop strategies to combine science and policy to yield real-world solutions
• A launch pad for new initiatives and partnerships
SAVE THE DATE

Disasters and Environment
SCIENCE, PREPAREDNESS, AND RESILIENCE
13th National Conference on Science, Policy and the Environment
January 15-17, 2013
Ronald Reagan Building & International Trade Center, Washington, D.C.

National Council for Science and the Environment
Improving the scientific basis for environmental decisionmaking

www.DisastersandEnvironment.org
Handbook of Federal Funding for Environmental R&D

• NCSE’s online Handbook of Federal Funding for Environmental Research & Development (R&D) was created to help faculty and administrators at universities and colleges identify opportunities for funding in the environmental and energy fields. The handbook covers a broad range of federal agencies and offices, describing how each office engages in environmental research and highlighting opportunities for universities to participate in federal extramural research.

• The updated handbook now includes:
  – A comprehensive survey of $9 billion in federal funding for environmental R&D
  – A report of trends in federal funding for environmental R&D
  – Programmatic descriptions of federal agencies and offices engaging in environmental research, as well as links to sources of federal funding for extramural research

• The password-protected handbook is available exclusively to University Affiliate schools
Trends in Environmental R&D Agencies
Changes from FY03 to FY12, FY03 = 100

Source: AAAS Research & Development series and agency budget documents. FY 2012 is the latest estimate.
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R&D Changes by Function Since 2003
change from FY 2003 to FY 2012, FY 2003 = 100

Source: OMB R&D data, agency budget justifications, and agency budget documents. FY 2012 is the latest estimate. Environment includes natural resources R&D.
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NSF By the Numbers

NSF Twenty Year Budget History by Account
in Millions of Current Dollars

- Research & Related Activities
- Education & Human Resources
- Academic Research Infrastructure
- Major Research Equipment & Facilities Construction
- Agency Operations & Award Management
- Office of Inspector General
- National Science Board
2012 Census of Environmental & Sustainability Academic Programs

• All 1638 4-year HE institutions in U.S. – 2010 Carnegie Classification (76 multiple campus FP)
• Interdisciplinary/broad programs
• Discipline & professional fields with specializations
• Minors/certificates
• Center & Institutes
Trends: Rapid Growth in HE Institutions Hosting Programs

- Total N=1552
- Doctoral/Research Very High Research N=108
- Doctoral/Research High Research N=98
- Doctoral N=75
- Masters Large N=380
- Masters Medium N=166
- Masters Small N=96
- Baccalaureate Arts & Sciences N=266
- Baccalaureate Diverse Fields N=319
- Baccalaureate Associates N=44

2012 2008
IE Degree Types

Environmental Sciences
N=748

Environmental Studies
N=459

Sustainability
N=141

Other
N=511

- Bachelors
- Masters
- PhD
- Total
Administration R&D Priorities

• Promoting **sustainable** economic growth and job creation
• Defeating the most dangerous diseases and achieving better **health** outcomes
• Moving toward a **clean energy** future
• Understanding, adapting to, and mitigating the impacts of **global climate** change
• Managing competing demands on **natural resources**, based on **sustainability** and **biodiversity**
• Developing the technologies to protect our troops, citizens, and national interests (**security**)
CLIMATE ENERGY
Obama administration agenda on climate and energy

• “Washington may not be ready to get serious about energy independence, but I am…”
• Inaction is not an option that is acceptable to me…– not on energy, not on the economy, and not at this critical moment.”

• “we will transform the way we use energy”
• largest ever increase in funding for basic research
Hot Research Areas

• Climate Change and Energy
  – water issues,
  – livelihood issues,
  – ecological restoration
  – extreme events
  – disaster preparedness
  – security
  – health effects of energy choice
  – vulnerable populations
  – adaptation
  – alternative energy and conservation
  – sustainability
The future of energy

• Transition to the age of renewables
  – Scientific advances in non-energy fields have great potential to transform the future supply and use of energy
    • Nano/bio/microbio/info/cogno science and technology
    • Behavioral and social sciences
    • Interplay between energy and other natural resources
2012 SRN Awards

Joseph Ryan (PI) – University of Colorado Boulder

*Routes to Sustainability for Natural Gas Development and Water and Air Resources in the Rocky Mountain Region.*

Requested amount: $11.1 million

Klaus Keller (PI) - Pennsylvania State University

*What are Sustainable Climate-Risk Management Strategies?*

Requested amount: $11.9 million
Water

• Water Quality Decisionmaking

• Demand/Use

• Health/Pollution

• Research Funding lagging
Forecasting

- Bio- and Eco- Informatics
- Regional Forecasting
- Sensors and Sensor Networks
- Remote and Ground-Based
Indicators

• Sustainable Communities
• Economic, Social Environment
• Health and Environmental Impact Assessment
• Cumulative Impacts of Multiple Stressors
Research Trends

• Emphasis on collaborative research and big science aided by sensing and computation technology
• National Ecological Observatory Network
• Decline of single investigator research
• Integration of research and education
• Citizen and participatory science
Common Themes

• Cross Disciplinary
• Problem-Oriented
• Impacts and Effects
• Integration of Social Sciences
• Translation of science into policy
• Long Term
• Private-Public
• Substantial Investment
• Sustainability
• Social science
• Communication
• Diversity – broader impacts
Impacts on Universities

- Land grant and comprehensive universities throughout the West are looking to DoI, USDA, EPA, NASA and NOAA for supporting the next generation of research, but budgets are declining rapidly.

- USGS seems to have successfully passed through their evolution from more of a basic science to more of an applied science and technical assistance agency. Thus they are competing less with universities.

- Over 9000 cooperative agreements have been created through the Cooperative Ecosystem Services Unit (CESUs), but now federal contracting officers are increasingly reluctant to use cooperative agreements to work with universities.
Impacts on Universities

• As the research mission at many institutions has increased, and as the pressure on university faculty to obtain sponsored projects (and the indirect costs that come with them), there are many more faculty competing for research awards. This is especially true at NSF.

• Many older faculty have good pipelines of support established through years or decades of cooperative research.

• Younger faculty are really in a bind. Sure there are some programs focusing on young investigators, but they are a drop in the bucket. The federal resource management agencies will continue to provide an important avenue for research funding to develop our younger faculty.
Impacts on Universities

• The federal resource management agencies will continue to provide an important avenue for research funding to develop our younger faculty.
• Concern about continued budget cuts and financial impacts on universities.
• Many researchers trying to compete for NSF funding, but NSF focus is on fundamental research.
• NSF Science, Engineering and Education for Sustainability Initiative provides opportunities, but success rates are only 20%.
Responses by Universities

- faculty are looking to other places for research support.
- more funding support and engagement from Industry.
- increasing cross-university collaboration
Responses by Universities

- Ohio State three $50K seed grant teams that 1). Have to seek grants totaling over $3 million and 2). Must involve at least two different colleges.
- OSU website to help faculty learn about others with a similar interest. Key words for each person; key words will be cross-linked so you can use key words to find people who have used that same key word.
- More "upstream" activities such as engaging agencies in their process of designing grants and increasing communication with agency program managers. More help (budget help, proposal writing) to researchers who are writing grants.
NSF OVERVIEW
for AC-ERE

Dr. Margaret Cavanaugh
(AD GEO Acting)

September 12, 2012

Advisory Committee for Environmental Research and Education (AC-ERE)
NSF OVERVIEW
for AC-ERE

Dr. Margaret Cavanaugh
(AD GEO Acting)

September 12, 2012

Advisory Committee for
Environmental Research and
Education (AC-ERE)
NSF by the Numbers (FY 2011 data)

• $6.9B appropriations (excludes special or donated funds)
• 1,875 Colleges, universities, and other institutions receiving NSF funding
• 51,600 proposals evaluated through a competitive merit review process
• 11,200 competitive awards funded
• 262,000 proposal reviews conducted
• 276,000 estimated number of people NSF supports directly (researchers, postdoctoral fellows, trainees, teachers, and students)
• 44,000 students supported by NSF Graduate Research Fellowships since 1952
## NSF FY2013 Budget

**Total:** $7.373 B  
**Increase:** $340 M  
**4.8% over FY12 enacted**

### FY 2013 Budget Request

<table>
<thead>
<tr>
<th>NSF Budget by Appropriation (dollars in millions)</th>
<th>FY 2011 Actual</th>
<th>FY 2012 Estimate</th>
<th>FY 2013 Request</th>
<th>Change Over FY 2012 Estimate</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Amount</td>
</tr>
<tr>
<td>Research and Related Activities</td>
<td>$5,608.38</td>
<td>$5,689.00</td>
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<tr>
<td>National Science Board</td>
<td>4.47</td>
<td>4.44</td>
<td>4.44</td>
<td>-</td>
</tr>
<tr>
<td>Office of Inspector General*</td>
<td>14.00</td>
<td>14.20</td>
<td>14.20</td>
<td>-</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>$ 6,912.55</strong></td>
<td><strong>$7,033.10</strong></td>
<td><strong>$7,373.10</strong></td>
<td><strong>$340.00</strong></td>
</tr>
</tbody>
</table>

*Note: Totals may not add due to rounding.  
NSF FY12 & FY13 Agency Priority Goals

• Access to Digital Products of NSF-funded Research
  NSF will have established policies for public access to high-value data and software in at least two data-intensive scientific domains

• Undergraduate Programs
  80% of institutions funded through NSF undergraduate programs document the extent of use of proven instructional practices

• Innovation Corps
  80% of teams participating in the Innovation Corps program will have tested the commercial viability of their product or service
Balancing Priorities

OSTP/OMB Priorities
- Innovation
- Manufacturing
- Green Energy
- STEM Education
- Cyber-security
- Economy
- Jobs

NSF Priorities
- Fundamental research
- Interdisciplinary opportunities
- OneNSF goals
- Quality of STEM education
- Frontier infrastructure
- Early career students, faculty
- Building a diverse workforce
Science, Engineering, and Education for Sustainability (SEES)

- **Mission:**
  
  *To advance science, engineering, and education to inform the societal actions needed for environmental and economic sustainability and sustainable human well-being*

- Established in FY2010
- Cross-NSF investment
- Portfolio of existing and new programs
- System-based approaches
SEES Goals

• **Build the knowledge base:** Support interdisciplinary research and education that facilitates the move towards global sustainability

• **Grow the workforce of the future:** Develop a workforce trained in interdisciplinary scholarship needed to understand and address the complex issues of sustainability

• **Forge critical partnerships:** Build linkages among existing projects and partners and add new participants in the sustainability research enterprise
Program Areas

Climate Change Education - Jill Karsten (GEO)
PIRE – John Tsapogas (OISE)
Water Sustainability & Climate – Tom Torgersen (GEO)
Earth System Modeling – Dave McGinnis (SBE)
Ocean Acidification – Candace Majors (GEO)
RCN-SEES – Bruce Hamilton (ENG)
Dimensions of Biodiversity – Richard Inouye (BIO)
CNH – Sarah Ruth (GEO)
SEES Fellows – Charles Pibel (MPS)
Sustainable Energy Pathways - George Maracas (ENG)
Sustainable Research Networks - Sarah Ruth (GEO)
SEES in FY2013

- Budget request: $202.5M
- New programs in:
  - Coastal systems (Coastal SEES)
  - Arctic systems (ArcticSEES)
  - Hazards & Disasters (HazardSEES)
  - Sustainable Chemistry, Engineering and Materials (SusChem)
  - Improvements in IT energy efficiency (CyberSEES)
- Interdisciplinary, research partnerships, professional development

http://www.nsf.gov/sees
SEES programmatic Highlights (2012)

- SEES competitions: 11
- Total # full proposals: ~ 1200
- Total # awards: 140 to 150 (1 to 5 yrs)
- Programs with partners: 4
  - DoB: NASA, NSF-China, FAPESP(Brazil)
  - EaSM: DOE, USDA
  - PIRE: EPSRC & ESRC (UK), Inter-American Institute, JST (Japan), MES (Russia), USAID, US EPA
  - WSC: USDA
- Total funding: ~ 280M (over five years)
- New programs: 5
  - Arctic SEES, SuSChEM, Coastal SEES, Hazards & Cyber SEES
Proposals are due on September 14, 2012.

Research projects will focus on one or more thematic areas related to Arctic sustainability:

- the natural and living environment
- the built environment
- natural resource development
- governance

Seven directorates, five US agencies, and one international consortium will be jointly reviewing and funding meritorious proposals in FY13.
Engineering & Materials (SUSChEM)

- DCL: Opportunities for interdisciplinary research & education in chemical sciences & engineering related to sustainable synthesis, use and reuse of chemicals & materials (NSF 12-097)
- Advance science, engineering & education to inform societal actions aimed at environmental & economic sustainability
- Partnerships and educational experiences to train workforce strongly encouraged
- Existing programs with co-review & co-funding involving:
  - Chemical, Bioengineering, and Transport Systems & Civil, Mechanical and Manufacturing Innovation (Engineering)
  - Chemistry & Materials Research (MPS)
  - Earth Sciences (Geosciences)
COASTAL SEES (NSF 12-594)

- Multi-directorate (BIO, ENG, GEO, SBE) program that seeks to:
  - Enable place-based system-level understanding of coastal systems on variety of spatial & temporal scales
  - Yield outcomes with predictive value in coastal systems
  - Identify pathways by which outcome could be used to enhance coastal sustainability

- Proposals due January 17, 2013

- Two tracks
  - Incubator proposals (Track 1) --200 to 600K over 2 yrs
    (strongly encouraged in 1st round to build capacity)
  - Research Proposals (Track 2) -- up to $3M over 5 yrs
Climate Change Education Partnership

- Connects (1) climate scientists, (2) experts in theories on how people learn science, and (3) formal and informal education experts, with the goals of increasing public understanding of global climate change and preparing the next generation of scientists and educators.

- **EHR (DUE & DRL), GEO, BIO, OPP**

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>10 CCE awards in response to Dear Colleague Letter</th>
<th>15 CCEP-I awards (110 proposals): 2 years, up to $1M</th>
<th>12 supplements: Up to $250,000 each</th>
<th>6 CCEP-II awards (30 proposals): 5 years, $5-6M</th>
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<tbody>
<tr>
<td>FY 2009</td>
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<td>FY 2011</td>
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<tr>
<td>FY 2012</td>
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**FY 2013:**
- *Establish a CCEP Alliance Office*
- *Initiate Program-Wide Evaluation*
• **Pacific Islands Climate Change Education Partnership (#1239733) - $5.9 M**
  – S. Nelson-Barber (PREL), C. Fletcher (Univ. of Hawaii, Manoa), D. Hess (College of the Marshall Islands, Majuro), A. Sussman (WestEd)
  – Using culturally relevant, place-based curriculum to educate K-14 students of the US-Affiliated Pacific Islands about climate science and the unique impacts facing island residents, including sea level rise, ocean acidification, and coastal erosion.

• **Polar Learning and Responding: PoLAR Climate Change (#1239783) - $5.7 M**
  – S. Pfirman (Barnard), J. Lee (Columbia Univ.), P. Schlosser (Columbia Univ.), E. Sparrow (Univ. of Alaska, Fairbanks), R. Steiner (AMNH)
  – Using novel interactive gaming techniques in formal and informal settings to engage students in climate science and the impacts climate change will have on the polar regions.

• **National Network for Ocean and Climate Change (#1239775) - $5.5 M**
  – W. Spitzer (New England Aquarium), S. Bales (FrameWorks Institute), P. Boyle (AZA), J. Yoder (WHOI)
  – Using “interpreters” in aquariums to lead regional workshops to effectively convey climate science and impacts to students in an informal setting.
CCEP-II Awards

- **Making Global Climate Science Local: Implementing an Effective Model to Educate Key Influentials and Community Leaders (#1239797) - $4.9 M**
  - M. Boudrias (Univ. of San Diego), Mica Estrada-Hollenbeck (California State Univ., San Marcos), Alexander Gershunov (Scripps Inst. of Oceanography), Jeanne Silva-Send (Univ. of San Diego)
  - Developing training modules targeted toward “key influencers” to better understand how to communicate climate science and climate change impacts to community leaders and policymakers.

- **MADE-CLEAR: Maryland-Delaware Climate Change Education, Assessment, and Research (#1239758) - $5.6 M**
  - D. Boesch (Univ. of Maryland Center for Environmental Science), N. Brickhouse (Univ. of Delaware), Nancy Shapiro (Univ. System of Maryland), Nancy Targett (Univ. of Delaware)
  - Developing curricula for Maryland and Delaware public schools that communicate climate science and climate change impacts, and align with K-16 state standards for education.

- **Climate and Urban Systems Partnership (CUSP) (#1239782) - $5.9 M**
  - S. Snyder (The Franklin Institute), K. Crowley (Univ. of Pittsburgh), R. Horton (Columbia Univ. Center for Climate Systems Research)
  - Creating a partnership of several cities on the East Coast that use informal education venues and public outreach initiatives to broadly disseminate climate science to a variety of audiences.
PARTNERSHIPS FOR INTERNATIONAL RESEARCH & EDUCATION (PIRE)
Partnerships for International Research and Education

Examples of 2012 PIRE Awards

Mapping evolutionary process in the face of climate change: an integrated approach to education and conservation prioritization in Central Africa –UCLA-Cameroon, Gabon, United Kingdom, and Germany

Context Sensitive Implementation of Synergistic Water-Energy Systems- Univ. of S. Florida-Belize, Dominican Republic, Panama. United Kingdom

Developing Low-Carbon Cities in the USA China & India through Inter-Disciplinary Integration across Engineering Environmental Sciences Social Sciences & Public Health-U of Minnesota-India and China

Understanding marine biodiversity along geographic and anthropogenic stress gradients-San Diego State-Indonesia

Nuclear energy systems and materials under extreme conditions-Purdue-Russia, Japan, Germany, Ireland

Local to Global Scale Monitoring for a Sustainable Earth Dam and Levee System-Colorado School of Mines-Netherlands and France
WATER SUSTAINABILITY AND CLIMATE (WSC)
The GOAL of the Water Sustainability and Climate (WSC) solicitation is to understand and predict the interactions between the water system and climate change, land use (including agriculture), the built environment, and ecosystem function and services through place-based research and integrative models.
WHAT IS WSC?

...transformative systems science that builds upon research in four Directorate/Agency disciplines (BIO/AG, ENG, GEO, SBE).

...to portray the disciplinary processes and the coupling of those processes as a system

...at specific sites singly or in combination ... with or without ongoing observations

...that allow for spatial and temporal extrapolation to other regions, as well as integration across the different processes”

"Proposals that do not broadly integrate across the biological sciences, geosciences, engineering, and social sciences may be returned without review."
WSC 2010: $26M

- Cat 1: 65 submissions, 10 projects funded
- Cat 2: 67 submissions, 4 projects funded
- Cat 3: 40 submissions, 3 projects funded

WSC 2012: $26M

- Cat 1: 61 submissions, 4 projects funded
- Cat 2: 60 submissions, 4 projects funded
- Cat 3: 42 submissions, 7 projects funded

• one more time and possibilities for more…. 
Water Sustainability and Climate

- Cat 2 funded 2010
- Cat 2 funded 2012
- Cat 3 funded 2010
- Cat 3 funded 2012
- Cambodia
- SE Asia, Sri Lanka
- Asia, mountains
- Nationwide
Decadal & Regional Climate Prediction Using Earth System Modeling (EaSM)
Solicitation revised 2012
  – Proposals were due May 11, 2012

Program long-term goals
  – Reliable global and regional predictions of decadal climate variability and change
  – Quantify impacts of climate variability and change on natural and human systems
  – Maximize model utility for vulnerability/resilience and risk assessments
  – Translate climate predictions (& uncertainties) into scientific basis for policy and decisions

2010 Awards
  – 12 Type I (large) awards ($21.1M)
  – 15 Type II (exploratory) awards ($9.0M)

2012 competition only for Type I proposals
  – 85 unique projects
  – 204 total proposals
  – 7-12 awards expected; budgets ~ $3-5M for 3-5 yrs
Ocean Acidification (2013)
Research Coordination Networks – SEES Track (RCN-SRN)
New RCN-SEES Grants (2\textsuperscript{nd} Round)

- RCN-SEES grants support research coordination, not research
- The award size is up to $750K with a duration of 4-5 years
- For this 2\textsuperscript{nd} round of the RCN-SEES competition, seven (7) new grants are being made
New RCN-SEES Grants (continued)

- “Coordinating Phosphorus Research to Create a Sustainable Food System”
  Jim Elser at ASU (managed by CHE/MPS)

- “Multidisciplinary Approaches to Carbon Capture, Utilization and Storage”
  Alissa Park at Columbia U. (managed by CBET/ENG)

- “Building a Research Network for Promoting Arctic Urban Sustainability in Russia”
  Robert Orttung at GWU (managed by OPP)
New RCN-SEES Grants (continued)

• “Advancing our Social and Environmental Understanding of Complex Mountain Landscapes and Their Vulnerability to Environmental Change”
  James Gosz at U. of Idaho (managed by DEB/BIO)

• “Integrated Network for Social Sustainability: Concepts, Language, and Assessment”
  Nicole Peterson at UNCC (managed by BCS/SBE)

• “Engineering Research Collaboratory for Sustainable Infrastructure in a Changing Climate”
  Jennifer Jacobs at UNH (managed by CBET/ENG)
Dimensions of Biodiversity
Dimensions of Biodiversity

A 10-year campaign to characterize the dimensions of biodiversity on Earth

Initial focus on areas where three dimensions overlap

- Integrative approaches
- Innovative concepts
- Rapid advances

“This has pushed the community beyond business as usual.”

“[Dimensions] will accomplish in 10-15 years what would ordinarily take 50 years.”
Dimensions of Biodiversity

FY2010
• 290 letters of intent; 195 proposals reviewed in 2 panels
• 13 research awards, one joint U.S.-China IRCN
• $26.3 M Total: BIO $18.9 M; other NSF $6.8 M; NSFC $600 K

FY2011
• 117 proposals reviewed in 1 panel
• 11 research awards and one joint U.S.-China IRCN
• $28.6 M Total: BIO $17.5 M; other NSF $10.5 M; NSFC $600 K

FY2012
• 122 proposals reviewed in 1 panel
• 14 research awards – two US-China, one US-Brazil
• $31.5 M Total: BIO $21M; other NSF $5.4 M; NSFC $2.4 M; Brazil $2 M; NASA $731 K
## Dimensions of Biodiversity

### Streams of activity

<table>
<thead>
<tr>
<th>Research</th>
<th>2020 Goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>An integrated understanding of the key but unknown dimensions of biodiversity on earth</td>
<td></td>
</tr>
<tr>
<td>Cyberinfrastructure</td>
<td>Informatics and infrastructure that support accessible, interoperable information capability for dimensions of biodiversity</td>
</tr>
<tr>
<td>Collections</td>
<td>Digitization of collections and enhanced physical infrastructure to link to cyberinfrastructure and leverage the enormous investments of the past</td>
</tr>
<tr>
<td>Workforce</td>
<td>A diverse, interdisciplinary, globally-engaged, scientific workforce capable of transforming and communicating our understanding of biodiversity on Earth</td>
</tr>
<tr>
<td>Synthesis</td>
<td>Scientific analyses and syntheses that generate and disseminate useful information for scientists, educators and decision makers</td>
</tr>
</tbody>
</table>

### Approach:

- Planning & Partnering
- Base lining & synchronizing
- Assessing progress
- Aligning investments with emerging priorities
Dimensions of Biodiversity

“...an inexact first pass” with focus on key but little known dimensions.
Dynamics of Coupled and Natural Human Systems (CNH) 2012
CNH Solicitation

...quantitative, interdisciplinary analyses of relevant human and natural system processes and complex interactions among human and natural systems at diverse scales.

Large (up to $1.5 million over 4-5 years)
Mature projects, typically large teams

Exploratory (up to $250,000 over 1-2 years)
New teams, smaller projects
NOT planning grants

Research Coordination Networks ($500k over 5 years)
Build communities and capacity around a common theme
2012 CNH Awards

• 13 large and 6 exploratory awards (of 91 and 35 proposals resp.)
• 14 with strong international components (Asia, Africa, Central & South America, Pacific Islands)
• Topics and themes:
  – ecosystems (services and restoration)
  – health (disease vectors and climate)
  – ancient societies, landscapes and practices
  – agriculture and fisheries
  – resilience, vulnerability
## CNH Success Rates

<table>
<thead>
<tr>
<th>Year</th>
<th>Project Proposals</th>
<th>Highly Competitive / Competitive (fundable)</th>
<th>Funded</th>
<th>Funding Rate (total received)</th>
<th>Funding Rate (fundable)</th>
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<tbody>
<tr>
<td>2007</td>
<td>80</td>
<td>26</td>
<td>12</td>
<td>15%</td>
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<td>2008</td>
<td>64</td>
<td>30</td>
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<tr>
<td>2009</td>
<td>94</td>
<td>34</td>
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<td>41%</td>
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<td>2010</td>
<td>97</td>
<td>25</td>
<td>14</td>
<td>14%</td>
<td>56%</td>
</tr>
<tr>
<td>2011</td>
<td>98 (large)</td>
<td>24 (large)</td>
<td>14 (large)</td>
<td>14% (large)</td>
<td>58% (large)</td>
</tr>
<tr>
<td></td>
<td>37 (exp.)</td>
<td>13 (exp.)</td>
<td>5 (exp.)</td>
<td>14% (exp.)</td>
<td>38% (exp.)</td>
</tr>
<tr>
<td></td>
<td>4 (RCN)</td>
<td>2 (RCN)</td>
<td>1 (RCN)</td>
<td>25% (RCN)</td>
<td>50% (RCN)</td>
</tr>
<tr>
<td>2012</td>
<td>91 (large)</td>
<td>31 (large)</td>
<td>13 (large)*</td>
<td>14% (large)</td>
<td>42% (large)</td>
</tr>
<tr>
<td></td>
<td>35 (exp.)</td>
<td>12 (exp.)</td>
<td>6 (exp.)</td>
<td>17% (exp.)</td>
<td>50% (exp.)</td>
</tr>
<tr>
<td></td>
<td>6 (RCN)</td>
<td>3 (RCN)</td>
<td>0 (RCN)</td>
<td>0% (RCN)</td>
<td>0% (RCN)</td>
</tr>
</tbody>
</table>
* Now 12
SEES Fellows
Interdisciplinary Graduate Students
solicitation currently open
Sustainable Energy Pathways 2012

To develop efficient pathways towards sustainable energy, from starting points to ending points, via a systems approach in the priority areas of:

- **Sustainable Energy Harvesting, Conversion, and Storage**
  - Energy harvesting and conversion
  - Energy storage solutions
  - Critical elements and materials
  - Nature inspired processes
  - Reducing carbon intensity

- **Energy Transmission, Distribution, Efficiency, and Use**
  - Transmission and distribution
  - Energy efficiency and management

**Fundamental Considerations**
- Scientific knowledge & technological innovation
- Environmental, societal and economic imperatives,
- Education and workforce development,
- Role of SBE – present in all awards

$37M for 20 awards

MPS, ENG CISE, GEO, SBE BIO, EPSCoR, MPS/OMA
SEP 2012 Proposal Review Process

- 11 Virtual Panels (Thematic)
  - Ratings: HP, P, LP
  - Panel Summary #1

- Onsite Panel (All Topics)
  - Ratings: HR, R, DNR
  - Panel Summary #2

- 307 proposals
- 32 proposals (Compliance)
- 275 proposals

- Technical strength and SEP criteria
- Technical strength, transformative potential, group synergy, and SEP imperatives

- 435 proposals

- 40 (15%)

- 20 awards ~$37M

- MPS: 12,500,000
- ENG: 10,000,000
- CISE: 5,000,000
- GEO: 4,000,000
- SBE: 4,000,000
- EPSCoR: 489,957
- MPS/OMA: 300,000
- BIO: 500,000

- Allocated funds: $36,789,957
Solid state Li pyrite (SS-LP) battery. FeS₂ is environmentally benign, inexpensive, and energy dense. (S-H Lee)

Solar, heat, RF & microwave energy harvesting (O. Lavrova)

New organic PV materials (L. Yu)

Lignocellulosic biomass fuels using termite enzymes. (S. Chen)

Tidal turbines in Puget Sound (B. Polagye)

Calcium oxide production without CO₂ emission (S. Licht)

Human-mediated energy systems in multi-occupancy buildings (B. Becerik-Gerber)

CO₂-Plume Geothermal (O. Saar)

Integrated analysis framework

Stability analysis and control

Grid management and policy

Resource and storage allocation

Wind resource characterization

High renewables penetration electric power systems (D. Gayme)
Sustainability Research Networks (SRN)
SRN Solicitation

- 3 - 4 awards
- 4 - 5 years
- up to $12 million each
- Awarded as cooperative agreements, with additional NSF oversight.

Frontier sustainability theme

Integration of science, engineering and education

Multi-institutional team (academic, private, government, NGOs)

Inter-disciplinary approach
2012 SRN Awards

Joseph Ryan (PI) – University of Colorado Boulder

Routes to Sustainability for Natural Gas Development and Water and Air Resources in the Rocky Mountain Region.

Requested amount: $11.1 million

Klaus Keller (PI) - Pennsylvania State University

What are Sustainable Climate-Risk Management Strategies?

Requested amount: $11.9 million
NSF By the Numbers (FY11 data)
Questions & Answers
David Blockstein, Ph.D.
Senior Scientist
National Council for Science and the Environment
1101 17th Street NW, Suite 250
Washington, DC 20036
www.NCSEonline.org
202-207-0004
David@NCSEonline.org
Thank you!