SEES

At NSF, sustainability is embraced in the $660 million NSF-wide annual investment area of

Science, Engineering and Education for Sustainability
SEES at NSF

- NSF initiated SEES in FY 2010
- NSF SEES expenditures for FY 2010 were ~$660 million
- NSF total budget for FY 2010 was ~$7 billion
- FY2011 NSF request for SEES is ~$765 million
  - Total FY2011 request ~$7.4 billion
- SEES is planned as a growth area at NSF to run for at least 5 years

**SEES at NSF**

**NSF FY2010 SEES investments by Directorates and Offices:**

- GEO $196 million (1<sup>st</sup>) (climate change)
- BIO $121 million (2<sup>nd</sup>) (environmental biology)
- ENG $108 million (3<sup>rd</sup>) (energy-environment nexus)
- MPS $87 million (4<sup>th</sup>) (sustainable chem. & materials, solar)
- OPP $65 million (5<sup>th</sup>) (polar sustainability science)
- OIA $27 million (6<sup>th</sup>) (STCs, MRI)
- SBE $21 million (7<sup>th</sup>) (social and economic aspects)
- CISE $17 million (8<sup>th</sup>) (green IT)
- EHR $12 million (9<sup>th</sup>) (sustainability education)
- OCI $6 million (10<sup>th</sup>) (cyberinfrastructure)
- OISE $3 million (11<sup>th</sup>) (international sustainability research)
NSF Linkages of Sustainability

- **Across Disciplines** (BIO, ENG, GEO, SBE...)
- **Across Agencies** (NSF, EPA, DOE, USDA, USGS...)
- **Across Countries and Continents** (U.S., China, Europe, Africa...)
- **Across Topics** (Water, Energy, Climate Change...)
- **Across Sectors** (University, Government, Industry, Private Foundations, NGOs...)

EXAMPLES
EXAMPLES: NSF Linkages of Sustainability

EXAMPLE #1: Across Disciplines: WSC

- WSC = Water Sustainability and Climate Solicitation
- WSC initiated by NSF in FY 2010
- 16 grants made for a total of $21 million
- Every grant was required to have significant intellectual content involving all four of
  - BIO  - ENG
  - GEO  - SBE

Example WSC Grant

Award #1058038

Collaborative Research, WSC-Category 2: Regional Variability and Patterns of Urban Development – Impacts on the Urban Water Cycle and Nutrient Export

PI = Claire Welty (UMBC)

~$5 million over 5 years shared across the collaborators on the integrated team

continued...
Welty grant (continued...)

A collaboration of 7 partner institutions:
• Lead Institution: UMBC (PI = Claire Welty)
• Partner Institution: Princeton (PI = Jim Smith)
• Partner Institution: Ohio State U. (PI = Elena Irwin)
• Partner Institution: Penn State U. (PI = Allen Klaiber)
• Partner Institution: UMCP (PIs = Charles Towe, Sujay Kaushal)
• Partner Institution: Institute of Ecosystems Studies (PI = Peter Groffman)
• Partner Institution: U. of RI (PI = Arthur Gold)

Welty team (continued...)

Research Questions

• How do human locational choices, water-based ecosystem services, and regulatory policies affect the supply of land and pattern of development over time?

• How do changing composition and variability of urbanizing surfaces affect local and regional climate?

• How do patterns of development (including the engineered water system) and climate variability affect fluxes, flow paths, and storage of water and nitrogen in urban areas?
EXAMPLES: NSF Linkages of Sustainability

EXAMPLE #2: Across Agencies: SEED

- SEED = Science in Energy and Environmental Design (Green Buildings)
- New solicitation FY 2010 (NSF, EPA, DOE)
- 10 grants made for a total of $20 million

Example SEED Grant

Award #1038257

EFRI-SEED: Design for Autonomous Net-Zero Water Buildings

PI = Jim Englehardt (University of Miami)
$2 million over 4 years

Objective: develop principles for the design of net-zero water buildings, off the water grid (includes energy minimization and water treatment)
EXAMPLES: NSF Linkages of Sustainability

EXAMPLE #3: Across Countries: IRCN

- IRCN = International Research Coordination Network
- Publicly announced at AC/ERE meeting: think of RCNs as one route to new NSF-funded sustainability projects

Example IRCN Grant

Award #1046113

Dimensions IRCN: Diversity and Forest Change: Characterizing functional, phylogenetic and genetic contributions to diversity gradients and dynamics in tree communities

PI = Stuart Davies (Harvard)
$632K over 5 years

continued...
Davies grant (continued...)

This project will establish an international research coordination network that combines two existing forest networks in the United States with a set of forest plots in China, to advance understanding of how tree diversity determines the functional aspects of forests, and to test hypotheses concerning the resilience of forests to global change.

EXAMPLES: NSF Linkages of Sustainability

EXAMPLE #4: Across Topics (water, energy...): RESIN

- RESIN = Resilient and Sustainable Infrastructures
- $16 million portfolio of 8 RESIN grants
Example RESIN Grant

Award #0835414

EFRI-RESIN: The Interface of Infrastructures, Markets, and Natural Cycles – Innovative Modeling and Control Mechanisms for Managing Electricity, Water and Air Quality in Texas

PI = David Allen (U. of Texas at Austin)
$2 million over 4 years

EXAMPLES: NSF Linkages of Sustainability

EXAMPLE #5: Across Sectors (University, Government, Industry, Private Foundations...)

• NSF and the McKnight Foundation (MN)

continued...
NSF and the McKnight Foundation (MN)

Award #1101386

Twin Cities Urban Sustainability Forum

PI = Lawrence Baker (U. of Minnesota – Twin Cities)
$50K for 18 months

SEES and Education

• Education is integral to all aspects of SEES
• Just one example activity is:

Climate Change Education (CCE):
Climate Change Education Partnership (CCEP) Program, Phase I (CCEP-I)
• Initiated FY 2010
• 15 awards, up to $1 million each for 2 years, with potential for a $250K supplement
Example CCEP-I Grant

Award #1043262

CCEP-I: MADE-CLEAR: Maryland-Delaware Climate Change Education, Assessment, and Research

PI = Donald Boesch (U. of MD System)

$1 million over 2 years

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