



**YEAR 3 ANNUAL REPORT OF THE
NATIONAL SOCIO-ENVIRONMENTAL SYNTHESIS CENTER**

Reporting on Activities from September 2013 to August 2014



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MESSAGE FROM THE DIRECTOR

Since its inception SESYNC has developed a rich portfolio of synthesis activities and support services focused on helping researchers, policy-makers, and representatives of many different groups to work together to discover solutions to socio-environmental (S-E) problems. Over the course of Year 3, we continued to grow our core activities through new Thematic Pursuits, Ventures, Workshops, and Fellowships. This strong foundation provided Center leadership and staff with a wealth of information to understand not only what has been successful, but also to push us to examine and implement new, creative approaches — those that will help the Center adapt to the needs of a diverse community of users. Highlights of activities from Year 3 include:

- A number of new collaborations were launched including: development of a new Theme with two German biodiversity centers that now jointly supports six international synthesis teams examining critical linkages between biodiversity and ecosystem services; collaboration with the Luc Hoffmann Institute in Switzerland to co-support postdoctoral fellows from developing countries or underrepresented groups; work with the Packard Foundation to advance understanding of how knowledge moves to action.
- A new (biannual) call for highly quantitative or data intensive S-E synthesis projects and an innovative support structure for these projects which includes additional advanced on-site computational staff.
- A new opportunity for graduate student teams to conduct synthesis research on issues of urban sustainability or “surprises” in S-E systems.
- An increase in the number of postdoctoral fellows in residence beginning Fall 2013 and in Spring 2014, the launching of a new approach to recruitment that enhances the role of external mentoring as a key part of the fellowship experience. The 2014 program resulted in 199 postdoctoral applications making the program very competitive.
- An internal examination by all staff, driven in part by SESYNC’s assessment process and our mid-term strategic plan review, that has helped the Center determine how to better adapt and more innovatively meet the needs of the communities we serve.
- A significant increase in group facilitation and team science activities as well as the beginning of a study on SESYNC synthesis team dynamics by a postdoctoral sociologist.

Further details of these and many other activities from Year 3 are found in this report. Progress made over the past year has allowed the Center to expand our portfolio and positioned us to move ahead with new approaches to engage and challenge a broad community working to solve pressing socio-environmental problems.



Margaret A. Palmer
Professor and Executive Director
May 29, 2014

INTRODUCTION

SESYNC (să-sink) is a national research center supported by a Cooperative Agreement from the National Science Foundation (NSF) to the University of Maryland (UMD). The Center funds the world's leading social and natural scientists to travel to the Annapolis facility and work intensively in transdisciplinary groups to advance fundamental research on socio-environmental (S-E) problems. The formal mission of the Center is to foster synthetic, actionable scholarship related to the structure, functioning, and sustainability of S-E systems.

We provide a variety of programs to support S-E synthesis:

- **Themes** are general research topics that are identified by SESYNC through a community-driven process. SESYNC funds a limited number of research projects, or Pursuits, under each Theme. A Pursuit is designed to facilitate face-to-face engagement of researchers at the Center in Annapolis, and synthesis originating from these interactions should address the goals of a particular SESYNC Theme. Generally, Pursuits last one to two years and involve two to four meetings of approximately five days.
- **Ventures** may be proposed on any topic relevant to S-E science, but should represent a pressing need or a project with high-reward potential. The Ventures program is designed to fund projects that may not be linked to a current Center Theme, but are timely and important to advancing S-E knowledge. They should focus on quickly generating knowledge in response to a pressing need or unexpected opportunity, or on developing tools or approaches that could provide a new catalyst for the synthesis process. Ventures typically last 18 months.
- **Workshops** are single meetings with up to 30 participants that focus on a broad topic or a set of related topics, summarizing/synthesizing the state of the topic, identifying future directions, or exploring novel ideas. Organizers (one or two leads) identify up to half of the participants with the remaining participant slots filled through open application.
- **Fellowships:** SESYNC offers Postdoctoral Fellowships, Sabbatical & Research Fellowships, Short-term Visitor opportunities, and Policy & Practice Fellowships. SESYNC also offers Maryland Fellowships for those from USM universities who apply to work at SESYNC during periods of leave or sabbatical from their home institutions.
- **Foundations of S-E Synthesis** is a program that supports synthesis efforts on critical and emerging or understudied topics, or efforts that capture specific disciplinary perspectives that have not been well integrated into the broader S-E scholarship. These projects are initiated by the SESYNC leadership, who actively recruit scholars to lead small Workshops that will result in two publications: one for their requisite peers, and a more general article designed for broad communities of natural and social scientists.
- **Short Courses** are on topics relevant to S-E systems, the synthesis process, data management and analysis, or cyberinfrastructure tools. Short courses held at SESYNC are typically 3–10 days, and SESYNC provides substantial support for participants.

CAPACITY-BUILDING FOR S-E SYNTHESIS

Capacity-building for socio-environmental (S-E) synthesis is a priority across most program elements at SESYNC including: education, cyber support, professional development, engagement, and partnerships.

Education programs: Advancing the science of synthesis

Over the past year SESYNC leadership transitioned from the development of new programs to a focus on fully integrating education activities and outputs supported through Pursuits, Ventures, internships, and short courses. During Year 3, interest from the community in SESYNC Education programs increased dramatically.

This past year SESYNC solicited proposals under an education focused research Theme “Learning to Integrate across Natural and Social Sciences.” Proposals focused on synthesis efforts designed to build upon existing knowledge from various disciplines to advance understanding of 1) how undergraduate and graduate students learn to integrate data, concepts, techniques, approaches, tools, perspectives, and/or theories from the natural and social sciences to understand environmental problems and inform solutions, and 2) pedagogies that support the development of this cognitive ability in a S-E context at the undergraduate or graduate level. Support was provided for three novel Pursuits. As with all Themes, team leads participated in a theme-wide meeting where they were encouraged to build cross-project communication and collaboration. Pursuits funded under this Theme will also advance our knowledge and research agenda in improving the team science skills of the S-E research community.

Two Ventures focused on S-E synthesis education highlight the distinctive nature of actionable research at SESYNC. Participants of the founding Venture, “Experiment in teaching the socio-environmental synthesis process,” have developed modules for teaching S-E synthesis methods and concepts and these are now being tested in classrooms across five campuses with very different missions and student body characteristics. The participants in this synthesis Venture will contribute 5 presentations based on the analysis of their first year assessment results at the 2014 Ecological Society of America annual meeting. In addition, this team’s work led to the founding of a SEEDS chapter (Strategies for Ecology Education, Diversity and Sustainability) at the historically black campus of Coppin State University. The project has also supported the development of new courses at that University. The second education Venture, “State Policies to Transform Undergraduate STEM Education” has led to a new curriculum-development initiative across the California State University system, two large grant proposals to NSF, and several conference presentations.

S-E Case study training for teachers

Due to the success of the Year 2 short course, “Teaching Socio-Environmental Synthesis with Case Studies,” SESYNC’s Assistant Director of Education will offer another short course in case study training in July 2014. Interest in this offering was exceptional — SESYNC received 133 applications which is more than double the number received for the first offering in 2013. The course has been revised with more advanced objectives including assessment and involvement of SESYNC leadership and postdoctoral fellows. This second generation course will be taught exclusively by SESYNC directors and researchers and will rely mostly on curriculum materials developed by SESYNC and previous course participants. Involvement of SESYNC postdoctoral fellows will introduce short course participants to

the use of mathematical and computational modeling techniques, including agent-based modeling. Case studies and exercises developed for this purpose will familiarize participants with common elements and complexities of S-E systems including feedbacks, non-linearity, and tradeoffs. By involvement in the case study course postdoctoral fellows are building their teaching portfolios, but more importantly, their findings, tools, methods, and research feed back into SESYNC products and the larger S-E research community.

Undergraduate S-E internship program

Applications to SESYNC's summer internship program increased from 45 applications in Year 2 to 103 applications in Year 3, and through careful program management, the number of participants will grow from 10 to 15 students and from 8 to 14 mentors in Year 3. Students are from all over the U.S.; faculty members are chiefly from UMD reflecting SESYNC's strong ties to the UMD campus and faculty. Additional mentors come from local government agencies. Several alumni of this program have begun graduate studies (one with a prestigious NSF Graduate Fellowship), obtained directly related professional positions (EPA), or been selected for participation in competitive international courses.

Cyberinfrastructure: Accelerating data synthesis

Over the past year, SESYNC's cyberinfrastructure (CI) team focused on investigating and deploying new technologies, offered computational training and assistance, and worked closely with counterparts at other NSF BIO Centers and in the scientific computing community. SESYNC greatly broadened the CI resource and knowledge base for the S-E research and practice community through training, individualized support, and infrastructure deployment. The CI team was particularly effective in observing and responding to the needs of on-site researchers and synthesis group participants.

Individualized support & customized infrastructure deployment

Year 3 saw a significant increase in the cyberinfrastructure demands of both in-house postdoctoral researchers and funded synthesis teams. SESYNC's CI team observed requirements that were common across multiple projects, and whenever possible, these services were standardized and offered on SESYNC's existing virtualization platform to all SESYNC researchers. To date, services provided in this framework include virtual workstations, R Studio Server, and Gitlab (version control) software management. CI staff also provided custom development and consultation for a number of working groups and on-site researchers in the areas of very large database creation (millions of records), visualization (via Google Earth and d3 packages), and integration with R Studio Server analysis resources. New additions to our staff include Computational Research Scientist Dr. Nicholas Magliocca, who is developing new platforms for agent-based modeling and Ian Muñoz, a scientific programmer. Both work directly with our postdoctoral fellows and synthesis teams on a variety of projects.

The CI team deployed a second version of SESYNC collaboration platform in Year 3. This new resource evolved from a wiki/discussion-based approach to one that focuses on allowing easy editing and browsing of standard MS Office formats (Word, Excel, etc.). This has facilitated both offsite collaboration and onsite co-development of documents by supported teams. Additionally, CI staff developed a new conference infrastructure which allows sharing of HD video and audio from all conference rooms. User feedback revealed that this greatly improved the experience of remote participants. An instructor at one of SESYNC's computational training programs remarked that our

ability to support remote participants is, “the finest setup I have encountered across industry, government, and academia so far.”

Computational training

By the end of Year 3, SESYNC will have hosted two more computationally-focused training workshops bringing the total to three since the Center opened. SESYNC hosted a four-day course offering lessons from Software Carpentry (SWC), on-site consultation to help participants learn basic coding and data management techniques, and instruction on how to apply those techniques to their specific science problems. Participants included members of supported working groups as well as members of the UMD and USM community. Due in part to the large demand for this course, the CI team recognized the need for training two SESYNC personnel who became certificated as SWC instructors. This will allow us to more easily offer SWC training in the future.

In summer 2014, SESYNC will host its first Computational Summer Institute. A competitive call open to the broad S-E community has been used to recruit small teams of researchers to learn the fundamentals of data and code management, and collaboration using SESYNC’s infrastructure. The Institute is intended to accelerate team members’ progress on their individual collaborative research projects. The Institute is also linked to SESYNC’s Theme 8 “Data-Intensive Analysis & Modeling for Socio-Environmental Synthesis.” As part of the Center’s continued efforts to build computational expertise and capacity among the S-E community, technical personnel and/or a PI from each project team supported under this Theme will also attend the Computational Summer Institute.

Engaging a diverse research community

Participant diversity

SESYNC is supporting a diverse array of scholars in terms of disciplines, ethnicities, and stages in their career. Further, we are fostering their interactions. This support is intended to impact the development of young scientists, the development of interdisciplinary ideas, and the greater inclusion of underrepresented groups in science. For those who filled out a demographic survey for Themes, Workshops, Ventures, Short Courses, Foundation Series, and/or Theme Identification Meetings, the following percentages illustrate SESYNC’s impact on the development of human resources.

Participants are categorized as “scholars” or “knowledge users” based upon their selection for “institutional status” within the demographic survey. Scholars are those within academic institutions as graduate students/postdoctoral scholars and teaching or research faculty and knowledge users are those within the policy, business/industry, government, or NGO sectors.

SESYNC's disciplinary diversity of all participants who filled out a demographic survey is illustrated in the percentages of overall “scholars” within each discipline below. For further breakdown of sub-disciplines of overall scholars, please refer to Appendix D.

- Life sciences: 30%
- Social sciences: 32%
- Geosciences: 11%
- Computer science: 8%
- Policy: 7%

- Engineering: 4%
- Public health: 2%
- Education: 3%
- Planning: 1%
- Business: 1%
- Mathematics and physics: 1%

SESYNC's knowledge user diversity of all participants who filled out a demographic survey is illustrated in the percentages of overall "knowledge users" within each sector below:

- Government: 40%
- Business/industry: 8%
- Non-profit/NGO: 52%

SESYNC's race and ethnic diversity of all participants who filled out a demographic survey is illustrated in the percentages below:

- White/Hispanic: 5.1%
- White/Non-Hispanic: 79.7%
- Asian: 10.4%
- Black or African American: 2.7%
- Native American or Hawaiian/Pacific Islander: 0.6%
- Multi (more than one of the above race/ethnicity): 1.5%

Of all participants who filled out a demographic survey, SESYNC participants' self-characterization is illustrated in the percentages below:

- Social scientist: 24.1%
- Natural scientist: 34.5%
- Both: 17.7%
- Other: 21.9%
- Multi: 1.8%

Of all participants who filled out a demographic survey, SESYNC's career-stage diversity of identified "scholar" participants is illustrated in the percentages below:

- College research or teaching faculty/staff: 73.1%
- Postdoctoral scholars: 9.2%
- Graduate students: 17.2%
- Undergraduate students: 0.5%

Diversity within teams also fosters interaction and collaboration. For example, across Theme 3, scholars have expertise in the following disciplines: life sciences (29%), social sciences (26%), policy (19%), computer science (6%), business (7%), and geosciences (13%). One Pursuit within Theme 3, "How will businesses speak biodiversity?," demonstrates one example of extensive and novel diversity of scholars within a synthesis team, especially given that business was a field previously underrepresented in SESYNC projects. Scholar participants within this Pursuit have expertise in ecology, biology, policy,

business, public policy and ecosystem services, and knowledge users come from the business/industry, government, and non-profit/NGO sectors. This team produced an industry white paper targeted for businesses (“The New Nature of Business”) and an interactive website targeting large corporations. They also have given presentations in a broad variety of venues ranging from international and national conferences to on-campus and local business presentations. This team also leveraged an additional \$50,000 in funding to continue case study work and have developed a network of national and international collaborators around the topic of businesses and biodiversity.

Professional development: A new generation of S-E scholars

Postdoctoral Fellows

SESYNC has focused on building a strong community of postdoctoral fellows at the Center. In Year 3, 10 postdoctoral scholars were in residence at the Center. One member of the original cohort of fellows completed a fellowship at SESYNC in 2014 and began an assistant professorship in Anthropology at the University of Oregon. Another member of our first cohort accepted a position in Peru with the United Nations Food and Agriculture Organization (FAO) to direct the project “Assessments of Climate Change Impacts and Mapping of Vulnerability to Food Insecurity under Climate Change to Strengthen Household Food Security with Livelihoods’ Adaptation Approaches.”

In addition to regular group meetings to discuss research with SESYNC Director, Margaret Palmer, the postdoctoral fellows were offered a number of professional development training opportunities. These included: bringing to SESYNC a panel of senior researchers to discuss grant writing; a multi-day communications workshop that brought noted science journalists from AAAS (Science Magazine) and National Public Radio to work with the postdocs; and a networking event with NSF Science, Engineering and Education for Sustainability Fellows (SEES) fellows to learn more about funding opportunities. In addition, most of the fellows took advantage of hosting their off-site mentor at SESYNC for several days which provided time for interaction and the mentor typically gave a seminar. Finally, approximately 30% of each Fellow’s time was dedicated to Center activities, which has included: participating in funded Pursuits, Ventures, or Workshops; arranging and inviting speakers to SESYNC’s Seminar Series; and developing and teaching the summer “Teaching with Case Studies” short course.

Graduate Student Scholarship

We have recently increased graduate student involvement in synthesis teams as well as implemented novel programs exclusively designed for graduate student-led synthesis research. A multi-day workshop was offered to 18 graduate students from the natural and social sciences to learn about S-E synthesis and proposal writing. Participants had the opportunity to network across their respective disciplines and to develop ideas for team-based synthesis research proposals for a graduate student Theme. Several teams originating from this experience will likely respond to the recently issued graduate student RFP. We anticipate valuable research outcomes from this effort, but also significant skill development in the important areas of leadership, project management, communication, and transdisciplinary collaboration.

This past year SESYNC also hired three Graduate Research Assistants. Drew Hart worked initially on data analysis of the socio-ecological dynamics and epidemiology of dengue in Colombia with postdoctoral fellow Dr. Harish Padmanabha. Currently, he is working with Assistant Director of Computational Synthesis, Mary Shelley, in management and further development of a large relational

database of public health and social welfare data sourced from USAID surveys. The goal of this database is to provide greater data accessibility for a SESYNC working group focused on conservation and human welfare. Dr. Safa Motesharrei is currently working on two projects: 1) The Human and Nature Dynamical Model (HANDY) to conduct “thought experiments” on societal dynamics, specifically population and resource use and 2) A Coupled Human-Climate-Water Model (COWA) to investigate water availability and consumption at the watershed level considering impacts of climate change. A third GRA, Steve Epting, is working on the use of remotely sensed images and data to build models for predicting the location of intermittent streams that connect to “waters of the U.S.” He is working closely with policy makers at EPA to ensure that the model is policy-relevant. Two additional graduate students will be hired to assist with various projects in early summer 2014.

Building sustainable institutional partnerships

International collaboration to support biodiversity and ecosystem services research

SESYNC’s collaboration with “sister” centers in Germany reached a new level in Year 3 with the development and implementation of a joint Theme: “Biodiversity and Ecosystem Services.” SESYNC leveraged \$330,000 in co-funding with the Helmholtz Centre for Environmental Research (UFZ), and the Synthesis Centre (sDiv) within the German Centre for Integrative Biodiversity Research (iDiv). A joint RFP was administered by SESYNC and the proposal review was conducted jointly between the German centers and SESYNC’s Scientific Review Committee. The international competition resulted in six new Pursuits. Each will bring together data, ideas, theories, and/or models to address critical S-E questions at the interface of biodiversity and ecosystem services. All members of the new research teams had their first meetings February 24–28, 2014 at SESYNC—a new model designed to facilitate interaction among all participants in the Theme and to accelerate progress in individual team efforts. The teams will alternate meeting locations between Annapolis, MD and Helmholtz center in Leipzig, Germany over the subsequent 18 months.

A new international partnership with WWF’s Luc Hoffman Institute

SESYNC was awarded \$185,000 from the Luc Hoffman Institute, a subsidiary of WWF, to fund postdoctoral fellowships for SESYNC research programs. An important goal of this effort is to hire scholars from developing countries or underrepresented groups to work on these projects. Dr. David Gill, SESYNC Postdoctoral Fellow, was selected from a competitive call for a Luc Hoffman Fellowship. His work is associated with the SESYNC Pursuit “Solving the Mystery of MPA Performance.”

Leading NSF BIO Centers cyber-collaboration

SESYNC continues to collaborate with staff from the various NSF BIO Centers to identify and tackle common areas of concern. One of the resulting working groups from Year 2, on data literacy, kicked-off the first in a series of standardized “data carpentry” workshops at NEScent in May 2014 (Year 3).

SESYNC Computational Research Scientist Dr. Nick Magliocca submitted a proposal to the National Science Foundation’s CyberSEES program in collaboration with University of Michigan. If funded, this will help advance SESYNC’s efforts to facilitate work on scaling agent based models.

Continual engagement with Resources for the Future

As a founding institutional partner, Resources for the Future in Washington, DC continues to play an essential role guiding the Center's activities focused on strengthening the actionability and social relevance of research efforts. Members of SESYNC's leadership team, Jim Boyd (SESYNC and RFF), Jon Kramer, and Margaret Palmer, partnered with RFF on a proposal to the Packard Foundation to learn how scientific knowledge pertinent to environmental decision-making is used by federal agency staff. The \$250,000 award is currently underway.

University of Maryland Partnerships

Using University of Maryland funds, SESYNC provided support to two UMD community teams working on interdisciplinary problem solving. Dr. Donald Milton completed a multi-day workshop at SESYNC exploring critical research needs for understanding influenza transmission in the built environment. Drs. Steve Gabriel, Lars Olsson, and Elizabeth Gilmore are currently examining key interactions within the energy, transportation and agricultural sectors to develop an enhanced model for capturing greater benefits from wastewater processing in the DC metropolitan area. SESYNC is providing support for the team and associated students.

In addition to the two projects detailed above, SESYNC is currently supporting four other synthesis teams led by UMD researchers from across the campus community. Each (1 Foundation Series, Workshop, Venture, and Pursuit each) competed successfully through our normal RFP process. In addition, six UMD faculty gave invited Seminars at SESYNC over the past year. Overall, SESYNC has funded 106 faculty, students, and administrators from UMD since its inception.

INNOVATION & ADAPTATION

At the frontiers of team science

Over the past year, SESYNC leadership and staff have increased our level of engagement with research teams. “Priming calls” are tele- or video-conferences between a team of SESYNC staff and newly funded leads of Pursuits and Ventures. In addition to initiating early efforts to facilitate group work by providing entry points to using our cyber and other services very early, these calls provide an opportunity to reinforce team science concepts. SESYNC also organized 1.5 day sessions focused on team-science skills with leaders of Pursuits when they convened at the Center for Theme-wide meetings. These pre-meeting consultations are used to structure and refine future meeting plans and agendas.

In addition to introducing team-science concepts to synthesis groups, SESYNC leadership have played an active role in facilitating portions of meetings for 10 teams. Several of these efforts involved the development of shared (often pictorial) frameworks to describe the S-E systems being studied. Others were designed to help teams come to consensus on their approaches to research and problem solving. These activities helped facilitate cross-disciplinary collaboration (bridging epistemological, methodological, and philosophical divides) and actionability.

These efforts are coupled with a new study regarding how teams develop and come to consensus on frameworks. Lorien Jasny, a SESYNC Postdoctoral Fellow, is conducting this work. To date she has worked with 10 synthesis teams to collect detailed data on these social processes.

Strategic programmatic assessment

During the past year SESYNC initiated formative and developmental assessment activities consistent with the utilization-focused approach adopted by the Center. Dr. Ann Zimmerman, SESYNC’s external evaluation specialist, completed the assessment implementation plan in October 2013. SESYNC collects a wide variety of demographic information and quantitative data on scientific outputs (detailed elsewhere in this report) as part of this plan. We have now implemented data collection for a network analysis to assess levels of collaboration within newly formed teams. That baseline data will enable a more detailed network analysis to be done in the coming year.

These data are being coupled with qualitative approaches that gather information through direct interaction with participants at SESYNC. The methodology employs semi-structured interviews and surveys to better understand how personal attitudes, knowledge, and behaviors change as a consequence of SESYNC programs. This aspect of the assessment has been deemed human subjects research. SESYNC submitted an application for and received Institutional Review Board (IRB) approval from the University of Maryland at the end of January 2014. Shortly thereafter Center staff and Dr. Zimmerman conducted a series of video conferences (“check-in meetings”) with 30 people who are leading or co-leading 14 SESYNC teams that are nearing the final phases of their research. The meetings addressed several questions in SESYNC’s evaluation plan. Specifically, they provided information about the Center’s effectiveness in supporting project implementation and preparing PIs to lead their teams, and the ways in which SESYNC’s services, support, and interventions contributed to synthesis research and team outcomes, including databases and publications. During the check-in meetings SESYNC staff

also collected data on the impediments and challenges teams face. Findings show that team leaders who have taken advantage of SESYNC's services (e.g., facilitation, cyber-support, conceptual mapping) are very satisfied. These PIs credited Center staff with helping their team deal effectively with the challenges of interdisciplinary, synthesis research (e.g., disciplinary language barriers; finding, sharing and analyzing heterogeneous data). They also expressed appreciation for SESYNC's flexibility in adapting to unanticipated needs or opportunities (e.g., allowing a change in meeting location in order to engage policy makers); in facilitating connections that led to additional resources needed to accomplish their work (e.g., interns, postdoctoral fellows, foundation support); and in providing excellent logistical support for travel and meetings. Results also show that teams nearing their ends have many products in progress or near completion. They are looking to SESYNC for advice and support in communicating to people and organizations that can act on the knowledge produced, in finding venues for their work outside traditional disciplinary channels, and in locating repositories for data.

Learning and adaptation

SESYNC has reached the halfway point in its current grant cycle which has triggered an internal assessment of our progress in achieving the goals and objectives detailed in the Center's strategic plan. Because so many of the procedures instituted by the Center were new, establishing appropriate benchmarks for success required that we learn from our own experiences during the "start-up" phase of Center operations. All Center staff convened in a retreat in early January 2014 to discuss progress made, challenges, and opportunities for further innovation. The retreat was followed by an extensive internal analysis of our strategic plan conducted by all units at the Center. Data from the past 24 months will inform specific indicators of progress. As part of this exercise, each unit established benchmarks for the next 2 years. In addition, each unit has proposed mid-term modifications to the strategic goals and objectives of the original plan. They have also proposed new activities to enhance the Center's effectiveness and promote innovations to better engage and spark creativity in Center programs as well as procedures. This process will be completed in early summer 2014 and is consistent with the nature of a "living" planning process and our developmental approach to assessment.

Programmatic adaptation

As SESYNC continues to adapt to meet the needs of its staff and funded participants, several other changes occurred throughout Year 3. While interest in the SESYNC Ventures program continues to remain strong, the success rate of submissions declined, which is consistent with our intent to become more selective. We have modified our procedures to emphasize the Center's intent to support more high-risk/high-reward activities with this program. Other programmatic adaptations included a new postdoctoral fellowship recruitment process to increase engagement of domain mentors in fellowship projects. For the first time, postdoctoral fellowship proposals were co-developed with one of a pre-screened set of mentors. This effort was designed to support the postdoctoral fellows in the domain-specific research challenges of their projects and to engage a new population of researchers with SESYNC. Despite additional steps in the application process with this model, we have received a significantly larger number of applicants than in previous years (199 in Year 3 versus 50 in Year 2).

Partners & Advisors

SESYNC implemented two changes to its External Advisory Board (EAB) and Scientific Review Committee (SRC) that further strengthened the role of these two fundamental groups. First, SESYNC reduced the size of its External Advisory Board from 20 to 7 members by identifying select senior

scholars who had expertise that would benefit SESYNC planning and who were truly interested in engaging with SESYNC; most of the committed to participating in or organizing a SESYNC activity beyond the EAB meetings. Second, due to the increasing volume of applications received for our research programs, we increased the number of the Scientific Review Committee from 15 to 22 members in order to broaden the disciplinary breadth of our review panel.

Stimulating novel data-intensive synthesis

Responding to the changing landscape of quantitative socio-environmental (S-E) research, SESYNC launched its eighth Theme during Year 3. The Center invited proposals for data-intensive or modeling projects that can advance S-E synthesis research. This new theme was developed based on the recognition that challenging S-E research questions often require integrating heterogeneous, large-scale, or highly detailed data sets from multiple regions and disciplines, yet many natural and social science scholars lack the informatics skills, time or resources to undertake these tasks. Our aim in launching this Theme was to engage and create bridges between S-E and computational research communities, as well as to build the computational and IT capacity of our supported participants. Unlike previous Themes, SESYNC will offer support for technical personnel among project teams, recognizing that this is often the rate-limiting step in answering computationally-intensive research questions. The first round of applications was completed in early April (22 proposals received) and resulted in support of one Pursuit, three Workshops, and one Venture. This theme will be re-competed twice annually on an ongoing basis.

ENGAGEMENT & ACTIONABLE OUTCOMES

Forming a knowledge-to-action research community

A vital part of SESYNC's mission is to fund synthesis research that produces actionable science, and further, to expand and improve upon existing knowledge about what actionable science is. Knowledge users are an integral part of this process as is the knowledge-to-action community who connect fundamental research to actionable outcomes. As part of research teams, knowledge users prompt their teams to ask relevant and solutions oriented research questions.

This past year SESYNC secured \$250,000 in funding from the Packard Foundation for "Actionable Socio-Environmental Science and Federal Decision Making" research and convening. Now underway, the project allows SESYNC to play a major role in improving the understanding of the role of S-E science in federal policy analysis. Dr. Jim Boyd, Director of Social Science and Policy, developed and led a 2-day workshop entitled "Environmental Decisions and Scientific Knowledge: Strategy & Opportunities for the Knowledge-to-Action Community of Practice." This workshop was designed to support and expand upon a synthesis of knowledge and a community of practice focused on institutional approaches to science–decision processes. Dr. Boyd is also leading a new SESYNC program launched with support from the Packard Foundation to organize and deploy four workshops focused on policy interactions and facilitation connections to knowledge users and to deliver three reports (interim, synthesis, and strategy reports) about these efforts.

Engaging public audiences

SESYNC connects its products and actionable outcomes to a variety of audiences. Outreach channels, such as our website and social media, increase awareness of and accessibility to information related to SESYNC working groups, research opportunities, and products. SESYNC's communication goals include expanding our network by converting unengaged audiences into supporters and "SESYNC community members" who engage with multiple facets of SESYNC's mission and efforts. SESYNC uses an external vendor, Constant Contact's Small Business Marketing, to engage our list of 1,063 subscribers that include supported PIs and participants, short course and workshop attendees, and other interested scholarly parties. We are moving towards a monthly distribution of our regular e-newsletter, supplemented by targeted mailings of time-sensitive announcements. Our emails have an average open rate of 58.9% (the education industry average is 20.5%), and an average click-through rate of 24.1% (the education industry average is 12.3%).

SESYNC's website saw a significant increase in traffic and engagement in year 3. Between July 1, 2013 and May 6, 2014, the website had 106,948 total visits (compared to 43,616 total visits between July 1, 2012 and May 6, 2013). In addition to the homepage, the majority of page visits are to open research and funding opportunities, such as the Postdoctoral Fellowship & Collaborator program; the Science Communication Fellowship program; and the Biodiversity & Ecosystem Services, Data-Intensive & Modeling Projects, and Graduate Student Themes. This reflects the success of our advertising, new media, and general outreach efforts around dynamic website and deadline-oriented content.

SESYNC's social media channels—which include Facebook, Twitter, YouTube, and LinkedIn—have been very successful tools for reaching and engaging new audiences within the scholarly community, with a primary goal of driving those audiences to dynamic content on our website. For example:

- Our Facebook community has grown from 159 likes (July 2013) to 537 likes (May 2014).
- Facebook is our #5 referral of web traffic, representing 5.2% of total referral traffic between July 1, 2013 and May 6, 2014.
- Our Twitter community has grown from 620 followers (July 2013) to 1,337 followers (May 2014).
- Twitter is our #3 referral of web traffic, representing 10.3% of total referral traffic between July 1, 2013 and May 6, 2014.

This year, SESYNC formed a new partnership with Café Scientifique – Annapolis, coordinated by Danielle Lucid of the Maryland Department of Natural Resources, to strengthen our relationship with the scientific and general communities in Annapolis. Café Scientifique is a grassroots public science initiative that provides an informal and friendly forum in which attendees, mostly non-scientists, can explore the latest ideas in science and technology. The Café is credited with improving the image of scientists and careers in science by demystifying scientific research for the general public and empowering non-scientists to more comfortably and accurately assess science and technology issues, particularly those that impact social policy making.

SESYNC presentations include:

- April 28, 2014: Margaret Palmer, Executive Director
- July 31, 2014: Neil Carter, Postdoctoral Fellow
- August 28, 2014: Mary Collins, Postdoctoral Fellow

YEAR 4 GOALS

Looking forward

Fostering innovation – In the coming year SESYNC’s senior leadership will develop and play an active role (as facilitators and leaders) in the development of “Frontiers” initiatives. The purpose is to push the innovation envelope by constantly seeking to identify a range of new topics that are critical to S-E sustainability and ripe for synthesis, and to identify new approaches to S-E problem solving. In addition, Center leaders will experiment with different mechanisms designed to enhance recruitment of scholars and practitioners outside the core research communities we typically serve. We will also focus on new ways incentivize collaborations among these participants. Our goal is to develop 3 to 5 “frontiers groups” exploring novel potentially high risk areas in the coming year.

Early career scholars initiative – As part of our the Frontiers effort, SESYNC will establish and implement a new program focused specifically on young scholars—including postdoctoral scholars and other early career researchers. This program will recruit emerging scholars and provide support through workshops and synthesis research opportunities. Partnerships with senior scholars and practitioners will play a role in this effort as well.

Cyberinfrastructure expansion – In the coming year, SESYNC’s CI team will continue to grow all aspects of the services offered to synthesis teams. Cluster support will allow researchers to maximize computational efficiency and speed. Continued engagement with other NSF BIO Centers and with the open science computing communities allows the CI staff to respond to the research community’s needs with evolving technologies and adaptive training programs along with the customized resource development as needed.

Advanced training opportunities – SESYNC will expand graduate student involvement in programs and will develop new training opportunities such as a synthesis “boot camps” focused on natural–social science boundary and research–policy boundary spanning. SESYNC will also develop a graduate student S-E synthesis short course that will introduce S-E synthesis instructional modules developed by the Education directors.

Supporting the research community – Ongoing assessment will provide insights to help SESYNC leadership and staff adapt support services to better meet the needs of synthesis teams. A particular focus will be to increase the Center’s capacity for onsite facilitation of teamwork. Toward that end, the Center will recruit a new science facilitator to the staff in the coming year who will play two roles. First, he/she will explore a variety of new tools to help teams develop consensus and develop new approaches to complex problems. Second, he/she will develop mechanisms for identifying opportunities for interactions across Pursuits and Ventures and potentially cross-project synthesis within Themes.

Education focused theme – Efforts to engage the education community and build the capacity for S-E synthesis will continue. Key will be a new call for education-focused synthesis Pursuits.

Building a community of practice for actionable science – With external funds provided by the Packard Foundation and a variety of other resources senior leadership at the center, SESYNC will embark on a series of activities (e.g. workshops, meetings) to engage a cross section of practitioners and

scholars focused on understanding and enhancing how knowledge is used to solve S-E problems. Our goal is to build a network of interested experts using SESYNC as a platform for discourse and research.

Administrative and travel support – SESYNC will implement a new state-of-the-art event management application to enhance and improve collecting, organizing, securing, confirming, and communicating with visitors and staff for meetings and travel logistics. The administrative team will also work together to develop a new online system for hotel booking, and expense reimbursement.

APPENDICES

A. List of projects funded through present (Years 1-3)

Themes

Theme 1. Ecological Wealth and Changing Human Populations (11 proposals received). The following were supported:

- 2012T1-003: Evaluating relationships among human health and welfare, ecological condition and natural resource governance (B. Fisher, T. Ricketts)
- 2012T1-005: Creating a global database of how different populations within cities are dependent on freshwater ecosystem services (R. McDonald, D. Balk)
- 2012T1-006: Rural forest communities at a tipping point? Trends and actionable research opportunities (B. McGill, K. Bell)
- 2012T1-009: Synthesis to link understanding, planning, and management of urban ecosystems in China (W. Xiang, J. Nassauer)
- 2012T1-011: Urban ecological sustainability: Multi-level governance of water, energy and carbon in the Northeast mega region of the United States (S. Pickett, J. Connolly)

Theme 2. Globalization and Environmental Change (9 proposals received). The following were supported:

- 2012T2-003: Globalization of the live plant trade: Informing efficient strategies for reducing non-native pest invasion risk (R. Epanchin-Niell, A. Liebhold)
- 2012T2-009: Globalizing Our Understanding of Rural Land Use Change. (J. van Vliet, E. Ellis) Proposal was resubmitted and funded for a single workshop.

Theme 3. Informing Sustainability and Adaptation Decisions through Assessment and Modeling of Ecosystem Services (8 proposals received). The following were supported:

- 2012T3-003: How will businesses speak biodiversity? Novel and adaptive uses for ecosystem services data (S. Duncan, S. Elliott)
- 2012T3-004: Monitoring the direct links between ecosystems and people (H Tallis, B. Reyers, S. Andelman)
- 2012T3-005: Incorporating values and assessing social and environmental trade-offs in managing for ecosystem services (L. Olander, D. Urban)
- 2012T3-007: Solving the mystery of marine protected area (MPA) performance: Linking governance, conservation, ecosystem services, and human well-being (H. Fox, R. Pomeroy)
- 2012T3-008: Integrating biodiversity and ecosystem services into sustainable global climate mitigation scenarios (G. Hurtt, J. Edmonds)

Theme 4. Globalization & Socio-Environmental Systems (5 proposals received). The following were supported:

- 2013T4-005: Linking local consumption to global environmental impacts (K. Hubacek and K. Feng)
Proposal was resubmitted for and funded as a single workshop.

Theme 5. Water, People, and Ecosystems (8 proposals received). The following were supported:

- 2013T6-002: Towards socio-hydrologic synthesis: modeling the co-evolutionary dynamics of coupled human, water and ecological systems (T. Troy and M. Sivapalan)
- 2013T6-007: Social-ecological system resilience, climate change and adaptive water governance (B. Cosens and L. Gunderson)
- 2013T6-009: Climate change and water resources adaptation: Decision scaling and integrated eco-engineering resilience (L. Poff and J. Matthews)

Theme 6. Learning to Integrate across Natural and Social Sciences (10 proposals received). The following were supported:

- 2013T6-002: Understanding, teaching, and employing model-based reasoning (MBR) in socio-environmental synthesis (EMBeRS) (D. Pennington and A. Danielson)
- 2013T6-007: Translational ecology: A pedagogical framework to integrate natural and social sciences (M. Brunson and M. Baker)
- 2013T6-009: The development of a social and ecological framework for understanding climate change mitigation and adaptation (R. Shwom and R. Jordan)

Theme 7. Biodiversity and Ecosystem Services (28 proposals received). The following were supported:

- 2013T7-006: Anticipatory governance and societal feedbacks in socioenvironmental transitions: multi-continental acacia invasions as a model system (C. Kueffer and D. Richardson)
- 2013T7-011: Effects of land use on the trade-off between biodiversity and provisioning ecosystem services (R. Seppelt and S. Lavorel)
- 2013T7-012: Ecological and Social Linkages among Biodiversity, ESS, and Environmental Policy and Management in the World's Cities (M. Aronson and C. Nilon)
- 2013T7-013: Synthesis of micro-scale human decision making to mitigate risks to ecosystem services (M. Schluter and M. Janssen)
- 2013T7-015: Feedbacks between biodiversity and ecosystem functions and services during the recovery process of restored ecosystems after anthropogenic disturbance (D. Mateos and H. Jones)
- 2013T7-018: Playing dominoes with tipping points? Exploring the linkages between anthropogenically-driven shifts in marine and terrestrial biodiversity and ecosystem services in a rapidly globalizing coastal region within the Mesoamerica Biodiversity Hotspot (S. Sistla and D. Kramer)

Theme 8. Data-Intensive Analysis & Modeling for Socio-Environmental Synthesis (22 proposals received). The following are currently under revision:

- 2014T8-008: Urban futures: Comparing urban modeling approaches for global scale climate and impacts modeling (D. Runfola; *Resubmitted as a Workshop*)
- 2014T8-016: Pursuit for a modeling framework for addressing drought impacts in Kenya: Dynamic systems and adaptation policies (B. Agusdinata; *Resubmitted as a Workshop*)
- 2014T8-017: Hawaiian watershed hydrologic and ecosystem services response to predicted shifts in forest structure in a changing climate (T. Wong and J. Price; *Resubmitted as a Pursuit*)
- 2014T8-018: Development of a prototype of an integrated modeling system for socio-economic and environmental analysis to promote sustainability at the regional level (G. Knapp and R. Moeckel; *Resubmitted under UMD-SESYNC funding as a Venture*)
- 2014T8-020: Integrating ecological data into investigations of urban scaling effects (M. Alberti; *Resubmitted as a Workshop*)

Theme 9. Graduate Student Themes. *Deadline July 31, 2014. Proposals supported TBD.*

Theme 10. Data-Intensive Analysis & Modeling for Socio-Environmental Synthesis. *Deadline August 4, 2014. Proposals supported TBD.*

Ventures

There has been a growing interest in the SESYNC Ventures program as the community has become familiar with the Center. Although early proposals and projects were not necessarily urgent high-risk/high-reward efforts, we are increasingly fielding inquiries from scholars who are addressing questions of this type. The Ventures program has also given SESYNC the opportunity to co-fund projects with NIMBioS and NCEAS. To date, SESYNC has received 29 Venture proposals. Thirteen have been approved for support, and five are currently under review.

The following have received support:

- Founding Venture: Experiment in teaching the socio-environmental synthesis process (A. Berkowitz, D. Hawthorne)
- 2012V-002: State policies to transform undergraduate STEM education in support of global sustainability (C. Middlecamp, M. George, J. Ramaley)
- 2012V-003: International Forestry Resources and Institutions (IFRI) research on forest social ecological systems for actionable science (A. Agrawal, P. Newton)
- 2012V-004: Using spatial data and analysis to understand the human impacts of ocean acidification (L. Pendleton, S. Cooley, L. Suatoni)
- 2012V-006: Linking biodiversity and ecosystem services: From expert opinion to prediction and application (B. Cardinale, E. Barbier)

- 2012V-009 (co-funded with NCEAS): Understanding how land-use change impacts the dynamics of vector-borne and water borne infectious disease of humans and domestic livestock (A. Dobson, N. Bharti)
- 2012V-011: Macroevolution of Ecosystem Services from Trees (J. Cavender-Bares, S. Polasky)
- 2012V-012 (co-funded with NIMBioS): Integrating human risk perception of global climate change into dynamic earth system models (B. Beckage, L. Gross, A. Zia)
- 2013V-016: Developing an integrated framework to model resilience of the coupled human/natural environment in tropical coastal systems (E. Hines and R. Lewison)
- 2013V-018: Advancing research on the perception, role, and function of urban green infrastructure by bridging the SESYNC synthesis process with an open community engagement process for software development (B. Minsker, S. Ahalt, and L. Band)
- 2013V-019: Renewable energy from wastewater: A synthesis of the agricultural, energy, and transportation sectors and environmental tradeoffs (S. Gabriel, L. Olson, and E. Gilmore)
- 2013V-021: Evidence and decision-support tools for controlling agricultural pests with conservation interventions (D. Karp and R. Chaplin-Kramer)
- 2013V-022: Models to unleash the power of citizen-science insect data for science, policy, education, and conservation (D. Sheldon, J. Calabrese, and L. Ries)

Foundations for S-E Synthesis

The Center's EAB challenged SESYNC to actively engage social science researchers, noting that this was essential in the early stages of the Center's evolution. SESYNC responded by initiating a new program, Foundations for S-E Synthesis, focused on understanding how the most recent theories and techniques from the social sciences can be applied to S-E issues, or alternatively to specific S-E problems. SESYNC leadership has actively recruited sociologists, psychologists, and governance scholars to lead small workshops comprised chiefly of participants from their disciplines. Participants are asked to develop two products—a publication for their peers, and one of a more general nature designed for broad communities of natural and social scientists. The Center has now begun to recruit natural scientists to lead similar efforts.

- 2012F-001: Sociological perspectives on non-state actors in environmental governance (D. Fisher and C. Sirianni)
- 2012F-002: The limits of environmental governance (A. Agrawal)
- 2012F-003: Large-scale natural resource conservation and restoration—Issues of governance (L. Scarlett)
- 2012F-004: Time scales and the interplay between human response and management and ecological and ecosystem dynamics (A. Hastings)
- 2013F-005: Contributions of psychology to socio-environmental problem solving (S. Clayton, P. Devine-Wright)

- 2013F-006: Food security, equity, and ecological sustainability: A multi-indicator, process oriented framework for food systems research (M. Jahi Chappell and H. Whitman)
- 2014F-007: Managing recreational fisheries as complex adaptive social-ecological systems (M. Wilberg, R. Arlinghaus, and O. Jensen)
- 2014F-008: Ecological restoration: Science, concepts, ethics (J.B. Callicott)

Workshops

Between September 1, 2011 and June 1, 2014, SESYNC received 18 formal proposals for Workshops. Six of these were funded and two are currently under review. SESYNC also funded a variety of Workshops led by SESYNC staff. These have given the Center the opportunity to engage with a variety of communities including researchers, educators, and graduate students.

- 2012W-002: Citizen science, butterfly monitoring, and cyberinfrastructure (L. Ries)
- 2012W-003: S-E synthesis education: goals, resources, and tools (D. Hawthorne; SESYNC Initiated)
- 2012W-004: Visualization technologies to support research on human–environment interactions (J. JaJa; SESYNC Initiated)
- 2012W-007: Social networking and priority scholarship (R. Berndtson and J. Kramer; SESYNC Initiated)
- 2012W-008: Macro-evolution of ecosystem services (N. Kraft and W. Fagan; SESYNC Initiated)
- 2012W-011: Linking S-E science to S-E change (T. Miller and L. Olsson)
- 2012W-005: Learning exchanges for conservation: An examination of lessons learned (LExCELL) (L. Jenkins and S. Peckham)
- 2012W-006: Advancing tools and visualization techniques for representing modeled ecosystem service outcomes in simulated multi-player game environments (R. Costanza and L. Waigner)
- 2012W-015: Globalizing Our Understanding of Rural Land Use Change (J. van Vliet and E. Ellis; project was originally submitted under Theme 2)
- 2013W-016: OCI (M. Smorul; SESYNC Initiated)
- 2013W-017: Cyberinfrastructure education in biology (M. Shelley; SESYNC Initiated)
- 2013W-019: Writing workshop for graduate students (D. Hawthorne; SESYNC Initiated)
- 2013W-023: Linking local consumption to global environmental impacts (K. Hubacek and K. Feng; project was originally submitted under Theme 4)
- 2013W-024: Socio-environmental synthesis research proposal writing workshop (R. Berndtson; SESYNC Initiated)
- 2013W-027: Influenza transmission and the built environment: Understanding modes of transmission in a sustainable future (D. Milton and J. Srebric)
- 2013W-028: Software Carpentry Workshop (M. Shelley; SESYNC Initiated)

- 2014W-033: How can social media can be used to explore coupled socio-environmental systems? (A. Crooks and N. Magliocca; SESYNC Initiated)

SESYNC has hosted a variety of additional Workshops pertinent to the Center's mission, including NSF-sponsored cyberinfrastructure meetings, planning sessions for partnership activities with the Renaissance Computing Institute (University of North Carolina), as well as sessions linked to the Keck Futures Initiative. SESYNC has also served as a venue for meetings of local academic programs, federal and state agencies, and NGOs.

Short courses

- Short course 1: Teaching socio-environmental synthesis with case studies (Summer 2013)
- Short course 2: Interactive visualization tools for socio-environmental data (Summer 2013)
- Short course 3: Teaching socio-environmental synthesis with case studies (Summer 2014)

Fellowships

Postdocs

SESYNC has focused on building a strong community of postdoctoral fellows at the Center. Seven solicitations have been issued to date. We have received 158 applications overall and funded 15 fellows.

- **William Burnside**, an ecologist with interests in human macro-ecology and sustainability will develop a synthesis of the ecological, societal, and economic correlates of sustainability.
- **Drew Gerkey**, an evolutionary anthropologist analyzes cooperation and collective action among fishers and herders. He will use a behavioral ecology framework for synthesis of the sustainability of social networks in socio-ecological systems. [Hired February 2014 as an Assistant Professor of Anthropology at the University of Oregon.]
- **Judy Che-Castaldo**, a conservation biologist studying ecological monitoring and phytoremediation will conduct a synthesis of anthropogenic threat and demographic data to predict species extinction risk.
- **Julio Postigo**, a geographer interested in how climate change, political and economic trends, and land reform have affected pastoralist societies will analyze pastoral societies' responses to global environmental change. [Currently on leave.]
- **Harish Padmanabha**, a human ecologist who studies socio-ecological drivers of dengue risk and human mortality in dynamic urban ecosystems of Colombia will expand his work to develop detailed models that account for human vulnerability and urban socio-ecological heterogeneity relating to disease dynamics.
- **Mary Collins**, an environmental sociologist who studies disproportionality and vulnerability in socio-ecological systems will focus on levels of pollution intensity, health risk and vulnerability of receptor human populations and ecological disruption in aquatic systems.
- **Andres Baeza Castro**, a theoretical and human ecologist, who looks at how cooperation behavior is shaped in semi-desert environments, is studying cooperation of a group of 200 rural communities in the semi-desert region of Chile in a gradient of environmental degradation and rainfall variability.

- **Neil Carter**, a conservation scientist interested in the dynamics and governance of complex S-E systems, particularly as they relate to wildlife conservation. At SESYNC he will synthesize datasets from disparate disciplines to develop a spatially-explicit, agent-based model of the reciprocal interactions between people and the environment in Chitwan.
- **Lorien Jasny**, a quantitative sociologist studying the belief networks among participants in the transdisciplinary project teams hosted by the National Socio-Environmental Synthesis Center (SESYNC). She will measure how these structures change over the period of collaboration, which will help understand how differences in belief structures are negotiated to develop group synthesis.
- **Kristin Powell**, a population and community ecologist who explores the ecological, ecosystem, and economic consequences of shifts in biodiversity. Her research at SESYNC examines anthropogenic pressures on biodiversity across increasing habitat areas, and the consequences of biodiversity loss for ecosystem services.
- **David Gill** specializes in marine resource management and his research focuses on identifying linkages between marine protected area (MPA) governance, human well-being, and ecosystem health. David's research is spearheaded by the World Wildlife Fund and affiliated with the SESYNC Pursuit "Solving the Mystery of MPA Performance"; he works together with an interdisciplinary team of researchers and data from MPAs from around the world to identify key trends between MPAs and their social and ecological impacts.
- **Elise Larsen**, a population and community ecologist interested in population and community dynamics in relation to disturbance and environmental change. Her research at SESYNC focuses on developing new tools for studying population dynamics and phenology in Lepidoptera, with an emphasis on climate impacts.

SESYNC recently offered fellowships to 4 candidates for the fifth cohort of postdoctoral fellows who, for the first time, will carry out research proposals that were co-developed with research collaborators.

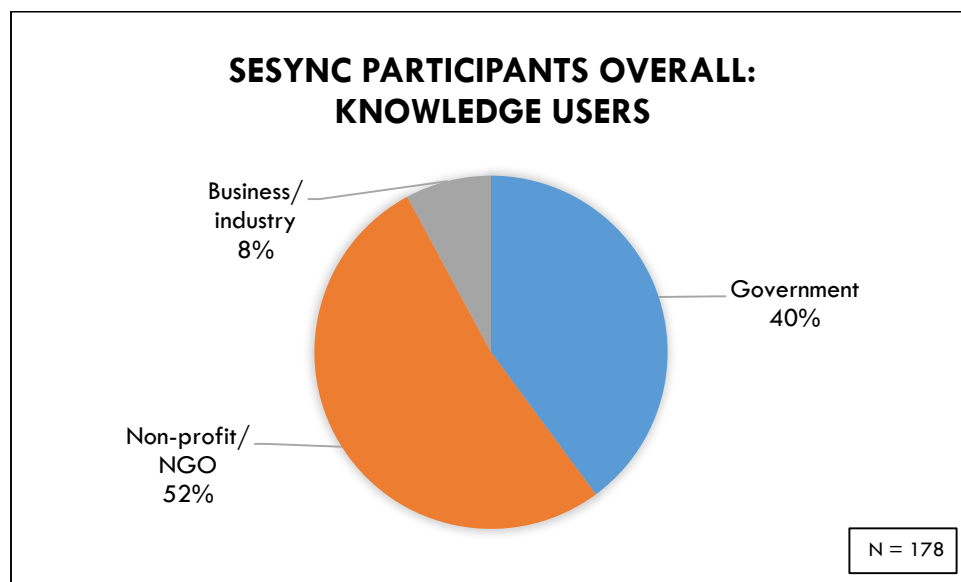
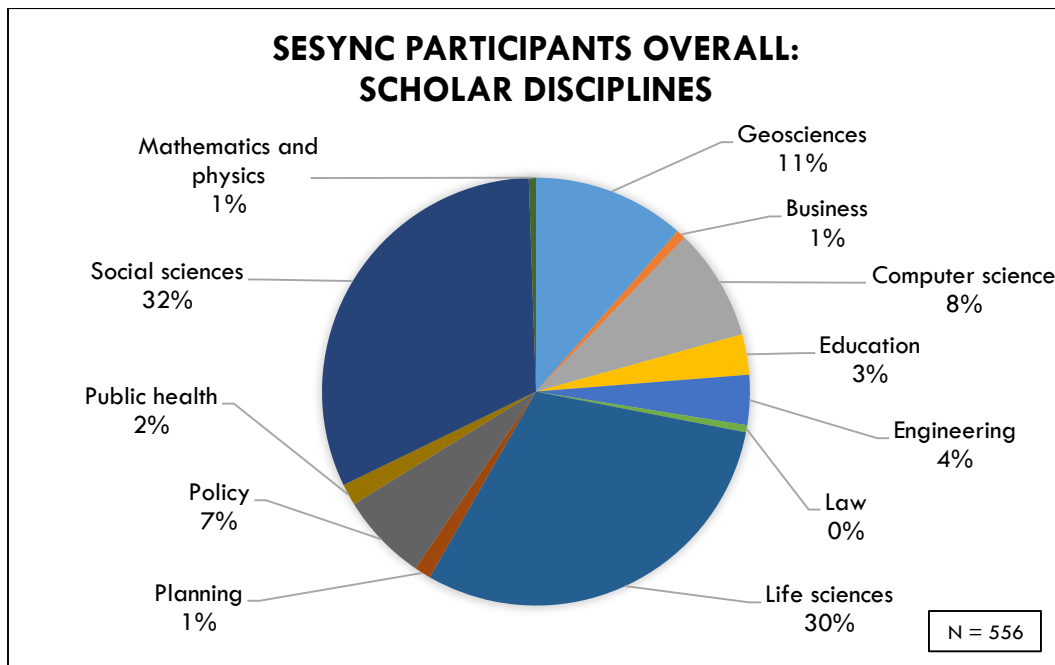
Visiting Scholars

SESYNC has also received a limited number of requests for research fellowships and sabbaticals. Previously, the goals of the applicant's research plans were quite distant from our mission, thereby limiting the utility of a visit to the Center—as such, most were declined. In Year 3, SESYNC hosted two sabbatical scholars.

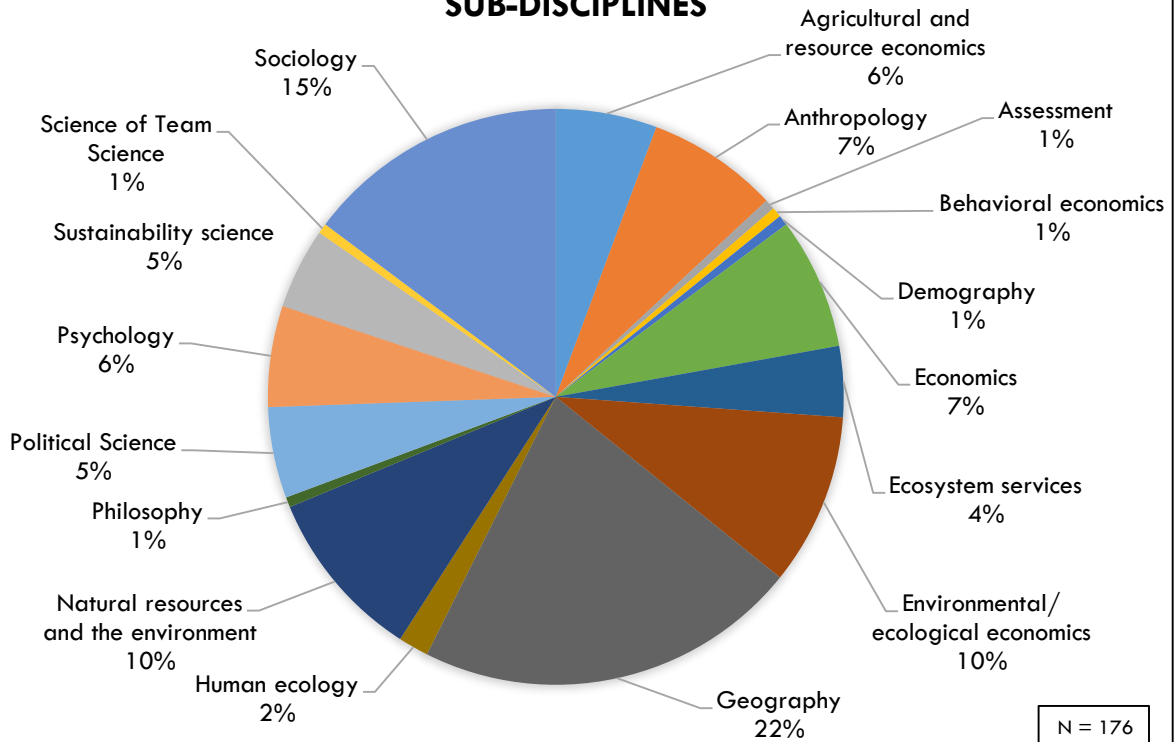
- **Tom Hobbs** (Colorado State University, Natural Resource Ecology Laboratory), an ecologist with expertise in population and community ecology of large herbivores as well as environmental modeling, will complete a book introducing ecologists to principles of Bayesian modeling, develop a working group proposal, and teach a short course about Bayesian modeling for ecologists and social scientists.
- **Dana Fisher** (University of Maryland, College Park), a sociologist with expertise in environmental stewardship and the relationship between environmentalism and democracy, will work with natural scientists affiliated with SESYNC to develop an integrated way to study watershed stewardship in a new project and write up findings from previously funded research on urban environmental stewardship. Her two writing projects include: a book manuscript based on the SESYNC Workshop on "Sociological Perspectives on Non-State Actors in Environmental Governance", which will be in collaboration with Carmen Sirianni and Kenneth

Andrews; and a book manuscript based on her research on urban environmental stewardship in New York City, which is under contract with Routledge Press.

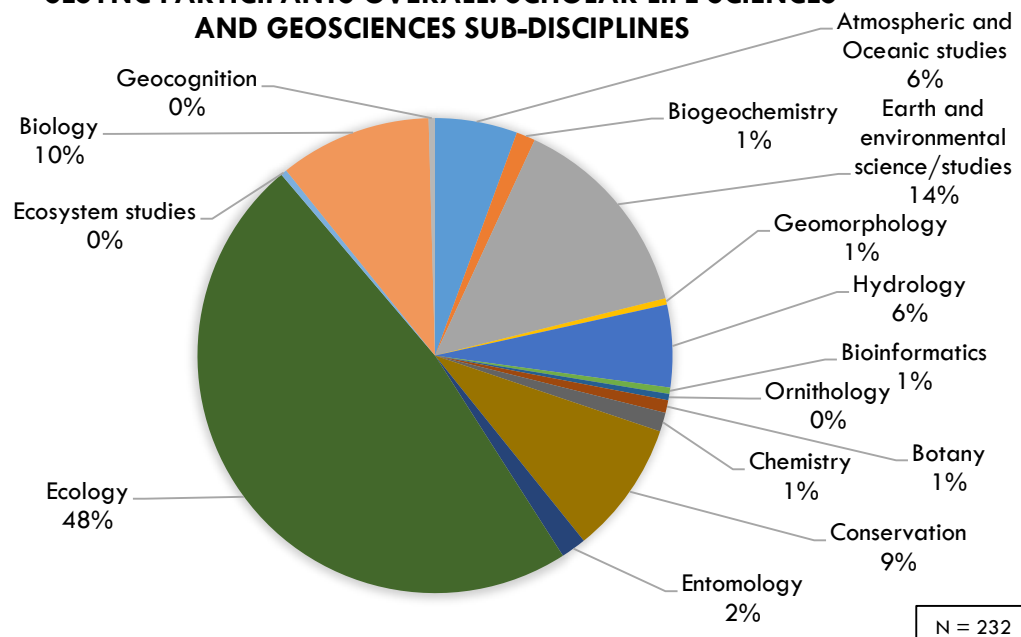
All SESYNC Participants (Themes, Ventures, Workshops, Short Courses, Foundation Series, Theme ID Meetings)



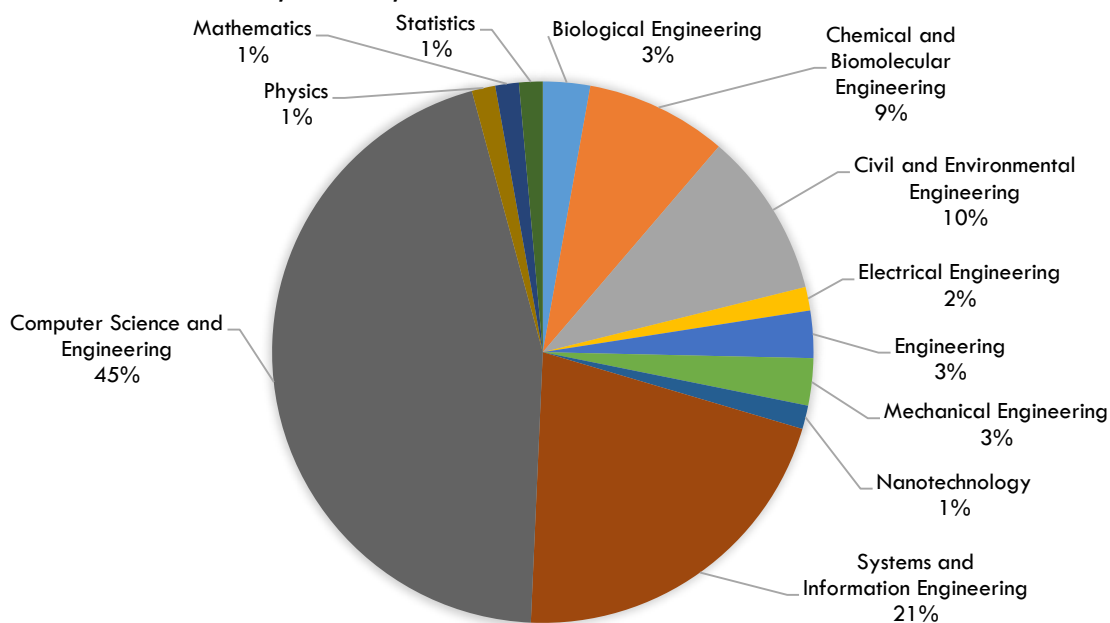
SESYNC PARTICIPANTS OVERALL: SCHOLAR SOCIAL SCIENCE SUB-DISCIPLINES



SESYNC PARTICIPANTS OVERALL: SCHOLAR LIFE SCIENCES AND GEOSCIENCES SUB-DISCIPLINES



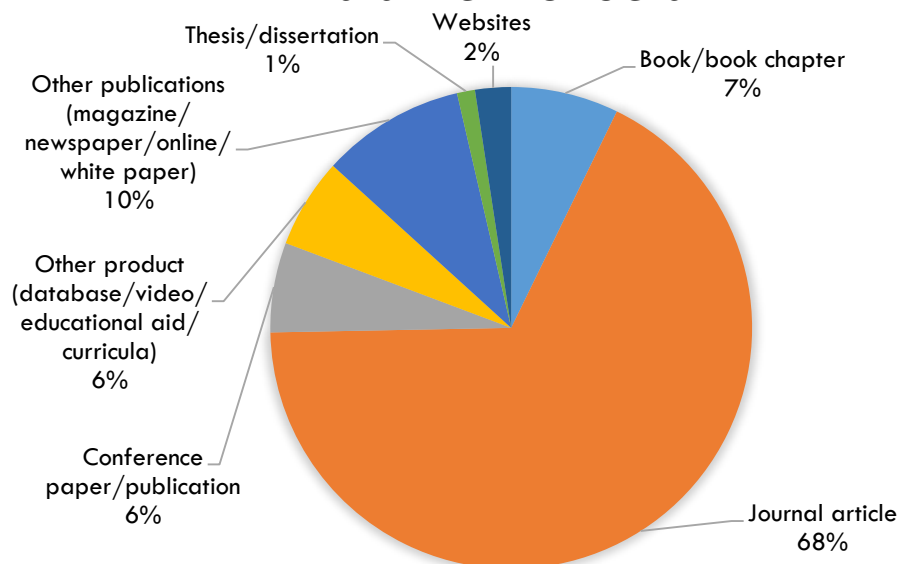
SESYNC PARTICIPANTS OVERALL: SCHOLAR COMPUTER SCIENCE, MATH, & ENGINEERING SUB-DISCIPLINES



N = 71

E. SESYNC Products

SESYNC PRODUCTS



N = 83