Discovery: Climate Change Adaptation and Mitigation (CCAM, pronounced "See-Cam")

Positioning ESF in Path-Breaking New Constellations for Teaching, Research, and Transforming Society

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(1) A description of the discovery opportunity.

Climate change is a fact. It is unlikely that political solutions to reduce GHG will be found in a timely manner; thus, there is a clear need for society at large to develop coping mechanisms. At this point, very few academic institutions have formal programs in climate change adaptation (CCA) or mitigation (CCM). SUNY-ESF has worked for decades in CCM research, but there is a golden opportunity here to develop a constellation of programs that couple research and teaching in a new configuration: Climate Change Adaptation and Mitigation (CCAM). **We aim for nothing short of a program that will put SUNY-ESF on the map *at an early stage* in this arena where to date few programs exist, but which will become widespread in university curricula in the next 5-10 years. This will draw attention to ESF and attract students, faculty, and researchers to tackle a problem and transform society.** Through a framework comprising new teaching/research initiatives, partnerships, and cross-campus collaborative configurations, ESF will become a "go-to institution" for obtaining knowledge, skills, and tools, provide solutions, and make nature and society more resilient.

(2) A description of undergraduate and graduate programs that will be impacted including new degree programs, and how these new programs will better position ESF students for career advancement and leadership in environmental science, practice and policy.

Transformative CCAM education at ESF will be developed at both the undergraduate and graduate levels. Our program development will be scaffolded so that by year 3 of this project, CCAM education will be self-sustaining (Year 1 graduate major and first cohort recruitment, Year 2 undergraduate major and first cohort recruitment, first graduate seminars; Year 3 first undergraduate seminar, graduating first graduate cohort). The program will cut across education levels and will include community education and outreach (described in section 6 below).

We will develop a new major in Environmental Science named after this Discovery Challenge project—Climate Change Adaptation and Management. This major will draw from current courses related to CCAM in LA, ERE, ES, EFB, Chem., PBE, and FNRM, such as Hydrology in a Changing Climate and Plant Ecology & Global Change, for example. In addition, we will develop a seminar series. Keystone classes will be required, including Climate Change Adaptation and Climate Change Science. Others will be selectable based on interest (e.g. CCAM and Food Security). ESF faculty will be invited to lead seminars on a rotating basis (so as not to overload individual faculty). By being a seminar lead, faculty will become better educated (with the students) in an area of CCAM, which will have the potential for snowballing further CCAM involvement and scholarship.

At the graduate level, the vehicle for education will be through GPES with a new Area in CCAM. Like at the undergraduate level, students will take courses already offered, and a seminar series will be developed. However, at the graduate level each student will facilitate a graduate seminar in CCAM with a faculty mentor.

At the end of year two, following these seminar developments and watching cohort needs, we will recommend a faculty hire (or two) in CCAM. The CCAM collaborative will participate in all stages of the faculty hire(s).

Certificate programs will be developed with partners at Syracuse University and SUNY Upstate: Climate Change Real Estate (SU Whitman School); Climate Change Law; Climate Change Adaptation and Public Health (SUNY Upstate); Climate Change Adaptation Communication (SU Newhouse).

(3) A list of agencies, partners, and funding entities either currently or anticipated to be interested in funding research, education, and outreach projects in the initiative area.

State agencies: NYDEC (specifically: Great Lakes; Hudson River Estuary Program; Mohawk Basin Program; Division of Marine Resources); NYDOS; NYDOH; NY Thruway Authority; NY Dept of Education

Federal agencies: HUD, NOAA, NASA, USEPA, USDA (esp. FS), DOD, DOE, DOT, Homeland Security, FEMA, USGS

International: Future Earth, Future Earth Coasts, Global Ocean Oxygen Network, UNESCO (?)

Research Funding Agencies/Programs/Philanthropies: NSF, NIH, USDA, Sea Grant, Bill and Melinda Gates Foundation, Pew Charitable Trusts, Bloomberg Foundation, Kresge Foundation, US Climate Alliance (as examples)

(4) A description of how the initiative will expand current or create new partnerships with other academic, government, and private organizations.

We anticipate that the CCAM will invite and attract collaborations from local to global. Locally, we can partner in the CNY/Finger Lakes region to plan and build for climate resiliency, leveraging existing projects such as those ongoing in LA. Statewide, ESF's expertise in novel design, restoration work, interpretation, and fields such as alternative fuels development will increase resiliency but also can become engines of economic change. Nationally and internationally, The CCAM paradigm becomes the "usual business" alternative to BAU. This requires understanding and teaching of green economy principles and processes for market design, regulatory frameworks which affect markets, and creating demand for climate-friendly programs, products, etc., involving other professional schools (e.g., business, medical, journalism, insurance, see Section 3). Partnering with other colleges and universities beyond Syracuse is also desirable, for example SLU in Sweden (for international forestry and aquatic resources), CUNY and Columbia (for urban CCAM), etc. Partnering with Native American communities, sustainability groups (e.g., TNC, land trusts, Hudson Valley groups such as Scenic Hudson, Riverkeeper, and Clearwater), etc. will strengthen and broaden ESF's diverse reach.

(5) A description of how the initiative will increase the use of ESF assets especially properties beyond the Syracuse main campus.

ESF's regional properties can serve as learning labs *al fresco*, as they do now, to track climate change and study long-term impacts. They provide space for experiments in C storage, land management (how do we manage for resistance, resilience, transition?) and connectivity to fresh, estuarine, and marine environments. *We envision that some of the other Discovery projects will fit into this part of the CCAM constellation*. In addition, we highlight the need to turn attention to the lakes on ESF regional properties, for these are the "magnifiers of watershed responses to climate change," and yet they are severely under-studied even as dramatic change occurs. CCAM will encourage hires to address gaps such as this. Finally, these properties offer great opportunity to develop and test-bed new conceptualizations of ecosystem services, develop means to make them affordable/profitable to landowners and other stakeholders, and share with various audiences (e.g., via the Adirondack Interpretive Center and other venues).

Here as well as in urban settings, design will marry with biophysical and social sciences for creating societal solutions to secure humanity, conserve natural areas, and bring natural areas into current built environments.

(6) How the initiative will inform policy decisions, enhance ESF's reputation, and have a global impact.

As a leader in CCAM we will inform climate change policy from regional to global scales. We will be sought out for CCAM education and solutions because we are leading the field with this Discovery Challenge, but then will be the leader through our experience. Our educational programs (section 2) and project partnerships (section 4) will be excellent advertisements for our program. In addition, we will initiate novel channels for public dissemination, such as a YouTube channel on CCAM at ESF.

(7) A description of new investments (including new faculty hires and support) required to move the initiative forward over a three-year period leading to financial sustainability by year four.

To ensure that CCAM at ESF is making meaningful advancements in teaching and scholarship, we propose an External Oversight Board, composed of blue-ribbon scholars, to provide guidance during the project and afterwards. Investment would be required for modest travel costs and honoraria.

A CCAM Distinguished Visiting Scholar Program will be developed through this project. This CCAM Scholar will be a world leader in CC scholarship, and will collaborate in teaching and research during the semester leave from their home institution. Although Discovery Challenge will fund the first three years of this program and the College Foundation will be enlisted for long-term donor funding, ESF may need to find an investment partner.

As outlined in section 2, a CCAM faculty line will be developed through this Discovery Challenge. We envision defining what this position would look like as we work through the steps above.

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Project Feasibility Statement

1) Initial Startup of the Project: A dynamic combination of activities will initiate a collaborative CCAM Institute for education, research and action. A core working group of 8, composed of faculty and professional staff from ESF and partner institutions, will initiate outreach and involvement to create mission and vision, and a strategic plan that engages science, engineering and design, social and behavioral sciences, communication and environmental education. We will establish CCAM sub-working groups within the first six months for: symposia, coursework, a journal, and funding development. We will establish an external advisory group consisting of leaders in climate change action from the academy, agencies, non-profits and businesses. We will develop certificate and MPS programs in CCAM with our partner institutions, and undergraduate and graduate majors at ESF. A blue ribbon symposium will highlight ESF's commitment to CCAM. CCAM programs will permeate throughout ESF, and will position ESF for CCAM education and research growth. We will advise the ESF Development Office in philanthropic partnerships for a CCAM chaired professorship and associated infrastructure, including new construction for this Institute. A journal will be established in CCAM in collaboration with ESF Libraries.

2) How the Project Will Grow to Be Self-sustaining: ESF will be among the first colleges in the US to offer specific CCAM education, positioning ESF to recruit top in- and out-of-state students. Our teaming at the local level will position us for agency-funded research. With advertising, CCAM will be visible and, as a unique institute, able to attract donor support for faculty chairs and infrastructure. CCAM team members include established faculty with a proven track records of significant funding for transdisciplinary projects and an exceptionally strong cohort of younger faculty that are rapidly establishing themselves as leaders in their fields. Partnerships with government, NGO's and businesses through working group membership will provide pathways for additional funding to support CCAM.

Transformative

1) Generally: Climate change is ***the*** critical environmental threat of the next decades. Every institution in the US will soon try to establish what we are proposing here. ESF, as one of the premier environmental institution in the US, should take the lead through this program to transform communities, lands and waters, and society as a whole to adapt to climate change, and to continue research and teaching in mitigation. We consider this imperative if ESF is to stay relevant.

2) With Respect to Research and Education at ESF: This Discovery Challenge project puts ESF in the driver's seat for climate change education and research going into the next generations. We will have CCAM educational programs at both the undergraduate and graduate level; this will likely disseminate into "ESF in the High School" and similar programs. Partnering with other institutions and working closely from the beginning with practitioners in the field and policy makers will provide new ways to approach problems and find solutions. We will have established the connections necessary to make agency projects attractive. We will solicit philanthropic partnerships to establish faculty chair and long-term infrastructure in CCAM. This project will fundamentally re-create ESF as the leader in climate change adaptation and mitigation, tying together everything that we already do, but giving us all, the whole college, a shared and truly vital purpose.