

THE AFRICAN ECOSYSTEMS PROGRAM AT COLORADO STATE UNIVERSITY

*“Building and enhancing Colorado State University’s strengths
in ecosystem research and education focused on Africa.”*

Mission

“Improve understanding and conservation of biodiversity, ecosystem services, and human well-being on the African continent through state of the art ecosystem and social science research, and develop solutions to environmental problems in which people are integral components of the landscape. “

Rationale, Goals, and Products

Africa harbors enormous biodiversity and provides ecosystem services of world-wide significance, but these natural resources are in peril. Threats to African environments include: habitat loss and fragmentation, deforestation, overgrazing, unmanaged fire, bush encroachment, hydrological diversions, climatic changes, human and animal diseases, invasive species, bushmeat poaching and hunting, increased cultivation of marginal lands, air pollution, and water pollution. Ecological and human-ecological systems are increasingly vulnerable. African ecosystems face not only degradation, but collapse. Such tragic changes can occur suddenly, and may be difficult or impossible to reverse.

People are central to these environmental problems, therefore they are also central to environmental solutions. A majority of all wildlife, biodiversity, and ecosystem services in Africa exist outside of protected areas, placing them in direct conflict with human uses. Africa is the least developed continent on the planet, with widespread poverty and environmental degradation. Africa’s natural resources are under ever-increasing pressure. Combined with human population growth, land use change, and land use intensification, human conflicts with biodiversity and ecosystem services are intensifying. Experience has taught us that the only viable solutions to environmental problems are those that consider humans as agents that both affect and are affected by the environment. It is therefore critical that we understand factors that influence human decision-making if we are to find lasting solutions to Africa’s environmental challenges.

While there are numerous centers and institutes around the U.S. focusing on Africa, nearly all of them are oriented to social or cultural aspects of African societies rather than environmental concerns. There are also relatively few ecologists or human ecologists in the U.S. who specialize on Africa. CSU has one of country’s largest concentration of environmental scientists with African expertise. NREL scientists have been carrying out ecological research in Africa for three decades and their work is widely recognized, nationally and internationally. The African Ecosystems Program (AEP) will play a unique role at CSU by providing a focus for

African environmental research, bridging disciplinary and departmental barriers, and serving as a focal linkage between CSU and African environmental scientists and institutions.

The goals of the African Ecosystems Program are to:

- Improve our understanding of ecological and environmental issues facing Africa and enhance the knowledge-base that informs decision makers at all levels (from family and village to national and regional), identifying the implications of land-use policies and decisions that affect long-term sustainability and integrity of African ecosystems.
- Conduct and apply state of the art ecosystem research to improve and sustain ecological viability and human well being on the African continent.
- Facilitate interdisciplinary research and interactions among CSU faculty, students, and African counterparts to enhance the application of more integrative ecological, environmental, and cultural knowledge to the environmental opportunities and problems facing African societies.
- Use the best environmental science to enhance decisions and policies that influence environmental sustainability in Africa.

Major products of the African Ecosystems Program will be:

- Integrated environmental assessments and corresponding strategies for solutions to environmental problems in Africa. Integrated assessments are interdisciplinary studies of ecosystems or human ecosystems that reveal how interactions among system components lead to emergent outcomes.
- Training of scientists and managers in the U.S. and Africa to build capacity for integrated research and assessments that provide viable solutions to African environmental problems
- Annual reports detailing our progress, successes, and direction, available on the web.
 - Web-based African environmental information center, distributing critical assessments and practical solutions.
 - Enhanced prospects for conservation of biodiversity and human well-being on the African continent.
- Alerts that announce hotspots of concern, identifying people and places that are currently in peril, or vulnerable to future crisis.

Activities

The African Ecosystems Program will facilitate interdisciplinary research and interactions among CSU faculty/students and African counterparts and thereby enhance the application of more integrative ecological, environmental and sociological knowledge to the environmental opportunities and problems facing Africa. Research will benefit citizens in the U.S. as well as in Africa.

Research activities:

- Strengthen and broaden research at CSU relating to African ecology, conservation, cultural studies, and sustainable development through recruitment of new faculty, research scientists and graduate students in targeted research areas.
- Conduct basic ecosystem research in focal areas such as grazing ecosystems, savanna dynamics, pastoral ecology, wildlife ecology, biogeochemistry, atmosphere-biosphere interactions, land use and land cover change, and linkages between biodiversity and ecosystem functioning.
- Conduct interdisciplinary research on linked human-environment systems and human decision-making.
- Perform integrated environmental assessments at local through regional scales, and make intercomparisons among assessments in different locations.
- Develop ecological forecasting tools such as ecosystem models to assess and predict environmental change.
- Develop an information center for the geographic distributions of biodiversity, ecosystem services, and their benefits to human societies in Africa.

Education and outreach activities:

- Organize world-class conferences, symposia and workshops in the U.S. and in Africa on African environmental problems and solutions
- Develop new scientific and institutional linkages emphasizing environmental research and education between CSU and partner institutions in Africa
- Enhance undergraduate and graduate exposure at CSU to the ecology and environment of Africa through targeted curriculum development and graduate fellowships
- Develop undergraduate and graduate curricula in association with relevant departments within CNR and across campus.
- Develop a training program for African resource managers and students that focuses on interdisciplinary understanding of human-ecological systems for sustainable land use and economic development. Educational experiences would typically be limited to two weeks to a semester to avoid contributing to African 'brain-drain'.
- Couple these programs with exchanges for U.S. students that provide opportunities for in-depth understanding of African cultures, languages and environments through long-term exchange and research
- Develop outreach programs with African partners, including community-specific presentations relating how systems approaches to management of natural resources integrate physical, ecological and socioeconomic components to provide a more comprehensive understanding of management options and their impact on communities and ecosystems
- Develop an African study tour program that provides participants with an integrated understanding of African ecosystems and societies.
- Develop and maintain a web site with linkages to sources of environmental research and data in Africa.
- Develop IT facilities for video conferencing with African partner organizations.

Program Organization

- Director. Overall management of African Ecosystems Program's research and education programs, liaison with collaborating African institutions, fund raising (60%), research (40%)
- Endowed chairs (2-3). Full time faculty or research scientist positions in ecology, human ecology, and environmental policy and economics.
(or)
- Part-time support for 5-10 core faculty or research scientists.
 - Support Staff (2-3). Outreach and educational activities staff. Technical programmer staff for developing and maintaining model user interfaces and web sites. Clerical staff.
 - Faculty. Affiliation will be open to all CSU faculty and scientists with active research and education interests in Africa.

Required Support

- Director salary
- Endowments for 2-3 faculty chairs.
- Support staff salary.
- Office space for Director, faculty, and staff.
- Graduate student fellowships that will allow the program to recruit students interested in research in African ecology, environment and human-environmental systems, and sustainable development.
- Travel funds for exchange visits for U.S. and African scientists and resource managers.
- Support for international conferences and workshops on African environmental problems.

NREL Scientists with African Expertise (17)

Randall Boone, Michael Coughenour, Stephen Del Grosso, Kathleen Galvin, Niall Hanan, Jeff Hicke, N. Thomas Hobbs, Alan Knapp, Dennis Ojima, William Parton, Jayashree Ratnam, Robin Reid, Mahesh Sankaran, Robert Sanford, David Swift, Diana Wall, Chris Williams

For further information, contact Michael Coughenour (mikec@nrel.colostate.edu), Niall Hanan (niall@nrel.colostate.edu), or Kathleen Galvin (kathy@nrel.colostate.edu).