Sustainability Primer

Research project proposals should embody sustainability. The goal of sustainability, derived from the U.S. National Environmental Policy Act of 1969 (NEPA), is to, "create and maintain conditions, under which humans and nature can exist in productive harmony, that permit fulfilling the social, economic, and other requirements of present and future generations." A sustainable approach is a systems-based approach that seeks to understand the interactions which exist among environmental, social, and economic pillars in an effort to better understand the consequences of our actions. Ideally, research that seeks sustainable solutions to protect the environment *also* strengthens our communities and fosters prosperity.

Sustainability Criteria Below are the three pillars of sustainability, each with six broad topics that relate to its respective pillar. A brief explanation and example are provided for each topic. The examples are not intended to be inclusive.

Environmental

Ecosystem Services
Protect, sustain, and restore the health of critical natural habitats and ecosystems
Example: Innovative nutrient management techniques (Green Infrastructure)

Green Engineering & Chemistry
Design chemical products and processes to: eliminate toxic hazards, reuse or recycle chemicals, and reduce total lifecycle costs.
Example: Lifecycle Assessments in molecular design

Air Quality
Attain and maintain air-quality standards and reduce the risk from toxic air pollutants
Example: Investigate potential greenhouse gas emissions reduction strategies

Water Quality
Reduce exposure to contaminants in water systems and infrastructure (including protecting source waters), optimizing aging systems, and next generation treatment technologies & approaches.
Example: Purpose driven water reuse and innovative treatment technologies

Stressors
Reduce effects by stressors (e.g. pollutants, greenhouse gas emissions, genetically modified organisms) to the ecosystem and vulnerable populations
Example: Fate of modified nanoparticles in aqueous media

Resource Integrity
Reduce adverse effects by minimizing waste generation to prevent accidental release and future cleanup.
Example: Innovative technologies and processes to prevent environmental impact

Social

Environmental Justice
Protect health of communities over-burdened by pollution by empowering them to take action to improve their health and environment
Example: Establish partnerships with local, state, tribal, and Federal organizations to achieve healthy and sustainable communities

Human Health
Protect, sustain, and improve human health
Example: Parameterize model which predicts developmental toxicology

Participation
Use open and transparent processes that engage relevant stakeholders
Example: Develop database of reduced-risk pesticides for commonly used products, create greater public access and understanding about sustainability

Education
Enhance the education about sustainability of the general public, stakeholders, and potentially affected groups.
Example: Provide opportunities for students and communities to learn about sustainability

Resource Security
Protect, maintain, and restore access to basic resources (e.g. water, food, land, and energy) for current and future generations
Example: Study impact of dispersants/oil combination on natural waterways

Sustainable Communities
Promote the development, planning, building, or modification of communities to promote sustainable living
Example: Landscape with native plant species, green buildings
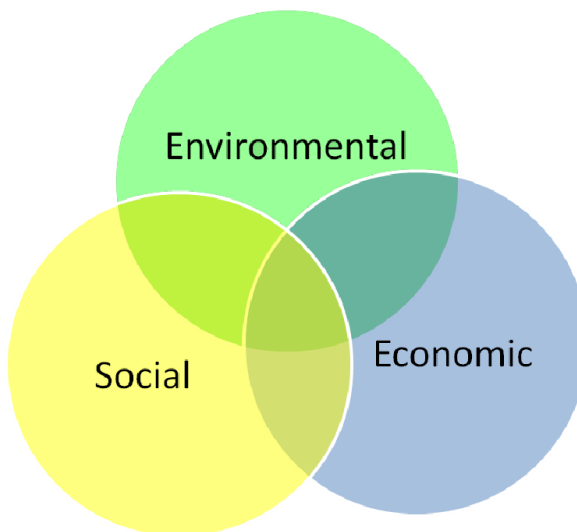
Economic

Jobs
Strengthen and maintain current and future jobs
Example: Promote jobs through introduction of innovative technologies and practices that provide multiple benefits to communities and the environment

Incentives
Promote incentives that work with human nature to encourage sustainable practices.
Example: Collaborative urban stormwater management approaches—Chesapeake Bay Partnership

Supply and Demand
Promote fully informed accounting and market practices to promote environmental health and social prosperity.
Example: Full lifecycle cost and benefit accounting techniques

Natural Resource Accounting
Improve understanding and quantification of ecosystem services in cost benefit analysis.
Example: Sustainability Assessments

Costs
Positively impact costs of processes, services, and products throughout the full lifecycle
Example: Strive to develop waste-free processes—eliminating need for regulation, treatment, and disposal costs throughout systems

Prices
Promote cost structures that reduce risk and premium for new technologies.
Example: Speed innovative technologies and approaches to the market through demonstration and testing with community partners