Sustainability Primer

Research project proposals should embody the principles of sustainability. Sustainability is defined by the Brundtland Commission as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs," and by the President's Council on Sustainable Development as "…an evolving process that improves the economy, the environment, and society for the benefit of current and future generations." A sustainable approach is a systems-based approach that seeks to understand the interactions which exist among the three pillars (environment, social, and economic) 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 6 broad topics that relate to its respective pillar. A brief explanation of each topic is given, along with example research activities or goals that might address that aspect of sustainability. The examples are not intended to be inclusive.

Environmental

Ecosystem Services
Protect, sustain, and restore the health of critical natural habitats and ecosystems
Examples: Potential impacts of hydraulic fracturing

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

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

Green Engineering & Chemistry
Develop chemical products and processes to: reduce/prevent chemical hazards, reuse or recycle chemicals, treat chemicals to render them less hazardous, dispose of chemicals properly.
Example: Lifecycle environmental impacts

Water Quality
Reduce exposure to contaminants in drinking water (including protecting source waters), in fish and shellfish, and in recreational waters
Example: Pathogen removal in riverbank filtration

Resource Integrity
Reduce adverse effects by reducing waste generation, increased recycling, and ensuring proper waste management; restore resources by mitigating and cleaning up accidental or intentional releases
Example: Improving recycling technology to prevent environmental impact of mining

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

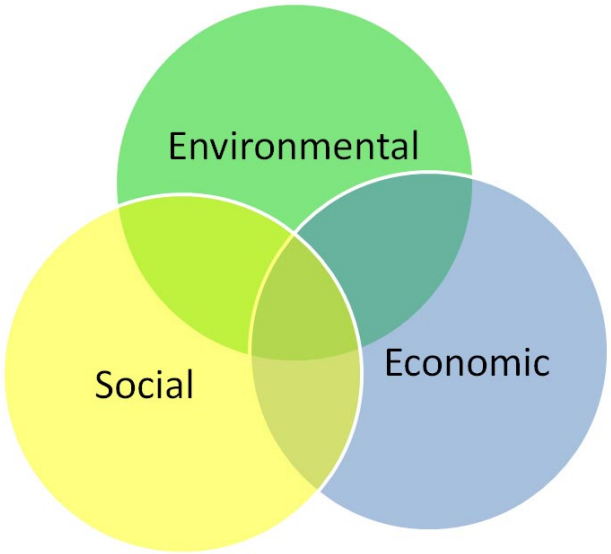
Human Health
Protect, sustain, and improve human health
Example: Parameterize model which predicts developmental toxicology

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 to learn about sustainability

Resource Security
Protect, maintain, and restore access to basic resources (e.g. food, land, and energy)
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
Create or maintain current and future jobs
Example: Create green jobs

Incentives
Generate incentives that work with human nature to encourage sustainable practices.
Example: Conservation Reserve Program, encouraging sustainable logging practices

Supply and Demand
Promote price or quantity changes that alter economic growth, environmental health and social prosperity.
Example: Increasing supply of green energy sources to reduce need for fossil fuels

Natural Resource Accounting
Incorporate natural capital depreciation in accounting indices and ecosystem services in cost benefit analysis.
Example: Green net national product

Costs
Positively impact costs of processes, services, and products
Example: Strive to develop a waste-free process—eliminating need for regulation costs

Prices
Promote a cost structure that accounts for externalities to production.
Example: Bottle bill