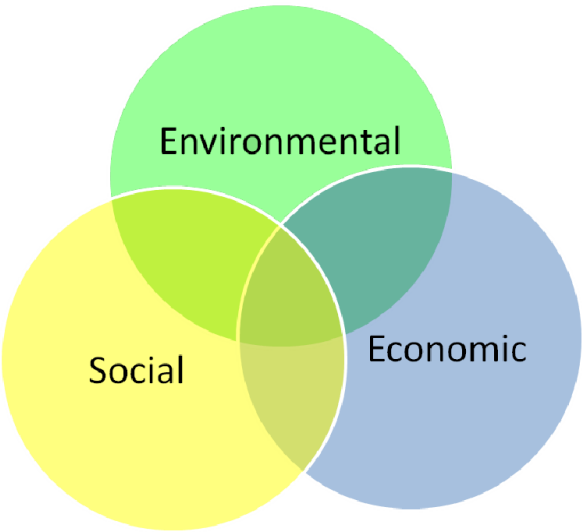


Sustainability Primer

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.

<div><div>Sustainability Criteria</div><div>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.</div></div>		
<div><div>Environmental</div><div><div><div><div>Ecosystem Services</div><div>Protect, sustain, and restore the health of critical natural habitats and ecosystems</div><div>Example: Innovative nutrient management techniques (Green Infrastructure)</div></div><div><div>Green Engineering &amp; Chemistry</div><div>Design chemical products and processes to: eliminate toxic hazards, reuse or recycle chemicals, and reduce total lifecycle costs.</div><div>Example: Lifecycle Assessments in molecular design</div></div></div><div><div><div>Air Quality</div><div>Attain and maintain air-quality standards and reduce the risk from toxic air pollutants</div><div>Example: Investigate potential greenhouse gas emissions reduction strategies</div></div><div><div>Water Quality</div><div>Reduce exposure to contaminants in water systems and infrastructure (including protecting source waters), optimizing aging systems, and next generation treatment technologies &amp; approaches.</div><div>Example: Purpose driven water reuse and innovative treatment technologies</div></div></div><div><div><div>Stressors</div><div>Reduce effects by stressors (e.g. pollutants, greenhouse gas emissions, genetically modified organisms) to the ecosystem and vulnerable populations</div><div>Example: Fate of modified nanoparticles in aqueous media</div></div><div><div>Resource Integrity</div><div>Reduce adverse effects by minimizing waste generation to prevent accidental release and future cleanup.</div><div>Example: Innovative technologies and processes to prevent environmental impact</div></div></div></div></div>		
<div><div>Social</div><div><div><div>Environmental Justice</div><div>Protect health of communities over-burdened by pollution by empowering them to take action to improve their health and environment</div><div>Example: Establish partnerships with local, state, tribal, and Federal organizations to achieve healthy and sustainable communities</div></div><div><div>Human Health</div><div>Protect, sustain, and improve human health</div><div>Example: Parameterize model which predicts developmental toxicology</div></div><div><div>Participation</div><div>Use open and transparent processes that engage relevant stakeholders</div><div>Example: Develop database of reduced-risk pesticides for commonly used products, create greater public access and understanding about sustainability</div></div><div><div>Education</div><div>Enhance the education about sustainability of the general public, stakeholders, and potentially affected groups.</div><div>Example: Provide opportunities for students and communities to learn about sustainability</div></div><div><div>Resource Security</div><div>Protect, maintain, and restore access to basic resources (e.g. water, food, land, and energy) for current and future generations</div><div>Example: Study impact of dispersants/oil combination on natural waterways</div></div><div><div>Sustainable Communities</div><div>Promote the development, planning, building, or modification of communities to promote sustainable living</div><div>Example: Landscape with native plant species, green buildings</div></div></div></div>	<div><p>A Venn diagram with three overlapping circles. The top circle is green and labeled 'Environmental'. The bottom-left circle is yellow and labeled 'Social'. The bottom-right circle is blue and labeled 'Economic'. The intersections of two circles are shaded in lighter tones of their respective colors, and the central intersection of all three circles is a light greenish-yellow.</p></div>	<div><div>Economic</div><div><div><div>Jobs</div><div>Strengthen and maintain current and future jobs</div><div>Example: Promote jobs through introduction of innovative technologies and practices that provide multiple benefits to communities and the environment</div></div><div><div>Incentives</div><div>Promote incentives that work with human nature to encourage sustainable practices.</div><div>Example: Collaborative urban stormwater management approaches—Chesapeake Bay Partnership</div></div><div><div>Supply and Demand</div><div>Promote fully informed accounting and market practices to promote environmental health and social prosperity.</div><div>Example: Full lifecycle cost and benefit accounting techniques</div></div><div><div>Natural Resource Accounting</div><div>Improve understanding and quantification of ecosystem services in cost benefit analysis.</div><div>Example: Sustainability Assessments</div></div><div><div>Costs</div><div>Positively impact costs of processes, services, and products throughout the full lifecycle</div><div>Example: Strive to develop waste-free processes—eliminating need for regulation, treatment, and disposal costs throughout systems</div></div><div><div>Prices</div><div>Promote cost structures that reduce risk and premium for new technologies.</div><div>Example: Speed innovative technologies and approaches to the market through demonstration and testing with community partners</div></div></div></div>

