Integrating Sustainability-related Issues into the Science Classroom

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SEPUP

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Science Education for Public Understanding Program

- Science curriculum design and professional development
- Based at the Lawrence Hall of Science, University of California at Berkeley
- Designing science curriculum, working with teachers, and supporting quality science instruction since 1983
- Major funding for curriculum work from the National Science Foundation

Science and Global Issues (SGI)

- NSF curriculum development project
- Uses sustainability as the unifying context for studying important biological concepts
- Inquiry-based, issue-oriented science…
  - Students talk, think, and discuss content as it relates to personal, societal, and global issues
  - Students learn to use evidence in the decision-making process
- Embedded assessments and literacy strategies
- Research-based and extensively field tested

What is Sustainability?

With your neighbor, discuss the following:

- How would you describe or explain the concept of sustainability?
- What ideas about sustainability might students bring from their everyday lives?

Common Sustainability Issues

- **Resource and energy use:** How can a home be made more energy efficient?
- **Water**: How should wastewater be treated before it is released into the environment?
- **Health:** How should research funding be allocated to address global health issues?
- **Biodiversity**: Where should conservation efforts be focused?
- **Food and nutrition**: Should foods be genetically modified?

Activity: Our Global Community

- First activity of the Sustainability unit
- Students examine what indicators tell us about regions of the world.

Activity: Our Global Community

- Read the Introduction and Challenge
- Complete Steps 1-3

Activity: Our Global Community

- Complete Steps 4-9
- Step 10: walk around and review the data for each region. Compare:
  - The amounts of the indicators relative to other regions
  - How the indicators relate to the population of each region

Activity: Our Global Community

- With those in your region, complete Step 10.
- Review Steps 11 and 12.
- Review the Analysis questions.

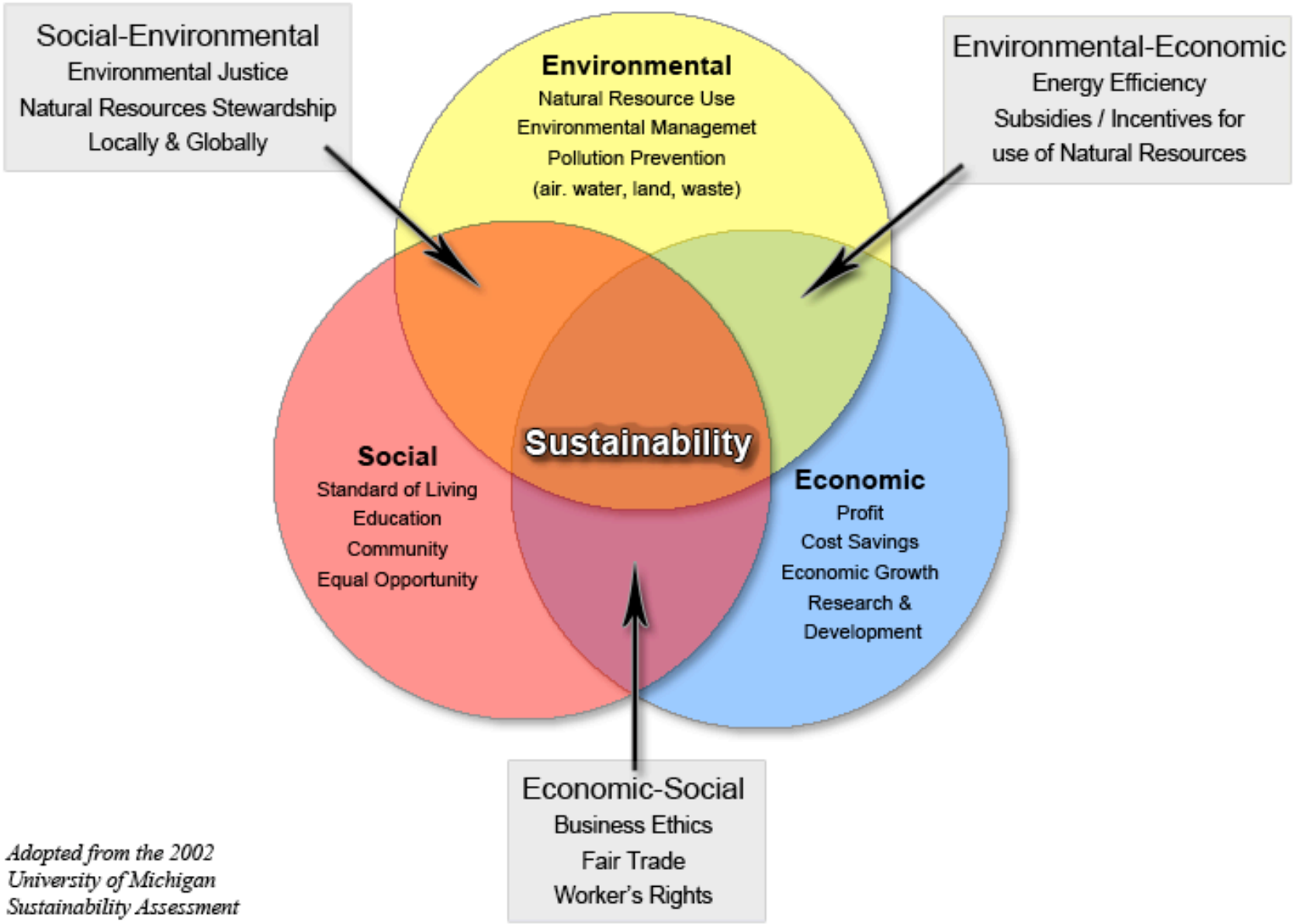
Sustainability

- In the context of human development:
  - Meeting the needs of the present without compromising the ability of future generations to meet their own needs
- Examined through three perspectives:
  - Economic, social, and environmental
- Considered on three levels:
  - Personal, community, and global

3 Pillars of Sustainability

- Economic
  - People desire the highest standard of living that they can achieve. The generation of economic wealth supports adequate access to health care, jobs, education, etc.
- Social
  - To have a sustainable future, peoples' needs for clean air, water, resources, access to health care, etc must be met equally.
- Environmental
  - The Earth has limited resources which organisms need for survival and healthy life.

The Three Spheres of Sustainability



Adopted from the 2002 University of Michigan Sustainability Assessment

Why Issue-oriented Science?

- Integrates sciences & science with other subjects
- Realistic view of how science contributes to solving problems and the role of science in careers
- Real-world connections
- Use of science in daily life
- More authentic science, for ALL students
- Helps students learn science
- Improves student attitudes toward science

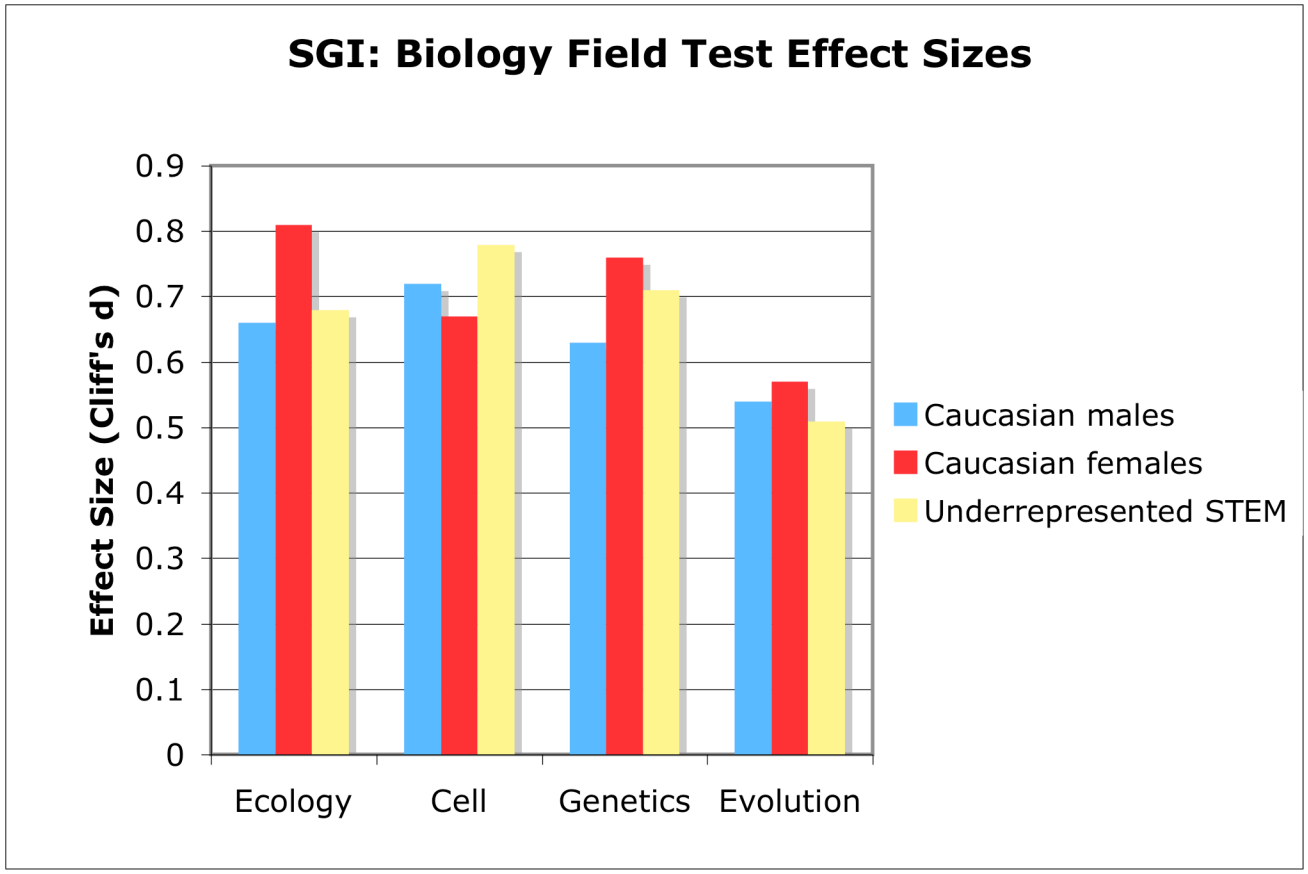
Why Sustainability?

- Sustainability opens up more avenues to relevance for students.
- Sustainable issues relate to science.
- Sustainable living is where our society is going and will likely continue in the future.
- Sustainability decisions and scientific literacy are closely related - one has the potential to develop and inform the other.

Development Process

- Iterative process of development, testing, expert review, evaluation, and revision developed and refined over 22 years of NSF funding
- Develop learning outcomes, assessments, and rough activities; pilot locally
- Refine activities and field-test nationwide; teachers receive PD; 1-2 cycles per unit
- Evaluate
  - Internal evaluation of usability for T and S
  - External evaluation of learning outcomes and pedagogy
  - External evaluation of scientific content

SGI Biology Field Test Pre-Post Effect Sizes



Cliff's d small effect size ≥ 0.147, medium effect size d ≥ 0.330,large effect size Cliff's d ≥ 0.474

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SEPUP website

(for this presentation and other information)

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