

Mapping the Terrain:

The Role of Teaching in U-M's Sustainability Initiative

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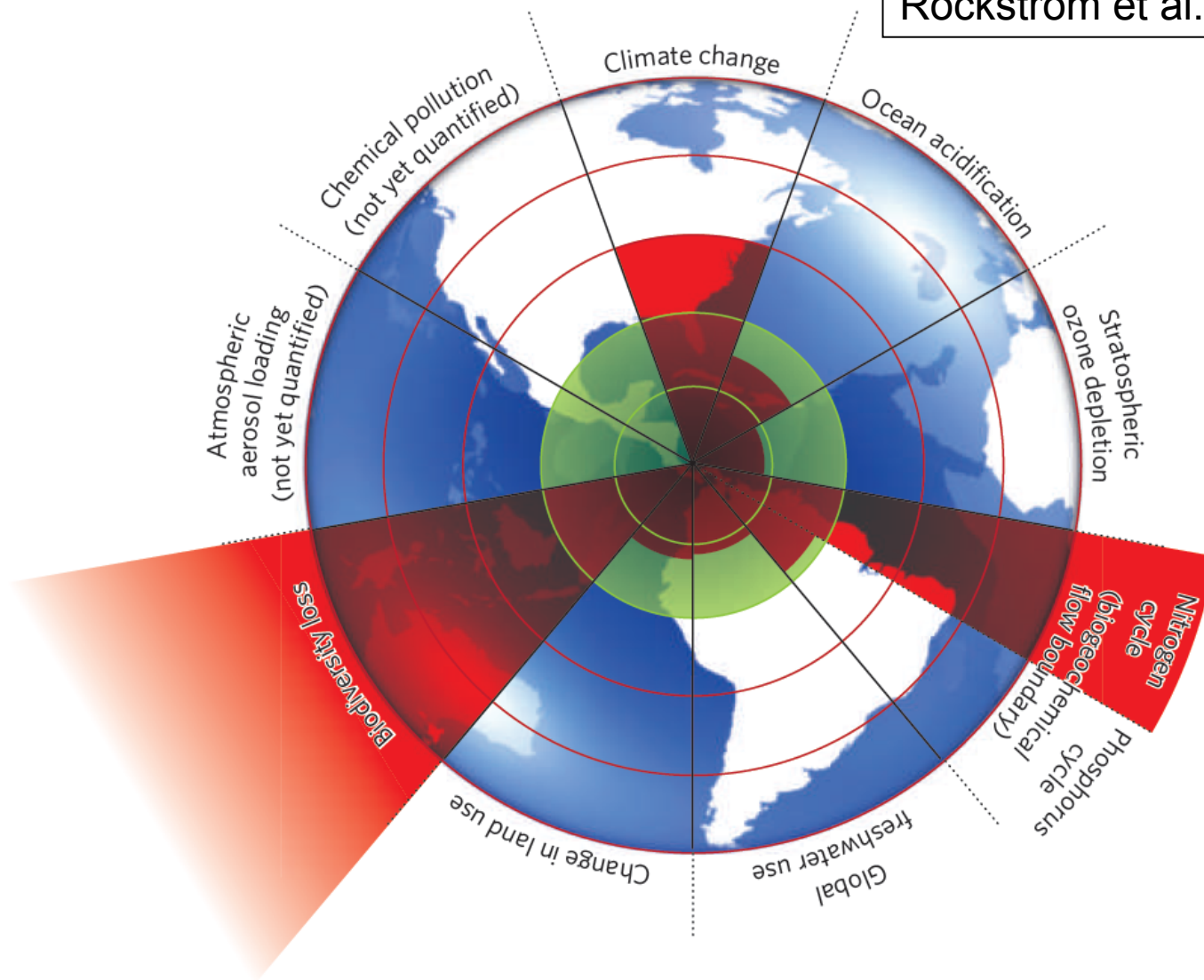
What is Sustainability?

... meeting the needs of the present without compromising the ability of future generations to meet their own needs.

...Brundtland Commission 1987 Our Common Future

Crossing Planetary Boundaries

Rockstrom et al. 2009 *Nature*



Local-to-Global Scales

Significant North/South Differences

Global
Issues



Local
Issues

NORTH

Old, rich millions
Affluence
“Global people”
Resource surpluses
Causes of climate change
Technological knowledge
Theory-driven research

Digital divide

Young, poor billions
Poverty
“Local people”
Resource shortages
Impacts of climate change
Traditional knowledge
Action-driven research

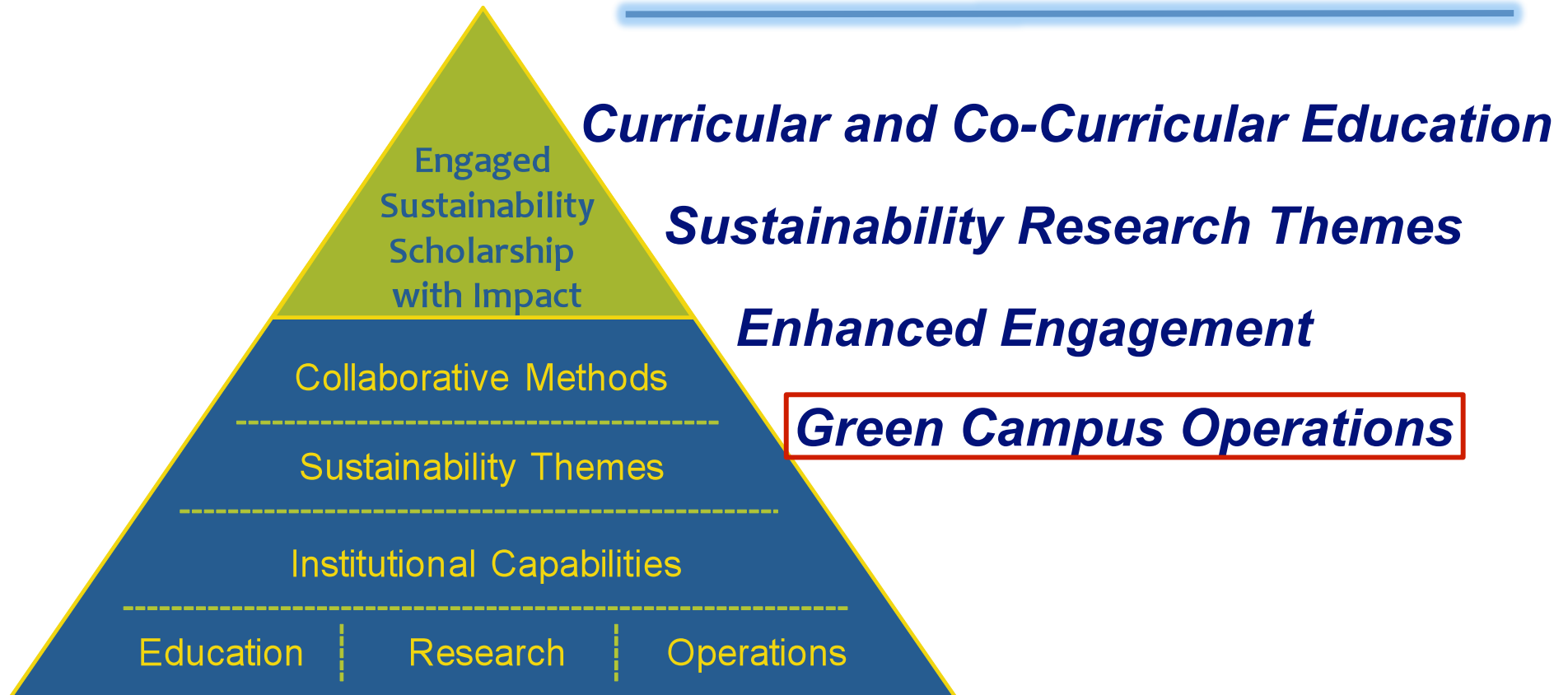
Kates et al. 2001 *Science*

SOUTH

**October 2009, President Coleman
established:**

- **Sustainability as a U-M Priority**
- **Special Counsel for Sustainability**
- **Office of Campus Sustainability**
- **Sustainability Executive Council**
President Coleman (Chair) & 6 VPs
Sets policies and direction

GOALS:



Campus Operations

Move sustainable operations beyond regulatory standards.

6-Point Environment and Energy Initiative:

- **Report annually on environmental performance**
- **Expand renewable energy portfolio**
- **Expand alternative transportation options**
- **Implement and encourage green purchasing**
- **Expand green construction/renovation policies**
- **Continue Planet Blue efforts**

Campus Sustainability Integrated Assessment

Establish 4-5 key sustainability goals for campus operations

Campus Sustainability IA

Phase 1: “What and Why”

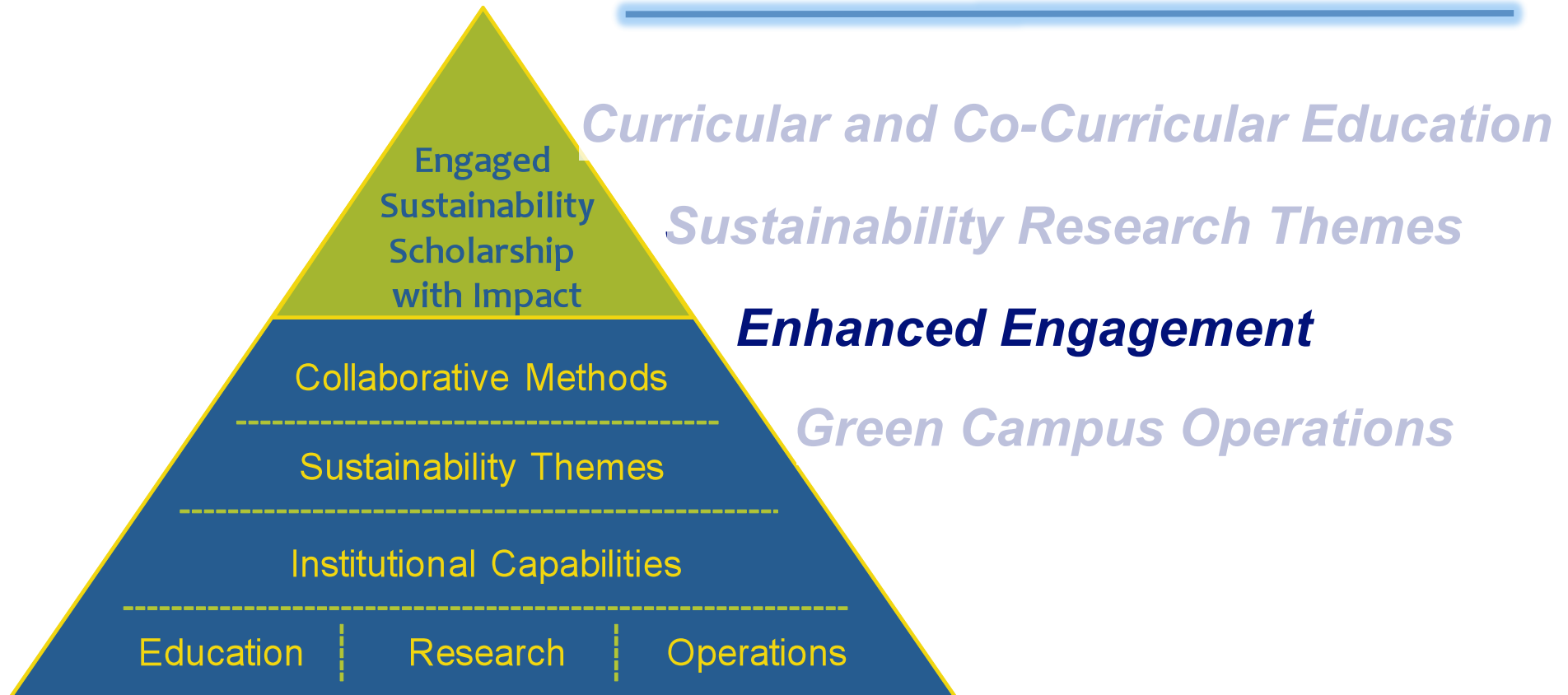
7 Analysis Teams:

Culture, Energy, Land and Water, Purchasing and Recycling, Transportation, Buildings, and Food.

- Faculty leads from 5 academic units
- 43 students from 12 academic units (> 3000 hours to date)
- 150 comments/ideas/suggestions from campus community

Documented current U-M practices; Benchmarked other institutions; Identify initial recommendations

GOALS:



Enhanced Engagement

Engaging academic, business, government, and NGO communities ...

The “Sustainability Collaboratory”

... where U-M centers of excellence engage the broader campus community and external partners in novel, highly adaptive partnerships to cultivate leaders and solve problems

Sustainability Collaboratory

Engage stakeholders to define/solve problems

- Highly participatory approaches (e.g., Integrated Assessment)

Novel mechanisms and tools

- Use IT to reduce energy related to collaborations
- Invent novel collaboration tools for distributed work

Train students to engage constituents and across disciplines

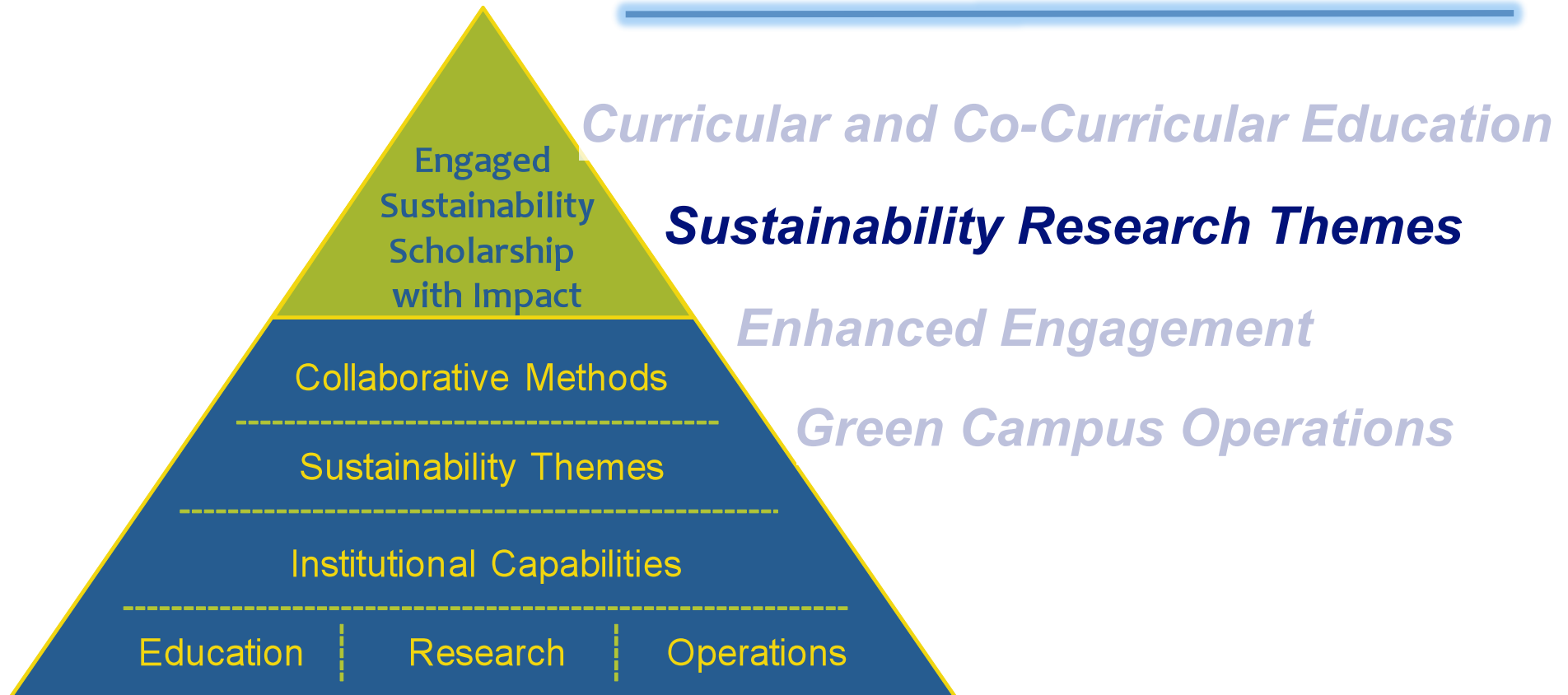
Flexible approaches and research models

- Evolve and adapt to address new and shifting issues
- Rapid engagement of new collaborators and stakeholders

Study the Collaboratory

- Assess effectiveness of collaboration models

GOALS:

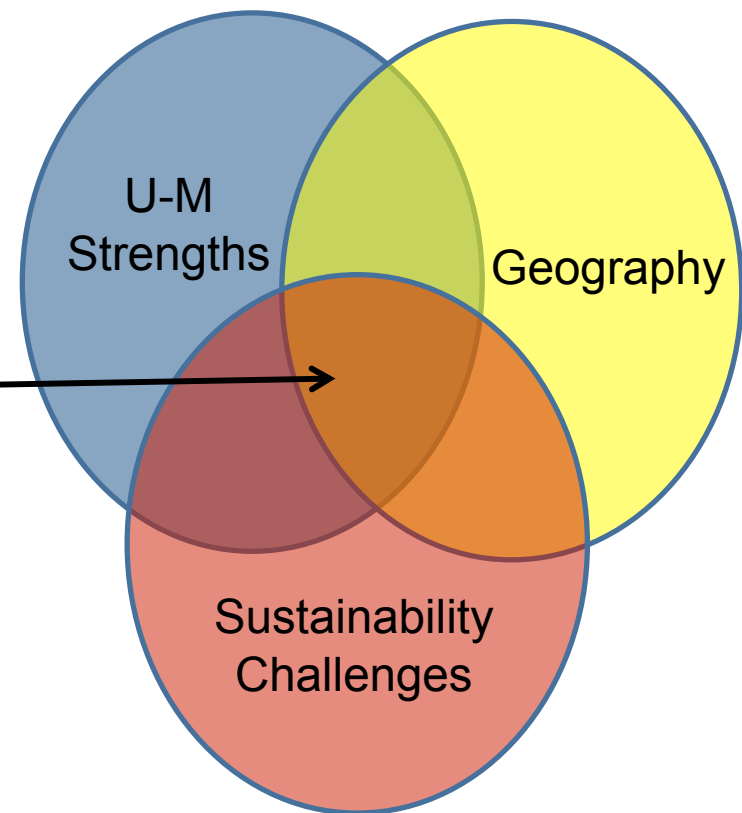


U-M Sustainability Research Themes

Water and Human Health

Climate Impacts, Adaptation, Mitigation

Livable Communities



Water and Human Health

Goals:

- **Better understand interrelationships between water and health**
- **Increase aquatic ecosystem resiliency**
- **Improve access to clean water**

Outcomes:

- **Better technical and policy approaches to restore and protect the Great Lakes and other aquatic ecosystem services**
- **Better ways to collect, purify, deliver clean water to prevent water-borne pathogens and contamination throughout the world**
- **Enhance valuation and market-based approaches to protect aquatic ecosystem services**
- **Assess the ability of current governance systems to ensure sustainable practices and policies**

Climate Impacts, Adaptation, and Mitigation

Goals

- Better understand relationships between behavior and climate
- Effective mitigation and adaption strategies that minimize adverse impacts on human and ecosystems

Outcomes

- Next-generation energy technologies and alternatives & the social dimension policies required to support them
- Better forecasts of regional climate impacts through integrated climate, physical, and biogeochemical models and feedbacks
- Improved adaptation and mitigation strategies
- More effective communication of climate information for decision-making under uncertainty

Livable Communities

Goals

- **Better understand relationships among behavior, transportation systems, IT, and the built environment**
- **Sustainable access to resources needed to live and thrive**

Outcomes

- **Transportation systems and related business models that integrate IT, human behavior, and alternative modes of mobility**
- **Improved integration of community and land-use planning strategies**
- **Improved green building principles, technologies, and techniques**
- **More sustainable technologies and materials that increase the safety and efficiency of transportation modes and infrastructure**
- **New IT solutions that reduce unnecessary transportation**

Enhance Key Program Areas

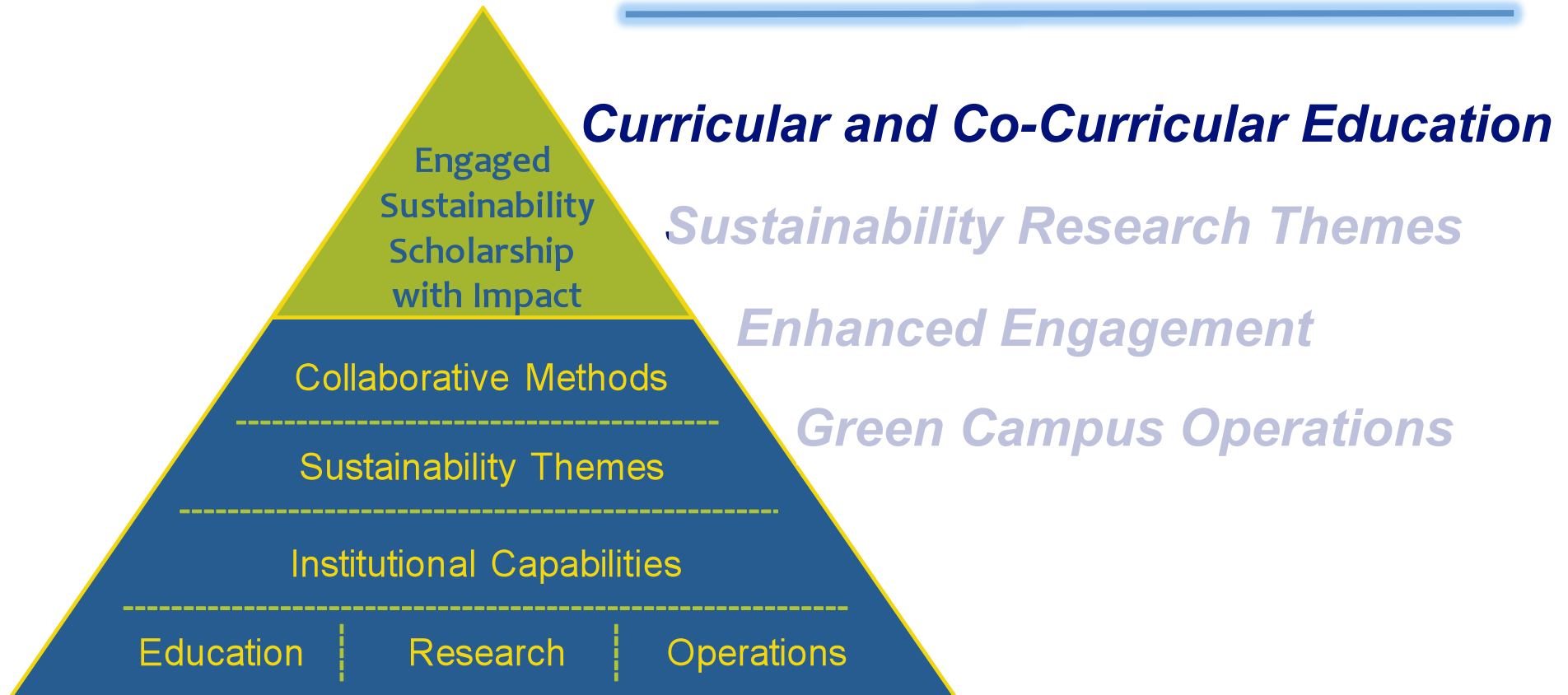
Water: Develop interventions, policies, and technologies to relieve stressed aquatic ecosystems, with a particular focus on the Great Lakes

Climate: Integrate climate, ecosystem, and human impacts research to improve mitigation and adaptation approaches

Built Environment: Reduce environmental impacts and improve human welfare by integrating materials, engineering, advanced controls, and human feedback

Social-Ecological Connections: Understand how to modify human and organizational behaviors that create sustainability challenges and are the keys to their solutions

GOALS:



EDUCATION

Engage students in learning journey that spans disciplines and instills knowledge/skills to cultivate future sustainability leaders

Co-curricular Efforts

Develop and enhance opportunities with:

Career Development:

Specialized Careers Guide; “MI time”; Immersion Excursions; Summer Internships

Campus Life:

Residence halls; Residential College; Campus Internships, Operations (e.g., Campus IA)

Community Service:

Michigan Community Scholars, Global Intercultural Experience for Undergraduates, Ginsberg Center

Curricular Efforts

Increased undergraduate field courses and internships

Sustainability & the Campus course - 2 offerings per year

Graham Undergraduate Sustainability Scholars program
-- First 25 Sophomores selected for Fall 2010

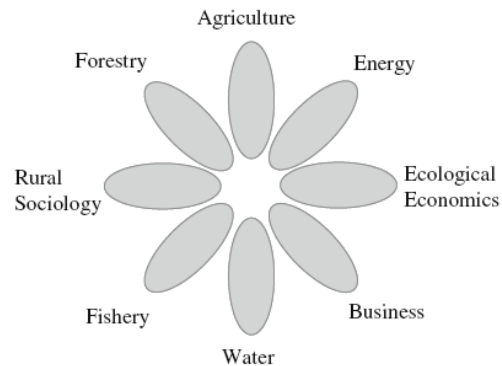
TODAY: *discuss innovative methods for:*

- ***embedding sustainability in existing courses?***
- ***creating new interdisciplinary courses?***
- ***new concentrations, minors, majors?***

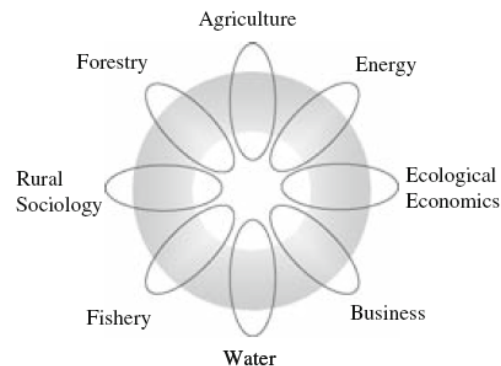
Follow on - Implementation planning (volunteers?)

What Knowledge and Skills are Needed?

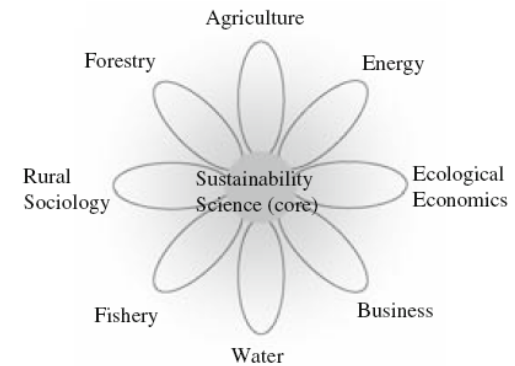
Kajikawa 2008 *Sust. Sci.*



Disciplinary?



Multi-disciplinary?



Trans-disciplinary?

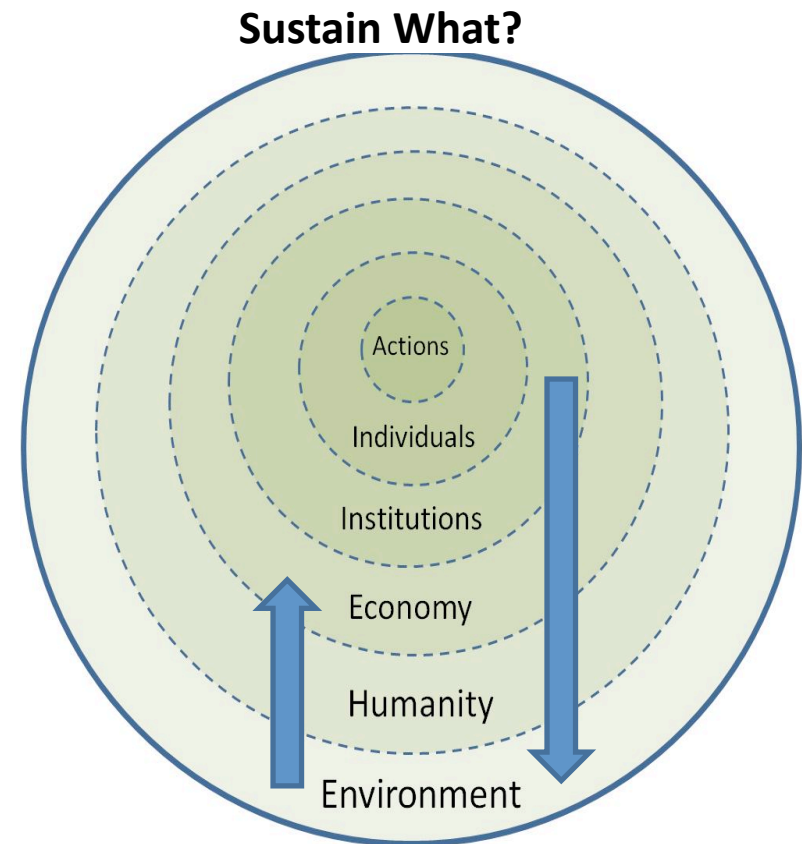
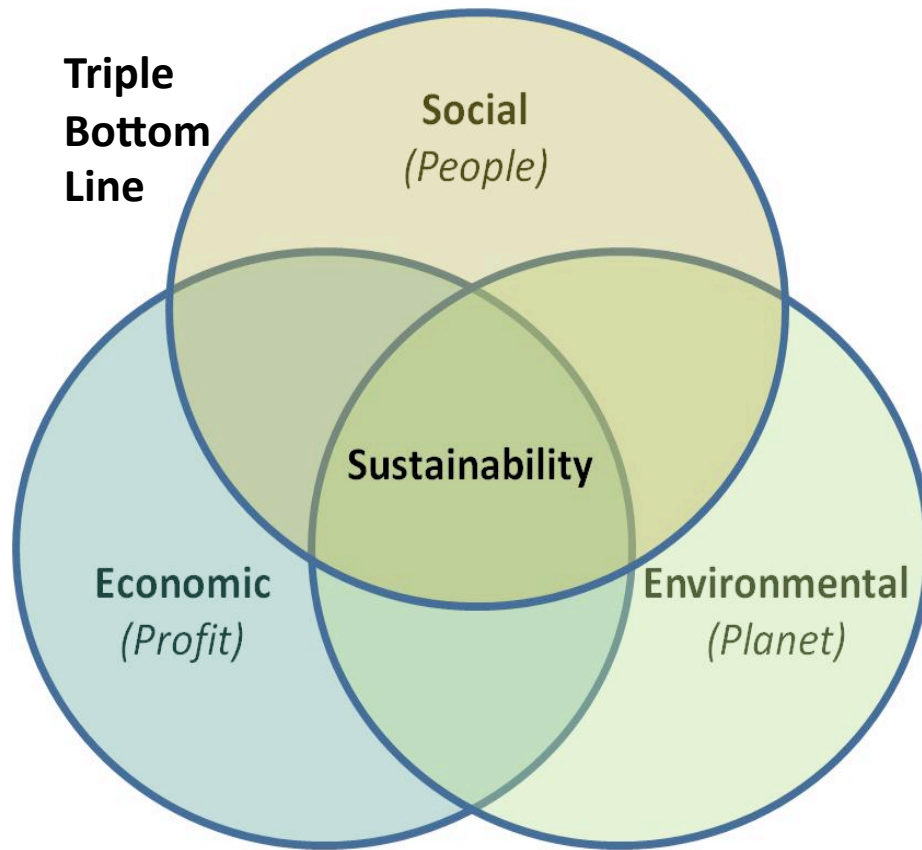
What's appropriate for undergraduates?

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What is Sustainability?



What is Sustainability?

A sustainable campus, city, community, state, country needs:

Clean **AIR**

Safe, reliable **WATER**

Healthy, available **FOOD**

Available, efficient **SHELTER**

Effective and safe **MOBILITY**

Clean, reliable, efficient **ENERGY**

Stable **ECONOMIC, SOCIAL, HEALTH** systems

ECOSYSTEM SERVICES (recreation, biodiversity, waste filtering)

What is Sustainability?

