



Framework for Understanding & Improving Urban Environmental Sustainability

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Institute
of the *Environment*



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Workshop on Urban Environmental Sustainability

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Healthy Communities Foundation





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Class of 1935 Distinguished Professor

Energy and Resources Group

Goldman School of Public Policy

**Director, Renewable & Appropriate Energy Laboratory
(RAEL)**

Inez Fung

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Department of Earth & Planetary Science

Environmental Science and Policy Management

Director, Berkeley Atmospheric Sciences Center



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**Formerly US West Coast Consul
for Science, Technology, Energy
and Environment for the UK
Government**



- **Chris Jones, Specialist**
- **Malini Ranganathan, Graduate Student Researcher**
- **Jessica Huang, Intern**

The BIE works with

- **43 undergraduate programs**
 - **55 graduate programs**
- with foci and/or faculty in the environment**

Issue Areas

- Air Quality
- Water
- Land Use
- Biological & natural sciences
- Energy & Climate
- Public Health
- Engineering
- Planning & Design
- Policy, Law & Business
- Environmental History

Cross cutting themes

- Water & Society
- Climate Change & Society
- Population & Environment
- Genomics
- Environmental Monitoring
- Green Business
- Governance
- Media
- Emerging Technologies

Berkeley Institute of the Environment



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The [Berkeley Institute of the Environment](#) strives to establish the University of California at Berkeley as the premier teaching and research institution for environmental science, technology, management and policy. UC Berkeley has some 100 individual [undergraduate](#) and [graduate](#) programs with foci in the environment, making it a top environmental research center. Please check back regularly for the latest in environmental news and activities at Cal.

Breaking Environmental News at Berkeley

[BIE Co-Director, Inez Fung, honored as one of the "Scientific American 50"](#)



Berkeley Institute of the Environment Co-Director, Inez Fung, was named one of 50 American technological leaders in the December 2005 issue of *Scientific American*. According to the magazine's editor-in-chief, John Rennie, "The *Scientific American* 50 is our annual opportunity to salute the people and organizations worldwide whose research, policy or business leadership has played a major role in bringing about the science and technology innovations that are improving the way we live and offer the greatest hope for the future." Fung was honored as a leading climate expert whose computer modeling has shown recently that the Earth may lose its ability to absorb much of the greenhouse gas that is raising global temperatures.

[More](#) (UCB New Center, Nov. 15 2005)

[Transportation researchers get DaimlerChrysler hydrogen car for the holidays](#)



DaimlerChrysler officially handed the keys to the F-Cell, the company's limited production hydrogen fuel cell vehicle, to UC Berkeley transportation researchers on Dec. 20 as part of a two-year field test. The project is connected to the U.S. Department of Energy's effort to assess the viability of hydrogen vehicle and infrastructure technology in real world settings. [More](#) (December 20 2005)

Featured Video Lecture



[Energy pricing, green
buildings, and putting
technology in California
homes](#)

Bear in Mind
October 5, 2005
[Full Video Library](#)

Photo Gallery



[California Flowers](#) by Stephen Wanyoike (Wams) Wamiti, participant in the College of



Motivation: From Science & Best Practices to Action and Evaluation

If cities continue to grow and industrialize using existing technology & practices, the Earth's fundamental life-support systems will be increasingly at risk and under stress.

Global scientific capacity is not being channeled to meet the unique challenges of mid-sized cities, where the pressures of growth are strongest and capacity is weakest.

Action: target research on these issues while partnering and building the capacity to put these findings into practice





What Cities Critically Need

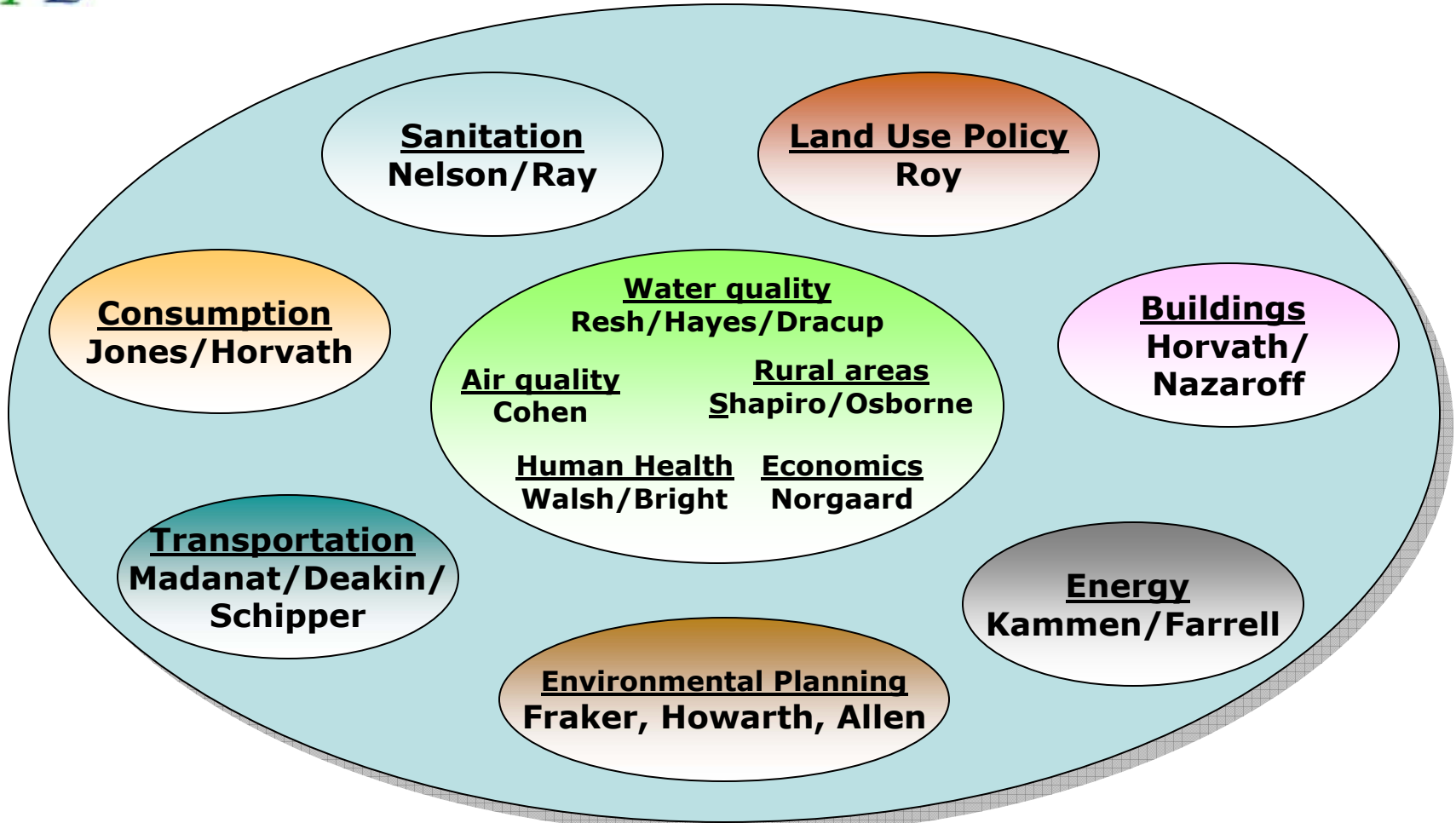
Improved:

- 1) Institutional Capacity
to capture benefits from existing technology,
policies & management practices
- 2) Technology, Policy & Management Options
appropriate for their populations & natural
environments
- 3) Financial Resources
which are frequently dependent upon points 1 & 2





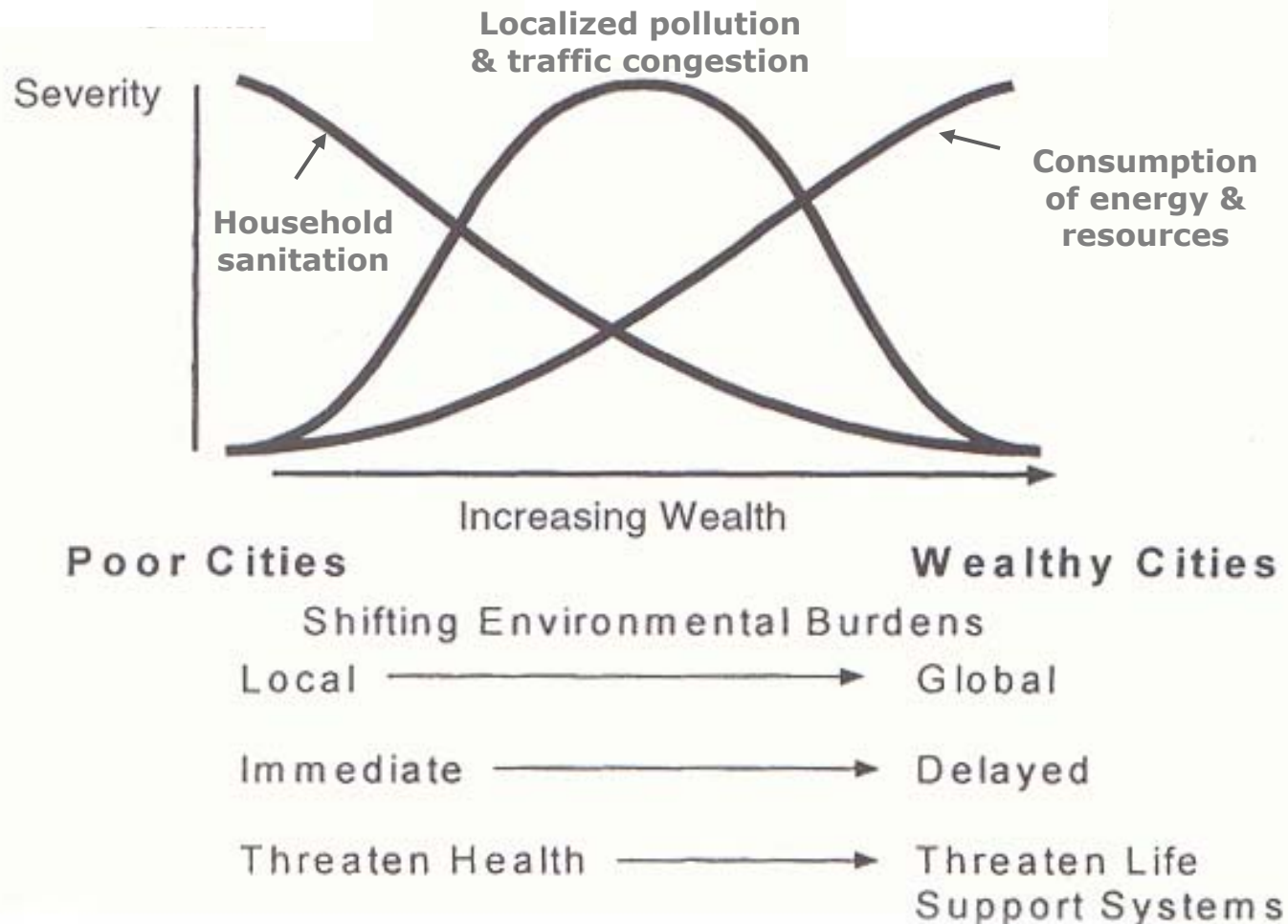
Berkeley Interdisciplinarity & Project Teams

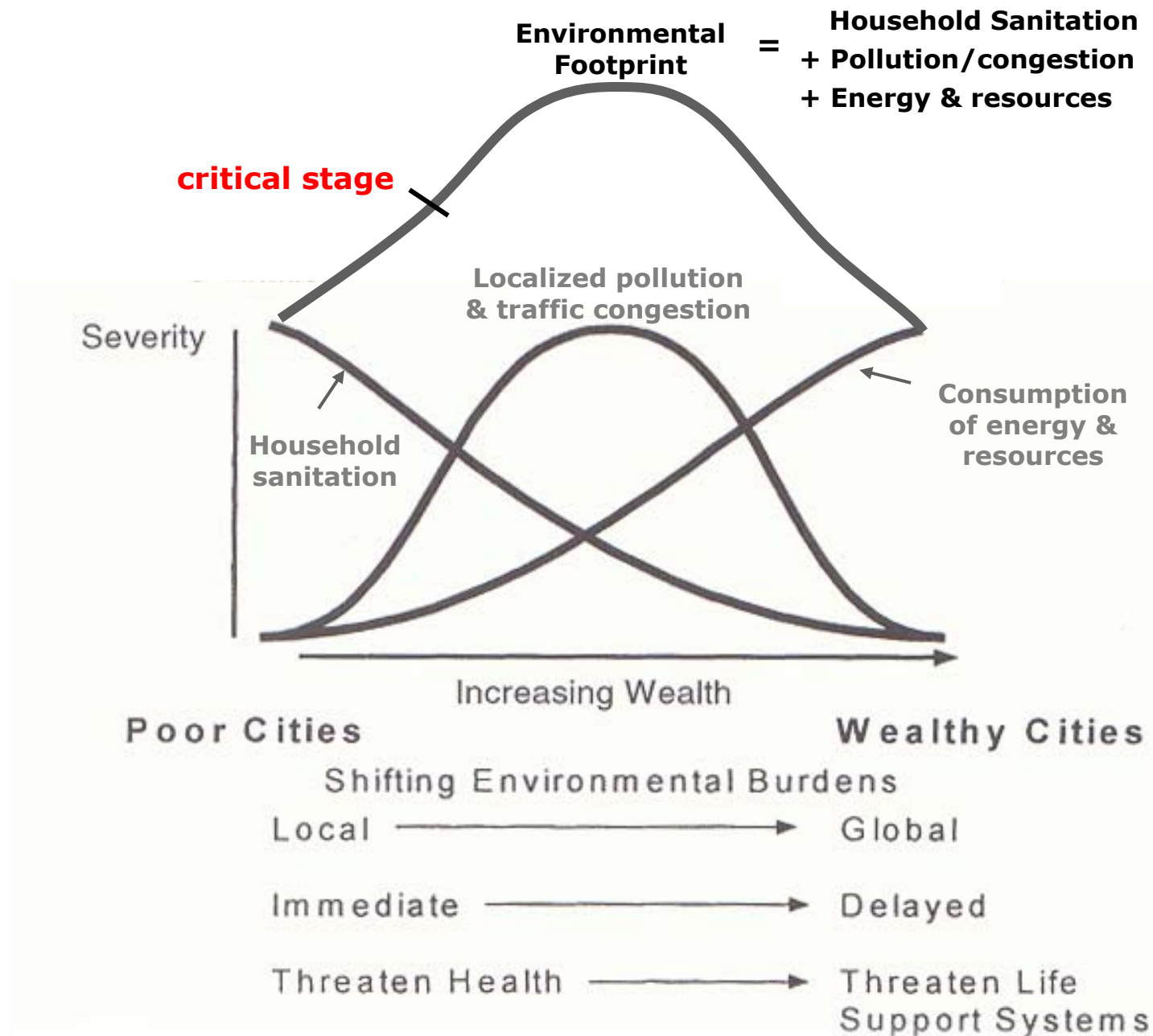


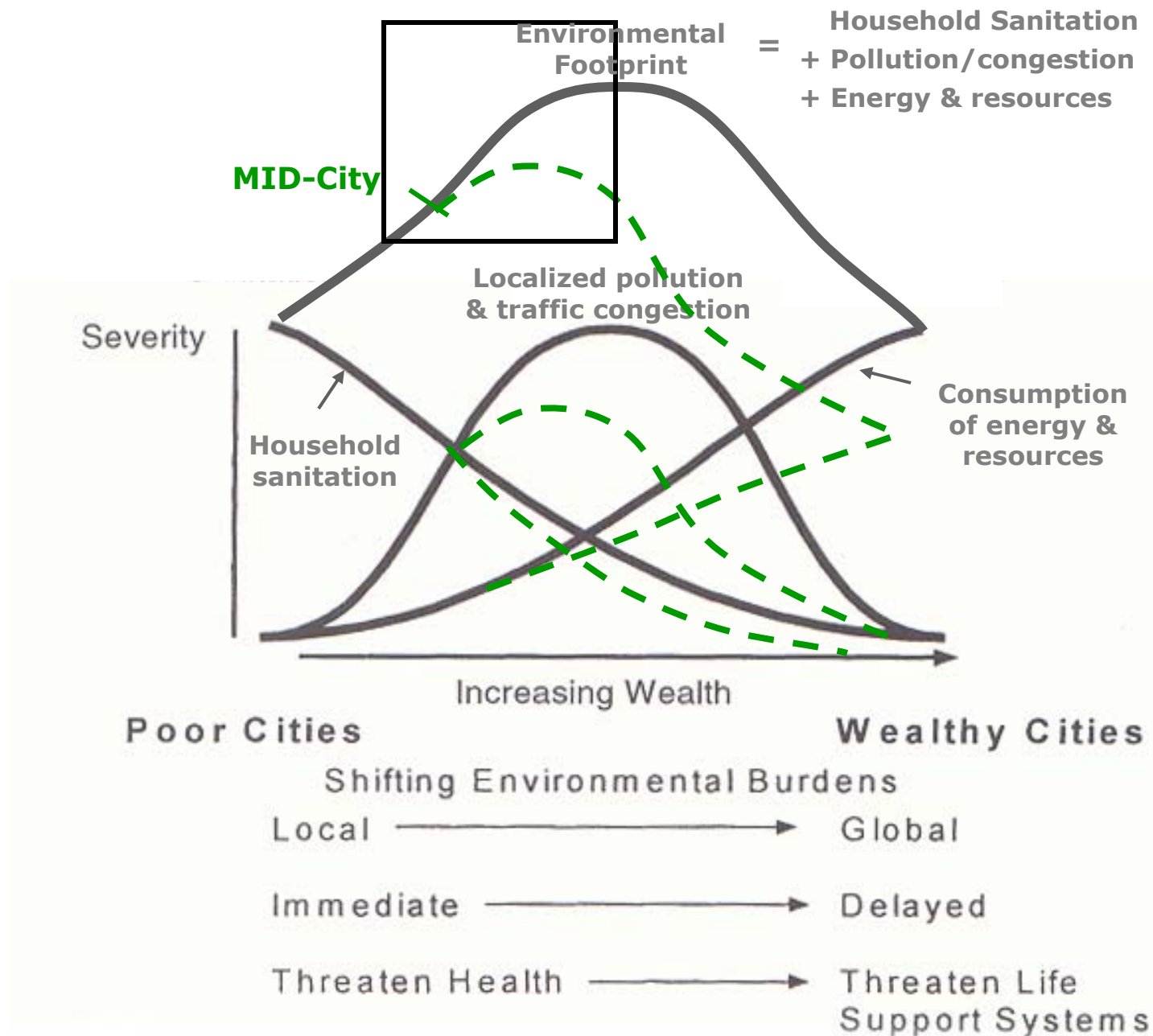
Professor Harrison Fraker, Dean, College of Environmental Design
Professor Samer Mandant, Director, Institute of Transportation Studies
Professor Kara Nelson, Department of Civil Engineering
Professor Ron Cohen, Director, Center for Atmospheric Studies



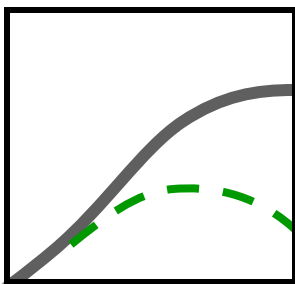
Generalized Model of “Sustainability” Priorities



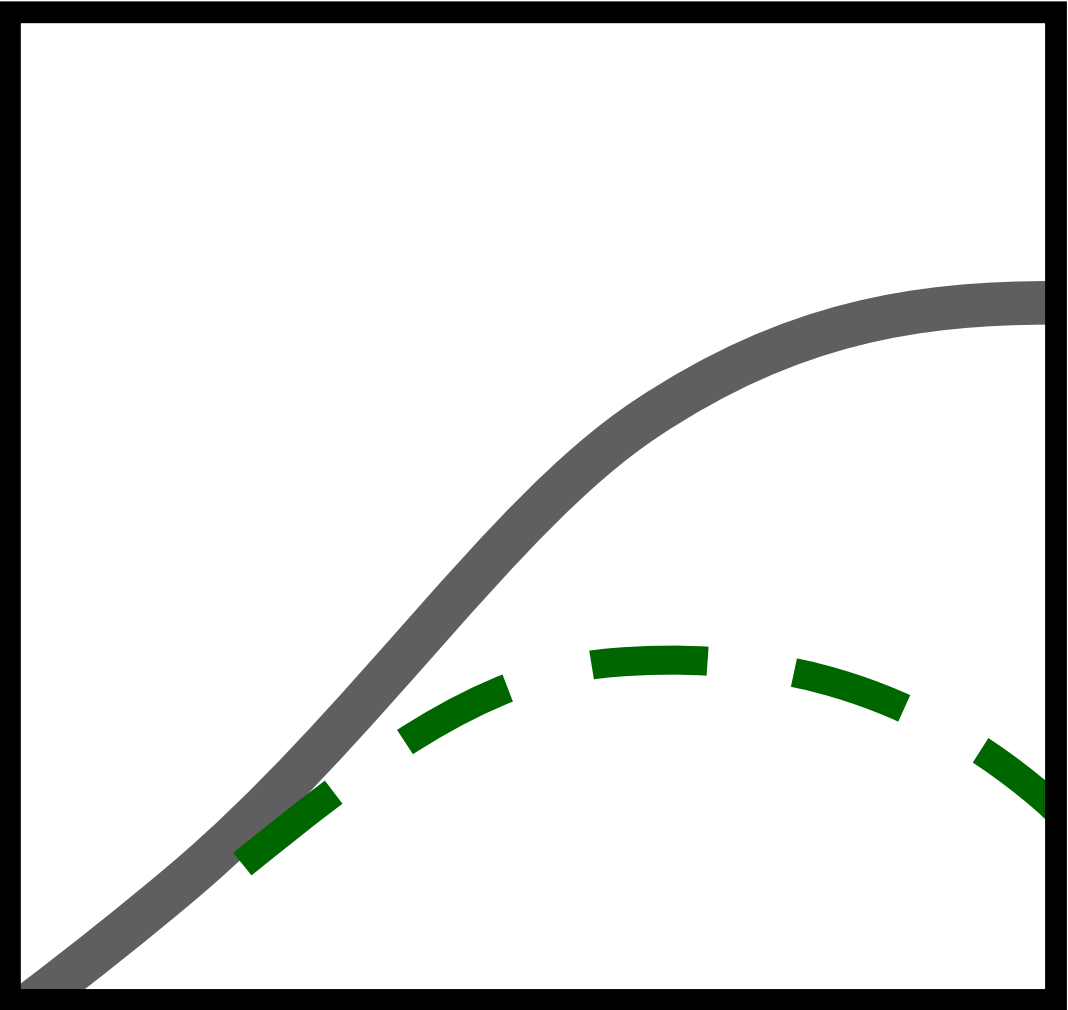




Adapted from McGranahan et al., 1999



**Environmental
Footprint**

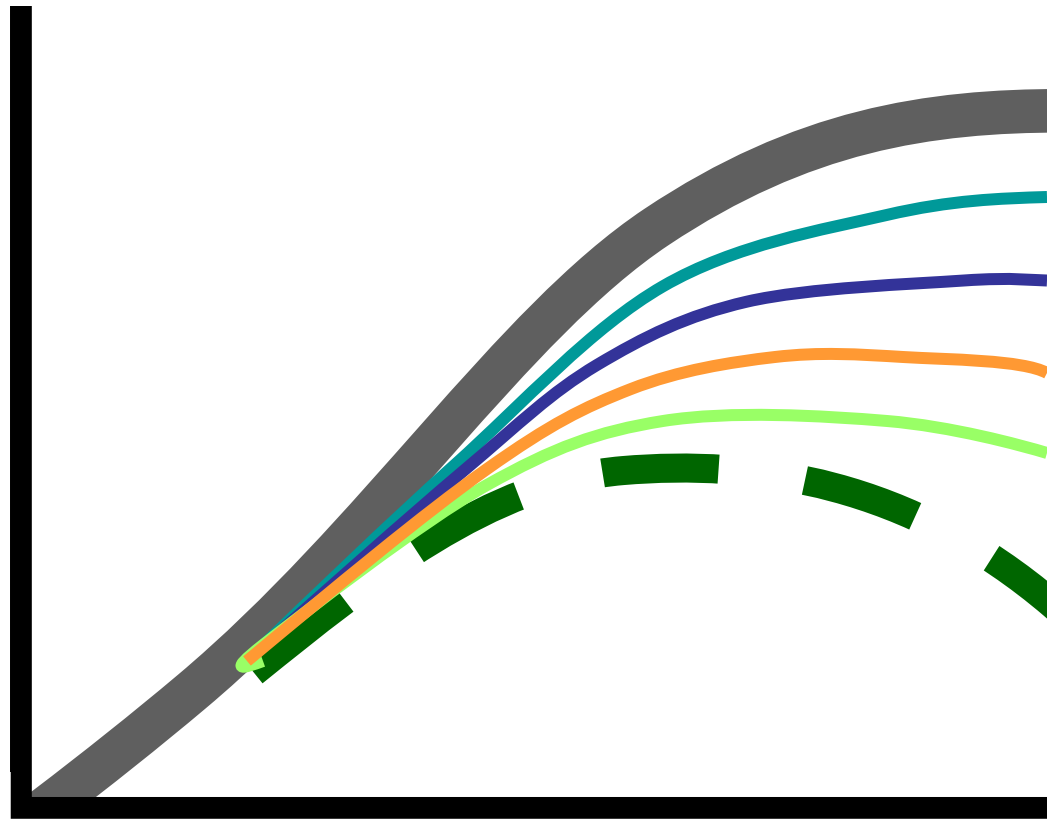


Development



Advancing Development & Environment Goals

Environmental
Footprint



Development

w/ improved institutions

w/ technology transfer

w/ UCB technology

w/ global innovation
& information network

w/ long-term investment
in promising technology



Berkeley Research Teams

Water

Nelson

Transportation*

Madanat & Deakin

Infrastructure

Fraker & Cohen

1. Drinking water/
Waste water/
Sanitation
(Nelson/Ray)
2. Watershed
processes/Ecological
health/biological
resources (Resh/
Hayes/Dracup/Harris)
3. Institutional capacity
(Harris/Kocher)

1. Balancing mobility
& accessibility
2. Sustainability of
urban structures
3. Traffic safety
4. Green logistics
5. Congestion mitigation

* Partner: EMBARQ

1. Green Buildings
(Horvath/Nazaroff)
2. Air quality monitoring
(Cohen)
3. Environmental Footprinting
(Jones/Horvath)
4. Human Health
(Walsh/Bright/Banerjee)
5. Renewable Energy
(Kammen)
6. Rural Linkages
(Shapiro/Osborne)
7. Natural Disasters & Risk
(Allen)
8. Urban Settlements
(Fraker, Roy)

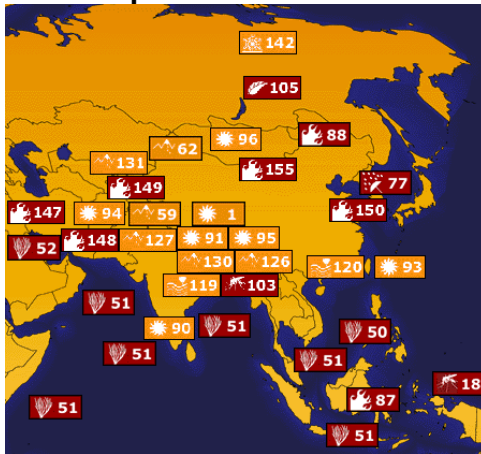
Teams will begin a process of identifying other US-based resource teams to invite into the project



Examples from UCB MID-Cities Toolkit

Training Tools

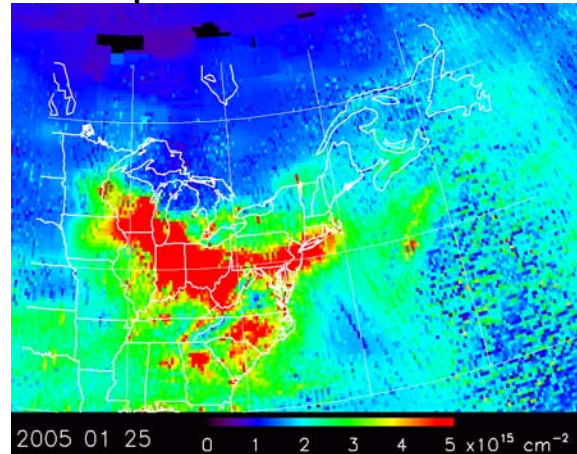
example



Best-practices
interactive
database and maps

Assessment Tools

example



Remote sensing
software and real-time
measurements

Planning and Action Tools

example



Lifecycle assessment tool,
water, air, waste, and
economic planning tools

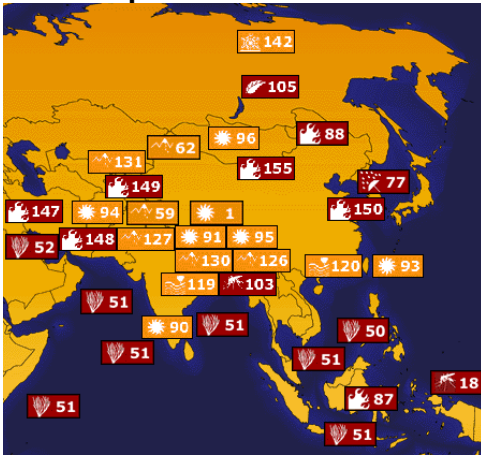


The Urban Sustainability Initiative

The Berkeley *Urban Sustainability Science* Toolkit

Training & Informational Tools

example



Best-practices map

- Promising Practices Case Studies Website (pictured)
- Sustainability science books, reports
- Training manuals
- Instructional videos
- Web-based training tools



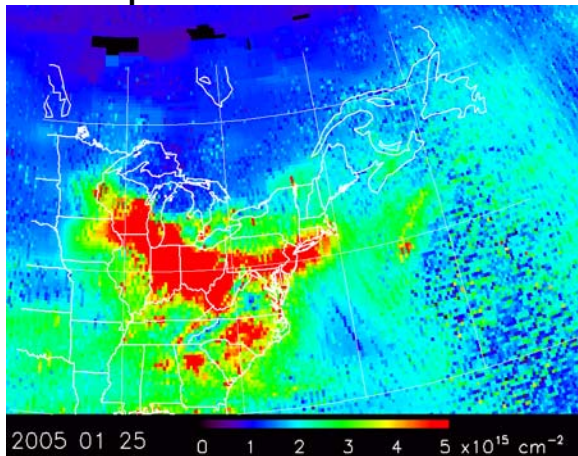


The Urban Sustainability Initiative

The Berkeley *Urban Sustainability Science Toolkit*

Monitoring & Assessment Tools

example



Remote sensing software

1. Comprehensive set of sustainability indicators
2. Innovative water monitoring methods
 - cost-effective stream invertebrates sampling
3. Remote pollution sensing
4. Urban sustainability indicators software
 - air pollution inventory
 - societal cost of traffic accidents, congestion...
 - Lifecycle assessment software





The Urban Sustainability Initiative

The Berkeley *Urban Sustainability Science Toolkit*

Interactive Planning Tools

example



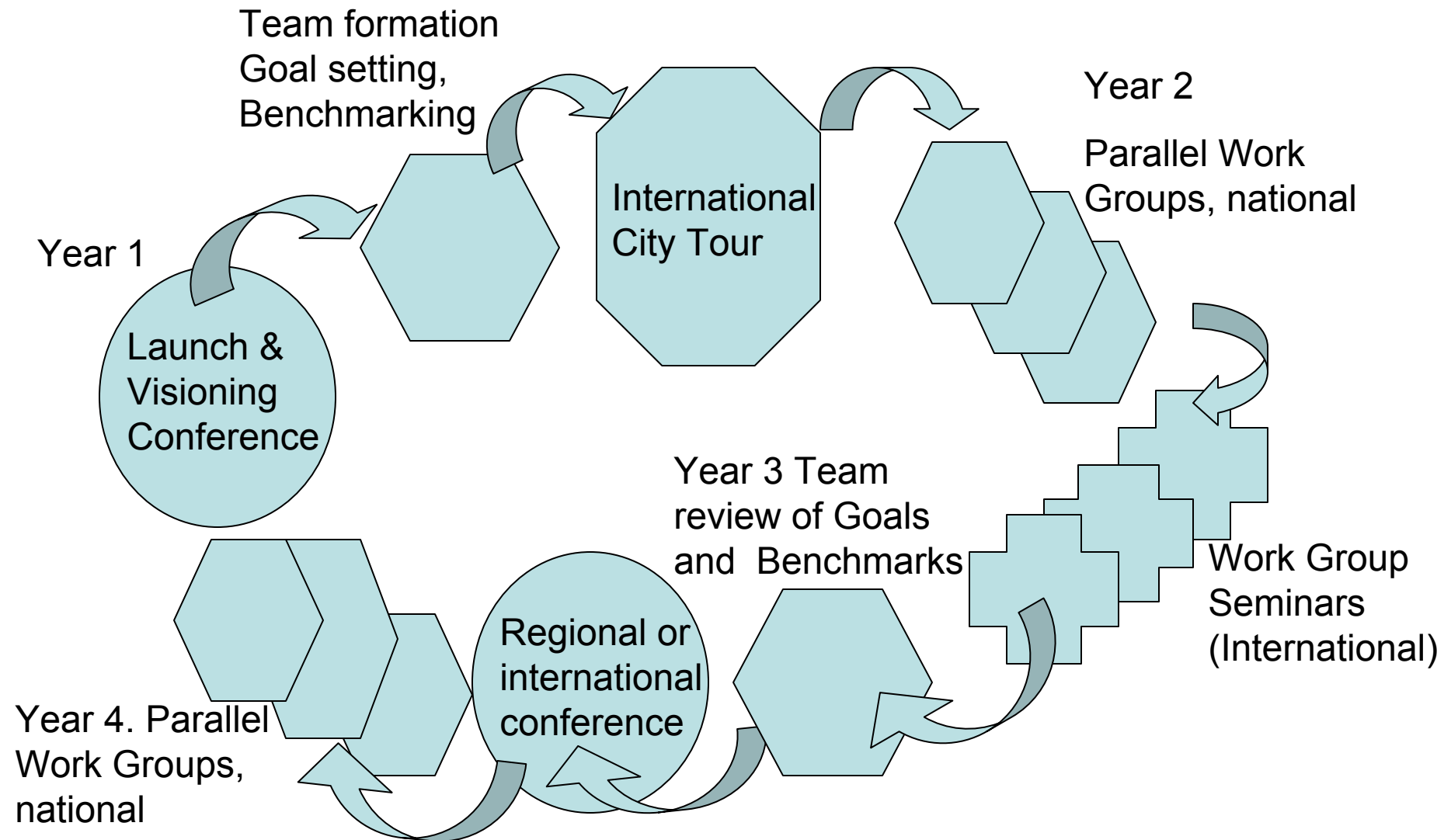
Lifecycle assessment tool

1. Allow users to test outcomes of planning scenarios
2. User-friendly, open-source models
3. A suite of tools for many applications
 - Neighborhood development, transportation systems, buildings, water systems, etc.
4. Allows cities to weigh tradeoffs in single platform
5. Links to detailed information
6. Useful in local as well as national-level policy-making (with major potential in China)



Urban Age Institute Capacity Building Programs

Hypothetical Sequence of Events. Learning and Exchange in MID-Cities





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Feature Story Environment: Guatemala and Mexico Promote Agreement to Protect Resources

With the objective to create a center for the study of the mangrove forests, environmentalist organizations of Guatemala and Mexico look to fortify the bases for signing a binational agreement.... [Read the full story](#)

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National Survey

What type of transportation do you use to commute to work?

- ☐ car
☐ walk
☐ bicycle
☐ bus

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Votes: 12



Resources

Urban Sustainability Project, Berkeley Institute of the Environment

<http://bie.berkeley.edu>

Urban Age Institute

<http://urbanage.com>

Healty Communities Foundation

<http://www.hcf.org>



Towards a Project Process Model – “Living Laboratories”

