INFRASTRUCTURE WORKING GROUP

Meeting Minutes: SAGE Workshop May 21, 2014

Group Leader: Farrokh Nadim

Members in Attendance: Christine Brandon, Don DeGroot, Fernando Gilbes, Paul Kirshen, Sissy Nicoloau, Pamela Patrick, Aaron Sachs, Tom Sheahan, Dale Webber, and Jonathan Woodruff

What gray and green infrastructure techniques are available?

- First: goals? What do we want to obtain with infrastructure?
- Site specific considerations. Varies by location, social, and ecological systems.
    - Focus on Caribbean and Northeast U.S.
    - "Caribbean" might be too broad still
- Does focusing on "climate change" hurt the project? We still need to deal with the problems of today.
- Include adaptable infrastructure. For example: Building a sea wall that would be easy to add onto in the future, as needed.
- Dutch program "Room for the River." This program / mindset is focused on "accommodation" which consists of letting the threat occur, but finding a way to safely/comfortably live with the threat (i.e. the flooding). The Dutch are less concerned about climate change, but they have invested a lot of money up to this point.
- "Protection," on the other hand, is focused on reducing the threat from occurring.
- The storm threats vary in importance from one location to another: Wind (Caribbean), rain (Puerto Rico), and storm surge (Northeast).

Summary of Green vs Gray Infrastructure

Accommodation	Protection	Retreat
Flood proofing (R, S)	Sea walls (S) gray	Move infrastructure away from coast (S) gray
Evacuation plan (R, S, W)	Wave breakers (S) gray	
Floating houses (R, S)	Hurricane straps (W) gray	
Upgrading/Plan for Communications, sewers, gas lines (R, S, W)	Wind break (W) green	
	Dunes (S) green	
	Riprap (S) greenish-gray?	
	Artificial reefs (S) gray-to-green*	

Abbreviations: Protection against applicable threat: R=rain S=storm surge W=wind

* Starts gray, but turns into living reef.

- The Army Corps of Engineers defines coastal protection infrastructure into the following categories:
    - Structural
    - Natural or Nature-based
    - Non-structural: policy, insurance

- The Infrastructure Working Group would like to consider revising the definitions of "green" and "gray" infrastructure. Perhaps this is more of a spectrum than two separate categories. (i.e. natural vs. nature-based.)
    - Gray = Structural
    - Green = Natural + Nature-based
    - *Note: After conclusion of the meeting, the following issue was raised via email:* The word "infrastructure" itself could be problematic as it has a dual meaning. It refers both to the actions taken, as part of climate change adaptation, to improve resilience; and to lifeline networks, power stations, and other key structures critical for functioning of the society. This dual use of the same word could be confusing. The more general terms of "interventions" and "coastal risk reduction measures" may be more accurate in some context. The Infrastructure Working Group would like to see the definition of "infrastructure" clarified for future usage.

- Extreme precipitation (e.g. runoff management) is a concern.
    - Relevant for inland flooding, landslides, pumping water over sea walls.
    - Caribbean experiences less storm surge due to deep bathymetry; experiences more waves.
    - Greatest surge damage in Caribbean comes from surge retreat, not inundation.

- Preliminary Bubble idea: Infrastructure inventory
    - Multi-decision support system (i.e. will be different for different communities)
    - Be aware that short term and long term are in the eyes of the beholder
    - Need to evaluate effectiveness of different strategies (e.g. how effective will a marsh be? Does it make sense in this area?)

- Preliminary Bubble idea: evaluate what information is lacking
    - Research theme on bounds for analytical techniques: Unknowns
    - Good surge models, ok on waves, not good on extreme events impacts on sediment transport.
    - Quantitative risk assessment of infrastructure?

- Preliminary Bubble idea: evaluate effectiveness of infrastructure
    - Need well-defined metrics (e.g. minimize loss of human life)
        - Matrix with checkboxes: feasibility, cost, risk, etc.

  - Need to recognize other storm resilience issues (e.g. more efficient evacuation plans) besides infrastructure
    - Cuba does this at the expense of quickly rebuilding
  - Other factors: insurance rates, post-flooding mildew
  - More accommodation strategies ("creative")
  - Should include values of community in mitigation strategies (e.g. tile first floors great for Americans, not great for Bangladeshi)

- Preliminary Bubble idea: communities need to prioritize what they want to protect
  - Need to identify infrastructure that needs to be protected ("critical" infrastructure)
  - Need to spend money more efficiently
  - Identify vulnerabilities
  - Education: public needs to know about these factors
  - Audit after money is distributed
- Preliminary Bubble idea: Standardized document for assessing coastal vulnerability?
  - Guidelines put out by NOAA or ACE?
  - Consultants are doing risk assessments
  - Need to assess how the water gets into the building

- Preliminary Bubble idea: Amass library of literature of "lessons [to be] learned"
  - Make it a blog?
  - More difficult to publish what didn't work as opposed to what worked
    - Client won't pay for it
  - Caribbean better about sharing information than U.S.
  - Data sharing not just quantitative: experiences, things that worked

- Preliminary Bubble idea: Goal of next workshop: presentations on strategies that worked
  - Maybe have one day open to the public
  - Maybe have webinar instead

- Design and Reconstruction: NYC planners can discuss their issues
  - AIA New York chapter
  - DOB (Department of Buildings)
- Identify key groups to work with

- Preliminary Bubble idea: Dedicated issue in an existing journal
  - Large-scale vs small-scale infrastructure (e.g. long, linear levees)

- Preliminary Bubble idea: building codes and guidelines:
  - What's out there? Who's using them?
  - Research and evaluate existing systems (identify limitations)

    - Having building codes
    - Enforcing building codes
  - Uniform Building Code and International Building Code; ASC7 or FEMA documents
    - Maybe we should summarize these
    - Also local codes
  - Be careful that you don't give false sense of security (i.e. if you follow these codes, you'll be fine)
  - It is one thing to have a code, it is another to enforce it.
  - Not just for occupied buildings, but guidelines for seawalls, levees, and more "green" technology.

Are there additional outside professionals or academics currently studying these technologies whom we should bring into the discussion?

Summary of Potential Contacts

Person to Contact	Company or Organization
Coastal Engineer (ask Leonard for name)	Lehigh
David Smith	Top coastal engineer in Jamaica, Smith Water International
Philip Orton	Stevens Institute, oyster modeling in NY Harbor
Susan Moser	Sociologist from California
TBD	Army Corps of Engineers
Kirk Bosma	Woods Hole Group Inc.
Peter Glus	Arcadis
Eve Hinman, President	Hinman Consulting Engineers
Shalva Marjanishvili, Developer	Hinman Consulting Engineers
Paty Romero-Lankao (prlankao@ucar.edu)	Natural Hazards group in Colorado
TBD	Deltaris
Alan Benimoff	Staten Island College
Jennifer Irish	Virginia Tech