ASU COMPLEX ADAPTIVE SYSTEMS
ARIZONA STATE UNIVERSITY

Biosocial Complex Systems Research at ASU

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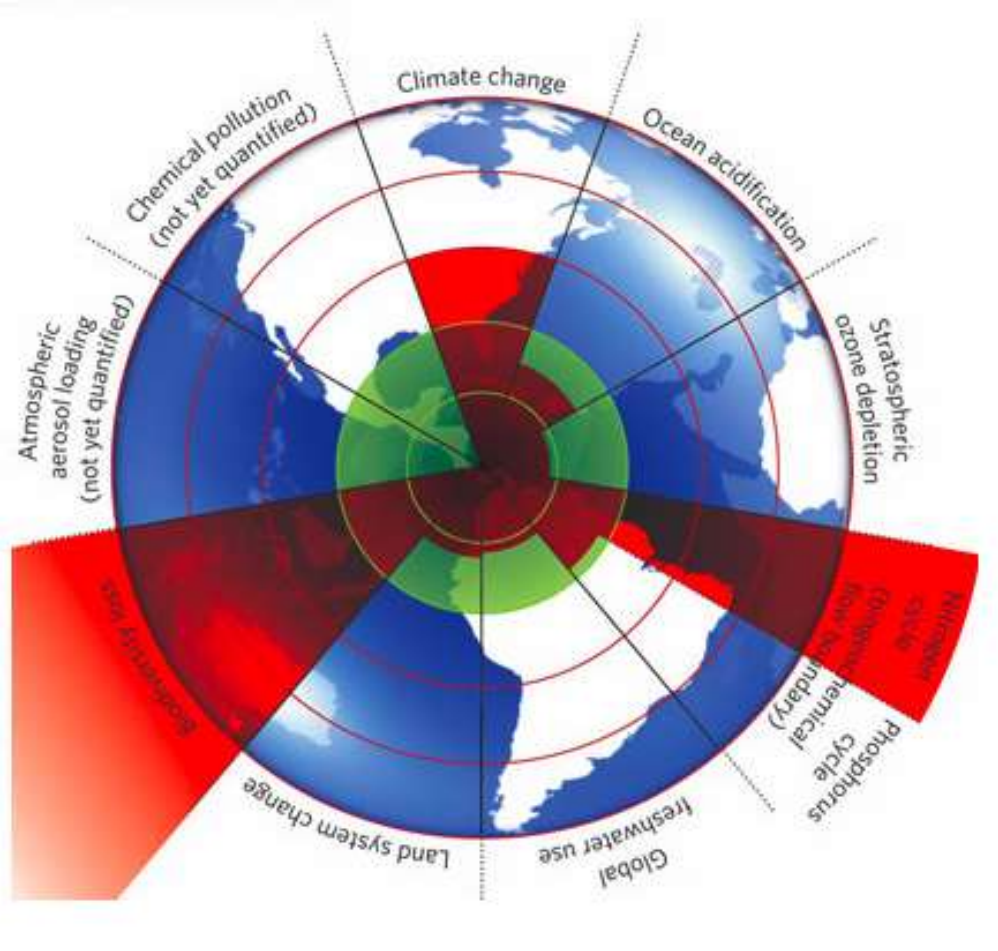
3 Centers → 1 Consortium

- Starting point: develop Complex Systems approaches across biology and society – 'what does 'being social' mean?
- CSDC: Collaboration SOLS and SHESC from 2005, directed by Jenny Fraser & Bill Griffin, now Manfred Laubichler and Michael Barton: wide range of CAS projects
- CSID: Founded by Ostrom, Janssen and Anderies (2006) in SHESC: focus on human institutions and decision-making
- MCMSC: Founded by Castillo Chavez (2008): focus on CAS mathematics, modeling and health issues
- CBCS: (2010) bundling efforts at request of faculty
- Now: Biosocial CAS @ ASU, alongside Biomedical CAS and Decision-Making CAS

CBCS Ongoing activities

- Lecture series
- Dynamical discussions
- Graduate concentration + certificate in CAS
- Examples of research projects:
  - Collaborative Research: Division of Labor in Communal Groups
  - Modeling time, space and behavior: combining ABM & GIS to create typologies of playgroup dynamics in preschool children
  - Mathematical and Theoretical Biology Institute
  - CoMSES Net
- 2 major new initiatives: building platforms for A-A' activities
  - Climate Adaptation Center
  - Urban sustainability

Environment as a complex system



- Climate, yes, but all the rest too: atmosphere, geosphere, biosphere, hydrosphere, anthroposphere
- Most work focuses on one or more sectors, but the whole is what affects us
- Emergence rather than origins

CAS perspective

- “There are no subsystems (social or natural), only interactions and loops between different processes”
- Science has more or less taken this on board
  - The rest of the world has not
- “Climate Center” is attempt to bridge this gap
- Study the interactions between natural dynamics and societal ones ‘on the ground’
- Emergence perspective: directed towards the future
- Gathering data about systems on which change impacts

How do we adapt to climate uncertainty?

Solution:

Center for Integrated Solutions to Climate Challenges

Expertise

Climate & modelers: Alex Mahalov, Mohamed Moustaoui, Matei Georgescu, Robert Balling, Kevin Gurney, Randy Cerveny, Marty Anderies, Soe Myint, Nancy Selover**,** Bohumil M. Svoma, Tony Brazel, Winston Chow, Ariel Anbar, Zhihua Wang, Ariane Middel, David Feary, Susanne Grossman-Clarke

Air Quality: Jim Anderson, Huei-Ping Huang, Pat Mariella, Pierre Herckes

Health: Rolf Halden, Gerardo Chowell-Puente, Sharon Harlan, Alexandra Brewis-Slade

Energy: Gary Dirks, Pat Phelan, Harvey Bryan, Mike Pasqualetti, Kamil Kaloush, T. A. Reddy, Clark Miller

Water: Enrique Vivoni, Pat Gober, Dave White, Ben Ruddell, Paul Westerhoff, Mikhail Chester

Ecosystems - Food systems: Nancy Grimm, Dan Childers, Hallie Eakin, Netra Chettri, Rimjhim Aggarwal, Christopher Wharton, Chris Martin, Helen Rowe, Leah Gerber, Janet Franklin, Charles Redman, Charles Perrings, Hillary Hartnett, Arjun Heimsath, Sander Van Der Leeuw

Transportation: Ram Pendyala, Michael Kuby, Aaron Golub, Francisco Lara-Valencia, Pitu Mirchandani

Decision-making/sustainability: Ann Kinzig, Osvaldo Sala, Dan Bodansky, Nalini Chhetri, John Sabo, Dan Sarewitz, Tom Seager, Arnim Wiek, Rob Melnick, David Pijawka, Billie Turner, Chris Boone, Eddie Brown, George Basile, Manfred Laubichler

Economics: Michael Hanemann, Michael Barton, Kerry Smith, Joshua Abbott, Jose Lobo

Practitioners: Ray Quay, Nick Brown, Mick Dalrymple, Peter Hyde, Al Brown, Elisabeth Graffy, Monica Elser, Ken Galluppi

<Animation: Each of these segments should come on individually>

A double-edged initiative

- Mediation between two communities
- On the one hand a research effort, on the other a communication tool
  - Gathering first-hand information about envisaged challenges and their drivers in the societal domain
  - Linking knowledge about the environmental system to the societal domain
- Translation the core – communication the challenge

Urban Sustainability

- H.A. Simon: ‘the greatest challenge of the 21st century’
- Urbanization one of the few truly stable human transitions from c. 7000 years ago to present

Accompanied by all the fundamental accoutrements of our civilization: counting, writing, trade, laws, administration, archives

Questions:

- What is a city?
- What drives urbanization?
- What impacts on urban sustainability?
- How do sectors interact in urban context?
- What is the role of innovation in urban sustainability?
- What is the role of infrastructure in urban sustainability?
- What may be the impact of ICT on urban dynamics and sustainability?

ASU's involvement and elsewhere

- Long tradition in urban ecology at ASU
  - Lots of work going on (CAP-LTER; DCDC; Energize Phoenix, GeoDa, etc)
- CAS perspective developed in Europe, now also N. America
  - SFI, U Toronto, NYU, IBM, Berkeley, MIT, UCL (CASA),
- ASU develop its sustainability focus
  - Create cross-sectoral 'platform' + link to other institutions