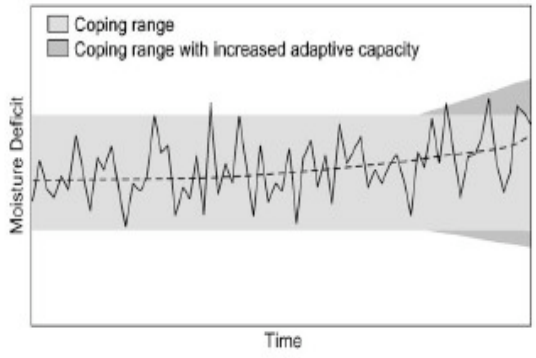
Anticipatory Learning for Climate Change Adaptation and Resilience

We look at adaptive capacity using the concept of **anticipatory learning**, defined as learning about the future before impacts are apparent. Our team is not only interested in how **communities** respond to the impacts of climatic changes, but how **iterative social learning may** enhance people's capacity to make **flexible decisions** in the face of **uncertainty** (Funding: National Science Foundation, HSD).



Adaptation provides a vital entry point to enhancing the **capacity of** highly vulnerable individuals and groups in the face of **climatic change and uncertainty**, as noted in the Nairobi Work Programme.

However, the current debate has contributed little to the understanding of the **decision making processes** that shape adaptation and ultimately determine resilient livelihoods. We ask: How can we facilitate learning and action to increase the coping/adaptive range illustrated by Smit and Wandel (2006)?

- From a conceptual perspective, the current debate focuses **too much on responding to the predicted climate change impacts** for some specified future time (typically 2025 or 2050), rather than **addressing the underlying factors** that shape vulnerability and adaptation action.

- Our existing methodological toolbox is **sparsely equipped** to initiate and sustain **adaptive and anticipatory learning**, especially at the community level.

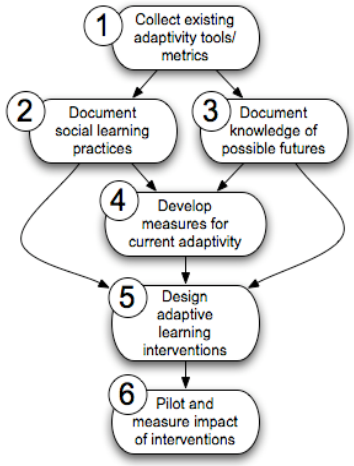
- We use a resilience-enhancing approach that stresses a multi-faceted, **iterative way of analyzing and learning** about uncertainties and changes by viewing adaptation as a **socio-institutional process** that involves **cycles of anticipation and responses** to multiple stressors.

We identify **Complex Adaptive Systems and Participatory Action Research (PAR)** as two theoretical frameworks that address learning processes from a **dynamic systems perspective**. What we have discovered are so far unexplored similarities on how **iterative loop learning** occurs, the best example occurring in cases of **Adaptive Co-Management.** These dynamics lead to three challenges for **anticipatory learning in climate change adaptation:**

- How do we acknowledge and incorporate uncertainty and surprise in an iterative social learning process built upon a systems view?
- How do we monitor and learn from past events and actions while anticipating the future?
- How do we validate different types of knowledge and address power imbalances among multiple and diverse groups of stakeholders?

Contact: Dr. Petra Tschakert (PI), Department of Geography and AESEDA, Pennsylvania State University, University Park, PA 16802, USA (email: petra@psu.edu)

Methodology: No Learning by Shock!



Case studies: Ghana and Tanzania

- Literature review
- Evaluate current learning tools (focus on Africa) — 1

- Ranking & scoring of risks/uncertainties
- Mental model - driving forces of change
- Semi-structured interviews and Venn diagrams of social capital
- Surveys of climate change knowledge and sources of information
- Focus groups on existing tools — 2

- Scenario building for future visions
- Big wall drawings, 3D/GIS models of local landscapes, written storylines
- Community and district workshop — 3

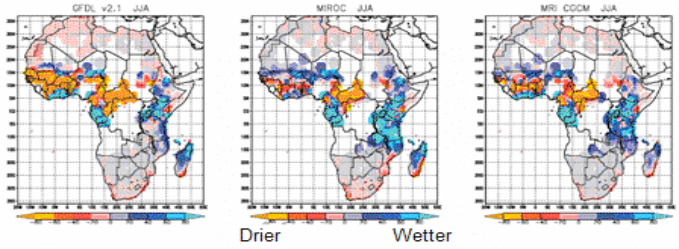
- Structured interviews on memory and social capital — 4

- Interdisciplinary graduate seminar for design of anticipatory learning tools — 5

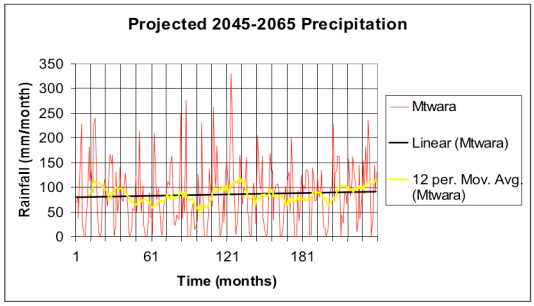
- Popular theatre on community scenarios
- Video taping and translation of scenarios
- Testing of anticipatory tool prototype
- Post-performance debates — 6

Climate Models: Trends *versus* Extremes

Example Tanzania:
Predicted future climate changes, as those presented in the Fourth Assessment Report of the IPCC (2007), show two contrasting trends with different spatial and temporal uncertainties. While we can be confident of an increasing trend in rainfall (in blue, below), we can also expect extended periods of wetter and drier years, wetter and drier rainy season months than the average present-day conditions, and years when the season starts drier and finishes wetter than at present (shown for Mtwara, below). For people, this means that long-term trends treacherously obscure short-term extreme events (floods and droughts).
Our project attempts to anticipate and prepare for uncertainties associated with such extreme events.



Anomalies (percent deviation) of mean monthly precipitation (mm) for June/July/August using daily data down-scaled from three GCMs for 2080-2099 (from Hewitson & Crane 2006 in Christensen et al. 2007).



Team Members:

Petra Tschakert (PI)	Penn State University, USA	Chris Hoadley	New York University, USA
Elias Asiama	University of Ghana, Ghana	Esther Prins	Penn State University, USA
Alex Asiedu	University of Ghana, Ghana	Ken Tamminga	Penn State University, USA
Robert Crane	Penn State University, USA	Nuhu Umar	Afram Plains Development Organization, Ghana
Maureen Biermann	Penn State University, USA	Pius Yanda	University of Dar es Salaam, Tanzania
Kathleen Dietrich	Penn State University, USA	Bruce Hewitson	University of Cape Town, South Africa

and, most importantly, committed community members from Ghana and Tanzania.

NSF/HSD Award#0826941