MICHIGAN STATE UNIVERSITY

Human Adaptation to Risk

Scott Swinton and Sandy Marquart-Pyatt
October 6, 2017

KBS-LTER All Scientists Meeting

Adaptation to external stressors

General term	Ecological	Social
Spatial distribution	Dispersal	Land use / crop choice
Diversity	Diversity	Portfolio, insurance, futures/options
Stock resilience	Natural capital	Capital stock
Adaptation	Evolution	Technological change
Structure	Trophic structure	Institutional structure (political, economic, social)

Human adaptation to environmental threats

- Laws & institutions

- Voluntary change

Technological Evolution

Compatibility of adaptation mechanisms in row crop agriculture

- When are ecological and social adaptation mechanisms compatible? Why or why not?
  - Plant nutrition and nutrient cycling vs fertilizers
  - Natural pest control & pollination services vs synthetic

- Adaptation arises from choices
  - How and when do farmers make adaptation choices?
    - Land use – What to grow?
    - Crop management – How to grow it?

Drivers of farmer choices – Past results

- Why are some practices adopted but not others?

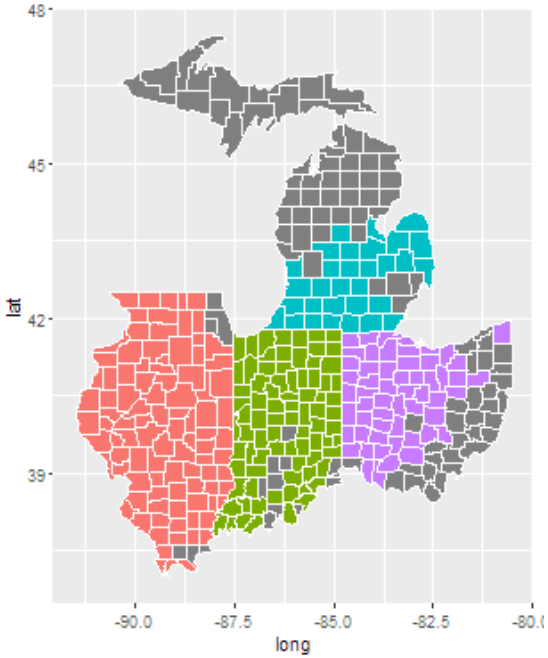
- Determinants of choice in cropping practices:
  - **Objectives** - Farming as livelihood vs hobby
  - **Knowledge**, information, perceptions
  - **Attitudes** - re: risk, environment, community
  - **Resources** - Land, equipment, educ shape options
  - **Incentives** - Prices, contracts, subsidies (e.g., payt for environmental services, cost shares, etc)

Future focus:

Swinton et al (2015) , "Farmer Decisions…" KBS-LTER book

Toward long-term socioecological research

- Past KBS-LTER socioecon research methods
  - One-time surveys, focus groups & experimental auctions
  - Static cropping system budgets
- Future:
  - LT East Corn Belt survey
  - Return to same farms as 2017
    - Separate farm vs temporal variability
  - Focus groups for added depth

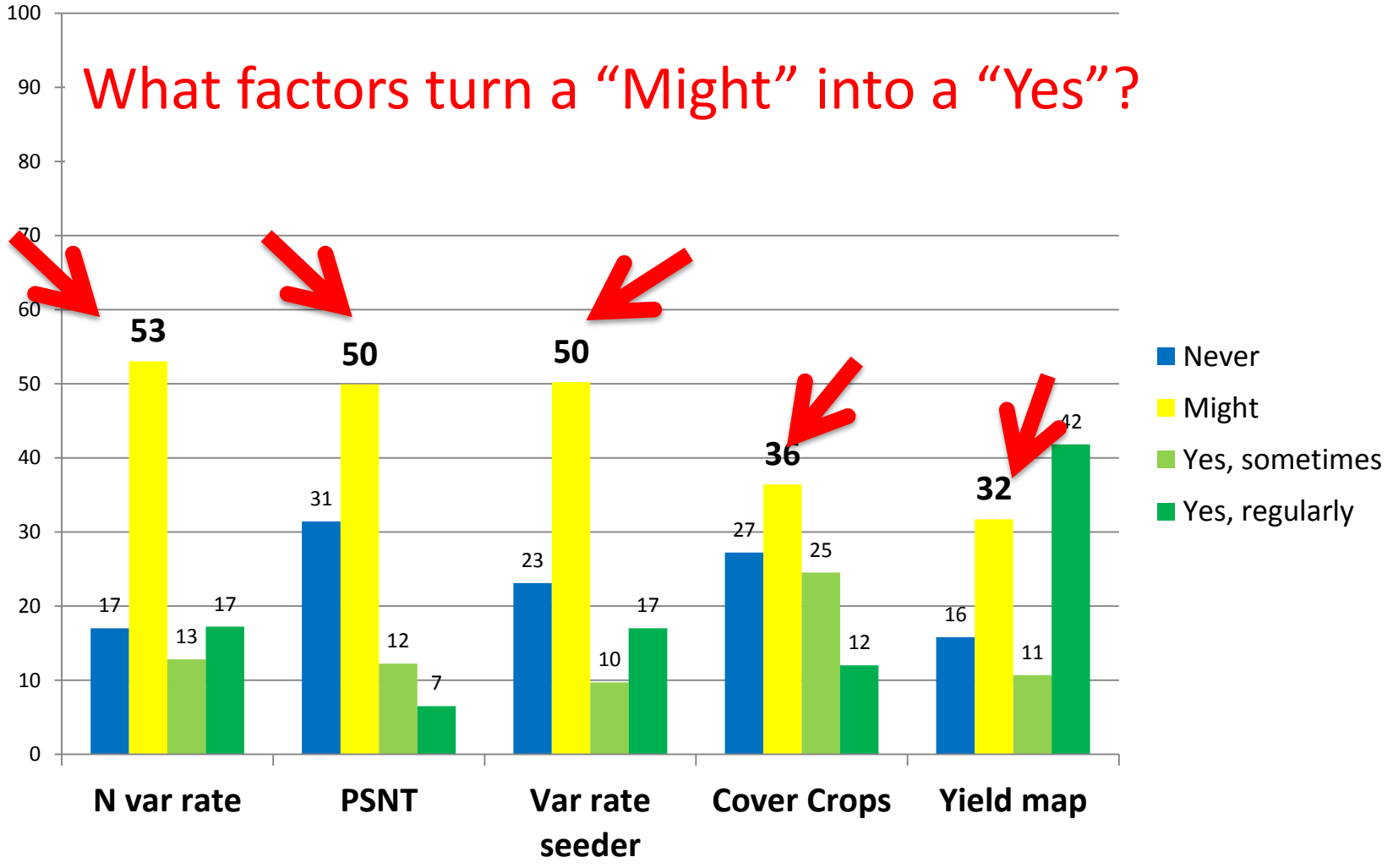


How do farmers & landowners make land management decisions in the face of changing environmental & social conditions?

Climate Change

- **Knowledge**: Farmer expectations of change in probability distributions of crop yield and risk of extreme outcomes
  - Adaptation behavior plans: Alternative crops? Cultivars? Soil mgmt? Irrigation, Crop insurance?
- **Attitudes**:
  - Risk tolerance
  - Environmental stewardship & CC mitigation
- **Ensuing management choices?**

Crop Mgt Choices (2017): Please indicate whether you have used, will use, might use, or do not plan to use this practice.



How do farmers & landowners make land management decisions in the face of changing environmental & social conditions?

Landscape simplification & non-crop vegetation

- **Knowledge** of pollination & pest regulation ecosystem services (ES) from habitat provided by non-crop vegetation
- **Attitudes** toward
  - Location & configuration of non-crop veg
    - Opportunity cost of giving up crop land
  - Planting habitat vegetation for desired ES
  - Coordinating non-crop veg area with neighbors
    - Hidden cost of time needed (Palm-Forster et al 2015 *AJAE*)

Next steps

- Planning integrated research
- How to inform ecological research using
  - Survey questions & planned analyses
    - E.g. – Behavioral model of why farmers adopt practices
  - Economic experiments
    - E.g. – Willingness to cooperate on landscape configuration
  - Personal interviews
- Goal: cutting-edge research for both social science and ecological audiences