# Managing interdisciplinary teams

## Lessons learned from coupled natural and human systems modeling in lake catchments
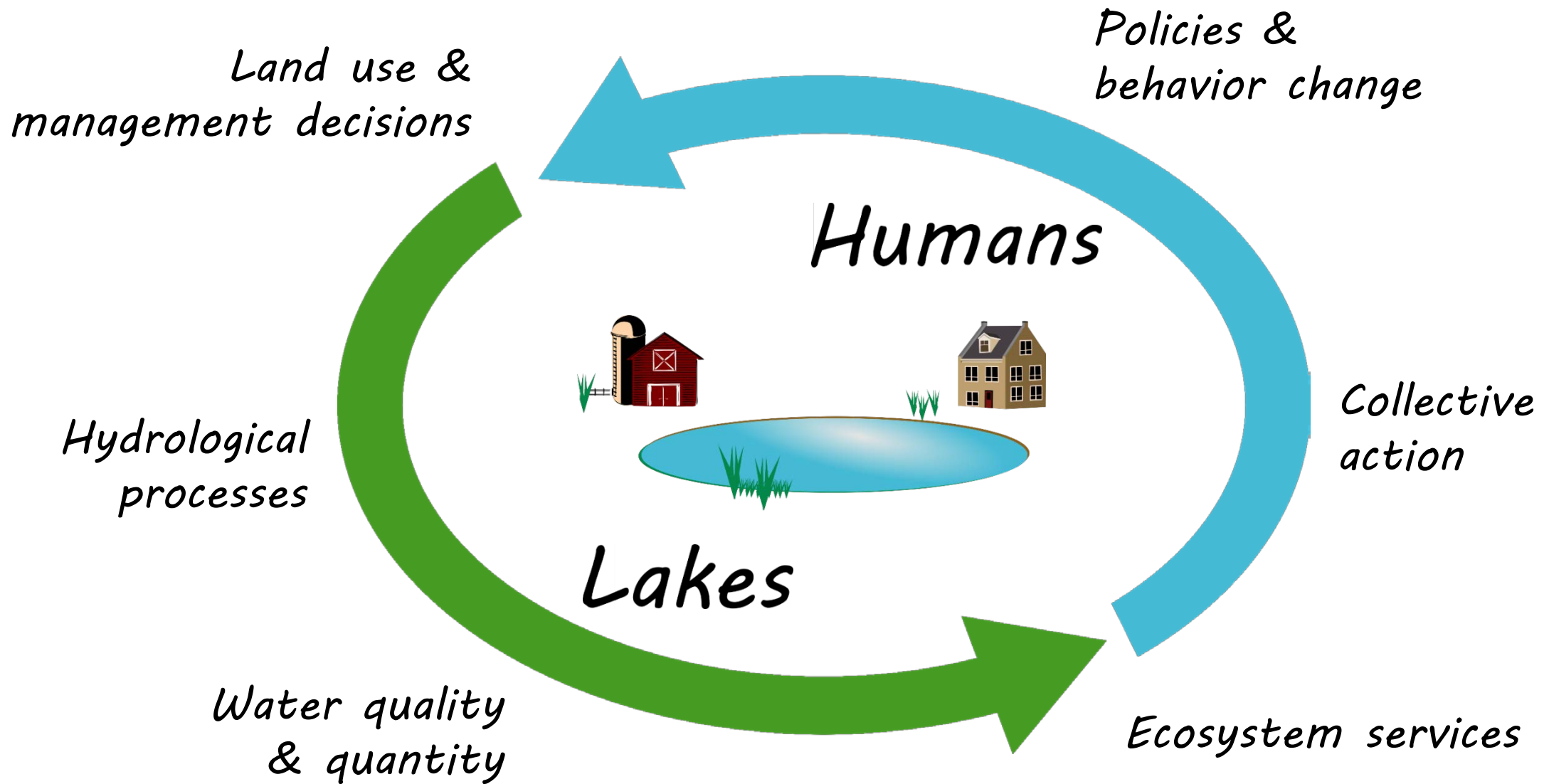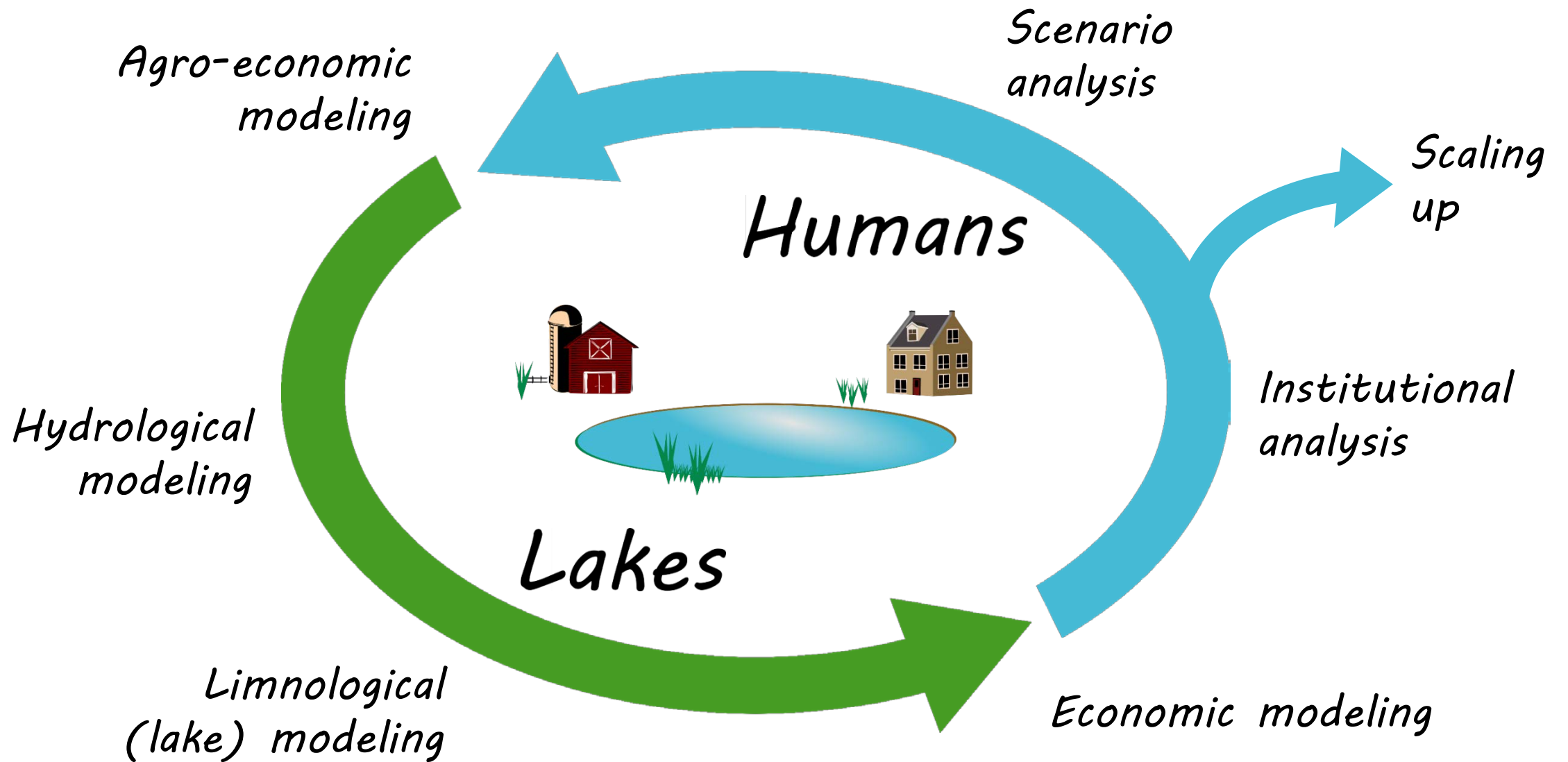
**Reilly Henson**
**Project Manager, Virginia Tech**

- Our experiences can't be generalized to everyone

- But they can reveal practical, day-to-day insights

- Contribute to a foundation of team management knowledge

- Project
- Framework
- Challenges
- Solutions
- Implications

Land use &
management decisions

Policies &
behavior change

**Humans**

Hydrological
processes

Collective
action

**Lakes**

Water quality
& quantity

Ecosystem services

Agro-economic modeling

Scenario analysis

Scaling up

Humans

Hydrological modeling

Institutional analysis

Lakes

Limnological (lake) modeling

Economic modeling

Agricultural modeling

Economic decision making model

Crop growth model

Institutional analysis

Scaling up

Economic property value model

Hydrological model

Lake model

▲ Quantitative-Qualitative transition

★ Social Science - Natural Science Coupling

⬟ Change in spatial/temporal scale of process

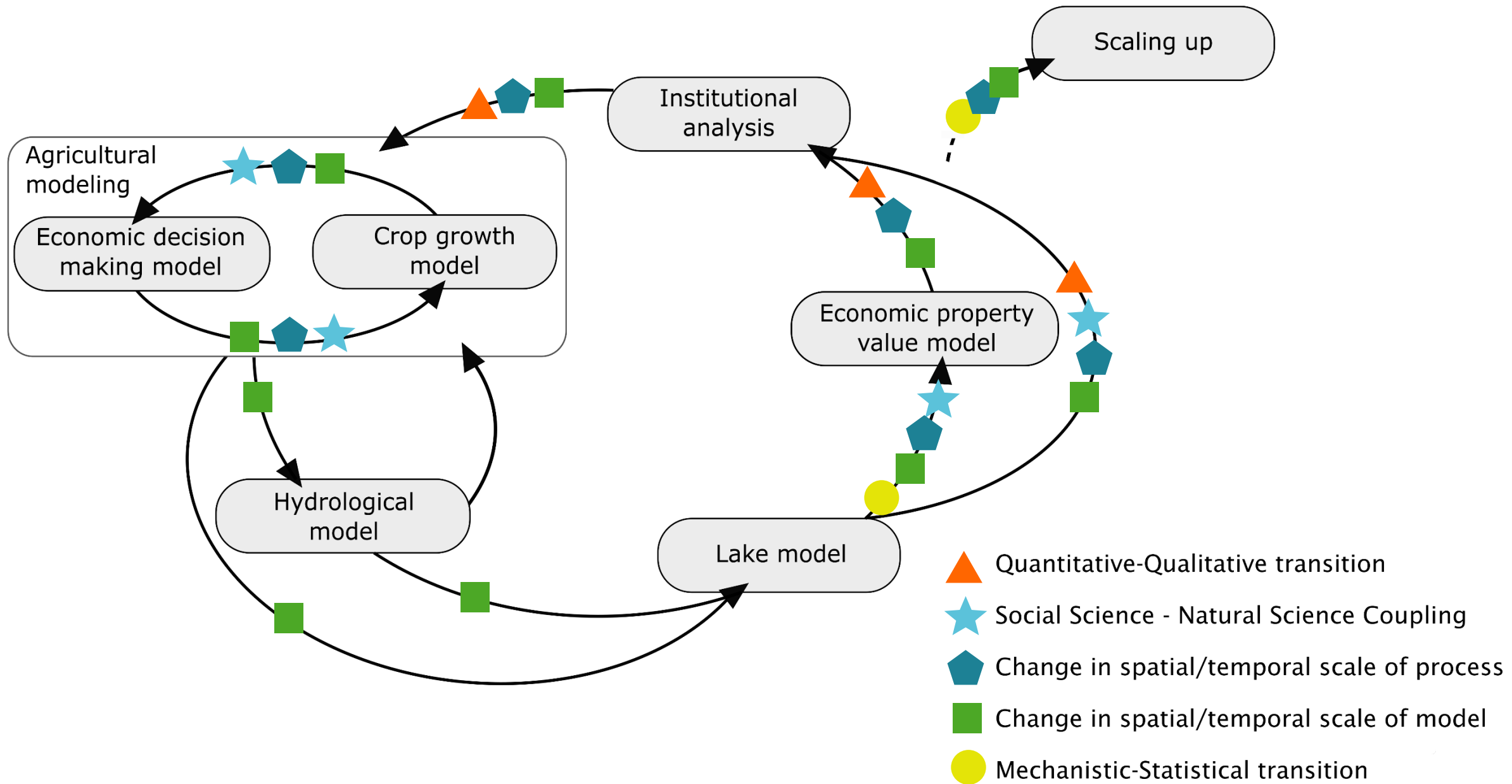■ Change in spatial/temporal scale of model

● Mechanistic-Statistical transition
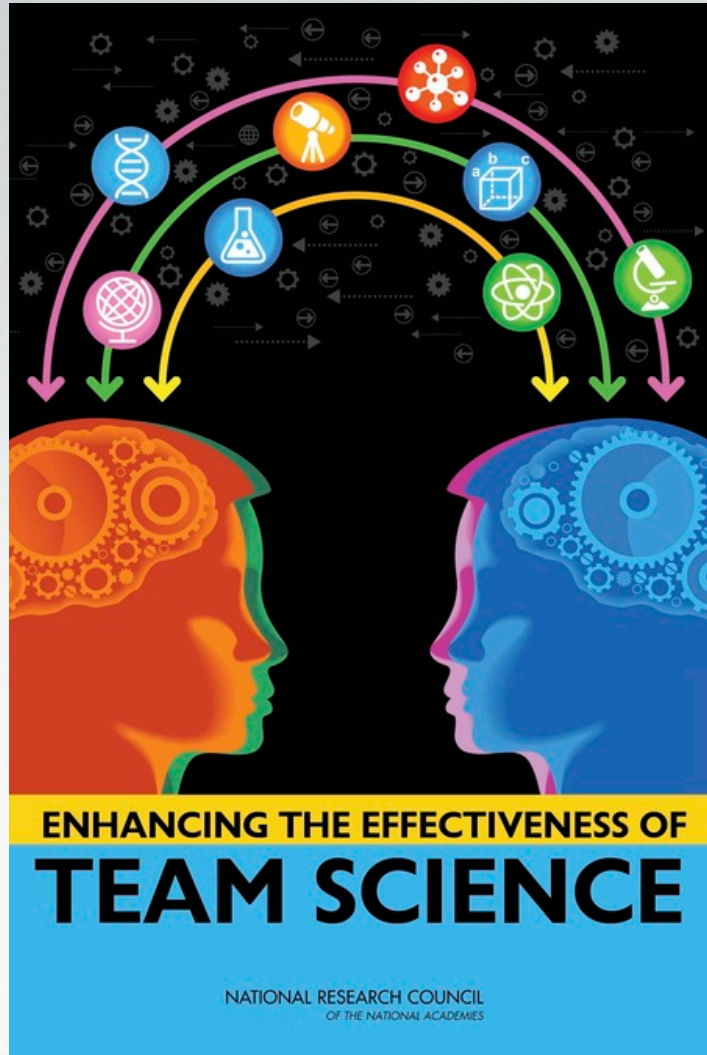
**Project** ➤ Framework ➤ Challenges ➤ Solutions ➤ Implications

# The CNH Lakes Team

- More than 20 researchers
- Economists, hydrologists, biologists, sociologists, agronomists
- More than 6 institutions
- Wide range of career stages

ENHANCING THE EFFECTIVENESS OF
TEAM SCIENCE

NATIONAL RESEARCH COUNCIL
OF THE NATIONAL ACADEMIES

1. **High diversity of membership**

2. Deep knowledge integration

3. **Large team size**

4. Goal misalignment with other teams

5. Permeable boundaries

6. **Geographic dispersion**

7. High task interdependence

High diversity of membership,

Large team size, &

Geographic dispersion

Through the lenses of:

Data management

& Co-authorship

# Diverse team members

- **Different norms & preferences**
  - Data storage platforms
  - File access

# Large team size

- Version control
  - A method to tell which file is most up-to-date
  - Many people analyzing the same datasets

# Geographic dispersion

- Resolving questions & issues

  - Communication across geographic distance

  - Complex topics, difficult to describe in email/over a call

# Diverse team members

- **Diverse expectations about co-authorship**
  - How many authors?
  - Who should be co-author on a grad student's paper?

# Large team size

- **Managing the writing process**
  - Manage timelines
  - Integrate ideas
  - Cohesive style

# Geographic dispersion

- Manuscript development
  - Brainstorming
  - Feedback on ideas

# Solutions & Recommendations

- Data management

  - File storage: Get data experts involved

  - Version control: Establish protocols at beginning of project

  - Resolving problems: Facilitate real-time brainstorming & visualizing

- Co-authorship

  - Diverse norms: Distribute authorship memos

  - Writing process: Combine bottom-up & top-down strategies

  - Developing ideas: In-person project workshops

# Key takeaway:

Data management and co-authorship are the processes in which the 7 dimensions of team science are most likely to manifest challenges.

# Broader implications

- Coupled natural and human systems research provides an excellent testing ground for team science best practices.

- The NRC (2015) framework is helpful for categorizing and understanding team science challenges.

- Major themes from the literature (e.g., communication, shared vision, leadership) play into day-to-day practices.

Thank you!

# References

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