# Beyond Markets and States: Polycentric Governance of Complex Economic Systems

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# Brief Overview of the Journey

- **The Earlier World View of Simple Systems**
- **Efforts to Understand Complex Systems**
  - **Studies of Polycentric Water and Police Industries**
  - **Doubling the Types of Goods**
  - **Developing the Institutional Analysis & Development (IAD) Framework**

# Are Rational Individuals Helplessly Trapped in Dilemmas?

**Earlier studies recorded settings where humans self-organized to cope with common-pool dilemmas**

- **Little knowledge accumulation until a US National Resource (NRC) Committee studied common-pool resources across disciplines, sectors and countries**
- **Meta-analysis discovered diversity of locally known property rights to control resource use**

- **Empirical Studies of Common-Pool Resource Dilemmas**
  - **In the experimental laboratory**
  - **Irrigation systems in Nepal**
  - **Forests around the world**

# Current Theoretical Developments

- Many scholars now developing behavioral theories of individual choice
- Central role of trust in coping with dilemmas now seen for its importance

- **Lessons from Studying Complex Systems**
  - Rules need to fit social-ecological context
  - Polycentric systems may enable a fit between human action situations and nested ecological systems
  - Panaceas are potentially dysfunctional

  - Now, lets review the journey – back to the 1960's

# Complex Human Systems Were Considered Chaotic in 1960s

- Scholars criticized the number of government agencies rather than trying to understand why created and how they performed.
- Maps showing many governments in a metropolitan area were used as evidence for the need to consolidate.
- V. Ostrom, Tiebout & Warren developed concept of polycentric systems to *analyze* performance rather than *criticize* messy maps

# Mechanisms Found to Improve Output in Polycentric Systems

- Small to medium-sized cities are more effective monitors of performance & costs.
- Citizens who are dissatisfied with service provision can "vote with their feet" and move to jurisdictions that come closer to their preferred mix and costs of public services.
- Local incorporated communities can contract with larger producers and change contracts if not satisfied with the services provided while urban districts inside a large city have no voice.

# Police Industry Studies

- **In-depth studies of police served by multiple sized departments in six metropolitan areas**
- **Not a *single* instance was found where a large centralized police department outperformed smaller departments serving similar neighborhoods in regard to multiple indicators.**

# 80 Metropolitan Area Study

- Large number of direct service (e.g. patrol) producers found to be more efficient.
- Small number of indirect service producers (e.g. radio dispatching & criminal laboratory analyses) also more efficient
- Thus, mix of large & small most efficient
- Rejected theory underlying metropolitan reform approach.
- Demonstrated that complexity is not the same as chaos in regard to metropolitan governance.

# Empirical Work Led to a Doubling of the Types of Goods

- Instead of private vs public goods
- Added common-pool resources
  - Shares subtractability with private goods & difficulty of exclusion with public goods
  - Forests, water systems, fisheries, and the global atmosphere are of immense importance for the survival of humans.
- Also added toll goods to build on earlier work of Buchanan on club goods

# Four types of goods

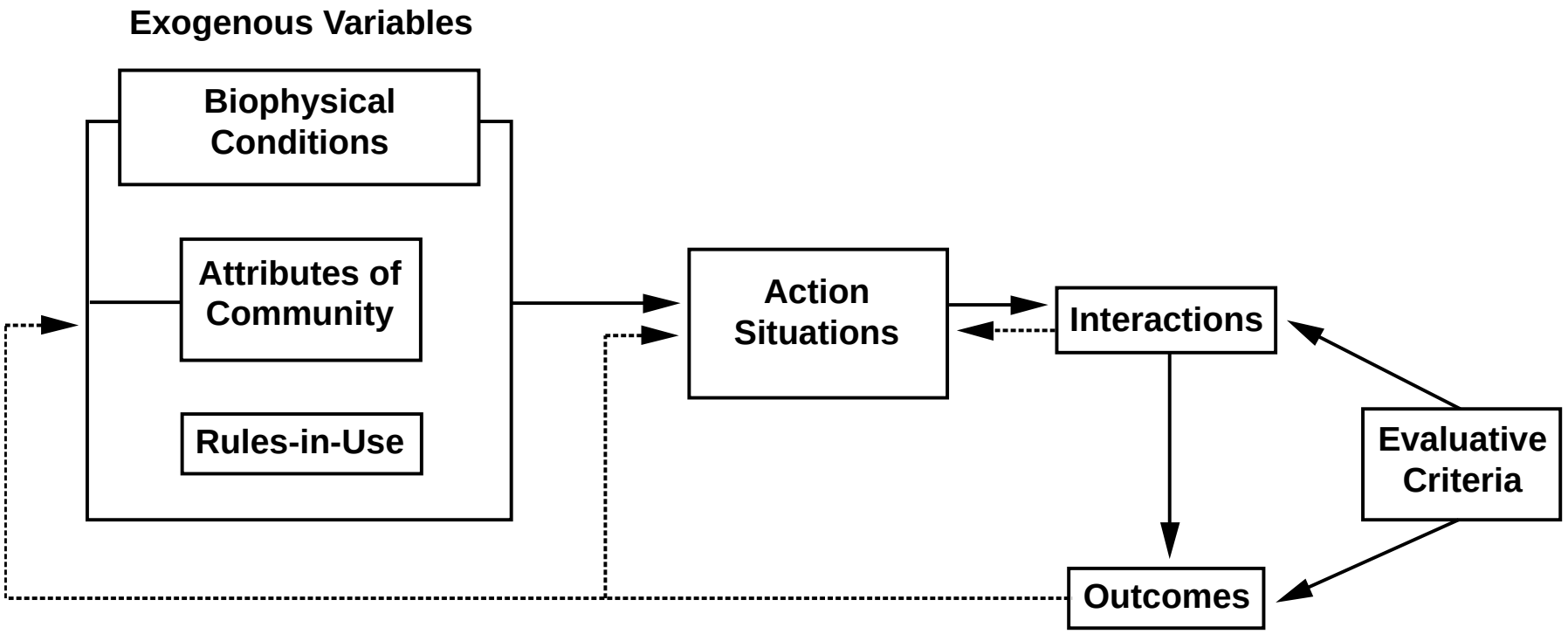
| | | Subtractability of Use: High | Subtractability of Use: Low |
|---|---|---|---|
| **Difficulty of Excluding Potential Beneficiaries** | **High** | *Common-pool resources*: groundwater basins, lakes, irrigation systems, fisheries, forests, etc. | *Public goods*: peace and security of a community, national defense, knowledge, fire protection, weather forecasts, etc. |
| | **Low** | *Private goods*: food, clothing, automobiles, etc. | *Toll goods*: theaters, private clubs, daycare centers |

*Source*: Adapted from E. Ostrom (2005: 24).

# Developing a Framework

- The Institutional Analysis and Development (IAD) framework
- The work of many colleagues over time
- Contains a nested set of building blocks that social scientists can use in efforts to understand human interactions and outcomes across diverse settings.
- Exogenous variables affect the internal working parts of an action situation that in turn affect interactions and outcomes.

# A framework for institutional analysis

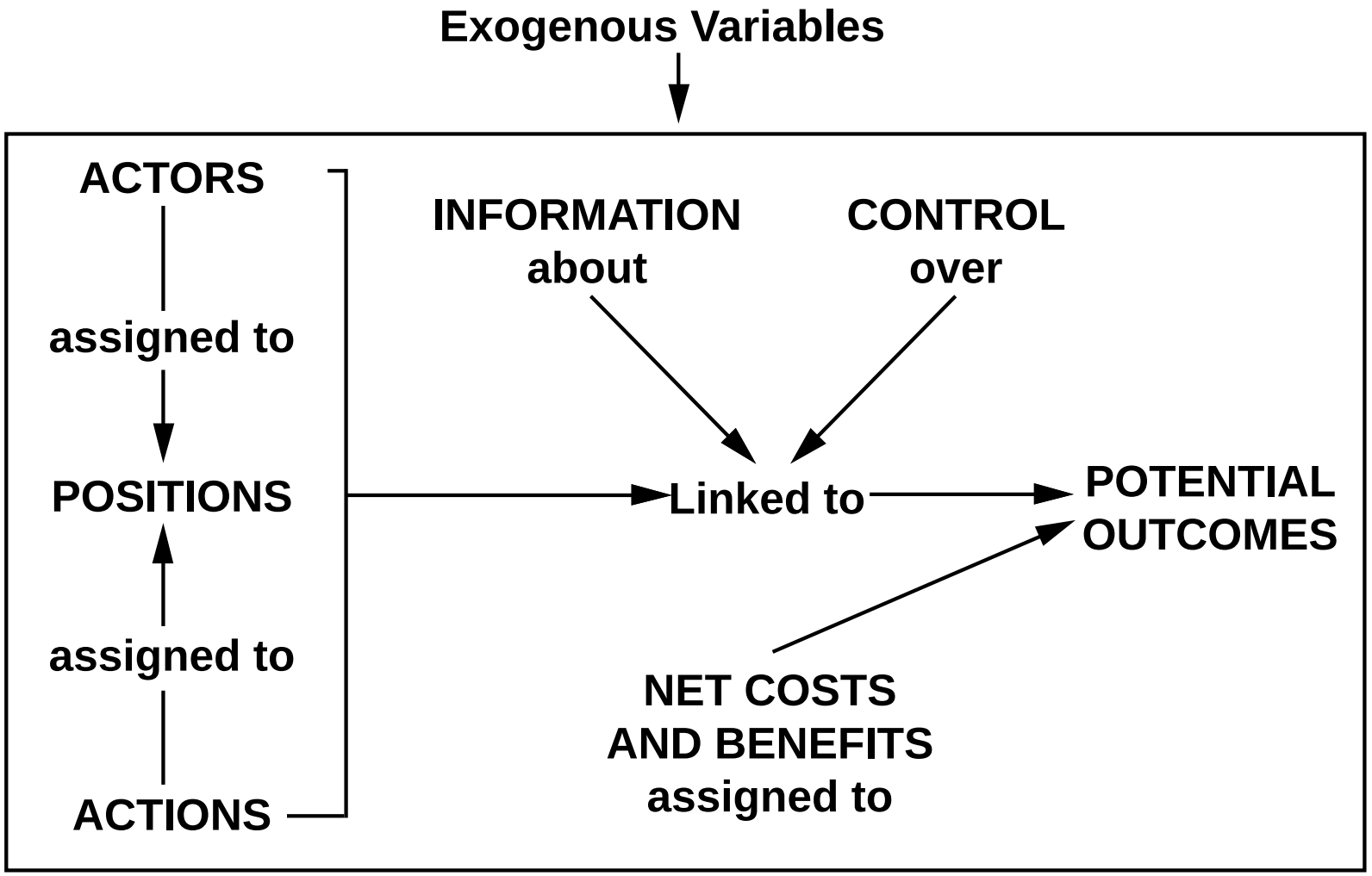



*Source*: Adapted from E. Ostrom (2005: 15).

# Internal Parts of Action Situations

- Similar to the working parts of a game so that IAD can be used to organize game theoretical analysis, agent-based models, design of laboratory experiments, and for collecting, coding and analyzing extensive data from field research

# The internal structure of an action situation




*Source*: Adapted from E. Ostrom (2005: 33).

# ARE RATIONAL INDIVIDUALS HELPLESSLY TRAPPED IN SOCIAL DILEMMAS?

- Theory presented humans in commons dilemmas as unable to extract themselves.
- They were "trapped"
- But other humans – public officials – were supposed to impose optimal devised by scholars on resource users.
- Government or private ownership presumed to be optimal.

# Earlier Knowledge of Self-Organization did not Cumulate

- Many studies conducted by
  - Scholar from multiple disciplines about
  - Diverse sectors in
  - Different regions
- More attention paid to news reports of resource destruction
- NRC committee in mid 1980s brought scholars from all traditions together to present an overview of the empirical studies

# Meta Analysis of Common-Pool Resource Studies

- IAD framework used to develop coding manual
- Difficult due to lack of agreement of earlier scholars about what should be reported
- 47 irrigation systems & 44 fisheries analyzed.
- Over 72% of farmer managed systems had high performance – crops grown, benefit-cost ratio
- 42% of governmental irrigation systems had high performance even with fancy engineering
- Informal fishery groups allocated space, time, and technology to try to reduce over-harvesting
- Groups that did not communicate were more likely to overuse their resource

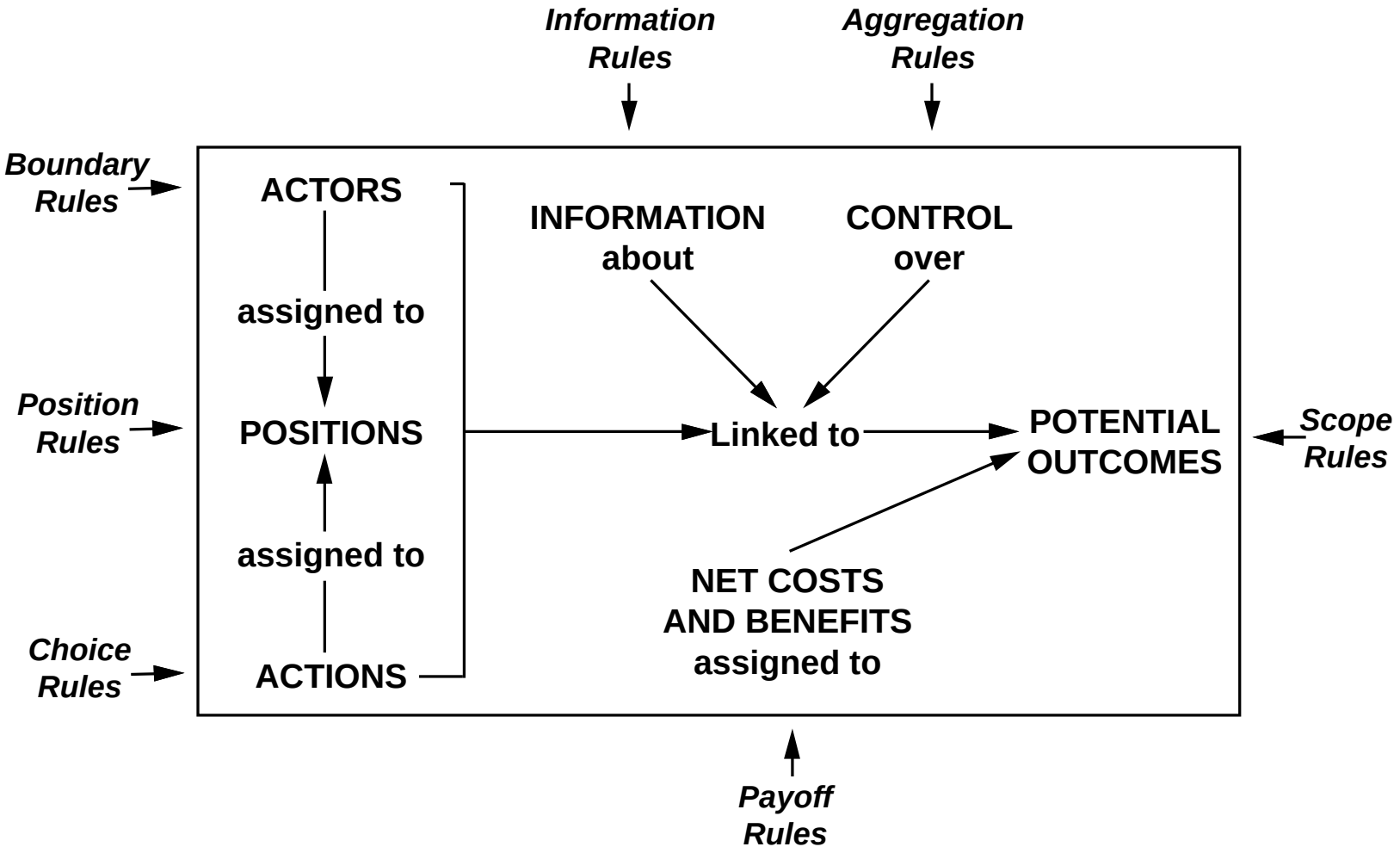
# Clarifying Concepts

- "Common-property resource" widely used
- Confused the concept of property and that of resource
- Need to switch to "common-pool *resources* and "common-*property* regimes"
- Found five types of property rights rather than just one
- Access, withdrawal, management, exclusion & alienation rights were all real rights
- Property rights systems may mixtures of the 5, not just alienation rights

# Finding Diversity of Rules

- Resource uses had devised immense number of different rules fitting their local resource system
- Again IAD helped us identify order from this initially chaotic morass
- We asked: What part of an action situation does a rule affect?

# Rules as exogenous variables directly affecting the elements of an action situation




*Source*: Adapted from E. Ostrom (2005: 189).

# Long-Surviving Institutions

- **Once studies were coded, I had hoped it would be feasible to find an optimal set of rules used by robust, long-surviving institutions and not used in the fragile ones.**
- **After a long struggle – realized this was not feasible and turned to the analysis of underlying practices of successful systems (design principles) not present in failures**

# A Quick Overview

- Boundaries of users & resource are clear
- Congruence between benefits & costs
- Users had procedures for making own rules
- Regular monitoring of users and resource conditions
- Graduated sanctions
- Conflict resolution mechanisms
- Minimal recognition of rights by Government
- Nested enterprises

# Empirical Studies in the Lab

- Laboratory provides the capability to design a CPR experiment and slowly change one factor at a time to assess the impact on outcomes.
- When subjects make decisions anonymously with no communication – overharvest even worse that predicted!
- Face-to-face communication (cheap talk) enables them to increase cooperation
- If they design own sanctioning system achieve close to full optimality
- Field experiments testing how resources users themselves act in different structures

# Irrigation Systems in Nepal

- Compared systems designed by engineers & run by government with those built & run by farmers
- Farmer-systems were quite "primitive" in terms of construction, but they were able to:
  - grow more crops,
  - run their systems more efficiently, and
  - get more water to the tail-end

# Forests Around the World

- International Forestry Resources and Institutions (IFRI) research program
- IFRI is unique--the only interdisciplinary, long-term research program studying forests owned by governments, by private organizations, and by communities in multiple countries.
- Collaborating with centers in Africa, Asia, Latin America and US
- All use same research protocols to carefully measure forests (e.g. species diversity, basal area)
- Measure if and how users are organized, their activities, and living conditions

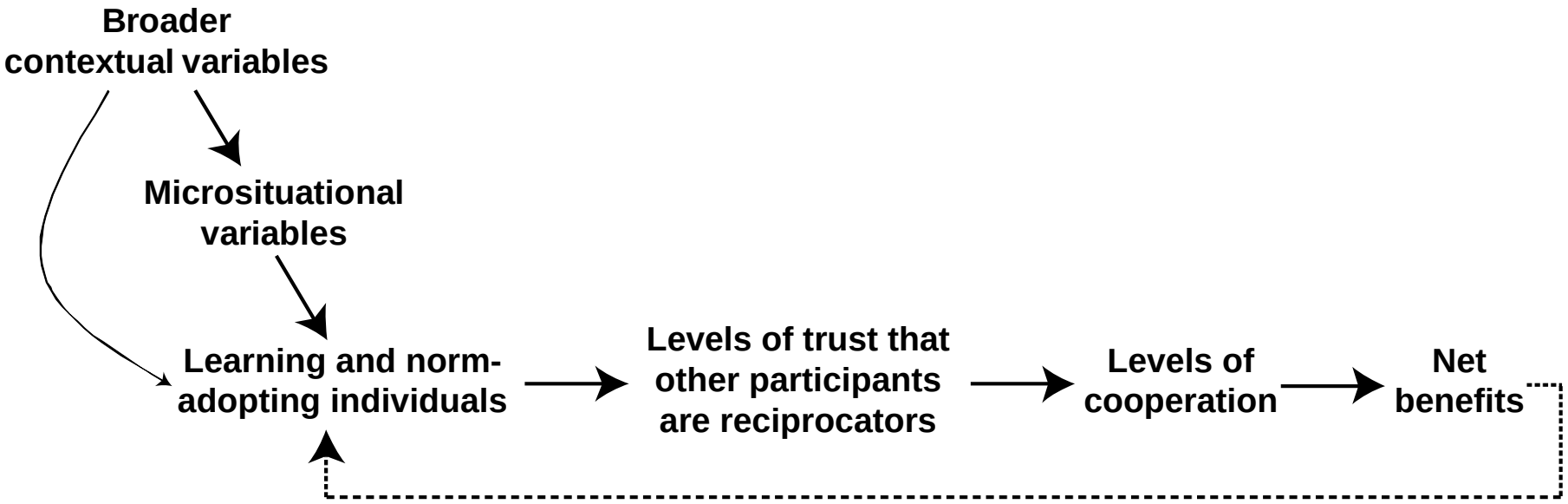
# Surprising Findings

- **In sustainable forests around the world, users are active monitors of the level of harvesting occurring in their forests**
- **Users monitoring forests is more important than type of forest ownership!!!**
- **Recent analyses examine tradeoffs and synergies between level of carbon storage in forests and their contributions to livelihoods.**
- **Larger forests more effective in enhancing carbon *and* livelihoods**
- **Even stronger when local communities have strong rule-making autonomy and incentives to monitor**

# Current Developments

- Theory of rational but helpless individuals not supported
- Many theorists now working on behavioral theories of the individual
  - Boundedly rational, but learn through experience
  - Use heuristics but update over time
  - Learn norms & potentially value benefits to others
- Learning to trust others is central to cooperation

# Microsituational and broader context of social dilemmas affects levels of trust and cooperation




*Source*: Poteete, Janssen, and Ostrom (2010: chap. 9).

# Micro-Situational Level of Analysis (Labs & Field)

- **Factors that affect cooperation in CPRs**
  - **Communication among participants**
  - **Reputation of participants known**
  - **High marginal return**
  - **Entry & exit capability**
  - **Longer time horizon**
  - **Agreed upon sanctioning mechanism**
  - **All factors that increase likelihood that participants gain trust in others and reduce the probability of being a sucker**

# The Broader Context: Social-Ecological Systems

- A network of colleagues in Europe and across the US working on identifying aspects of the broader context that affects micro-situations and likelihood of resource sustainability across water, forests, and fishery resources
- More to do in future work!

# Reform?

- Resources in good condition have users with long term interests, who invest in monitoring and building trust.
- Many policy analysts and public officials have not yet absorbed the central lessons.
  - Government protected areas or private rights are still recommended by some as THE way to solve these problems.
- Must learn how to deal with complexity rather than rejecting it.
- Polycentric systems can cope with complexity
- Panaceas are not to be recommended!

# Thank you