



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

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



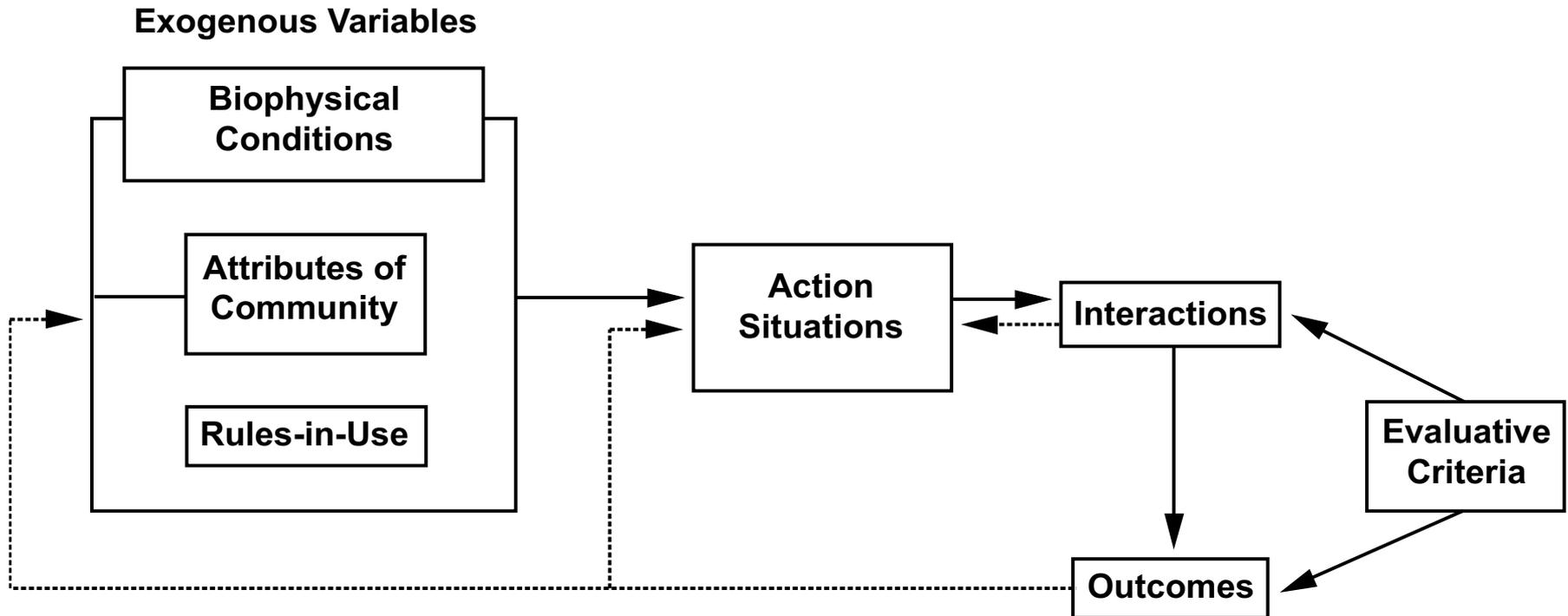
# **Developing a Framework**

**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



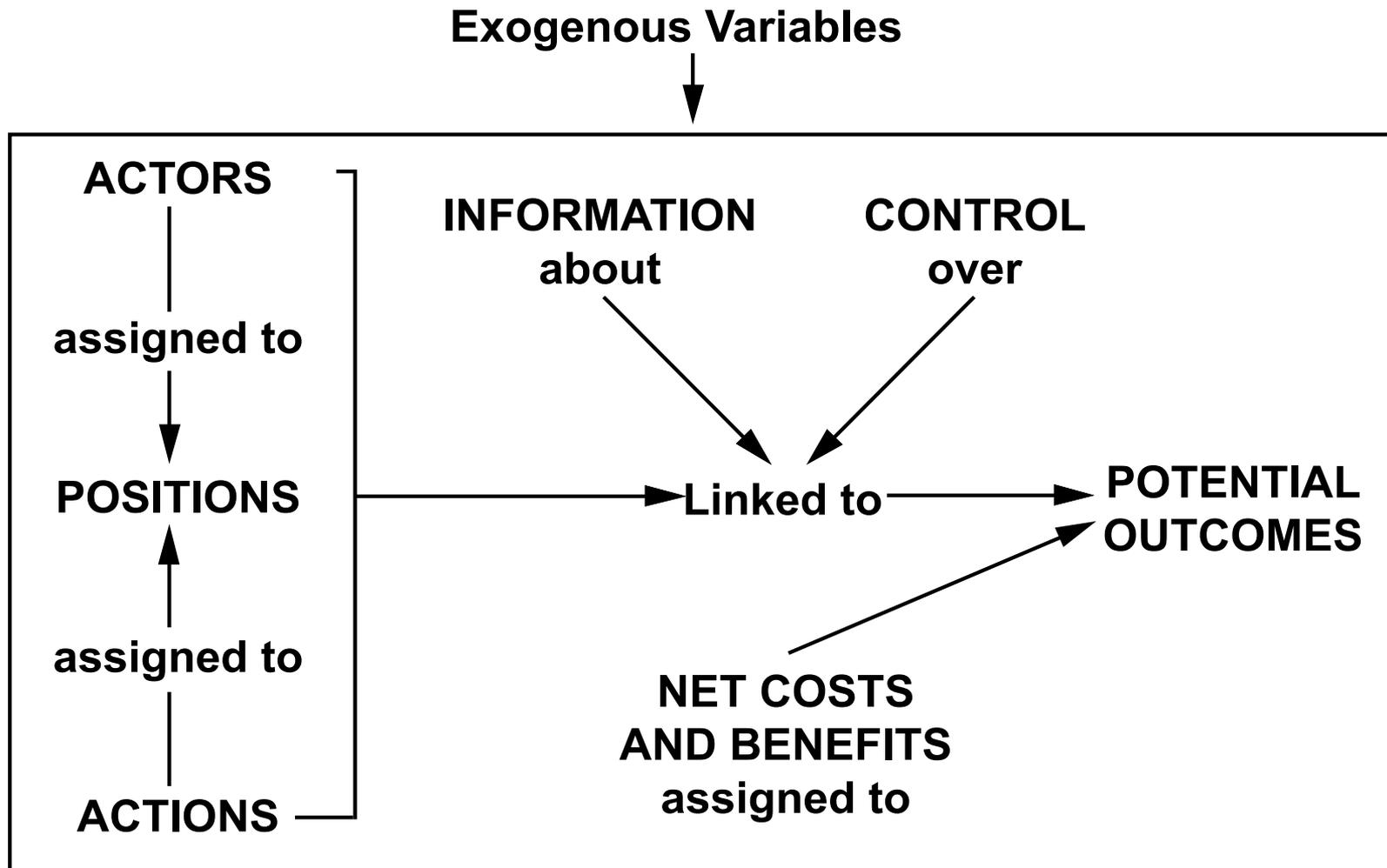
Source: Adapted from E. Ostrom (2005: 15).



# **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

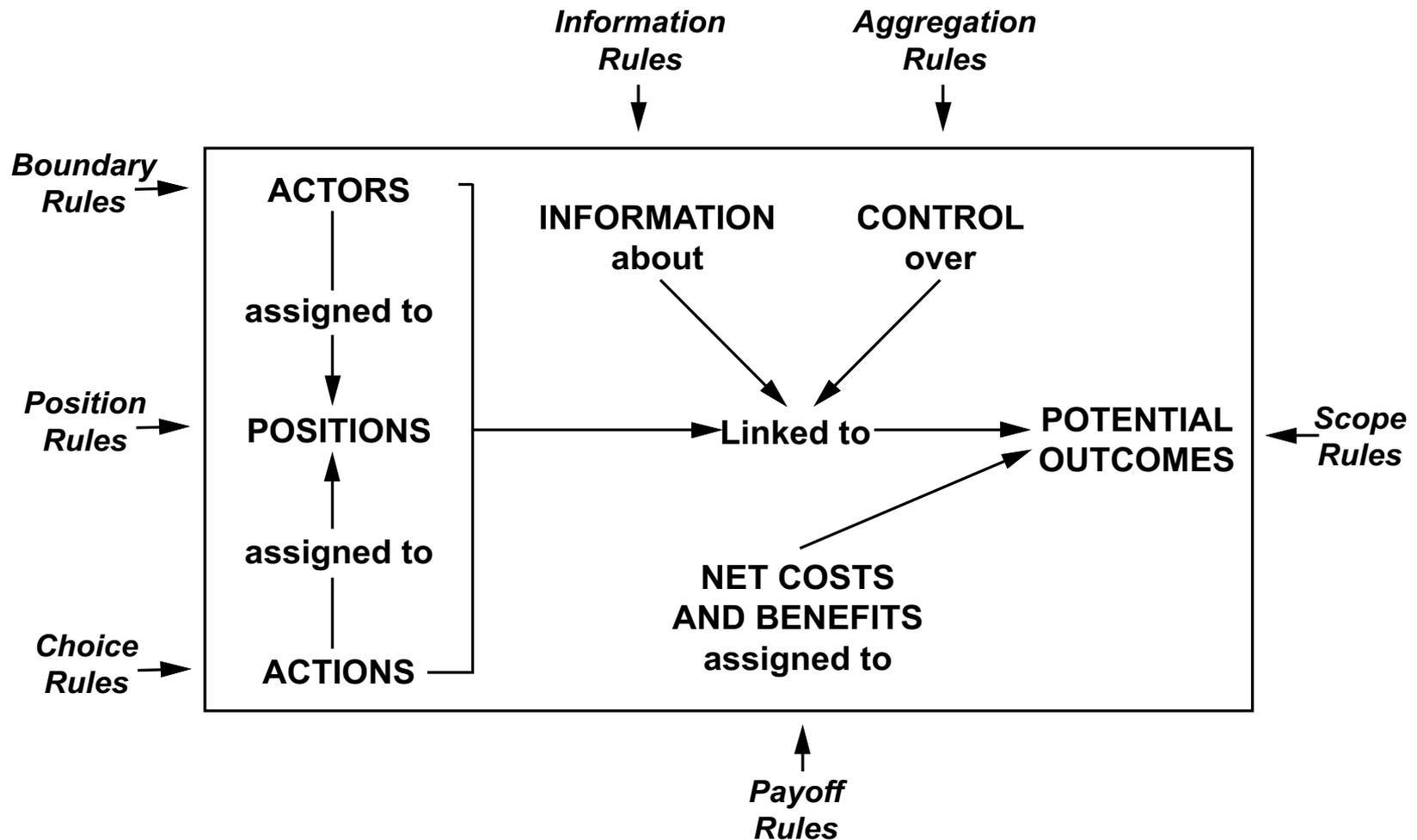
- **“Common-property resource” widely used**
- **Confused the concept of property and that of resource**
- **Need to switch to “common-pool *resources* and “common-*property* regimes”**
- **Found five types of property rights rather than just one**
- **Access, withdrawal, management, exclusion & alienation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



# Finding Diversity of Rules

- **Resource users 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 than 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

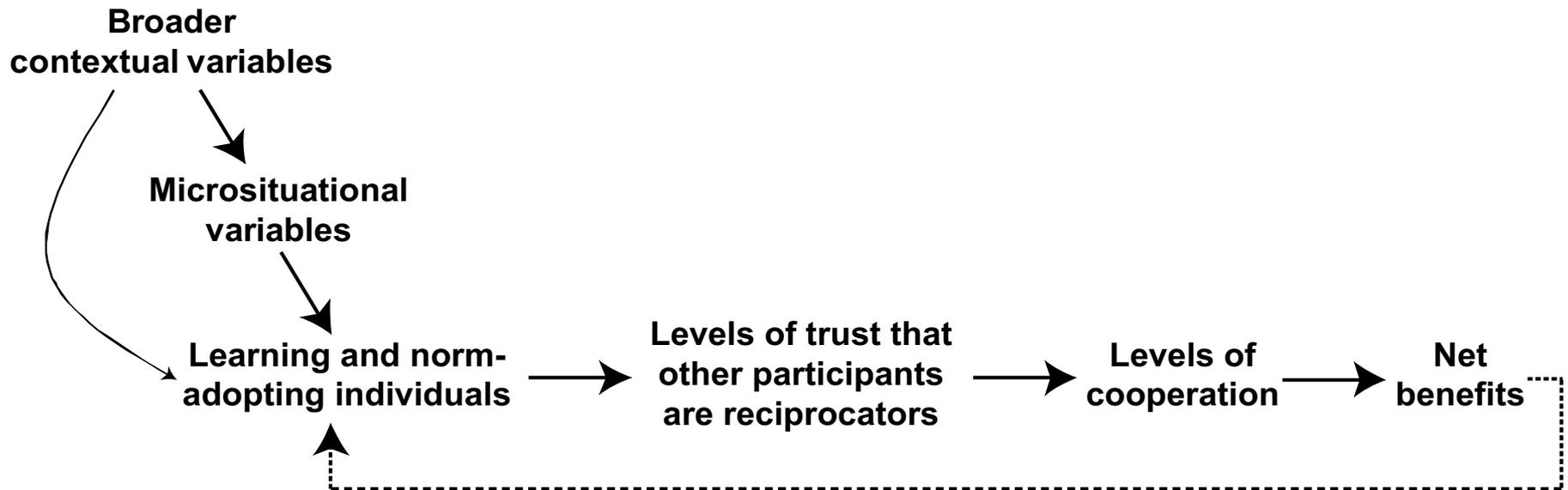
- **In sustainable forests around the world, users are active monitors of the level of harvesting occurring in their forests**
- **Users monitoring forests is more important than type of forest ownership!!!**
- **Recent analyses examine tradeoffs and synergies between level of carbon storage in forests 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**

