Resource Management:
INSTITUTIONS AND INSTITUTIONAL DESIGN

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Working with rules

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Literature

Ostrom, Elinor 2005, *Understanding Institutional Diversity*, Princeton University Press, Princeton, Ch 8-9

- Using Rules As Tools to Cope with the Commons
- Robust Resource Governance in Polycentric Institutions

Rules in self-organised CPR regimes

- Boundary rules in CPR regimes
  - Defines attributes and conditions for those entering a position as authorised appropriators in an action situation
  - Groups with boundary rules do better in managing their resources than those without
  - Community members with reputation as trustworthy vs license paying strangers?
  - Community devised boundary rules tend to increase the proportion of users with long term interests in the resource
  - Central government devised rules do so in less degree, and often the tendency is in to opposite direction

Table 8.1 Attributes and conditions used in boundary rules

ATTRIBUTES	ATTRIBUTES	CONDITIONS
Residency or membership	**Personal characteristics**	**Relationship with resource**
National	Ascribed	Use of specified technology
Regional	Age	Continued use of the resource
Local community	Caste	Long term rights base on
Organisation (e.d., co-op)	Clan	Ownership of a proportion of annual flow of resource units
	Ethnicity	Ownership of land
	Gender	Ownership of non-land asset
	Race	Ownership of shares in a private organisation
	Acquired	Ownership of a share of the resource system
	Educational level	Temporary use rights acquired through
	Skill test	Auction
		Per-use fee
		Licenses
		Lottery
		Registration
		Seasonal fees

Rules creating monitors

- Self-organised resource user systems often employ or use guards/ monitors
- In many systems the presence of a monitor is the difference between a well kept sustainable system and a badly degraded system (forests, large irrigation systems)
- Some groups use a system of self-monitoring (fisheries, small irrigation systems)

Choice rules used to allocate CPRs

- Allocation formulas and conditions for using these may vary from resource type to resource type and may vary from actor type to actor type in the same area
- The most frequently found policy advice of individual quotas based on an estimate of the optimal quantity of fish to be harvested in the long run has NOT been found in self-organised coastal fisheries, neither do irrigation systems allocate fixed quotas of water
- Allocation rules will often be designed to economise on monitoring costs and will usually be tailored to ecological conditions
- Many systems will also have choice rules for the maintenance of the resource system, often creating duties congruent with the rights enjoyed

Table 8.2 Choice rules used to allocate CPRs

Allocation formula for appropriation rights	Basis for allocation formula
Percentage of total available units per period	Amount of land held
Quantity of resource units per period	Amount of historical use
Appropriate only from a specific location	Location of appropriator
Appropriate only from a specific time slot	Quantity of shares of resource owned
Rotate in time and space	Proportion of resource flow owned
Appropriate only during open season	Purchase of periodic rights at auction
Appropriate only resource units meeting criteria	Rights acquired through periodic lottery
Appropriate whenever and wherever	Technology used
	License issued by government authority
	Equal division to all appropriators
	Needs of appropriators (e.g. type of crop)
	Ascribed characteristics of appropriator
	Membership in organisation
	Assessment of resource condition

Payoff and position rules

- Norms of ostracism and shunning
- Frequently used sanctions in field settings
  - Fines, usually graduated
  - Loss of appropriation rights
  - Incarceration
- Use of guards require payoff rules to motivate the guard
  - Fixed wage independent of performance (central government managed systems)
  - In kind or in money from each household
  - In kind or in money from local user organisation

Information, Scope, and Aggregation rules

- These rules tend to complement boundary, choice, position and payoff rules
- The more valuable resource units are and the more appropriators there are the more information has to be kept by appropriators and their officials
- Scope rules often used to limit harvesting (creating refugia)
- Aggregation rules most frequently used in collective choice situations, less in appropriation
  - But sometimes it is required that harvesting is done in teams

Assumptions about resource policy that needs revision

Common bureaucratic assumptions that is challenged

- Resources are so interconnected that only central coordination can manage them
  - National governments have been notably unsuccessful in governing nationalised resources such as forests and fisheries, in effect creating open access resources and alienating local communities in the process
- Resource users are incapable of designing appropriate rules of management
  - Users are not all rational egoists and bureaucrats do not always work unfailingly for the common good.
  - Bureaucrats will in most complex problems know as little about what is a better strategy as the average practitioner
  - Documented that local groups have created viable institutions for local governance, but the conditions for successful local organisation is not well understood
- Designing appropriate rules is a rather simple analytical exercise
  - Available evidence says this is a very challenging task. The number of possible rule configurations will usually far exceed available time for analysis. In addition there are a multitude of unique links to the bio-physical environment. Practical experiments with goal directed adaptation of rules work better and faster

Rule configurations

- Grether, Isaac, and Plott 1979/81 studies allocation of airport slots.
  - Developed formal model of alternative rules' impact on incentives
  - Simulated the the decision setting in an experimental laboratory
- Ostrom 1996 studied rules affecting an action situation of farmers constructing an irrigation system
  - Using a series of formal games
  - Had to make multiple assumptions about both farmers and their environment
  - Investigates 7 rules
  - Finds two rule configurations as producing the best results seen from the farmers side
- Conclude: even simple rule problems create complex analytic exercises

Complexity and adaptation

- Coping with complexity
  - Learn from the engineers of complex systems
  - Be aware that small perturbations may cascade into major failures
  - All politically engineered change should be viewed as an experiment designed to provide information for improvement of performance
- Rule change as an adaptive process
  - Persuade all that rules are necessary for preserving the resource
  - Adapting rules, norms, strategies

Success in self- governing associations

Resource
- Improvement of resource is feasible
- Reliable indicators of resource conditions
- Flow of resource units is predictable
- Spatial extent of resource system is congruent with social system (not too big)

Appropriators
- Resource is salient for the appropriators
- There is a common understanding of the resource dynamic
- A low discount rate
- Trust and reciprocity
- Access and harvesting rules are determined locally
- Appropriators have prior organisational experience and local leadership

Performance of a local system is conditioned by the larger syst

A rule change calculus

- Incentive to change rules (R) :
  - Γ_i = Perception$_i$ ($R_{new} - R_{old}$)
- Costs: costs of creating new rules (C1), short term costs from change (C2), long term from monitoring and system maintenance (C3)
- To change requires $\Gamma_i > C1 + C2 + C3$ for a sufficient number of i's in the group
- A minimum coalition will depend on the kind of collective choice rule used in deciding
- If for all coalitions $\Gamma_m \leq C1_m + C2_m + C3_m$ no new rule is adopted
- If more participants benefit, the enforcement costs will be lower
- External enforcement will distribute costs unjustly

Resource attributes and costs

- Attributes affect benefits and costs of institutional change
  - Relative abundance on the one hand or basically destroyed on the other do not generate much benefit form organising. Only scarcity that can be fixed do so
  - Good indicators make appropriate response easier sooner
  - Predictable flows are easier to manage than erratic
  - Smaller spaces are less costly to monitor

Appropriator attributes and costs

- If resource is of less importance to income, efforts to organise may not be worth it
- Without a common understanding of resource dynamics, agreeing on joint strategies will be very difficult
- Access to several resource pools (fish for example) may make it more profitable to mine one now without incurring costs of long term maintenance
- Trust and reciprocity lowers costs of monitoring
- Autonomy tends to lower costs of organising
- Prior experience with organising also lowers costs
- Central government may facilitate local efforts (fair courts and conflict resolution) or hinder them
- Self-governance is not to be taken for granted

Theoretical puzzles in self-organisation

- Size – many attributes change with size
  - Large groups make communication and agreement on strategies more difficult
  - Some find no correlation, one find curvilinear relation (smaller as well as larger have difficulties)
- Heterogeneity (cultural background, interests, endowments) – contradictory and context dependent impacts
  - Privileged groups
  - Rules may take into account a diversity of heterogeneity compensating for them or accentuating them

Robust resource governance

- Making rules will always be a limited analysis of a small part of the ecological, economic, political, and social setting
- No rule configuration produces the same outcomes in different settings
- Knowledge of how to govern complex non-linear systems will probably improve but it will never be complete or good enough to avoid disastrous mistakes
- To improve policy we need to make all policy interventions into experiments from which we can learn

Design principles 1990

- Boundaries of ecosystems should approximate boundaries of governance

From 1990:

1. Clearly defined boundaries of resource and social group utilising it
2. Proportional equivalence between benefits and costs
3. Collective choice arrangements
4. Monitoring: users monitored can as a group instruct monitors
5. Graduated sanctions
6. Conflict resolution mechanisms
7. Minimal recognition of rights to organise
8. For larger resource systems: Nested enterprises

Design principles 1990 new evidence (1)

1. Well defined boundaries (avoids free riding)
   1. Externally imposed boundaries does not work well compared to locally legitimised
   2. Boundaries needs to be defendable by the users
2. Equivalence of benefits and costs
   1. As sign of fairness supports participation and rule following among conditional cooperators
3. Collective choice arrangements
   1. Farmer designed rules work better than village elite designed rules that work better than central government designed rules

Design principles 1990 new evidence (2)

4. Monitoring
   1. Monitoring by locals or on contract with locals work better than external monitoring
5. Graduated sanctions
   1. Most self-governed groups rely on quasi-voluntary cooperation (the Ulysses technique) rather than voluntary or coercion
6. Conflict resolution mechanisms
   1. May involve levels above the village to counteract elite capture
7. Minimum recognition of rights to organise
   1. Making rules in the extra legal sector is more difficult (will usually require unanimity) than in the legal sector
   2. Local rule makers can more efficiently take into account new knowledge
8. Nested enterprises, multiple layers, polycentricity

Design principles 1990 new evidence (3)

- Design principles in practice
  - DPs are a beginning point for a search of means to solving a rule design problem:
    - How do we define boundaries? Clarify relations between costs and benefits? Enhance participation in decisions? Who monitors and what are their incentives? What are goals of sanctions? How are conflicts resolved?
    - How can local rule makers be recognized? How do we make a polycentric system of resource governance?

Threats to robust governance (1)

1. Rapid exogenous changes
   - Collective action based on trust and reciprocity may unravel rapidly by immigration
   - Changes in technology, populations (human, animal, plant), factor availability, usage of monetary transactions, heterogeneity of participants
   - The faster key variables change and the more variables that change the more difficult is the adaptation of the system

Threats to robust governance (2)

2. Transmission failures
   1. Rapid cultural change or turnover in population threaten learning and understanding of rules
   2. Reliance on minimal winning coalitions in rule change or interpretation may erode good will and legitimacy of rules in use
3. Blueprints and external funds
   1. Assume the locals have failed and external intervention necessary. Usually one see that
      1. local property rights are seen as unimportant
      2. Previous (local) investors have lost and are unwilling to contribute
      3. Local knowledge and institutions disregarded
   2. These problems are shared in general with all welfare motivated governmental interventions

Threats to robust governance (3)

4. Corruption and rent seeking
   1. External funds for infrastructure is a powerful motor for opportunistic behaviour, rent seeking and corruption.
   2. Pricing policy and subsidisation is another
5. Lack of large-scale supportive institutions
   1. Provision of impartial accurate information on complex resources
   2. Mechanisms for conflict resolution for conflicts with external actors

Coping with threats

1. Creating associations of community governed entities instead of cooperating through external NGOs
2. Comparative institutional research to find ideas for alternative designs and operation: what works? and why?
3. Develop high school courses on local governance. Today it mostly discuss central government.
4. Create polycentric governance systems:

Polycentric governance systems (1)

Advantages of local level organisation

- Local knowledge
- Inclusion of trustworthy participants
- Reliance on disaggregated knowledge
- Adaptation of rules is better
- Lower enforcement costs
- Parallel autonomous systems reduces chance of large scale failure

Polycentric governance systems (2)

Limits of local level organisation

- Some appropriators will not organise
- Some self-organised efforts will fail
- Local tyrannies
- Stagnation
- Inappropriate discrimination
- Limited access to scientific information
- Conflict among appropriators
- Inability to cope with large scale resource systems

Coping with tragedies of the commons in polycentric systems

- Polycentric systems consist of mixtures of general and special purpose governance units with varying scales
- More diversity of expertise and information give better chance of hitting a workable solution
- Such systems look terribly messy and hard to understand. But
- “The scholars’ love of tidiness needs to be resisted.”

