

# International Cooperation and the International Commons

Scott Barrett

Duke Environmental Law & Policy Forum , Vol. 10, 1999

# Introduction

- Usually cooperation will be partial and
- There will be some loss in efficiency
- International cooperation in these situations is analogous to domestic politics..
- Agreements that seek to sustain cooperation must be self-enforcing

# Motivation

- Free-riding
- Compliance
- The purpose of this article is to try to make sense of the negotiators' problem by discussing what makes international agreements work and how they can be made to work better

- The most important feature of the PD is that the efficient outcome may not be sustainable by a decentralized or anarchic international system.
- There is no third party that can effectively enforce agreements between countries
- Many problems are more akin to coordination games
- One of the differences between the PD and coordination games is that, for the latter, players do not have dominant strategies
- Participation in a treaty may resemble a coordination game, and yet the problem addressed by the treaty may be a PD.

- With sanctions imposed on non-signatories, every party prefers to participate if a significant number of others do as well.
- If the treaty also requires that the parties supply the public good, then this resembles the PD game
- Number of countries affected by the commons problem
- It is neither essential nor reasonable to assume that all choices are binary

# General Remedies

- 200 multilateral agreements
- Treaties are specific remedies
- Why not simply allocate rights, pursuant to the Coase Theorem, to all the earth's resources and let bargaining take care of the rest?

## General Remedies

- Customary international law states that shared resources should be subject to “equitable utilization,” but the law is silent on what makes for an equitable allocation
- Enforcement by a third party

## Specific Remedies

- The harder problem is figuring out how to ensure full participation in the agreement effecting an allocation and
- How to enforce an allocation.
- In general, negotiating allocations is a simpler problem as compared with enforcement.



# Compliance

- Though the punishment for breaking with this customary law is not specified, it is real
- Few treaties specify explicit punishments, or “sticks,” for noncompliance

- Noncompliance will only be deterred if the act of noncompliance is punished.
- The compliance problem needs to be interpreted differently.

- It is a rule of international law that participation in a treaty is voluntary
- Free riding is manifest in every party providing too little of the public good
- The problem of international cooperation is the deterrence of free riding.
- There is a much deeper reason for thinking that free riding is not a problem
- How can credibility be augmented in order to deter nonparticipation?

- If a trade sanction works well, then it will never need to be implemented.
- It can only be acceptable to impose sanctions against freeriders, as opposed to nonparticipants.
- To reduce leakage, some kind of border tax adjustment would probably be needed

- N-player prisoners' dilemma where  $N \geq 2$  and countries must choose between Cooperate and Defect



$$\pi_D(z) = bz \text{ and } \pi_C(z) = -c + dz$$

- Note that  $\pi_D(0) = 0$

- The prisoner's dilemma has three important features
  - Defect is a dominant strategy  $bz > -c + d(z + 1)$
  - Country  $i$ 's payoff is increasing in the number of other countries that play cooperate (irrespective of  $i$  playing  $C$  or  $D$ )
  - Note that if  $z = 0$  then  $0 > -c + d$  and hence:  $c > d$
  - The Nash equilibrium of the one-shot game is inefficient ( $C \succsim D$ )
  - $-c + 2dz > b(2z - N)$

## Model when countries care about their own fulfillment

- Two stage game:
  - First stage: countries decide the environmental goals in the IEA.
  - Second stage: countries choose how much to invest in clean technologies.
- Two countries.
- Each country is endowed with  $w$  monetary units.
- The agreed level of investment that country  $i$  specified in the treaty,  $c_i \geq 0$ .
- $x_i$  denote country  $i$ 's monetary investments in clean technologies.
- $z_i$  represent country  $i$ 's consumption of private goods.
- $G = x_i + x_j$  is the total investments in clean technologies by country  $i$  and  $j$ .

## Model when countries care about their own fulfillment

- Country  $i$ 's quasilinear utility function:  
$$U_i(z_i, G, f_i) = z_i + v(G, f_i)$$
- where  $f_i = \alpha_i(x_i - c_i)$  is country  $i$ 's relative fulfillment of the agreement.
- The difference is scaled by  $\alpha_i \in [0, +\infty)$ ,  $\alpha_i$  indicates the importance of green voters in country  $i$ .



## Model when countries care about their own fulfillment

- $v(G, ful_i) = \ln [mG + f_i]$  and using  $z_i = w - x_i$ , we can simplify maximization problem to:

$$\max_{x_i} w - x_i + \ln [m(x_i + x_j) + \alpha_i (x_i - c_i)]$$