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**Institutions and economic analysis:  
Theoretical considerations for natural resource management**

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#### **Abstract of Paper**

Walrasian analysis of natural resource economics has painted a gloomy picture with regard to the management of natural resources, assuming that rational individuals acting in self-interest will create a collective tragedy of the commons. But Walrasian analysis with its assumptions of perfect information and costless exchange represents a world very different from the real world, where constraints exist with regard to the costliness of information and positive transaction costs.

How then in this type of a world, is the tragedy avoided or is it? This paper looks at the importance of post-Walrasian institutional analysis and its emphasis on the functioning of institutions. How can free-riding problems be avoided? In an economy which is often characterised by contested exchange where resources need to serve competing interests, what are the agency problems associated with various institutional arrangements and how do they affect traditional systems of resource management?

This paper argues that in order to look at both free-riding and agency problems, a theory of the origins of institutions, institutional change and the role of the state is needed. An attempt has been made to analyse the theoretical usefulness of post-Walrasian models in examining how institutions function and to operationalise this model so as to provide a framework in which to look at various natural resource regimes.

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# **Institutions and Economic Analysis : Theoretical Considerations for Natural Resource Management**

## **Introduction**

Neo-classical Walrasian economics at its outset was primarily concerned with the functioning of markets - the production, allocation and distribution of resources. The inherent assumption in much of this analysis has been that market forces work smoothly to allocate resources to their highest valued use based on the private decisions of individuals each seeking their own self-interest.

The foundations of Walrasian neo-classical economics has been challenged both by neo-classicists themselves and by others. One line of criticism has been that Walrasian economic enquiry is vastly oversimplified - that it assumes that market exchange is costless and information fully and freely available to all. As a result, the market is assumed to function efficiently and respond ably to relative price changes.

The critics argue that this short-coming has resulted in the complete neglect of the role of non-market institutions in the economic process, taking them for granted rather than examining them. As a result growing attention has been paid both by neo-classicists and others to the origins and functioning of economic institutions. One aim has been to focus on the micro-rationale behind the formation of economic institutions (i.e. minimising transaction costs, creating efficient property rights, overcoming problems of incomplete markets and imperfect information etc.) and to what extent various institutional arrangements account for these factors. The second main aim has been to analyse the process of institutional change in economic systems and to determine what factors help shape new institutional formations.

The study of institutions has therefore been a starting point for many critics of the above mentioned model. Van Arkadie in his analysis of economic institutions correctly says that, on the one hand institutions provide the context in which markets operate - influencing their efficiency and distributive impact. On the other hand, they also define in what terms various actors confront each other, molding their expectations and defining their rights. (Van Arkadie 1989)

Application of institutional analysis has been significant with regard to the functioning of firms, insurance agencies, credit transactions, agrarian institutions etc. Here we are primarily concerned with institutions with regard to natural resource management. In mainstream neo-classical economics, natural resources are subject to a public goods type problem. Unlike the exchange of private goods which is assumed to reach a socially optimum equilibrium (Pareto optimum), the exchange of natural resources results in non-socially optimum outcomes. This is because the neo-classical theoretical literature has treated these resources as open access goods. It has been assumed that natural resources will be over-exploited due to their very nature (non-excludability and subtractability).

But as in the case of other economic activities, the management of natural resources does not necessarily fit into such a simplified model of market functioning. Though natural resources might be susceptible to what has now been commonly termed "the tragedy of the commons" scenario, it is not necessarily inevitable. Examining the institutional context in which natural resources are managed, we believe is critical.

What we seek to do, therefore, is to examine the literature on economic institutions in post-Walrasian analysis and determine its usefulness for the study of natural resource management. Most

strategies for natural resource management have institutional assumptions making it all the more important to analyse the various theoretical positions. Our focus will be on the management of renewable resources such as water, forests, grazing lands etc. Moreover, we will address questions pertaining to local common property goods not the global commons which we believe poses different problems and is prone to different solutions.

We have three questions in mind: what are the origins of institutions and how do they affect individual patterns of behaviour? What is the driving force behind institutional change? And finally, what is the role of the state in natural resource management? The broad aim of the paper is to review the literature on economic institutions and to see how successful the various frameworks have been in explaining the dynamics of natural resource management and to what extent it can be operationalised. It is our contention that understanding the functioning of institutions and the process of institutional change is a necessary starting point to examine both free-riding problems associated with local common property goods as well as agency problems associated with various natural resource regimes. This paper is an attempt in that direction.

The paper is divided into seven sections. Section 1 clarifies what we mean by institutions and why they are important in examining natural resource regimes. Section 2 critiques the neo-classical approach to natural resource dilemmas. Section 3 looks at various approaches to institutional analysis and its usefulness in understanding local common property regimes. Section 4 examines the role of the state while Section 5 looks at the process of institutional change. In Section 6, we examine the potential for operationalising a model in which to examine natural resource regimes. We conclude in Section 7 by re-examining what the role of the state could be and offer suggestions for further research enquiry.

## **1. Institutions and Their Importance**

What is it that we actually mean by institutions and why are they important? There are two distinct approaches to the study of institutions. The first one examines the role of institutions (or organisational structures) such as local government bodies, trade unions and NGOs which assume an organisational role. Thus here institutions are seen as synonymous with organisations. The second approach treats institutions as a set of rules which govern the behaviour of individuals and/or social groups. (Van Arkadie 1989; Ostrom 1990; Oakerson 1992; North 1990) It is the second definition which we will use as the starting point of this paper.

One commonly cited definition of institutions (as we take it to be) is that by Douglass North. He says "institutions are the humanly devised constraints that structure political, economic and social interactions." (North 1990:97) This definition of institutions suggests that institutions play a major role in the functioning of the economic system. Another definition suggests that institutions are the "rules of the game" or the "rules in use". (Ostrom 1990)

What these rules in use are must be clearly specified. Bromley's categorisation of institutions is useful. He makes a two-fold distinction: (i) conventions and (ii) entitlements. Conventions refer to a regular pattern of behavior based on shared preferences and shared expectations of the other's actions. Entitlements, on the other hand, refer to rules which are based on a socially sanctioned and enforced set of expectations of others. (Bromley 1993) While conventions are based on the predictability of other's behavior, entitlements are based on *de jure* or *de facto* relations. (Bromley 1993)

Another way of looking at rules of the game is seeing them either as formal or informal in nature. North defines formal rules as political (and judicial) rules, economic rules and contracts. (North 1990)

Political rules, he argues define the hierarchical structure of the polity, whereas economic rules define the structure of property rights. Contracts contain provisions which are specific to a particular exchange agreement. Informal rules, on the other hand, are based on culturally transmitted forms of behavior which help reduce the costs of human interaction. (North 1990) The challenge for institutionalists is to examine how formal (de jure) rules complement informal (de facto) rules so that they do not ignore the physical, economic and social context of a particular natural resource system. (Ostrom 1990)

These definitions of institutions open up areas of enquiry ignored by early neo-classical economics. As soon as we talk about rules of the game, we are implying that there are institutional structures other than the market which affect people's behaviour. These conventions and entitlements can manifest themselves in the form of specific rules which govern the use of resources. Elinor Ostrom has three levels of rules in mind: (a) Operational rules - rules which affect the day to day actions of users of a particular resource. These will include rules concerning "when, where and how to withdraw resource units" (Ostrom 1990:52) as well as the rewards and sanctions pertaining to abiding by these rules (b) Collective choice rules - rules which are used by users and external authorities in making policies about how a resource should be managed and (c) Constitutional choice rules - rules which define who can participate in the system and what specific rules will be used to craft the set of collective choice rules. (Ostrom 1990:52)

We believe that economic institutions (both formal and informal) assume importance in a world where transaction costs are present. Transaction costs are all costs not found in a Crusoe economy. (Neelakantan 1992:14) Such an economy is characterised as a world of full information and costless exchange. However, in modern economies, an increasing amount of human labour is spent on activities "related to collecting, protecting, processing and applying transaction information." (Neelakantan 1992:22) This might include searching for information about the price and quality of goods, negotiations and bargaining with regard to these prices, formulating explicit or implicit contracts, the monitoring and policing of contracts, the enforcement of contracts and the protection of goods and services from third party encroachment. (Neelakantan 1992:14) Actors can be assumed, therefore, to act with bounded rationality in such situations. Once these costs are recognised, the role of economic institutions are an important factor in the working of the system. How these rules are formed and how they change is therefore key.

These questions raised in post-Walrasian analysis have been diluted in much of the economic analysis prior to it. Walrasian economics by assuming that enforcement of contracts was costless and perfect as well as information costlessly available paid little attention to the difficulties involved in the actual process of market exchange. On the other hand, while much of the classical analysis of Smith and Marx looked at questions of political economy such as issues of opportunism, strategic action and collusion among agents, the emphasis was primarily structural in its outlook. (Bowles and Gintis 1993) Thus while, post-Walrasian analysis in one sense returns to questions posed both by Smith and Marx, it goes beyond it by attempting to look not simply at the structural changes of the economy but at the actual process of institution formation and change.

## **2. Walrasian Economics and Natural Resource Dilemmas**

Natural resources such as water, forests, grazing lands etc. has provided mainstream neo-classical economists with a dilemma. The traditional assumptions of perfect competition and general equilibrium analysis were seen to provide non-optimum outcomes in the case of natural resources. As a result a literature surfaced which treated these commodities differently. Examining the merits of these theoretical positions and the assumptions made by them is crucial.

## Public Goods

Mainstream economics' first encounter with the question of natural resources came in the form of externalities. Pigou, in the 1920s, questioned the applicability of the fundamental theorems of welfare economics by arguing that in the exchange of certain goods, some form of intervention would be necessary in the form of taxes or subsidies to make the choices of private agents consistent with social optimum. (Pigou 1946) Pigou's claim that all market exchanges do not result in a social optimum resulted in further study of the exchange of goods which could pose externality problems.

Samuelson's theory of public goods went a long way in initiating a debate about the production and distribution of natural resources and possible externality problems. The theory of public goods, though not specifically addressed to the use of natural resources, raised some important questions. According to Samuelson, some goods and services which were characterised by non-competitiveness (non-subtractability) and non-excludability would be under supplied by private individuals because no incentives would exist for them to provide services which anyone could exploit without paying for a share of the cost. In a now well-cited example, Samuelson argued that in the case of a lighthouse, any boat sailing in the sea could benefit from the light provided by the lighthouse regardless of whether or not they had paid a fee for its usage. (Samuelson 1973)

Strictly speaking, a **public goods** problem is a supply side problem. This is because the non-excludability of entrants allows anyone to make use of a public good without paying for it. This in turn does not give the supplier of a good an incentive to supply it. It is not a demand side problem because one person's use is not considered harmful to another person (non-subtractable). But Samuelson's theory also sheds light on goods which in public goods language can be considered non-pure public goods. These goods become subtractable after a certain point in time and therefore pose a demand-side problem. A case in point is a factory which pollutes the air. Air has traditionally been treated as a public good. But if a factory pollutes too much, the use of that air might no longer be possible due to the deterioration in quality. In that sense goods such as water and forests are also non-pure public goods. The point being made is that goods which pose Pigouvian type externality problems are goods which have been treated as having unique characteristics of non-excludability and subtractability. Though this analysis has severe limitations (which will be explored later) the study of natural resources originated from this type of an analysis. Its importance lies more in the fact that it recognised that there are cases when individuals who are utility maximisers can behave in ways which cause socially non-optimum outcomes.

## Tragedy of the Commons

The literature on natural resource economics by mainstream neo-classicists, following from the public goods literature, has argued that natural resources by nature are susceptible to over-exploitation. This is the case, they argue, because the physical properties of natural resources (non-excludable and subtractable) make them susceptible to free-rider problems.

Garrett Hardin's well known passage forms the basis of such scenarios. While describing the use of a pasture by rational utility maximising herders, Hardin argued, that each herder will continue to increase his/her herd size in order to maximise the benefits for the animals. The herder's logic according to Hardin is based upon his/her assumption that he/she can exploit the pasture as much as possible while bearing only a share of the costs. Hardin argues:

"Therein lies the tragedy. Each man is locked into a system that compels him to increase his herd without limit - in a world that is limited. Ruin is the destination towards which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons". (Hardin 1968:1244)

What Hardin is suggesting is that the pasture is open to all (non-excludable) and that over-exploitation results from over-use of the pasture (i.e. subtractable). In such a situation as in Scott Gordon's theoretical examination of fisheries, over-exploitation is inevitable because of the nature of the good. (Scott 1954) Both authors assume that the costs of removing the resource from the public domain are too high and that the tragedy is inevitable.

Such an analysis which dominated discussions of natural resource management for so long is based on a particular model of individual behaviour. This behaviour has been formalised into a "prisoner's dilemma" game where two prisoners "a" and "b" have two choices - either to **defect** (betray their friend) or **cooperate** (protect their friend). Utility maximising individuals in such a situation, the model presumes, would choose to defect with the hope that if the other cooperates, then he/she will be free to go at the other's expense. (Hardin 1968) In other words, defection is the wiser of two options. However, when both defect as this model predicts, they produce an outcome which is not the best for either nor Pareto optimum. Hardin's pasture is such an example. Every herdsman assumes that he/she can feed his/her herd without limitation (i.e. **betray** others who depend upon it too) therefore maximising his/her utility. But when all act like this, the outcome is not individually or socially optimum. As long as natural resources are treated as open to all and individuals behave as utility maximisers, degradation is inevitable because of free-riding problems.

This model of natural resource usage, however, has two main problems - one based on its depiction of the physical characteristics of natural resources and the other based on the constraints imposed on the ways in which people behave. Hardin's description a "pasture open to all" reveals the first problem. Are natural resources such as pastures, forests, tanks etc open to all? Can individuals making use of such resources use them without constraint? These questions are not explored by the tragedy of the commons theorists. Second, the model assumes that individuals make decisions totally independent of other individuals. Are resource users really prisoners? If individuals realise that their actions result in the degradation of resources can they not interact with one another to prevent such degradation in the future? (Sengupta 1991) A resource is not private, public, common or open access by definition, but rather can be managed as any of these depending on the institutional arrangements which govern their management system.

Inherent, therefore in the "tragedy of the commons" scenario, is an assumption that people are unable to make institutional arrangements to overcome free-rider problems. Market transactions continue unabated despite the fact that both individual and collective outcomes are not optimum. Ironically, while the model has the normal Walrasian assumptions of individual rationality and perfect information when it comes to individual choice, when it comes to individuals acting in collective situations, individuals seem unable to work together rationally.

### **3. Approaches to Institutional Analysis**

The anonymity of Walrasian markets has assumed the worst when it comes to examining the possibility of making institutional arrangements with regard to natural resource management. Post-Walrasian institutional models, on the other hand, have offered numerous insights into possible institutional solutions to the degradation of natural resources. These models, by dropping the assumptions that enforcement is costless and information fully available to all have looked more carefully at simple acts of exchange both in terms of deception and strategic action. (Bowles and Gintis 1993)

#### **Transaction Costs, Property Rights and New Institutionalism**

New-Institutionalist approaches to transaction costs and property rights have become very common of late. Applications of this model have been used for explaining the origin of firms, analysing agricultural institutions

such as share cropping, understanding the process of interlinking transactions etc. Our concern is its usefulness to the application of natural resource economics.

Coase's seminal paper "The Problem of Social Cost" (which actually preceded Hardin's work) was the first to address the problem of transaction costs with regard to natural resources. (Coase 1960) Whereas the biggest fault with much of the "tragedy of the commons" literature is its complete neglect of possible institutional arrangements to deal with externality-type problems, Coase recognised that various institutional arrangements could exist to minimise these costs. Coase's main aim was to examine in what ways "those actions of business firms which have harmful effects on others can be minimised." (Coase 1960:142) His paper is a critique of Pigou's assessment that the divergence between social and private products can be best resolved through the enforcement of taxes. Coase argues:

The problem which we face in dealing with actions which have harmful effects is not simply one of restraining those responsible for them. What has to be decided is whether the gain from preventing the harm is greater than the loss which would be suffered elsewhere as a result of stopping the action which produces the harm." (Coase 1969:158)

In other words, Coase believed that it was just as necessary to examine the costs associated with shutting down the polluter as it was to look at the costs imposed by the polluter in order to reach a socially optimum solution.

Coase went on to argue that given the possibilities of market transactions, both parties would reach an agreement. Regardless of the initial allocation of legal entitlements, the two parties would come to a negotiated settlement - in other words the market would deal with the problem of rearrangement of legal rights wherever it would lead to an increase in the value of production. These market exchanges, however, unlike in early neo-classical analysis involve transaction costs - the aim being to rearrange rights so that the benefits exceed the costs. Coase believed that in the real world where transaction costs are positive, it was essential to compare various outcomes under different institutional arrangements. (Coase 1960)

Coase correctly observes that traditional analysis of externalities neglects the possibility of agreement between parties. But at the same time, his assertion that parties are able to come to some institutional agreement based purely on a process of negotiation also has its shortcomings. To assert that an opportunity cost approach (as his is) will lead to a desirable equilibrium outcome in the case of transactions is based on incorrect assumptions. First, in the case of natural resources to say that two parties can reach a mutually acceptable agreement all the time assumes that all actors have full information available to them. In the case of a polluting factory, residents downstream might not be aware of all the short and long-term effects of the pollution. Second, is it possible for the party who is less powerful to expect the polluter out of his own accord to want to reach an agreement? The question of power is not addressed by Coase at all. Finally, it is important to remember that transactions often involve many parties as opposed to Coase's two party model. What if all parties have their own agenda?

Coase's problem of "social cost", nonetheless, inspired many others to examine the question of transaction costs more carefully. Like Coase, many of these theorists have attempted to explain institutions as a means to economise on transaction costs. In fact, the transaction cost literature has as its premise that institutions which evolve do so primarily to economise on transaction costs and improve the performance of economies. Whereas for early neo-classicists, history is of no importance as markets are treated as anonymous, the advocates of a transaction cost approach see economic growth as a movement from low transaction cost societies (peasant economies) to high transaction cost societies (complex economies). Within the high transaction cost economies, minimising these costs is a priority. Williamson in his book "The Economic Institutions of Capitalism" argues that the development of capitalism and the evolution of the economic institutions of capitalism are primarily geared to economise on transaction costs. (Williamson 1985)

in economising on transaction costs, proponents argue that institutional arrangements prevent various forms of opportunistic behavior. Williamson puts it like this:

"Organise transactions so as to economise on bounded rationality while simultaneously safeguarding them against the hazards of opportunism." (Williamson 1985:32)

According to Williamson, an individual's behavior is best described as that of bounded rationality due to information constraints etc. As well as this, individuals, he argued tend to behave in opportunistic ways. In other words, unlike in the Walrasian model where an individual's behavior was totally rational, here it is bounded. Also, whereas Walrasian economic analysis assumed that people would create tragedies while acting rationally, Williamson correctly points out that individuals would attempt to find institutional arrangements in order to avoid free-riding problems.

Both these points are crucial in the study of natural resources. Tragedy of the commons scenarios are based on characteristics of shirking and free-riding. But if under conditions of bounded rationality and tendencies to act opportunistically, individuals can still attempt to overcome these constraints, this is of crucial importance and should be explored.

### **Property Rights Approach**

Property rights has assumed an increasingly important role in the transaction cost literature. According to the new property rights approach, property rights shape people's behavior in a world of scarcity. Yoram Barzel defines the property rights of individuals as those rights which give them the power to use (consume), get income from and exclude others from using. (Barzel 1989) Property rights are central to defining relationships between different actors. As Furubotn and Pejovich argue "property rights do not refer to relations between men and things but rather, to the sanctioned behavioural relations among men that arise from the existence of things and pertain to their use." (Furubotn and Pejovich 1972: 1139) In other words, the prevailing set of property rights in a society defines the position of each individual in a society with respect to the utilisation of scarce resources.

The property rights approach is based on the belief that the clear delineation between people included in the use of a resource and those excluded will result in a more efficient usage of it. Harold Desmetz argues that "a primary function of property rights is that of guiding incentives to achieve a greater internalisation of externalities." (Desmetz 1967:398) Thus property rights are perceived of as an institutional mechanism to prevent over exploitation of natural resources. Though the notion of property rights in much of the new property rights literature is aimed at the discretion of individual agents, the concept of a legal ownership is nonetheless crucial. This legal ownership entitles the user to three things:

- the right to use the asset
- the right to appropriate returns
- the right to change the assets form and to the allocation of property rights. (In this third component the central problem of economics - production, exchange and transfer are examined.)

(New Palgrave Dictionary, Vol. 3, 1987)

If the user of a resource has legal sanction to use, appropriate and change the asset's form, the argument goes that he/she will use the resource more efficiently.

However, theorists who place such high importance on property rights place an equal amount of importance on private property rights. The underlying current in the new property rights literature is that if a resource is removed from the public domain to the private domain, externalities will be internalised and more rewarding cost benefit scenarios will arise. In other words, the emergence of private property rights is construed of as an efficient outcome. Though there is no a priori assumption that state property is necessarily inefficient, the role of the state is seen more in terms of specifying the rules of competition and cooperation which will result in an efficient structure of property rights.

At the same time, new property rights theorists, like the tragedy of the commons theorists view the overuse of common property resources as inevitable. Neelakantan in his primer on the new institutional economics summarises well the position of property rights theorists with regard to their view on the difference between common property and private property :

"The difference between common property and private property arises because the users of the common property resource will give an uneconomically large weight to the claims of the present generation." (Neelakantan 1992:38)

He continues "common property should not be confused with state property. Common property is one over which everyone has access, whereas state property is exclusively owned by the collective, the state." (Neelakantan 1992:40) This position taken by many property rights theorists is based on a view that common property resources are open access resources. With such an assumption, private property naturally provides an institutional framework that is more adept at minimising transaction costs.<sup>1</sup>

Thus while new-institutionalist approaches provide useful tools to look at the micro-picture, there are a number of short-comings in its institutional analysis. First of all, the literature assumes that institutional change is based primarily on the minimisation of transaction costs. Though Williamson argues against this by saying that he doesn't make use of the words minimisation or maximisation, his analysis as well as other transaction cost analyses place the reduction of transaction costs on the top of their agenda with regard to the goals of institutions. (Williamson 1993) Therefore, although the literature is not clear as how actually to measure these transaction costs, institutions which develop are assumed to serve these functions. Moreover the literature tends to assume the optimality of existing institutions. This one can describe as a Catch-22 situation. If institutions which persist do so because they have reduced transaction costs, then these institutions must necessarily serve some important function. Much of the transaction costs literature based on the imperfect information hypothesis explains the existence of institutions such as sharecropping as a means to adapt to risk. (Stiglitz 1989) Given that that might be the case, is it sufficient to end ones analysis of sharecropping there? Though sharecropping might be a best-option adaptation, many better options in different institutional situations might exist.

By making these assumptions, the new-institutionalism ignores many other factors which are important in looking at Institutions and institutional change. For example, at a time when privatisation has become the catchword, little attention is paid to other forms of property rights systems (such as common property) which continue to be very important in developing countries. This is again because of the misconception with regard to property rights. Also by assuming the optimality of existing institutions (including private property), no attention is given to the original distribution of rights. Is it not possible that many institutional

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<sup>1</sup> *The assumption often made by new-institutionalists is that private property rights are the best way to give individuals the incentive to manage their resources prudently. However, it is important to distinguish between the right of ownership and usage. Do people who have the right of usage but not of exclusive ownership necessarily value that resource less as is often assumed? While examining different property rights systems, it is necessary to understand the internal logic of various systems instead of reaching conclusions based on false assumptions.*

structures which have emerged have done so not because they minimised transaction costs, but because they have been more conducive for a particular actor (firm or the state) to generate revenue? In other words, it is possible that in a market exchange, one actor's utility curve assumes more significance than another's. In such situations, private property and state property must be seen not in efficiency terms but in terms of centralisation of resources. Thus although transaction costs analysis is an important part of natural resource management in terms of opening up new areas of enquiry, the framework in which these factors have been analysed in many of the studies is somewhat limiting.

### **Marxist Analysis**

Marxist analysis has raised important questions with regard to agency problems associated with institutional set-ups. Unlike much of the new-institutionalist analysis which as mentioned earlier has often assumed that institutions which exist are optimum in a given context, Marxists have tended to examine more carefully principal-agent problems associated with institutions. Though principal-agent problems are central to new-institutionalist analysis, the emphasis has been more on free-riding associated with that of agents rather than on cases where a hierarchy of exchange exists between different agents or the principal and agent. Bowles and Gintis in their critique of new-institutionalist models argue that by assuming that tastes and preferences are exogenous to a given institutional set-up, new-institutionalists are over-looking many other types of agency problems. (Bowles and Gintis 1993)

In a model of contested exchange, Bowles and Gintis argue, that institutions must be examined not only in terms of their allocative function but also in terms of how they shape the process of exchange itself. In critiquing the functioning of capitalist firms, they argue that firms while allocating resources also provide disciplinary mechanisms. This disciplinary mechanism of markets operates through the exercise of power. An example of this could be given from a credit market where high rates of interest are charged with the threat of taking away land if the payment is not made. It is equally important in our mind to examine such disciplinary mechanisms when it comes to looking at natural resource regimes. For example, how does the state (principal) restrict village communities' rights of access to the forest within a state-centred management system. After all, solving the free riding problem does not necessarily mean that principal agent problems are resolved.

Assuming nonetheless as Marxist analysis does that collective action is based on class is limiting. Though Bowles and Gintis have argued that worker cooperative firms can improve principal agent relations, how exactly that happens is unclear unless one has reference to actual cases. (Williamson 1993) Thus while seeing changes in the productive forces as the impetus to changes in the relations of production might be useful, the question, however, which remains unanswered in much of the Marxist literature is how exactly this class action will manifest itself. What about free-riding within class?

John Roemer in an article entitled "Rational Choice Marxism: Issues of Method and Substance" argues that certain questions asked by new-institutionalists should be addressed to answer Marxian questions. In other words, more careful study must be made of how macro-changes affect individual patterns of behavior (Roemer 1987) Some of these questions we believe need to be answered specifically with regard to natural resource management are:

- 1) How do changes in the productive forces affect traditional patterns of resource management of various classes
- 2) How do various actors respond to these changes
- 3) What is the role of the state in influencing and changing existing institutional set-ups

#### 4. The State and Institutional Change

The second important aspect with regard to institutional analysis which must be examined is the role of the state as in most developing countries a majority of natural resources are legally in the state's domain. A problem with some of the theoretical literature is that the functioning of the state is subsumed in other analysis. For example, much of neo-classical institutionalist analysis of transaction costs and property rights place emphasis on the ability of individual actors to reach agreements. Here, as mentioned earlier, the state's role is seen purely in terms of providing legal provisions for such agreements.

But is not the role of the state a more active one in practice? Various theoretical positions have been examined with regard to the state's role in actual resource management. For some theorists, the state is of central importance in preventing the indiscriminate destruction of the environment. Many of the "tragedy of the commons" theorists including Hardin himself, presumed that a strong state could be a possible solution. In the case of a "prisoner's dilemma" the assumption is that if the state has perfect information about the carrying capacity of the field, monitoring capabilities and the reliability of sanctions with regard to individual behavior, an optimally efficient equilibrium could be reached. (Hardin 1968)

Olson's logic of collective action is another case where the state assumes an important role. Olson argues that the importance of an external authority, such as the state, is crucial in order to ensure that large or latent groups organise for coordinated action unless a particular individual within the group has a strong incentive to encourage collective action. (Olson 1965) In such cases where the state does assume such a role, the state is treated as an institution of Leviathan proportion capable of enforcing rules and regulations. In both these models, the state is seen as a better manager of resources than individuals or groups of individuals. In one sense individuals are presumed to undervalue resources by having high discount rates whereas the state is seen to value the future.

It is presumptuous, however, to assume as these theoretical models do that while individuals act only in self-interest, the state is able to act in selfless ways. Dilip Mookherjee points this out in his article on market failure. He says that the assumption is often incorrectly made that while individuals might be constrained by factors related to market failure, the state is presented as an "idealized notion of what a government can achieve." (Mookherjee 1994:32) In practice, he goes on to argue, the state might well be constrained by these same factors.

North (1990) takes note of these concerns in his less optimistic view of the role of the state. In his examination of 3rd party involvement, he says:

"The problem is that third party enforcer is an agent and has his or her own utility function, which will dictate his or her own perceptions about the issues and therefore will be affected by his or her own interests". (North 1990:58)

According to North, as long as the state acts with the same behavioural assumptions as individuals, it is difficult to see it as a "coercive force able to monitor property rights and enforce contracts effectively". (North 1990:58) North argues that within such a model, the state's main aim is to maximise revenue through a given property rights structure and only then reduce transaction costs within that structure. In other words, non-efficient property rights might prevail. Often, he argues, the priority given to usage has been channeled mostly for "state interests" with state interests being narrowly defined often in terms of industrial and commercial interests.

Marxist analysis shares this skepticism about the state. Though it will be unfair to ascribe uniformity to Marxist thought, it is fair to say that Marxists do not see the state in capitalist society as a potential third party enforcer. (Bardhan 1989) The state and state institutions, instead are part of the superstructure

of society which reflect the forces and relations of production. In any mode of production, the role of the state reflects the interests of dominant classes. This type of a model can be characterised as an "exploitative model". The state's involvement is restricted to a role of aiding and abetting class divisions.

What is important to note is that Marxist analysis of the state and institutional change argues that concerns for efficiency (neo-classical view) cannot be separated from those of redistributive institutional change (surplus appropriation). (Bowles and Gintis 1991) Such an argument seemingly challenges any claim that the development of property rights is purely an efficiency based phenomena. Instead it suggests that institutions must be examined in a framework which recognises the structural biases of an economy and the state as opposed to seeing it purely in terms of individualist and utilitarian objectives (Van Arkadie 1989:150).

The use of India's forests are a useful case study. Traditionally, management institutions existed amongst forest dwelling communities. However, since these forests were nationalised based on the assumption that forest dwelling communities would destroy them, these local, informal institutional arrangements have been hard pressed to survive. This has been the case because the "rent-seeking" goals of the state which are often in conflict with the aspirations of various actors in the state have been a priority. (Singh 1986)

To see the state purely in rent-seeking terms, however, ignores the intricacies involved in the formulation of state policies. For one it neglects to examine the various choices in terms of goal formulation involved in the derivation of state policy. Though the state might represent particular class interests, at the same time it is likely to have a set of policies which are aimed at meeting the needs of all of its citizens. As Bardhan says, it is necessary to distinguish between the top political leadership and the bureaucracy. (Bardhan 1989) Even if one perceives the state as primarily that of a rent seeker or favouring particular class interests, these interests at times can coincide with "development strategies". (Van Arkadie 1989) Moreover, the role of the state is crucial as at present it has control over a majority of natural resources in countries such as India. Even in cases where collective management of resources has been successful, the state has and can play an important role in supporting or hindering these efforts.

North addresses some of these concerns. (North 1981) While he argues that the state is an organisation which has a comparative advantage in violence and is therefore able to tax its constituents so as to maximise revenue within a given structure of property rights, he also acknowledges that it must ensure the support of its constituents. Thus North argues that there is a persistent trade-off between maximising revenue and retaining the constituent base of the state. (North 1981) Whether the state is able to adequately balance out these functions is crucial to the stability of it. As North argues, there is an on-going tension between the principal (state) and its agents. Thus he argues that besides for its comparative advantage in violence, the state relies on its ability to derive legitimacy and act as protector and carrier out of justice. (North 1981) Finally, as North argues, the role of the state must be seen in light of potential rivals. If the state does not adequately take care of its agents, will the agents look elsewhere? This raises important questions about other third party enforcers. If the state doesn't adequately address the concerns of its constituents, they might opt to look elsewhere (both legally and illegally) to meet their own needs.

## 5. Models of Institutional Change

The role of institutions and the role of the state must finally be examined in a dynamic framework that examines the process of institutional change. Assuming that economies move in the direction of greater output and more efficiency is not useful in determining what factors lead to these outcomes. Nor is it useful in determining why certain institutional arrangements result in more productive economies than others. To ascertain answers to these questions requires examining what factors govern institutional change itself.

If one carries Walrasian economic analysis to its logical conclusion, economic actors in the face of pervasive scarcity make choices which reflect a particular set of preferences aimed at maximising utility. In such an impersonal market, changes in relative prices caused by increases in population and thus increased demand will result in individual actors responding in ways which will maintain the coincidence between private and social cost. North (1981) gives the example of a fixed area of land (and no external trade). If population increases, the price of food will increase as more people will want food. While the owners of land will invest in more productive technology due to their increased income, workers' incomes will decrease because the real price of food will increase. As a result, the cost of children will increase for them and they will have fewer children. However with more productive technology, the worker's real wage will increase, an incentive will exist for reducing population and the use of land falls back to equilibrium. (North 1981)

Attempts to account for the fact that population has increased continuously (contrary to the assumptions of the above mentioned model), have been made by neo-classicists. Much of the literature on the enclosure movement in Middle Age Europe attempts to explain change in terms of population pressure. Douglass North (1973) in his earlier work **The Rise of the Western World** argues in a neo-classical framework that the increase of population changed the relative values of land and labour so as to affect property relations which governed the common-field system [North 1973]. He argued that the increasing scarcity of land and the consequent diminishing returns to labor made it economically efficient for lords to enclose the land as well as more feasible as labor was less scarce and hence less powerful.

This type of analysis has also been very prevalent in studies of resource degradation in the developing world. Remember Hardin's Malthusian illustration of the pasture? He explicitly states that it is population growth which will ultimately lead to the degradation of the resource base and thus warrant property rights changes. [Hardin 1968]

In such analyses, the role of property rights as an institution is subsumed and the importance of private property highlighted. But a number of questions still remained unanswered? In the case of North's example of land, is more productive technology only viable when private ownership rights exist? Moreover will workers always be spectators in the process of institutional change? In the case of Hardin's "open access" pasture the same questions can be asked. These models tend to assume that given an efficient set of property rights, economic change is based purely on cost-benefit calculations. They do not account for deviations from this nor do they examine other institutional set-ups which might result in "efficient" outcomes.

New-institutionalism by alluding to the importance of property rights and transaction costs also suffers from these shortcomings. Whereas the transaction cost approach alludes to institutions as ways to minimise transaction costs, property rights approaches emphasise internalising costs from the public domain. In both these approaches, institutional change is again seen to be towards an improved benefit-cost scenario given the existing constraints. These models also implicitly assume other things in terms of institutional change. One is that given constraints, rational individuals act in utility maximising ways. Second, the formation of new institutional arrangements is a manifestation of these rational choices. Though individuals might act in rational ways given constraints, whether they will only act in ways suggested by new-institutionalists is questionable. Application of these views to the study of natural resources has resulted in a view which sees movement towards a more private based economy desirable. Also these models do not adequately address how other factors not related to individual cost-benefit calculations have an impact on institutional arrangements.

The Marxist approach to institutional change by focusing on a theory of property rights (as much of the new institutionalists do) as well as on a theory of state and ideology provides a more realistic interpretation of institutional change. The development of the relations of production (or property rights) is not seen as purely a result of efficiency-based choices (though many Marxists did see the development of capitalist property relations as an efficient choice). Instead property rights are influenced by the productive forces of the economy

through a dialectical process. This could either occur through external stimuli such as the development of markets and trade or internal stimuli such as improvements in the productive forces of the economy. As a result of the development of the productive forces, new property rights configurations will emerge. These new property rights will largely determine the pattern of interaction by various actors. (Marx 1970)

What needs to be explored in greater detail, however, is how new relations of production manifest themselves as a result of changing productive forces. For example, how does one explain the manifestation of different property rights systems in areas where similar changes have taken place in the productive forces? Or how does one explain how individual actors respond in different ways to these changes? This is particularly important in seeing how traditional forms of resource management have changed. The literature on the moral economy of the peasantry is useful in that it illustrates how traditional institutional arrangements might persevere while the productive forces change. In other words, instead of seeing institutional change as a total transformation of the economy, it is important also to search for continuities. (Scott 1976; Hayami and Kikuchi 1982)

An examination of natural resource management must therefore include a theory of institutions, institutional change and the state. We have tried to raise certain issues in these last three sections which need to be explored while examining various natural resource regimes.

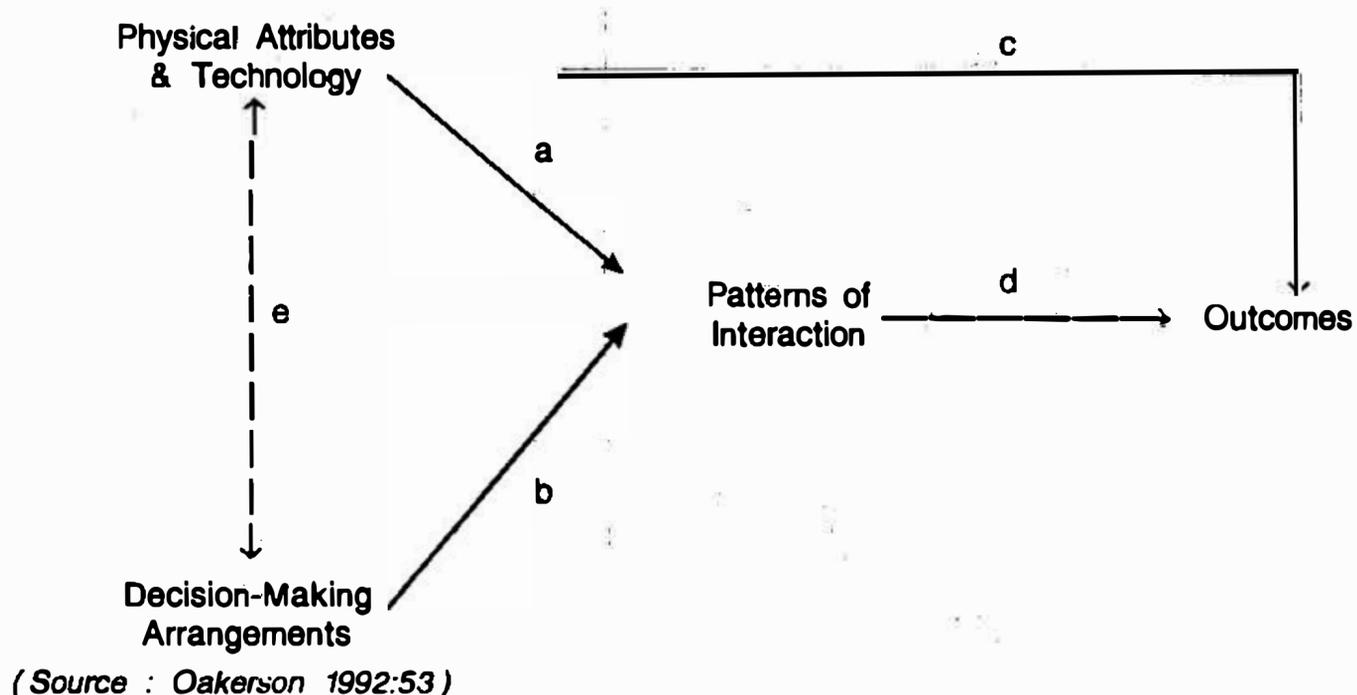
## 6. Operationalising Post-Walrasian Analysis : A Framework for the Commons

Trying to operationalise the ideas of post-Walrasian institutional analysis is key to understanding both the origin of institutions with regard to natural resources as well as seeing how they function and change over time.

Oakerson's framework for analysing the commons, which was part of the Workshop in Political Theory and Policy Analysis at Indiana University, U.S.A., is an useful theoretical framework in which to understand how natural resource regimes function. Using this model, one can analyse how these regimes operate and how various attributes of the regime interact with one another to produce particular outcomes. (Oakerson 1992)

Oakerson distinguishes between four different attributes: physical and technical attributes, decision making arrangements, patterns of interaction and outcomes. The diagram below (Figure 1) describes how these attributes interact with one another at a given point of time.

**Figure 1 : A Framework for Analysing the Commons**



An explanation of these attributes is necessary. First of all, the physical characteristics of a resource are important. Identifying features of jointness, exclusion, and indivisibility will help characterise the physical constraints of a resource. By jointness, Oakerson alludes to the extent that use of a resource subtracts in physical terms from the ability of another user to use it. For example in the case of groundwater, the cumulative use of water will eventually take toll on the ability of the resource to generate benefits (i.e it is partially subtractable if not used with care). Another important feature is the question of excludability, again defined purely in terms of its physical dimension. Here the important question is to what extent, the physical characteristic of a resource allows a group of users to exclude others from it. For example, a large open range might be difficult to fence. Finally, indivisibility poses potential problems. Here, one must look at how to divide the resource based on the physical dimension of the resource. The important factor is to divide the commons based on some boundary conditions according to physical and technical attributes. All these factors must be considered when taking institutional steps. (Oakerson 1992)

The second attribute which Oakerson refers to is the decision-making one. Here we allude to our earlier discussion of institutions. The main purpose of operational rules, collective choice rules and external arrangements (constitutional rules) is to specify who makes decisions and what these decisions are. (Oakerson 1992) While operational rules are specifically designed to limit user behaviour in order to maintain the physical and technical attributes of the commons, they are affected by the conditions of collective choice. Collective choice rules are meant to protect the individual's ability to make use of the commons. These rules according to Oakerson are meant to address questions such as to what extent coordination is voluntary, how much of the community is needed to enforce a decision, how does the community enforce decisions and in what types of forum disputes are settled. Finally, the external arrangements are a crucial aspect in the decision making process. What these external arrangements are will vary from case to case. They could be purely constitutional and establish a community's right to engage in collective choice or they could be more bureaucratic characterised by centralised rules of management. (Oakerson 1992)

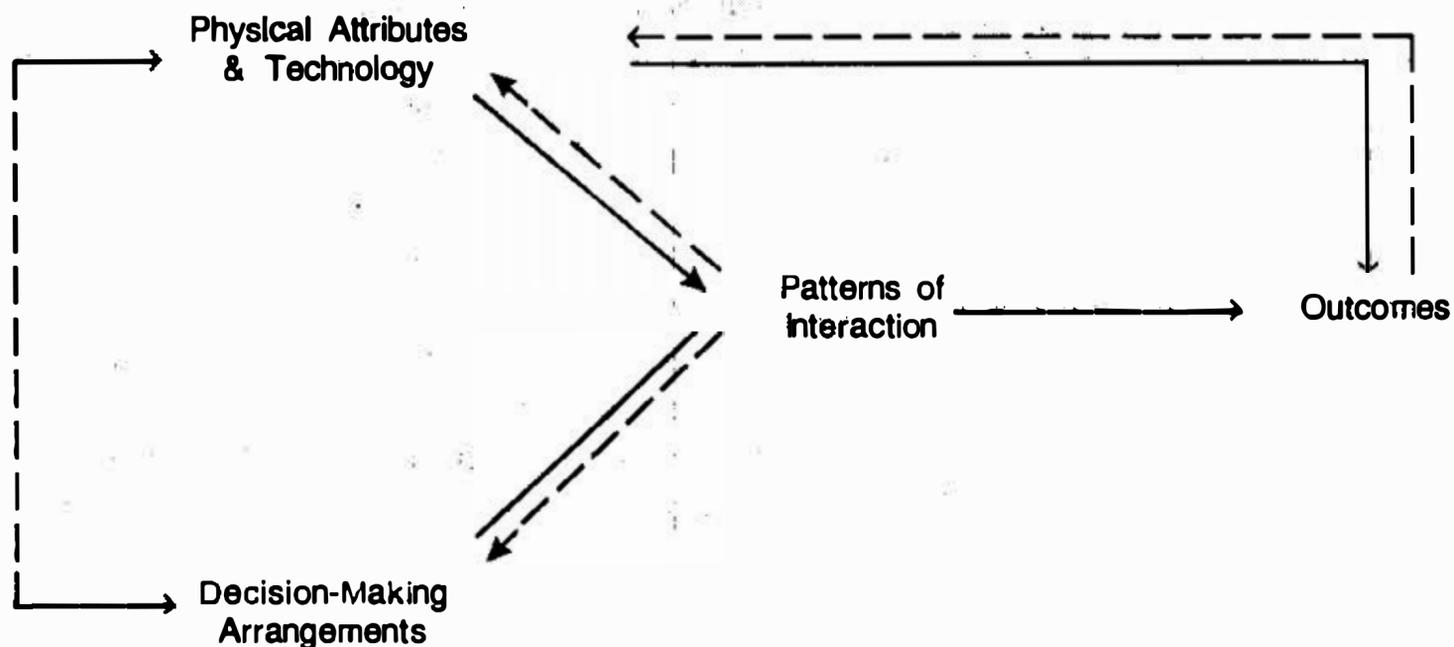
Together the physical and technical attributes as well as the decision making rules will determine the patterns of interaction with regard to the resource. In other words, will users be induced to act according to the operational rules set forward and the physical constraints imposed or will they attempt to shirk or freeride.

The outcome finally according to this model is affected by the pattern of interaction as well as the physical/technical attributes of the resource. Outcome is affected by the physical characteristics in two ways. First, it directly affects the outcome in the sense that it can pose a constraint due to its very physical nature. Second, it indirectly affects the pattern of interaction between various actors. Outcome itself is measured in terms of efficiency and equity. The model attempts to see to what extent common property systems optimise the rate of use without over-extracting from the resource (efficiency). Moreover, equity is seen as distributive equity rather than redistributive equity. (Oakerson 1992:52) We believe however that the outcome wherever possible should also be looked at in terms of redistribution.

The links between the different attributes are illustrated in Figure 1. Oakerson argues that lines a and b represent weaker causal connections as they only help constrain individual behaviour but do not determine it. On the other hand lines c and d can themselves determine the outcome as human discretion is not involved. Dotted line e does not show a causal relationship but is important as it potentially leads to a perverse set of incentives which could result in non-desirable outcomes. (Oakerson 1992:52-53)

Oakerson's model of common property resources also is useful for looking at institutional change in a dynamic framework. Below in Figure 2, the dynamic model is presented.

*Figure 2 : A Dynamic Framework*



( Source : Oakerson 1992:53 )

Whereas in the short-run analysis, the physical/technical attributes and the decision-making attributes are unchanging, in the long-run they change. Changes in the productive forces of the economy will manifest itself here. In this model, the role of changing property rights is included as part of the decision making arrangements which can affect the pattern of interaction between users of a resource. Consequently, it will have an impact on the physical attributes of the resources as well as on the patterns of interaction.

In addition to this the causal relationships are two-way throughout. Oakerson makes the point that institutional change must not be seen as exogenous but as endogenous. In other words, outcomes can affect the way people behave as well as vice-versa. Individuals may therefore try to improve institutional arrangements instead of purely being the recipients of institutional change.

The importance of this model is two-fold. First it posits how individuals under certain constraints will act in various institutional set-ups. Individuals are seen to be capable of making institutional arrangements to positively affect the outcome of common property management. Moreover, individuals can collectively change patterns of behavior over time in order to improve these institutional arrangements. Second, it can be used to see how other (non-common property based regimes) affect individual behaviour. For example, it can be argued that many of the state-centred management systems by placing excessive weight on external arrangements have had a negative impact on patterns of interaction with regard to prudent use of resources.

Using this institutional model both directly and indirectly, various theoreticians have argued that common property based institutions under conditions of bounded rationality are a desirable option. Like much of the application of new-institutionalist analysis to other areas of study, the literature on common property has seen institutions as a means to make transactions more efficient. However much of the common property literature argues that there are serious limitations in the market's ability to deal with externality problems associated with natural resources and sees common property regimes as a possible way to overcome this. (Chopra et al 1990) Thus while the new property rights literature, for example, more often than not concludes with a call for privatisation, the flip side of the coin is to examine common property resource management systems as an alternative means of resource management.

Definitionally, common property resources must not be identified with open access resources. In neo-classical literature and much of the new-institutionalist literature, the assumption has been that common property resources are prone to over-exploitation due to their non-excludable and subtractable nature. In actual practice, local common property resources could be both physically excludable as well as be guided by institutional arrangements. In other words, though a forest or a canal irrigation system as a whole might seemingly be non-excludable, on a local scale they might be excludable. Moreover, villages have had institutional arrangements such as forest protection committees or irrigation associations with a clearly defined geographical jurisdiction and a clearly defined user group.<sup>2</sup> (Oakerson 1992)

Examinations of such systems serve some important functions. First of all, case studies of common property systems examine the conditions under which such systems materialise. For example, why does one village create an irrigation water council while another does not? Or why do villagers in one village employ field guards or forest guards while another does not? Second, studies of common property systems from their theoretical analysis examine the actual functioning of institutions. Thus common property studies are an application of new-institutionalist analysis though they question some of the theoretical conclusions reached by this school.

In explaining the logic of collective action, common property theorists question the assumption that utility maximising individuals in the exchange of a common property resource necessarily create a tragedy. Such theoretical models though often using the utility maximising hypothesis have illustrated that there are many games other than the prisoner's dilemma. Sengupta in his examination of irrigation systems in India and the Philippines says "in any iterative (recurrent) game, a regularity of behavior emerges which may result in what one calls conventions." (Sengupta 1991:32) One such game often cited is Axelrod's "tit for tat". In tit for tat, each actor responds to the move made by another actor. Thus, even if as the prisoner's dilemma suggests, each actor is unsure of the other actor's first move, as soon as he/she learns about it, he/she can respond accordingly. (Axelrod 1984)

Drawing from various case studies of common property management pertaining to India, a few conclusions can be reached. First with regard to the physical characteristics which prevail, **scarcity** seems to be the key. Robert Wade in his study of irrigation organisations in Andhra Pradesh argues that it is more likely for irrigation institutions to emerge in tail end villages. His argument is that the benefits are greater in tail-end villages and the costs no higher, i.e. the incentive is more. (Wade 1988) Wade's analysis is very utilitarian in its approach. Nonetheless his observations are useful as they illustrate the potential for collective action even if for utility maximising reasons. Chopra et al's study of participatory development in selected villages of Haryana and Punjab has the same premise when examining the reasons for common property systems of management. Citing one of the villages where common property resource management systems have developed, the authors say "the classic tragedy of the commons was being enacted with self-interest working against common good". [Chopra et al 1990:329].

Elinor Ostrom makes reference to four important criteria which she feels are necessary to generate collective action. She argues that cooperative action takes place when there is a common understanding that:

- 1) Independent strategies will harm an important resource
- 2) Coordinated strategies exist that reduce risk of harm to common property resources.
- 3) Most of the other users can be counted on to change strategy
- 4) Cost is less than benefit (Ostrom 1990: 301)

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<sup>2</sup> *What rules govern the use of resources will differ from resource to resource and from place to place. It is therefore necessary to examine culturally specific systems.*

Under such conditions Ostrom argues if the physical characteristics of the resources do not impose stringent constraints, individuals may create institutional arrangements that encourage systems of common property management.

Once the conditions exist for common property resource management, organisations emerge which are guided by a set of institutional structures or rules of the game. These structures vary from resource to resource and from place to place. But whether it be rules for field guards or irrigation organisations, operational rules will emerge. These rules will indicate who is and who is not a member (define user group), the type of access to a resource, how decisions will be made to appropriate common property resources and how conflicts will be resolved [Ostrom 1990].

Studies on CPR management examine the formal and informal mechanisms which exist. The importance of local rules (which can explain cultural factors) are as important as the set of formal rules which exist in the state. In fact, the usefulness of studying common property regimes is that most of the theoretical assumptions on economic institutions is based on an attempt to draw from the experiences of such institutions in developing countries.

Ostrom argues that there are a set of conditions which make the success of these institutions more likely. Success is where and when:

- (a) small set of simple rules related to access and use exist
- (b) enforcement of rules is shared by all
- (c) organisation is constituted with internally adaptive mechanisms
- (d) appropriators from common property resources are able to sustain legal claims as owners of the common property resource.
- (e) organisation is vested in a set of larger organisations in which it is perceived as legitimate
- (f) organisation is not subjected to rapid exogenous change [Ostrom 1992]

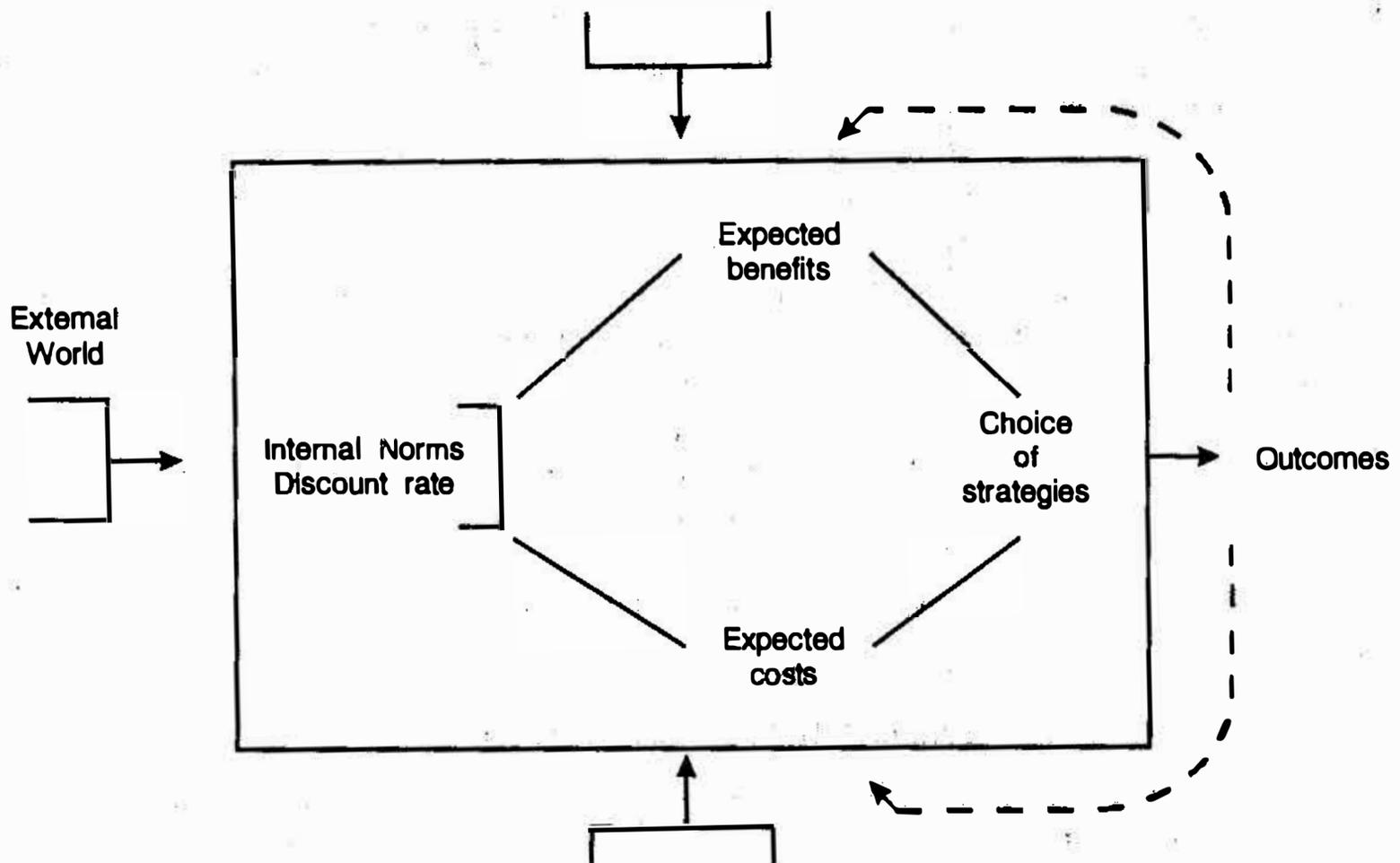
Most of the studies of CPR management in India suggest, however, that there are enhancing factors. In Wade's study, the social structure of the village is important. He argues that a more equal wealth and power distribution makes such organisations easier. (Wade 1988) Blaikie et al's study of common property resources in Tamilnadu also indirectly makes that claim. The authors argue that the interests of powerful lobby groups including the state often makes it difficult for institutions to emerge in non-homogeneous areas. [Blaikie et al 1992].

These studies on institutions based on principles of common property management assume significance in a society where resources have traditionally been managed as common property. Whether one bases it on land classification data or on actual land use patterns at the village level, resources such as forest produce, water from tanks, grazing pastures etc have been crucial in the village economy. These resources have been historically a lifeline for weaker sections of society as studies such as Jodha's and Blaikie et al's indicate [Jodha 1987; Blaikie et al 1992]. Finding theoretical as well as practical solutions which recognise these realities are important. Neo-classical institutionalist arguments in favor of privatisation ignore them. In fact, historical studies on common property clearly show that the privatisation of common property resources has had a disproportionately negative effect on poorer households [Jodha, 1987].

Though Ostrom's model is sufficiently inclusive to account for all types of changes both internal to the users and external, application of the model needs to pay more attention to a number of points. First, most studies have tended to focus on internal factors as opposed to external factors which might affect patterns of interaction, i.e. number of decision makers, discount rate, similarity of interests and leadership abilities.

(Ostrom 1990) Less attention has been paid to the external characteristics of the regime which might affect the ability to collectively interact. External decision-making arrangements which might influence the collective choice rules or operational rules need to be examined more closely for they could have a significant impact on an individual's discount rate. The diagram (figure 3) illustrates the individual's world and the affect the external world might have on it.

**Figure 3 :Internal World of Individual Choice**



(Source : Oakerson 1990:37)

Further studies on common property resource systems should examine this linkage in closer detail. Here the role of the state is crucial. Another important dimension which needs to be explored in much greater detail is the long term changes of a particular natural resource regime. For example what is the impact of changing technology on institutional arrangements in an Irrigation system? How do questions of land alienation affect tribal communities' management of the forest? Often these factors which might be treated as exogenous to the model are of great importance.

### 7. Policy Options for the State

To ascertain what the role of the state should be in natural resource management involves difficult questions. It is important to realise that competing interests exist for the usage of resources. For example, while forests are an important source of supply for minor forest produce for forest-dependent communities, they are also a source of raw material for forest-based industries as well as part of a fragile ecosystem which needs to be preserved. In the case of surface water bodies, irrigation for agricultural needs might compete with water usage for drinking water for both rural and urban needs as well as for industrial purposes. Grazing lands on promboke land are useful for grazing cattle but at the same time, they are lands which are increasingly being used to extend agriculture on.

The experiences with state management of natural resources in India illustrate that the state has often acted in undesirable ways. According to Bromley (1993), the state has either suffered from the problem

of doing nothing or doing the wrong thing. By doing nothing, Bromley refers to the phenomena of putting most resources under the state's control and then proceeding to neglect them. Doing the wrong thing, on the other hand refers to leaving local resource users to take care of themselves while subsidising various industrial sectors dependent on natural resources. (Bromley 1993)

An examination of the role of institutions suggests that an undue faith in the state at the expense of the existence of local institutional arrangements is unwarranted. Nonetheless, to say that everything should be left at the hands of the local community is also short-sighted given the vast array of tasks associated with natural resource management. What we want to do here is to suggest how the state might play a useful role in natural resource management.

First, it should be stressed that the role of the state should be to meet the needs of competing interests. There are certain tasks which can only be undertaken by the state. Monitoring of the resource base of the country is under the government's purview. Much of this is being undertaken by various government agencies involved in remote sensing. For example what is the state of the country's water resources, the country's forests etc? Second, zones which are ecologically fragile areas are under the state's preserve and therefore need to be carefully monitored. Though these tasks do not directly deal with the question of the management of the local commons, it is important to note that there are areas of concern which require direct state initiatives.

However, when addressing the local commons a different role should be assumed. These local commons have a history of management systems associated with them. This institutional set up should be the subject of enquiry. To what extent do these traditional systems persevere, how successful are they in fulfilling the tasks set forth and what are the problems associated with them? Though the suggestion is not for the government only to undertake these studies, learning about these systems is crucial. This might result in different solutions for different resources,

Detailed knowledge must also be made available about patterns of resource use and dependence on common property resources. This can only be achieved by taking both physical inventories of the availability of common property resources (in the case of minor forest produce etc) as well as socio-economic/technical studies with regard to use of resources such as forests, pasture land etc. (Blaikie et al 1992)

Apart from ascertaining information pertaining to the use of common property resources, the state can have other responsibilities. Van Arkadie in his analysis of development institutions says that a major task of the government is to present the right incentives to encourage and guide actors in the economy. The "right" incentives must be based on both theoretical considerations of natural resource economics and on practical experiences of natural resource management. Here as illustrated by the Ostrom and Oakerson models, the state has an impact on patterns of behavior.

Thus getting the rules right is important. Here we again refer to rules which encourage atomistic individuals to cooperate with one another as well as means to modify these rules when the social and economic conditions warrant it. (Bromley 1993) Four ways in which the government can be influential in shaping rules have been given below :

- 1) Rules defining property rights and their allocation
- 2) Other rules and conventions governing the relationship between participants in the economic process
- 3) Rules and conventions defining the economic role of a hierarchy of social institutions
- 4) Rules and conventions restricting participation in the economic process. (Van Arkadie 1989:160)

A close look at these factors is needed keeping in mind the lessons learnt from our institutional analysis. First, concerning the rules defining property rights and their allocation, it is important for the state to acknowledge the importance of natural resources as common property resources as well as to understand different community perceptions of what property rights mean. The case for changing property rights has been made with regard to India's forests (Commander 1986). Commander's argument is that state control of forests has been disastrous and that what is needed is locally-based systems of management. How changing property rights can affect the success of managing natural resources therefore needs to be looked at. Is there a case for turning reserved forest lands over to common ownership at the village level or is the establishment of usufructory rights sufficient? At present, experiments with joint forest management are being tried throughout India where villagers dependent on forest resources have been given management rights over interface areas of the forest. An evaluation of these efforts should be made. The modalities might be different with regard to water management systems, but the questions are similar. What is clear is that government control over natural resources has substantially reduced people's incentive to manage them with a long term perspective in mind. Consequently resources which were once managed by traditional institutions have very much become open access resources.

Hierarchy of social institutions is directly related to the question of property rights. The role of the bureaucracy for example is significant when it comes to natural resource policy in India. In irrigation management, the bureaucratic input is substantial. How does this affect systems of water management by water user groups? How do long-term changes in terms of the project design (in the case of irrigation) both in terms of technical changes and bureaucratic ones affect the functioning of institutions?

Finally, how have policies with regard to resource use been biased towards particular actors in the system? For example, what have the priorities been of the state when it comes to formulating policies with regard to resource usage. Again with reference to forests, it is clear that while village communities have been held responsible for much of forest degradation which is apparent from the various forest policies and acts, industry has been heavily subsidised. The impact of this needs to be assessed with regard both to the state of forest cover as well as with regard to how it affects management strategies at the village level.

What form government intervention should take depends on the particular situation. Wherever possible, it should induce individuals to participate in the management systems. (Sengupta 1991) However, in certain cases where unequal actors might have conflicting interests, the state should take a more punitive stance. This might be the case in hierarchically divided societies. Here the government should act to prevent any violation of the rules in use if the local institutional set-up does not self-regulate, the assumption of course being that the state does not favour particular group interests. Also it might be the case that particular systems of resource management by user groups is not functioning without damage to the resource base.

In our mind the above points serve as questions which need further examination in order to see how best institutions can function with regard to managing the resource base keeping in mind the competing needs of various actors. The substantial body of literature on this subject will be an useful starting point, but further studies of particular resource regimes need to be undertaken with a long-term perspective in mind.

### **Conclusion**

The importance of institutions in the study of natural resource management has been highlighted in this paper. We have argued that understanding natural resource regimes involves a careful examination of the functioning of institutions, the process of institutional change and the role of the state. This is so because problems of free-riding associated with many natural resource regimes is not simply a public goods dilemma as suggested by neo-classical Wairasian analysis, but a more complex equation which involves examining the

dynamics of economic transformation and its impact on institutions governing the use of natural resources. We have concluded by arguing that the state should support rather than hinder common property management systems wherever possible by creating the right incentives for individuals to act collectively as opposed to assuming that they are unable to do so without destroying the resource base.

## REFERENCES

- Axelrod, R. (1984) **The Evolution of Cooperation** New York: Basic Books.
- Bardhan, P. (1988) "Alternative Approaches to the Theory of Institutions" in **The Economic Theory of Agrarian Institutions** by P. Bardhan. New York: Oxford University Press.
- Barzel, Yoram (1989) **Economic Analysis of Property Rights** Cambridge: Cambridge University Press.
- Berkes, Fikret, ed. (1989) **Common Property Resources: Ecology and Community-Based Development** London: Belhaven Press.
- Blaikie, P.; Harris, J. and A. Paint (1992) "The Management and Use of Common Property Resources in Tamilnadu, India" in **Making the Commons Work: Theory, Practice and Policy**, ed. by D.W. Bromley. San Francisco: ICS Press.
- Bowles, Samuel; Gintis, Herbert and Bo Gustafsson (1991) "Post- Walrasian Political Economy" in **Markets and their Hierarchies** by Samuel Bowles and Herbert Gintis.
- Bowles, Samuel and Herbert Gintis (1993) "The Revenge of Homo Economicus: Contested Exchange and the Review of Political Economy," **Journal of Economic Perspectives**, Vol. 7, No. 1.
- Bromley, David W. (1989) "Property Relations and Economic Development: The Other Land Reform" in **World Development**, Vol. 17, No. 6., pp. 867-878.
- Bromley, David W. (1993) "Common Property as Metaphor: Systems of Knowledge, Resources and the Decline of Individualism" Presidential Address to 4th Conference of the International Association for the Study of Common Property Manila; June.
- Chopra, K.; Kadekodi, G.; and Murthy (1990) **Participatory Development; People and Common Property Resources** New Delhi: Sage.
- Coase, Ronald (1960) "The Problem of Social Cost", **Journal of Law Economics** October, pp. 1-44.
- Commander, Simon C. (1986) **Managing Indian Forests: A Case for the Reform of Property Rights** ODI Network Paper 3b.
- Commons, John R. (1956) **The Economics of Collective Action** New York: The MacMillan Company.
- Damodaran, A. (1990) "Property Rights and the Economics of Common Lands: Exploring the Nexus" in **Economy: Planning and Policies** by P.R. Gopinathan Nair, ed. New Delhi: Concept Publishing Co.
- Dasgupta, P. (1982) **The Control of Resources** Oxford: Oxford University Press.
- Dasgupta, P. and K.G. Maler (1990) "The Environment and Emerging Development Issues" in **Proceedings of the World Bank - Annual Conference on Development Economics**, pp. 101-132.

- Desmetz, H. (1967) "Towards a Theory of Property Rights", **Journal of American Economic Review** Vol. LVII, No. 1.
- Eatwell, J.; Milgate, M.; and P. Newman (1987) **The New Palgrave : A Dictionary of Economics** Vol. 1-4. London: The Macmillan Press.
- Ford Runge, C. (1992) "Common Property and Collective Action in Economic Development" in **Making the Commons Work: Theory, Practice and Policy** by Daniel W. Bromley, ed. San Francisco : ICS Press.
- Furobotn, E.G. and S. Pejovich (1972) "Property Rights and Economic Theory: A Survey of Recent Literature" **Journal of Economic Literature**, No. 10.
- Gordon, S. (1954) "The Economic Theory of a Common Property Resource: The Fishery", **Journal of Political Economy**, April, pp. 129-142.
- Hardin, Garret (1968) "The Tragedy of the Commons", **Science**, Vol. 162, pp. 1243-1248.
- Hayami, Y. and M. Kikuchi (1982) **Aalan Village Economy At the Crossroads** Tokyo: University of Tokyo Press.
- Hoffman, Richard (1975) "Medieval Origins of the Common Fields" in **European Peasants and their Markets: Essays In Agrarian Economic History** Princeton, New Jersey: Princeton University Press.
- Jodha, N.S. (1986) "Common Property Resources and Rural Poor in Dry Regions of India", **Economic and Political Weekly** 21(27), pp. 1189-1181.
- Marx, K. (1970) **A Contribution to the Critique of Political Economy** Moscow: Progress Publishers.
- McCloskey, Donald N. (1975) "The Economics of Enclosure: A Market Analysis" In **European Peasants and their Markets: Essays In Agrarian Economic History** Princeton, New Jersey: Princeton University Press.
- Mookherjee, D. (1994) "Market Failure and Information," in **Welfare Economics**, ed. by Bhaskar Dutta, Delhi: Oxford University Press.
- Neelakantan, S. (1992) **New Institutional Economics and Agrarian Change: A Primer** New Delhi: Indian Economic Association Trust for Research and Development.
- North, Douglass C. and Robert P. Thomas (1973) **The Rise of the Western World: A New Economic History** Cambridge: Cambridge University Press.
- North, Douglass C. (1981) **Structure and Change In Economic History** New York: W.W. Norton & Company.
- North, Douglass C. (1990) **Institutions, Institutional Change and Economic Performance** Cambridge: Cambridge University Press.
- Oakerson, Ronald J. (1992) "Analysing the Commons: A Framework" in **Making the Commons Work: Theory: Practice and Policy** by Daniel W. Bromley, ed. San Francisco: ICS Press.
- Olson, Mancur (1965) **The Logic of Collective Action: Public Goods and the Theory of Groups** Cambridge, MA : Harvard University Press.

- Ostrom, Elinor (1990) **Governing the Commons: The Evolution of Institutions for Collective Action** Cambridge : Cambridge University Press.
- Ostrom, Elinor (1992) **Crafting Institutions for Self-Governing Irrigations Systems** San Francisco : Institute for Contemporary Studies Press.
- Pigou, A.C. (1946) **The Economics of Welfare** 4th Edition, London : MacMillan & Co. Ltd.
- Roemer, John (1986) "Rational Choice Marxism: Some Issues of Method and Substance" in **Analytical Marxism** by John Roemer, ed. Cambridge: Cambridge University Press.
- Samuelson, P. (1973) **Economics** Vol. 9. London: McGraw-Hill.
- Savas, E.S. (1987) **Privatization: The Key to Better Government** New Delhi: Tata McGraw-Hill Publishing Co.
- Sengupta, Nirmal (1991) **Managing Common Property: Irrigation In India and the Phillippines** New Delhi: Sage.
- Scott, James C. (1976) **The Moral Economy of the Peasant: Subsistence and Rebellion In Southeast Asia** New York: Yale University Press.
- Singh, C. (1980) **Common Property and Common Poverty: India's Forests, Forest Dwellers and the Law** Oxford: Oxford University Press.
- Stiglitz, Joseph E. "Rational Peasants, Efficient Institutions and a Theory of Rural Organization: Methodological Remarks For Development Economics" in **The Economic Theory of Agrarian Institutions** by P. Bardhan, ed. New York: Cambridge University Press.
- Sugden, Robert (1986) **The Economics of Property Rights, Cooperation and Welfare** Oxford: Blackwell Ltd.
- Tang, Shui Yan (1992) **Institutions and Collective Action: Self-Governance In Irrigation** San Francisco: K S Press.
- Thirumalai Velayutham, S. (1990) **Property Rights Theory - A Survey of Recent Literature** Madras : MIDS Digest Series No. 6.
- Van Arkadie, Brian (1989) "The Role of Institutions in Development" in **Proceedings of the World Bank Annual Conference on Development Economics**. New York : World Bank.
- Wade, Robert (1988) **Village Republics: Economic Condtions For Collective Action In South India** Cambridge: Cambridge University Press.
- White, Gordon (1993) "Towards a Political Analysis of Markets" **IDS Bulletin** Vol. 24, No. 3, July.
- Williamson, Oliver (1985) **Economic Institutions of Capitalism: Firms, Markets, Relational Contracting** New York: Free Press.
- Williamson, Oliver (1993) "Contested Exchange Vs. The Governance of Contractual Relations", **Journal of Economic Perspectives** Vol. 7, No. 1.
- World Bank (1992) **World Development Report: Development and the Environment** New York: World Bank.