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**The Tragedy of the Commons Revisited:  
Sharing as a Means to Avoid Environmental Ruin**

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<b>1</b>	<b>INTRODUCTION.....</b>	<b>4</b>
<b>2</b>	<b>THE "TRAGEDY OF THE COMMONS".....</b>	<b>6</b>
2.1	INTRODUCTION.....	6
2.2	DEFINING PROPERTY REGIMES.....	6
2.3	DEFINING "OVERUSE" OF NATURAL RESOURCES.....	7
2.4	ECONOMIC AND INSTITUTIONAL APPROACHES TO THE COMMONS' DILEMMA.....	10
2.5	CONCLUSION.....	18
<b>3</b>	<b>THE TONGA PARADOX.....</b>	<b>19</b>
3.1	INTRODUCTION.....	19
3.2	LOFANGA AND 'UIHA - RESOURCE USE, FISHING TECHNOLOGY AND MARKETS.....	19
3.3	THE PROPERTY SYSTEM.....	21
3.4	SHARING IN LOFANGA AND UIHA.....	21
3.5	EFFECT OF SHARING ON RESOURCE USE.....	24
3.6	CONCLUSION.....	27
<b>4</b>	<b>SHARING AMONG HUNTER-GATHERERS.....</b>	<b>29</b>
4.1	INTRODUCTION.....	29
4.2	EXAMPLES OF SHARING RULES.....	30
4.3	PRINCIPLES OF SHARING.....	33
4.4	EFFECTS OF SHARING.....	35
4.5	WHY DO HUNTER AND GATHERERS SHARE?.....	36
4.6	CONCLUSION.....	42
<b>5</b>	<b>CPRS AND SHARING: TWO COMPLEMENTARY INSTITUTIONS.....</b>	<b>43</b>
5.1	INTRODUCTION.....	43
5.2	THE THEORETICAL ARGUMENT.....	43
5.3	SHARING AND C P R IN HUNTER-GATHERER SOCIETIES.....	44
5.4	EFFECTS OF SHARING ON WORK EFFORT AND RESOURCE USE.....	45
5.5	CO-EXISTENCE OF SHARING AND C P R - EVOLUTIONARY APPROACH.....	52
5.6	CONCLUSION.....	57
<b>6</b>	<b>LEARNING FROM TRADITIONAL SOCIETIES.....</b>	<b>58</b>
6.1	INTRODUCTION.....	58
6.2	WHY LEARN FROM TRADITIONAL SOCIETIES?.....	58
6.3	TRADITIONAL SHARING AND ECOLOGICAL TAX REFORM: A COMPARISON.....	59
6.4	ECOLOGICAL TAX REFORM REVISITED.....	65
<b>7</b>	<b>CONCLUSION.....</b>	<b>72</b>
	BIBLIOGRAPHY.....	74

# 1 Introduction

In 1954 two seminal papers were published in two different disciplines - and both of them had a profound impact within their respective discipline. H.S. Gordon published "The economic theory of a common property resource: the fishery", which is the first article addressing what subsequently has become known as the "tragedy of the commons". Within the discipline of social anthropology, M. Mauss' lecture "The Gift - Forms and Functions of Exchange in Archaic Societies" was translated into English and made available to an international audience in that same year (Mauss 1954). "The Gift" draws attention to the exchange and sharing of goods in traditional societies. Since then numerous contributions within social anthropology have sought to explain the role of the exchange of goods within traditional societies; the literature discusses rules by which the exchange is governed and why the exchange of goods is such a persistent phenomenon in traditional societies (Bliege Bird and Bird 1997).

Thus, starting in the year 1954, in the two disciplines of economics and anthropology, large literatures on these two phenomena - on common property in the case of economics, sharing in the case of social anthropology - have developed.<sup>1</sup> Additionally, within Social Anthropology, ample work on common property has been done.

The two literatures, which are brought together in this paper, have a common feature: they are concerned with traditional societies' lack of property rights as we know them in modern western societies. The common property literature discusses that, in traditional societies, natural resources are frequently not owned individually. In other words: an essential production factor is owned communally rather than individually. Literature on sharing focuses on the fact that in traditional societies the most important goods are not acquired for individual consumption alone but rather shared within the community. This goes in some instances so far as to reject individual ownership of these goods. Thus, both literatures find a lack of individual

<sup>1</sup> Of course, sharing was described within the literature on traditional societies also before 1954; and the problem of not clearly defined property rights, especially within the context of natural resources, was also recognised within the literature of economics before 1954. Yet, the two mentioned contributions recognised and defined the issue for the first time in such a concise manner and can thus rightly be seen as the starting point of the respective literatures.

property rights, in the one case property rights referring to the production factor, in the other case to the most important good or product. Yet, to my knowledge, very little work has addressed the *link between the two phenomena*.

This paper argues that for many traditional societies, the two property systems, sharing and common property, should be analysed together in order to understand their effects and their role. In some cases one of the property regimes alone might lead to inefficient outcomes, but the coexistence of the two property regimes results in efficient outcomes. In particular, it is suggested that in many traditional societies the "tragedy of the commons" is overcome due to the coexistence of common pool resources and a culture of sharing.

This paper describes the overall thrust of the economic literature of common property and confronts the existing literature with a case study on Lofanga, an island of the Kingdom of Tonga. Thereafter, the anthropological literature on sharing is analysed. Based on this analysis it is then argued that in a large number of traditional societies the systems of sharing and common pool resource systems are complements and the management of common pool resources often relies on the existence of sharing systems.

## **2 The "Tragedy of the Commons"**

### **2.1 Introduction**

Since the seminal contributions by Gordon (1954), Scott (1955) and Hardin (1968), common property problems in developing countries have attracted much interest among economists. One can thereby distinguish between two quite different consequences of the contributions by Gordon, Scott and Hardin.

On the one hand, the "tragedy of the commons" was taken as an adequate analysis of resource degradation. One consequence was the design of development projects introducing private (or state) property rights as a solution to actual or perceived resource problems in the developing world, mostly in Africa (Bromley and Cernea 1989). Up to now the "tragedy of the commons" is used to explain resource degradation in many circumstances.

On the other hand, there emerged a very vivid *academic discussion* on common property management as a response to the privatisation view. Thereby the common property issue has been tackled by both theoretical analysis and intense analysis of existing common property regimes. In the following this academic debate on common property management will be summarised briefly.

### **2.2 Defining Property Regimes**

Within the literature on the "tragedy of the commons" a number of different definitions have been used in order to describe a situation where resources are not private property: the terms "open access", "common property" and "common-pool resources" have been used. Within this work I shall define the various terms as follows:

- "Open access," describes a situation in which there is no clearly defined group of economic agents, entitled to use the resource, and where there exist no rules or restrictions on resource use.

"Common property", in contrast, describes a situation in which a clearly defined group of economic agents has sole access to the resource and where rules and restrictions on using the resource exist.

However, in some instances it appears to be not clear whether to describe a resource system as open access or common property and there is also some conflicting opinion on this issue between different disciplines. Such a problem on deciding how to define a system arises if it is not clear to *what extent* the use of the resource is restricted to a clearly defined group and to *what extent* rules and regulations within a society do affect resource use. In the case of the Tonga case study presented in chapter 3 below, for example, economists felt the situation needed to be described as "common property" while anthropologists were convinced that the situation had to be described as "open access".

- "Common-pool resource" (CPR) finally is the term which was used by Ostrom (1990) and which somehow leaves it open as to whether we have "open access" or "common property".

Ostrom defines CPRs as a "natural or man-made resource system that is sufficiently large as to make it costly (but not impossible) to exclude potential beneficiaries from obtaining benefits from its use." (Ostrom 1990: 30).

In this work I use all three terms "open access", "common property" and "common-pool resource" as defined above. Where I do not want to restrict the analysis to either common property or open access and where it is not clear whether we have an open access or common property system, I resort to the CPR term as defined by Ostrom (1990).

### **2.3 Defining "Overuse" of Natural Resources**

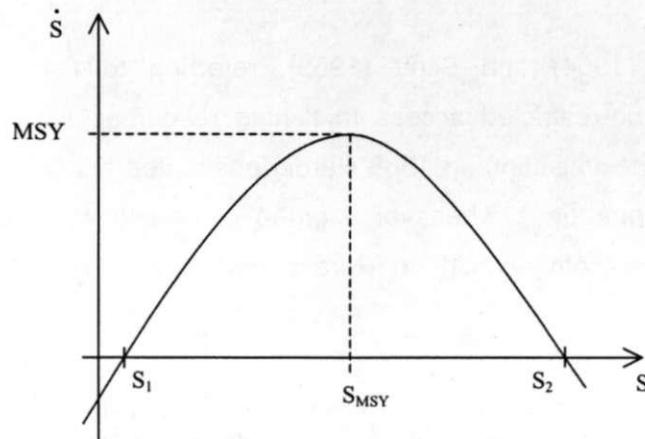
Before initiating the discussion on resource management it shall briefly be discussed how "overuse" or sustainable use of natural resources is to be defined here.

Firstly, some natural resources such as some fish species will be extinguished inevitably if the population falls below a certain threshold level. This is well-known for certain endangered species; but it is also true for some other natural resources such as (cited in this chapter below) underground water basins which will be destroyed by salt water intrusion if too much water is being drawn from them. Quite clearly, if a natural resource is used in such a way as to cause its complete depletion, "overuse" or "overexploitation" would be the correct term.

Secondly - and perhaps a little more contentiously - renewable natural resources may be managed in a way which does *not* destroy the resource completely, but *economic returns* gained from resource utilisation become sub-optimal due to low stocking levels. To explain the issue: the growth rate of a natural resource depends on its stock. The resource can now be managed in such a way as to maximise annual sustainable harvest. To reach the point of maximum sustainable yields (MSY), the stock of the resource has to be kept at a level where its growth rate is highest. This allows to cream off a maximum quantity of the resource every year, without reducing the overall stock. One simply harvests in any one year as much as can be replenished in that year.

Figure 1 depicts the situation. The diagram shows the growth rate of a natural resource as a function of the resource's stock, whereby a logistical resource growth function is assumed. The highest growth rate is reached at  $s_{MSY}$ , resulting in possible annual yields of MSY. If the stock falls below  $s_{MSY}$ , lower sustainable yields can be achieved. If the stock falls below  $s_i$ , the growth rate of the natural resource becomes negative and the resource is doomed; even if harvesting was stopped altogether and the stock was thus not further reduced artificially, the stock would decline further until it reaches zero.

**Figure 1**



If one now also takes into account harvesting costs and discount rates, one can calculate a stock level of the resource, which allows to maximise annual (sustainable) *economic* returns from the resource; thereby, typically, this (economically optimal) resource stock is not identical to the point which would allow maximum sustainable yield. If a resource is managed in such a way as to cause the stock of the resource to fall below the level, which would be optimal from an economic point of view, economic (sustainable) returns, which can be gained from the resource, are reduced. Example: if the stock of a fish population becomes very low, there are two aspects, which affect economic return from fishing. Firstly, annual sustainable off-take will be lower as there are simply less fish which reproduce themselves and secondly, it takes more harvesting effort per fish caught due to the lower population density.

Thus, it is possible to manage a natural resource in a sub-optimal fashion not in a sense of extinguishing the resource, but in a sense of reaping less economic returns from the resource than would be possible in principle. In the following, both cases of resource use will be referred to as "overexploitation" or "overuse". In fact, in most cases of sub-optimal management of a natural resource, the resource is not depleted completely, but the stock falls at low levels, reducing economic benefits to be achieved from using the resource.

## **2.4 Economic and Institutional Approaches to the Commons' Dilemma**

After Gordon (1954) and Scott (1955), referring to fishing problems, had suggested that non-restricted access to fishing resources was incompatible with aggregate utility maximisation, in 1968 Hardin postulated his famous and influential "tragedy of the commons": whenever a group of people were to use a resource communally the outcome would be Pareto inefficient - with at times disastrous results.

"Ruin is the destination toward which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons. Freedom in a commons brings ruin to all. ...Picture a pasture open to all...As a rational being, each herdsman seeks to maximise his gain. Explicitly or implicitly, more or less consciously, he asks, "What is the utility to me of adding one more animal to my herd? ...Adding together the component partial utilities, the rational herdsman concludes that the only sensible course for him to pursue is to add another animal to his herd. And another; and another...But this is the conclusion reached by each and every rational herdsman sharing a commons. Therein is the tragedy." (Hardin, 1968: 1244).

Hardin's analysis has been discussed much in the past decades and been challenged on a number of grounds:

- Firstly, pastures in traditional settings may not be open to all but restricted to a well-defined group of users.
- Secondly, the rational herdsman might well anticipate the long-term consequence of his behaviour and act in such a way as to ensure long-term sustainable use of the resource; due to repeated interaction a cooperative outcome may be achieved.
- Thirdly, it can be shown that even open access does not necessarily result in the destruction of the natural resource.

The last of the three points mentioned above shall be dealt with rather brief here. Soon after the discussion on common property and/or open access had been initiated, it became apparent that if the costs of resource exploitation and the regeneration rate of the natural resource are sufficiently high, the resource is not

destroyed, even if access to the property is completely open (see for example Dasgupta and Heal 1979). In fact, our analysis of the Tonga case study is based to some extent on the question of how costly it is (for the individual) to exploit the resource, as will be shown below.

However, the discussion on common property soon took another root. What was considered the most challenging aspect of common-property arrangements was the co-operation problem: a group of individuals had to agree voluntarily and without (state) enforcement to use a resource at a rate which allowed sustainable yields and even maximised resource rents. Thereby the focus of research was very much on common property defined as a resource which is owned by a clearly defined set of individuals as opposed to an open-access situation where the resource is open to all as described by Hardin.

The co-operation problem was then analysed on the one hand within game-theoretical models. On the other hand, more descriptive, behavioural models on the establishment of CPR management were developed. Within this latter approach, ample fieldwork was undertaken and the practical management of numerous CPRs was analysed. The focus of the empirical work thereby was on societies that had somehow invented or developed rules on resource exploitation. Ostrom, Gardner and Walker (1994) and Bromley (1992) are just two examples of contributions, which report from a wide range of case studies on CPR management.

## **2.4.1 Common Property and Game Theory**

The common property problem can be formalised as a prisoners' dilemma game (for example Dawes 1973). The prisoners' dilemma game describes a situation where it would be best for all "players" if all co-operated, but for each player it is individually rational to defect, as he will be better off when defecting, whatever, the other player does. Thus, both players will defect.

Table 1 shows the payoffs of a simple two-person prisoners' dilemma game. If both players co-operate, the outcome for both is one. If player 1 co-operates, the best choice player 2 can take is to defect, which gives the cooperating player a pay-off of -1 and the defecting player a pay-off of 2. If player 1 defects, it were also best for

player 2 to defect, as by co-operating he would have a pay-off of -1, while when defecting his pay-off is 0.

**Table 1**

		Player 1	
		Defect	Co-operate
Player 2	Defect	0/0	2/-1
	Co-operate	-1/2	1/1

The prisoners' dilemma game has attracted ample attention in the economic theory - and not only there. As early as 1975, 2000 articles on the prisoners' dilemma game have been counted (Grofman and Pool 1975). The prisoners' dilemma game is a tool for analysing numerous societal problems where co-operation would in principle be best for everybody, but all too often non-co-operation is chosen as the individual has a large incentive not to co-operate.

Within the theoretical literature on the prisoners' dilemma situation a number of reasons were identified why - and under which circumstances - co-operation could be possible after all. First of all, the time horizon is a critical issue. In a one-period game, defection is dominant (also) because it cannot be punished in later periods. If the game is repeated over time and in each and every period co-operation would be better for everybody (in case everybody co-operates), the players might well co-operate. However, co-operation will arguably emerge only if co-operation continues indefinitely or if the players don't know when the last round will be.

A second reason why co-operation might evolve is an anticipation that the other players might also co-operate. Depending on the likelihood that the other players do

co-operate, a rational player might decide to co-operate himself. Following ideas of Kreps, Milgrom, Roberts and Wilson (Kreps, Milgrom, Roberts, Wilson, 1981), Braden (Braden, 1985) shows that the introduction of uncertainty may make cooperation more likely to evolve. Under *strategic uncertainty* agents ascribe a positive probability to the possibility that the other agents cooperate. If a person believes that other players might follow a strategy of conditional cooperation<sup>2</sup>, then this may be sufficient to induce the first person to cooperate (Braden, 1985: 357). Important variables in this setting are the probability that others cooperate (p), the number of cooperating persons necessary for making cooperation to the individual worthwhile (n) (see also Tirole, 1989) and the discount factor. The probability of general cooperation increases as p increases, n decreases and the discount factor decreases (Braden, 1985: 357).

**Table 2**

		Player 1	
		Defect	Cooperate
Player 2	Defect	0/0	1/-1
	Co-operate	-1/1	2/2

Another line of argument suggests that the prisoners' dilemma game is not the most adequate framework to describe common property problems after all. Runge has repeatedly argued strongly that the so-called "assurance game" describe the common property problem much better. In the assurance game no player has an incentive to defect once co-operation is reached. Defection is superior only in the case that the other players defect as well. As no player has an incentive to defect in a situation where everybody co-operates, it is possible for the players to assure each

<sup>2</sup>Meaning they cooperate unless the other agent starts to defect.

other that everybody chooses to co-operate and thus reach a stable co-operative Nash equilibrium (Runge 1981). Table 2 depicts the payoffs of an assurance game.

Of course, the above paragraphs only sketch the scope and extent of the discussion within game theory on the question as to when individuals could possibly be expected co-operate and when they will be expected to defect from a co-operation strategy which will make co-operation impossible.

However, even this very brief summary shows that theoretical analysis on co-operation does not necessarily predict that co-operation between individuals is impossible. Coming back to the commons-problem this would imply that rational and selfish herdsmen in the grazing commons example are not condemned to overgraze their resource, causing sub-optimal use or even destruction of the resource. They might also recognise that co-operation is best for everybody in the long run and somehow agree on rules of optimal resource use.

And in fact, very much in contrast to Hardin's prediction, there are numerous examples of communally owned resources, which have been managed in a sustainable manner. The following sub-chapter gives some examples of such successful common property management.

## **2.4.2 Case Studies on CPRs**

There are dozens if not hundreds of descriptions of CPRs. Among all of the authors dealing with CPR, Elinor Ostrom stands out as the person who has collected and analysed an extremely impressive number of CPR examples. In this sub-chapter two of her examples are summarised.

In Northern California, access to underground water basins was not regulated sufficiently in the 1930s and 1940s. Use of the water was restricted in that everybody who possessed land over the basin could take water from the underground basin, but the restriction was not sufficient and the water resource was being overexploited; more water was taken from the resource than was flowing into the basin. Sooner or later the water reserve would have been exhausted and in addition to that there was

the possibility that low levels of water in the basin would cause salt-water intrusion from the adjacent Pacific Ocean, destroying the water basin altogether.

The problem of overdraft was finally resolved not by government pressure, but by self-organisation of the users of the basin. The users established a voluntary private organisation, discussed the problem together, the users limited their water production and finally a system of tradable water rights was established (Ostrom 1988: 108-111).

The second example describes the sustainable management of a fishing resource in Alanya, Turkey. About 100 local fishermen (fishing with small traditional boats) were using the fishing resource and there was no tradition of resource regulation. In the 1970s conflict among the fishers arose and competition for the best harvesting spots greatly increased harvesting costs.

The local fishermen's co-operative started to discuss the problem and implemented a system that allotted fishing sites to the local fishermen. The system is based on rotation so that each fisherman has access to the good fishing spots during the same number of days of the year, whereby lot decides the starting position of each fisher. The enforcement of the system appears to be a minor problem due to the collective interest in a fair system allocating fishing rights - occasional disputes are resolved informally at the local coffee house. (Ostrom 1988: 111-112)

In her article, Ostrom (1988) finally discusses which rules were used in four CPR systems in order to allow sustainable resource use. She finds that

- in all cases some sort of entry rule was established,
- in all cases both quantity of resource harvest and location of resource use (who was to use the resource where) was restricted or regulated in some way,
- in all cases sanctions could be imposed on use patterns,
- in nearly no cases resource use was managed by a resource tax system.<sup>3</sup>

<sup>3</sup> An exception was the California water pool example where a fee (the level of which depended on the quantity of water used) had to be paid to the water co-operation, but the fee was not the prime mode of regulating resource use.

### 2.4.3 CPR Management: An institutional Approach

The institutional approach towards the understanding and analysing CPR management is - in contrast to game theory - very much based on the detailed description of existing CPR systems. Ostrom (1990) has drawn together a large number of examples of common-pool resource (CPR) systems, has analysed them and has drawn some general conclusion on the factors which make successful co-operation within a common-property setting more likely.

Ostrom suggests that factors identified by game theory as being supportive of cooperation<sup>4</sup> are not sufficient to explain the success or failure of CPRs. The very specific situation of the CPR, for example the frequency of meetings between group members, the spatial dispersion of members and the current government policy are also important. Individuals' decision to cooperate or not to cooperate depend on the benefits and costs of co-operating, but also on norms shared by all group members and on opportunities available to group members. When evaluating these variables, it has to be taken into account that information may well be incomplete and that individuals may not translate information about costs and benefits accurately into expected costs and benefits. They will base their behavioural choice on a rather subjective assessment. Furthermore individuals may not behave in a straightforward, but rather in a strategic manner.

According to Ostrom, most critical for successful cooperation are the following points:

- Availability of information,
- low information costs,
- the public good (or the good which is obtained from the CPR) is highly valued,
- users are homogeneous and share norms and
- the situation is not complicated by different interests.

<sup>4</sup>According to Ostrom these are the total number of decision makers, the number of participants minimally necessary to achieve the collective benefit, the discount rate in use, similarities of interests, the presence of participants with substantial leadership or other assets.

Secondly, Ostrom analyses in her institutional model which factors allow CPRs to *change* in such a way as to improve the welfare of group members. Ostrom emphasizes the *capacity* of *communities* to formulate rules of resource use, which prevent resource degradation. The rules are to be enforced without outside intervention. The establishment of internal monitoring and enforcement mechanism are therefore at the heart of her analyses. In order for threats to be credible and monitoring effective a number of "design rules" of the CPR (which are in part taken from the analyses of successful CPRs) should be adhered to:

- A set of appropriators who are authorized to use the CPR must be defined,
- Rules should relate to the specific attributes of the CPR and the community,
- Rules are designed at least in part by local appropriators,
- Rules are monitored by individuals accountable to local appropriators,
- Sanctions are graduated.

Summarizing the *prospects* of changing rules within a CPR setting Ostrom finds the following points to be most important:

- Most appropriators share a common judgement that they will be harmed if they do not adapt to alternative rules. If a resource is being destroyed rapidly and such destruction can be readily observed, the members of the group might be more willing to cooperate. The perceived benefits of cooperation are higher.
- Most appropriators will be affected in similar ways by the proposed rule changes.
- Most appropriators highly value the continuation activities from this CPR (low discount rate).
- Appropriators face relatively low information costs, transformation-, and enforcement costs (If people meet regularly and if small groups on a local level already exist the perceived costs of co-operation control are lower and threats are more credible).
- Most appropriators share generalized norms of reciprocity and trust that can be used in initial social capital. If individuals use confrontational strategies in the rule-changing process, the costs of changing rules will be much higher.

- The group appropriating from the CPR is relatively small and stable. However, organisation via subgroups may overcome the problem.

## **2.5 Conclusion**

Common property has attracted significant scholarly attention during the past decades. Thereby the initial prediction that natural resources, which are not owned privately would inevitably be destroyed has been falsified.

Firstly, even with complete open access, natural resources are not overexploited, if the costs of resource use are high, returns relatively low and the regeneration rate of the natural resource is relatively high.

If, secondly, the natural resource is owned and/or used by a well defined group, group members may co-operate in such a way as to harvest at a level low enough to guarantee that a) the resource is not exhausted and b) that the resource stock does not become so low that harvesting costs become unduly high and harvests themselves unduly low. Thereby both game-theoretical arguments and institutional analysis predict the possibility of such co-operation.

However, both the study of successful CPR management systems and the institutional analysis of CPRs suggest that CPRs are typically managed by some sort of rules which are characterised by restricting access to the resource and by regulating resource use directly in some way or another.

## 3 The Tonga Paradox

### 3.1 Introduction

The existing work on common property will now be confronted with a case study on resource use on Tonga.<sup>5</sup> It will be shown that the situation that is found in Tonga differs from much of what has been described in the literature on CPR so far. Fishing resources are common property or - depending on the definition - open access in Tonga. There is no evidence of rules and regulations on using the resource. Yet, the marine resources have not been over-fished for centuries. Only in recent times and only where the traditional societal structure was changed, over-fishing has started to become a problem. The case study concludes that despite the lack of rules regulating resource use directly, the traditional societal system ensures sustainable use of the resource.

### 3.2 *Lofanga and Vina - Resource Use, Fishing Technology and Markets*

The field research was undertaken on the two islands *Lofanga* and *'Uiha* which are part of the Ha'apai-Group in the centre of the Kingdom of Tonga. The Ha'apai-Group includes 62 islands scattered around an area of 10,000 sqkm and is the most traditional area of the Kingdom. Only 17 islands of the group are inhabited by a total of 8000 people. Agriculture and fishing are the main economic activities. Fishing thereby takes place in the coastal zone of the different islands.

Today, some island communities of the Ha'apai group increasingly overuse the marine resources: the population density of some fish species is reduced or even endangered by extinction. Nevertheless, there are still islands where the system is in balance and where the resources are being used sustainably. An example is *Lofanga*. In neighbouring *'Uiha*, in contrast, *extensive* over-fishing can be observed.

<sup>5</sup> The case study was carried out within the context of a multi-disciplinary research project. Participants of the projects were Stefan Seitz and Andrea Bender, department of Ethnology, University of Freiburg (Germany), Andreas Ernst and Renate Eisentraut, department of Psychology of the University of Freiburg (Germany), Ernst Mohr and Wolfram Kagi, Institute for Economy and the Environment at the

Fishing in the Ha'apai group is carried out with hand-lines, nets and spear guns. Fishing with hand-lines thereby is most easy-going, but the result in terms of quantity of fish caught is subject to random fluctuations. Alternatively, fishermen dive and catch individual fish with spears. This activity requires more effort, but the catch is also less prone to random variations.

Whether fishing is carried out with hand-lines or with spears, the fishers rarely fish all on their own. The fishing grounds are normally reached by boat, and a group of fishers will drive there together. Traditionally, there are no fixed groups, but the teams are formed spontaneously every day.

Modern technology has not stopped at the borders of Tonga. With the help of electrical torches, fishers achieve relatively good catches at night, whereby the fishermen use the "spear method". Furthermore, engines for the boats allow reaching the fishing grounds faster than before. Technological change is certainly one possible explanation of increased fishing effort. However, although both Lofanga and 'Uiha have seen technological change and the *available* fishing equipment is identical on the two islands, only the fishing grounds in 'Uiha are being over-fished. Both fishing resources and the area available for agriculture (per person) is similar on both islands. Differences in terms of population pressure or in food supply by agricultural production are thus no explanation for the different development on both islands.

A noteworthy point to make is that despite of the *availability* of identical fishing equipment, the low-effort method of fishing with nets is more popular in Lofanga and the diving method more frequently used in 'Uiha - a point we will come back to below.

A further change, which has taken place in recent years in the Ha'apai group, is the development of commercial markets. On the island of Pangai, a two-hour boat trip away from 'Uiha and Lofanga, a ready market for fish exists. Fish can also be sold from time to time to the ferry to Tongatapu. The possibility to sell fish certainly increases the incentive to fish and earn cash income. The fishers from Lofanga sell fish occasionally if they need a cash income, primarily for payment of the church levy. Fishers from 'Uiha, in contrast, sell fish regularly and in much higher quantities over

University of St. Gallen (Switzerland). The case study itself was done by Andrea Bender. See (Bender, Kagi and Mohr 2001).

the year. Only in 'Uiha the commercial fishing has reached a scale which endangers the sustainability of the resource use.

### **3.3 The Property System**

In Tonga, traditionally, every island community seems to have had the right to use their coastal zone exclusively, although it is not quite clear how the property rights situation was organised then. At any rate, approximately 100 years ago, traditional use rights have been abolished. Since then, any Tongan citizen has the right to fish anywhere in the Kingdom.

However, island communities feel to have the right to defend their coastal area against extensive fishing by members of other island communities. There are even reported cases of violence between members of different island communities due to fishing activities, for example a dispute between fishers of 'Uiha and Lofanga, whereby the fishers of 'Uiha were found fishing frequently and extensively in the coastal area of Lofanga.

Besides the apparent existence of some vaguely defined boundary rules as described above, there are no rules regulating the *fishing activity*. There are no quotas or even norms which would allow to fish a certain quantity of fish per day or week only, there is no allocation of fishing grounds to individual fishers and there are no technological restrictions, not to speak of any sanctions which would enforce rules within the fishery. Quite to the contrary: fishers who fish large quantities are considered being "successful fishers" and acquire higher social status.

### **3.4 Sharing in Lofanga and 'Uiha**

#### **3.4.1 Lofanga**

Besides the CPR system that is interestingly characterised to a large extent by the *absence* of rules and regulations with respect to resource use, we observe extensive sharing on Lofanga. Fishers who have caught sufficient quantities on any one day share their fish with other members of the community, particularly with those who are in need of fish. In fact, these rules of sharing constitute an insurance against various

risks such as illness or bad fishing luck: those who have not caught fish on any one day receive some fish from someone else. Furthermore the system guarantees the support for the elderly. The insurance effect of the sharing system appears to be so dominant in the case of Tonga that we do in fact at times use the term "insurance" here when referring to the sharing system.

The sharing system follows the preceding pattern: A successful fisher will share part of his fish at the harbour with people waiting there. Furthermore, the fisher might give away some more fish to people he meets on his way home. At home then, he will share his fish with his kinship according to certain rules. Thereby elderly members of his family will be privileged beneficiaries. The partial random selection of beneficiaries ensures that the system includes the whole island community and is not restricted to kinship or family, which improves the insurance against non-correlated risks.

The quantity of fish a fisher gives away thereby depends on the size of his catch. If a fisher catches just as much as he needs for personal consumption, he is allowed to keep all of his catch. Only if he catches more than he needs for himself and his family, he is required to share. As technologies for conserving fish are hardly used, the requirements for personal use have an upper-limit and thus the *percentage* of the total catch that is shared increases with the quantity of fish caught. This rule ensures that no fisher is, as a result of the sharing requirement, forced to fish more than he would otherwise do in order to satisfy his family consumption needs.

As explained above, the people of Lofanga are not concerned about rules of over-fishing, but they are in fact very much concerned about the rules of sharing. Being asked, whether everybody would fulfil his sharing duties, not all fisher were sure whether this was the case and some were worried that not all might stick to the rule.

In the light of the perceived risk that individual fisher do not adhere to the rules of the informal insurance system, the observation of the changing composition of the fishing teams becomes an interesting feature: it allows monitoring the catch of other fishers. The institution of changing team composition thus serves the building of trust within the community and makes it difficult for individual fishers to disguise a large

catch. On the other hand, the changing team composition also allows individuals not to fish at all for some time, without this being detected immediately.

### **3.4.2 'Uiha**

Some 20 years ago, in 'Uiha some fishers have formed groups of five to eight fishers, the so-called "fishing-clubs".<sup>6</sup> The members of these clubs now devote much more time to fishing than before and sell their fish commercially. They fish approximately five times more than the fishers on Lofanga and are able to increase their individual income substantially.

Club-fishers are less integrated into the traditional insurance system. They share fish with relatively close relatives only and are found not to rely on help from outside their fishing club. Whether the club-fishers would receive help from the community in the case of an emergency remains unclear. At any rate they would find it difficult to ask others for help, not having fully participated in the system for some time.

If a member of the fishing-club is in need of fish, be it because of illness or because of an insufficiently large catch, he will ask his fellow fishers for fish. While the traditional insurance system includes the whole island, the risk is now shared only among the few members of the club. As a consequence, the club-fishers are in a position of having to rely more on their own work effort than on the informal insurance system.

The fishing clubs have also abolished the traditional system of changing composition of the fishing teams. Quite to the contrary, the club-fishers always fish together. This commitment with respect to the fishing activity reduces firstly the possibilities not to fish at all and live off the community for some time. Secondly, the fixed teams allow the teams to disguise the quantity of their catch. Neither the information on the daily catch nor on the overall wealth of these fishers is public information.

The idea of fishing clubs has apparently been introduced by an Australian who found the way to Tonga having fallen in love with a Tonganese girl, as the story goes. But whatever the initial reason for the forming of such clubs was - the idea has been taken up and the institutional innovation has had considerable consequences.

Presumably, however, the members of the fishing-clubs have the opportunity to save up considerable amounts of money. Part of these funds appears to be invested in the education of the children, but also real estate property in the United States has been purchased. It is possible, that the investment is sufficient to allow the individual members of the fishing clubs to live from the returns on the investment when they will no longer be able to fish due to old age.

### **3.5 Effect of Sharing on Resource Use**

Our hypothesis is that the *coexistence* of the system of sharing and CPR system leads to sustainable resource use.

From a theoretical point of view, there are various reasons why a complex system of interrelated rules could provide stability. In economics, but also in other social sciences, most notably in the political sciences, the idea that different potentially unstable systems can be stabilised *together* is well established (see for example Mohr and Thomas 1998 or Lohmann 1997). Different systems may be linked via cross-default clauses: defection in one system is punished in the other system.

Both the CPR system and the sharing system can be seen as prisoners' dilemma. Within the CPR system, each and every fisherman may have an incentive to fish more than is optimal for society as a whole. Within the sharing system, in turn, those fishers who have caught large quantities of fish may have an incentive not to share the fish with those who are in need even if those in need now have shared in the past (for the incentives of co-operation within such systems see Coate and Ravallion 1993).

If now two prisoners' dilemma are linked via cross-default clauses, one or both systems might be stabilised. Possible reasons for the stabilisation effect are: one system might be more stable than the other or the default incentives are not correlated.

However, on Tonga we cannot identify any such cross-default clauses. Neither are breaches of the rules of the insurance system sanctioned in the CPR system (for example by excluding the delinquent from the fishing community) nor is non-co-

operation within the CPR system sanctioned within the sharing system. The lack of the latter type of sanction is evident: rules regulating the resource system are completely absent. Thus there is by definition no non-co-operation in the resource system, which could be sanctioned in the sharing system.

Yet, the sharing system appears to stabilise the common property system. We have in fact identified two very simple mechanisms which foster sustainable resource use: one is the obligation to share fish when being successful, the other is the right to receive fish if one has not caught any fish oneself.

Sharing fish has the same effect as paying a tax. Since Pigou (1923) we know that economic activities, which cause negative external effects, should be taxed, so as to cause a reduction of this activity. The system of sharing (or informal insurance system) on Lofanga can thus be seen as a traditional form of an environmental tax, which reduces the fishing effort of the individual fisher.

Secondly, *receiving* fish in the case of illness or bad fishing luck, may lead to reduced fishing effort. This is so, because the effort level of the individual fisher is not clearly observable - the classical problem of moral hazard within insurance markets, where the effort level of the insurance taker is not known to the agent which has to make the insurance payment. As a result, fishers have an incentive to reduce their effort devoted to decreasing the likelihood of damages - which is in our case a bad catch. The system of changing composition of fishing teams does in fact facilitate the possibility to reduce the individual effort somewhat. Put simply: if a fisher does not go fishing for some time and relies on the help of others, it might go unnoticed for some time. In a system as it operates in Lofanga, it is relatively easy to become "lazy".

The field study does in fact produce strong evidence in support for the (theoretical) postulate of a moral hazard problem. Being asked whether they find that some people have become somewhat lazy because of the fact that they receive fish in case they have caught no fish themselves, an overwhelming majority of the fishers in Lofanga indicate that indeed some fisher have become lazy and rely on the sharing system.

Both, the "tax" effect and the moral hazard effect of the sharing system result in economic incentives. These incentives induce the individual fisher to reduce his fishing effort. For this reason there is no need to regulate resource use directly, be it by appropriation rules, rules with respect to fishing technology or assignment of fishing spots to individual fishers.

If the aim of the community was to increase income (and fishing effort) they would need to change their sharing system. The members of the fishing clubs on 'Uiha have introduced just such reforms: they have withdrawn somewhat from the sharing system. As a consequence, they have incentives to fish more than before. In fact, they now fish approximately five times more than the fishers on Lofanga and are able to increase their income substantially.

The withdrawal from the sharing system has altered the incentive structure of the fishers substantially. Firstly, they no longer have to share good catches with everybody who is in need. This allows them to keep more for themselves and sell relatively large quantities of fish on the market on a regular basis. This increases their incentive to catch more.

Secondly, the insurance provided by the sharing system is not as comprehensive as before, which requires the club-fishers to rely more on their own work effort. Also, the fixed fishing groups no longer allows the fishers, not to fish for some time, being lazy (perhaps without being detected) and receiving fish from other members of the community. Such behaviour would be detected quickly and not accepted in the fishing clubs.

A third reason why the fishers in 'Uiha fish such large quantities of fish may be the need to save for their old age. Having withdrawn from the traditional sharing system, the club-fishers cannot expect to receive fish in their old age from the community. They thus have to save up and/or invest the funds so as to have sufficient funds when being old.

As for the production method the following has been observed: the differences in the use of fishing equipment on the two islands Lofanga and 'Uiha are a manifestation of the different incentive structures on the two islands. In Lofanga, the

sharing system reduces the incentives to put high levels of effort into the fishing activity and as a result, the fisher prefer to use hand-lines, which requires less effort. The random fluctuations of the catch associated with this fishing technology don't endanger the level of fish consumption due to the comprehensive insurance system provided by sharing, which spreads the risk over the whole island community.

In the fishing-clubs in 'Uiha, in turn, the "spear method" is more common. The reason: the incentives are set in such a way as to increase individual fishing effort, which is manifested also in the fishing method, fishing with spears requiring higher levels of effort; the risk to have no catch on any one day is reduced if the spear method is used. As the members of the fishing clubs can not count any more on the large community sharing with them, fluctuations with respect to catch are potentially much more costly for the members of the fishing clubs in 'Uiha.

### **3.6 Conclusion**

The case study puts forward an explanation as to why the CPR system of Lofanga does not lead to over-fishing, although the technological prerequisites for over-fishing exist and although there are no explicit rules of resource use within the CPR system. The CPR system is stabilised through the *coexistence* with the sharing system. The sharing system decreases the incentives to overuse the natural resource through two mechanisms. One mechanism is the obligation to share one's catch, which can be seen as a traditional form of a resource tax. The other mechanism works via a moral hazard effect: there are incentives being lazy and rely for some time on the "insurance payment" provided by the sharing system. We thus conclude that the traditional society of Lofanga (Tonga) employs a sophisticated social structure, which results in incentives not to overexploit the natural resource.

Individual fishers in 'Uiha now chose to leave the traditional system and form fishing-clubs. As a consequence, they have incentives to catch more fish than before. Firstly, they don't have to share good catches, but can sell them on the market. Secondly, the fishing risks are spread among much less individuals; the "insurance" is less comprehensive. The latter requires the club-fishers to rely more on their own work effort. Thirdly, the withdrawal from the sharing system automatically excludes

these fishers from the traditional pension scheme. This in turn means that the fishers have to accumulate savings for the time of their old age.

## 4 Sharing among Hunter-Gatherers

### 4.1 Introduction

"The sharing of the meat of large game animals is a much-stressed characteristic of many hunter-gatherer societies. The hunter-gatherers themselves stress it and so do anthropologists. They and we are right to do so. Unquestionably sharing is of central importance in the operation of these societies." (Woodburn 1998: 48)

Since the seminal lecture on "Forms and Functions of Exchange in Archaic Societies" by Marcel Mauss (Mauss 1954), rules of sharing and making gifts have been observed in many traditional societies. In the centre of the sharing systems of hunter and gatherer societies are thereby the meat of large game or fish in the case of fishing communities. However, in many communities the sharing system extends to other items of daily life, for example to arrows, knives, smoking pipes, necklaces and cloths (for example Woodburn 1998). The literature subsequently described in great detail rules and patterns of sharing in different societies; it was discussed why the various societies share and the literature sought to determine the effects of the sharing systems (Bliege Bird and Bird 1997).

This chapter deals with the sharing systems of hunter-gatherer societies and thereby focuses on so-called immediate return systems.<sup>7</sup> Examples of hunter-gatherers with an immediate-return system are the Nayaken, Indian hunter-gatherers (Bird-David 1990), the Paliyar of South India, the Indian Pandaram, the Batek Negritos of Malaysia (Woodburn 1982), the Mbuti Pygmies in Zaire, the IKung Bushmen (San) who live in Botswana and Namibia, and the Hadza of Tanzania (Vogt 1992, Woodburn 1982).

The chapter is structured as follows: first three examples of sharing systems are *portrayed* briefly. Secondly an attempt is made to categorise rules of sharing; thirdly,

<sup>7</sup> Immediate-return systems are characterised by flexible social groupings where individuals have a choice of whom they associate with in residence, in the food quest, in trade and exchange and people are not dependent on specific other people for access to basic requirements (Woodburn 1982). Delayed-return systems, in contrast, incorporate pastoral, agricultural and also hunting and gathering societies with familiar kinship commitments and dependencies, lineages, clans and other kinship groups.

various theories as to *why* hunter and gatherer societies share are summarised and fourthly the evidence of the *effects* of the "culture of sharing" is reviewed.

## 4.2 Examples of Sharing Rules

"The hunting party was composed of four men: Gao Beard; his first wife's brother //Ao; ...his own brother, /Qui;...his brother-in-law, /Naishi... The party had hunted for eight days without success in heat so exhausting that they had to lie covered with sand through the middle part of the day. /Qui was the first to see the eland. ...Two boys joined the men to track the eland after it was shot. The party tracked it for three days and then found it dead from the poison. They cut up the meat and brought it to the werf at Gautscha, which was two days' travel away..."

"Gao Beard first gave meat to the hunters who helped him. To /Haishi he gave a forequarter and to //Ao a forequarter and the head. The two boys who helped track got nothing - because their fathers would give them some, we were told. To our astonishment, /Qui was given nothing. Gao Beard explained that his brother would eat from his pot...Gao Beard's sister, Di/ai, who had given him the arrow, received the meat of the back and throat and the intestines. Gao Beard kept the meat of the neck for himself and in a second wave of distribution he gave...to his first wife, //Kushay, he gave both hindquarters, ...the mount given to his first wife was enormous...she was to give a large portion of it to her parents...."(Marshall, 1961, 239-240)

Social anthropology lives from fieldwork, from the observation of custom and its documentation, be it in the form of photography, film or written word. Therefore, in any account of anthropological work, examples of such documentation of fieldwork take a prominent place. Here I want to follow this anthropological tradition and grant descriptions of fieldwork some space. Three examples of sharing systems are illustrated in some detail. This chapter has thereby commenced with an observation on sharing in a !Kung community (Southern Africa) and proceeds now with more general descriptions of the sharing systems in the three selected communities.

The first example describes the sharing system of the Hadza, hunter-gatherers living in Tanzania.

"Among the Hadza, the central focus for sharing is the killing of large game animals - zebra, buffalo, eland, giraffe, wildebeest, hartebeest, waterbuck, ... When an animal is killed, the carcass is skinned and the meat divided up...The meat is carefully divided into two categories. The first category consists of certain valued joints of meat... which are termed *manoko ma Epeme*, God's meat. This meat is strictly controlled by the initiated men,

and may eat more of the meat until their hunger is satisfied...They then carry the animal to the band..."

"The owner of the animal is the owner of the first arrow to be effectively shot into the animal so that it penetrates enough for its poison to work. That person is responsible for the distribution. The owner may or may not be one of the hunters...There is much giving and lending of arrows. The society seems to want to extinguish in every way possible the concept of the meat belonging to the hunter."

"...the first distribution of the animal is made in large portions usually to five or six persons. They are the owner of the arrow, the giver of the arrow (if the arrow was not one the owner had made himself), and the hunters...In a second distribution the several persons who got meat in the first distribution cup up their shares and distribute them further.... In the second distribution close kinship is the factor, which sets the pattern of the giving.... Everyone who receives meat give again, in another wave of sharing, to his or her parents, parents-in-law, spouses, offspring, sibling and others.... Visitors, even though they are not close kin or affines, are given meat by the people whom they are visiting.... It ends in everybody getting some meat." (Marshall 1961: 236-239).

As with many other hunter and gatherer societies, the composition of hunting groups is not fixed.

"The composition of the hunting party is not a matter of convention or of anxious concern. Hunting parties are freely organised by men who like to hunt with each other....Hunting parties are usually composed of from two to four or five men." (Marshall 1961: 236-237)

The third example is that of the Batek in Malaysia:

"The Batek expect people to share any food they obtain with other members of a camp, and they adhere closely to this expectation. The general principle is that they must give shares to their own children and spouse, then to any parents-in-law or parents present, and finally to all other families in camp. Thus, if they obtain only a small amount of food, it will be consumed within the procurer's conjugal family, but if there is more than the family needs, they will share it with other families. ...The result is that all families end up with some food, though not necessarily the same amount, even on days when very little is brought into the camp. *Yet, even when food is abundant, the sharing goes on according to the same principles, ...each family give portions of its excess food to other families and receives portions - sometimes of the same kind of food ... This apparently unnecessary distribution confirms that sharing of food is a dominant value in Batek culture.*" (Endikott 1988: 116, my italics)

who take it to the men's meeting place and eat it together on an equal basis in strict secrecy..." (Woodburn 1998: 51)

Nobody but the initiated men are allowed to eat *manoko ma Epeme* meat. Violations of these rules are sanctioned severely and Hadza believe that such violations also result in illnesses. The man who has killed the animal is allowed to eat from *manoko ma Epeme* only if he is an initiated man himself. However, *manoko ma Epeme* is only the smaller part of the meat. Most of the animal's meat is called *manoko et Hadzabe*, people's meat. Initially, the *manoko et Hadzabe* belongs to the successful hunter and he shares it with the whole community:

"The people's meat is widely distributed among all the men, women and children of the camp unit - maybe twenty-five to thirty people. There are several stages of sharing. The meat is first shared at the kill site among the men, women and children who have gone out to carry the meat. Back at camp it is then shared again with those who remained behind. When it has been cooked, the cooked meat is shared again among those who are present. As soon as one set of people in the camp finish their meat, gentle pressures are brought to bear on those who have any left to share again. Storing meat for private consumption is unacceptable...Everybody, however undeserving or unpopular, should, and almost always will, get their share." (Woodburn 1998: 52).

An interesting aspect of rules related to hunting and sharing is the fact that hunters are not supposed to boast about their success. Quite to the contrary, a successful hunter has to behave extremely modest:

"A Hadza returning to camp having shot a large animal is expected to exercise restraint. He sits down quietly with the other men and allows the blood on his arrow shaft to speak for him." (Woodburn 1982: 440)

The second example is taken from Lorna Marshall's description of IKung Bushmen in the Nyae Nyae region of South Africa. Also with the IKung, meat is the most important item to be shared, although sharing is not restricted to meat.

"The custom of meat-sharing applies only to the big game animals. Small animals the size of duikers or smaller, birds, tortoises....belong to the person who shoots, snares, finds or catches them. ... Meat sharing applies to the big animals which are deliberately hunted by organised parties."

"The system by which meat is shared begins with the hunters...When the kill is made the hunter have the prerogative of eating the liver on the spot

The Batek may eat some of the meat themselves if they catch a large animal, but are expected to bring part of the catch back to the camp. Any accumulation and storage of food is not permitted (Vogt 1992: 66).

### **4.3 Principles of Sharing**

"Sharing ... is not automatic; it has to be learned and reinforced by culture."  
(Lee 1988: 264)

Hunter and gatherers from all over the world practised or still practise sharing: Eskimos from Greenland, Australian Aborigines, African peoples and groups, hunter-gatherers in East Asia and North America. Are there any principles of sharing, some common rules?

Testart identifies two entirely different systems of sharing among hunter-gatherer societies (Testart 1987). In one system the person who has killed an animal is entitled to share it among the community. In the other system, the successful hunter hands the kill over to the community or a representative of the community who then carries out the distribution. Testart argues that in the former system the hunter has the right over the game, including the right to hand it over to another person, while in the latter system the hunter has no right whatsoever on the game. The latter system is identified in Australia, while the former is common in most other societies. Even in the Kung society where the owner of the arrow which hit the game is the owner, the hunter decides on the ownership of the kill, as he has consciously chosen an arrow of one of his fellow-men to kill the animal rather than one of his own arrows.

In those societies in which, according to Testart's definition, the hunter has the right on the game and on its distribution, numerous different patterns of sharing game exist. While in some it is the hunter himself who cuts the hunt into pieces and shares it out, in others this work is done by other members of the community. In some groups, food is shared according to the current needs of the different members, in others it is shared according to strict rules, some food being reserved to the initiated men, for example. Also the degree to which kinship matters with that respect, is different.

Woodburn (1998), following Price (1975) suggests to differentiate sharing systems between

a) systems where food and goods are given away as a *gift* by the person who owns the good without expecting to receive something in return (Marshall 1961);

b) systems in which sharing is more to be seen as a *form of exchange* (see for example Mauss 1954, or also Cashdan 1985); and

c) systems in which sharing has the role of *redistribution*. Within the latter system sharing resembles not so much trade, but more the social security systems of western societies (Woodburn 1998).

A further distinction may be made between systems where the person who owns a good initiates the sharing (either giving it as a gift or giving it expecting to receive something in return) and systems where a person who needs or desires a good asks (or better: demands) that good from the person who owns it (*demand sharing*).

In fact, demand sharing is more the norm than an exception in traditional hunter-gatherer societies. There is no need to ask, there is no such word as "please" and also there is no need to say thank the "donor" once the good has been received; the person who demands something is entitled to receive the good. Peterson (1995) shows in a detailed article that sharing is not initiated primarily by the person who gives away food or another item, but, quite to the contrary, by the person who receives. Children are educated to demand - and to respond to demands by others. Peterson argues that in an environment of scarcity, responding to demands is much more adequate than sharing on the account of observed needs by others. He illustrates the point as follows:

"On the occasions when they have limited amounts of goods that they can share generously or give away, with whom are they to share, or to whom are they to give? If they have lived in the community all their lives, there will be scarcely a person with whom they have not had some interaction and to whom there is not some kind of social debt. Are they to run through the entire list of people to whom they are indebted in one way or another, rank the debts, and then distribute the surplus as far as it goes? Should they concentrate on meeting the largest or oldest debts, or only those to close kin...An alternative strategy to this bookkeeping approach is simply to respond to demands as they are made." (Peterson 1995: 864)

## **4.4 Effects of Sharing**

In the following the effects of sharing in traditional societies are discussed.

### **4.4.1 Larger Variety of Goods and Food Stuff**

Sharing does in many cases increase the variety of goods available to the individual. The magnitude of this effect clearly differs across different sharing systems (see sub-chapter below). In sharing systems with reciprocity, where gifts are returned in different currency, the trade motivation is the driving force of sharing; in other systems like that of general reciprocity or in systems which are motivated by redistribution, the effect of obtaining a large variety of goods and food stuff is less significant.

### **4.4.2 Insurance**

An individual hunters-gatherer's access to food and other items varies over time. The same is also true for a family or even a whole band of hunter-gatherers. Reciprocal sharing allows a hunter-gatherer to insure himself against such temporal income fluctuations. There is ample evidence on the insurance effect of the sharing system (Marshall 1961, Ingold 1980, Lee 1968, Woodburn 1972, Wiessner 1982, Cashdan 1985, Smith 1988).

The importance of this insurance effects can be demonstrated looking at the !Kung. !Kung bands have use rights to certain regions, so-called nlores (Wiessner 1982).<sup>8</sup> The nlores vary significantly in terms of their ecological conditions and - nowadays also in terms of the opportunity to earn a cash income. Furthermore, the food availability in any one nlore varies significantly over time. Having established sharing relations with people from different nlores, these variations can be smoothed. The !Kung thereby choose their sharing partners very carefully in order to have access to food under different climatic circumstances (Wiessner 1982).

The land property system of the !Kung is rather complex in nature. Although there are use-rights assigned to bands, overall the system is more one of common property than one of private property (Vogt 1992).

### **4.4.3 Equality and Social Stability**

Where sharing is not based on pure reciprocity, it has a strong element of reducing inequality within the society. In fact, in many hunter-gatherer societies, reciprocity is not in the centre of the sharing system and it is most common that some members of the society always give more than they receive. Kent (1993) and Woodburn (1998) strongly argue that the main effect of sharing in hunter-gatherer societies is in fact that of increasing equity. Equity, in turn, reduces social conflict and thus contributes to the overall stability and welfare of the society (Woodburn 1998).

### **4.4.4 Social Bonds and Sexual Access**

Those authors who focus less on the economic impact of sharing but have studied more the social implications of sharing emphasise the role which sharing plays in terms of social relations between different bands. Sharing gives the opportunity or even requires visiting one another frequently (Kent 1993). Marshall notes in her study on the Kung bushmen with respect to sharing of non-food items:

"The dealings...are numerous and provide occasion, perhaps more than any other activity does, for visits which bring whole bands into polite encounter." (Marshall 1961: 241)

This interaction finally also leads to opportunities to find spouses outside the own band (Kent 1993), which reduces the risk of genetic degeneration of groups.

## **4.5 Why do Hunter and Gatherers Share?**

Some of the positive effects of sharing as discussed above may clearly be a motivation to share. However, it is not quite so clear which of the different effects of sharing are the *driving force* of establishing and entertaining a sharing system. And according to some scholars it might in fact well be the case that none of the observed positive impacts of sharing does in fact *motivate* the individual to share at a given point in time.

It is thus not a trivial question to ask: why does an individual hunter-gatherer decide to share his property with a fellow-hunter-gatherer.

"Successful human foragers often share their take with those who acquire less. This propensity to share has puzzled anthropologists, who have long noted the prevalence of sharing among human groups and its rarity in other animal species." (Bliege Bird and Bird 1997: 49)

In the following the main arguments to be found in the anthropological literature are reviewed.

#### **4.5.1 Reciprocity and Trade**

A potentially straightforward explanation of sharing is that something will be given in return some time in the future. Sharing on this account would be nothing else but a form of "primitive trade" (Sahlins 1972). Mauss, having analysed various gift exchange systems, concluded that making gifts in traditional societies would generally result in a return gift (Mauss 1954). Sharing then has very little to do with making a gift. In contrast, sharing is according to Mauss a means to acquire other goods, to increase one's personal wealth and prestige (Mauss 1954).

However, in many hunter and gatherer societies, no return gift is expected (Vogt 1992, Woodburn 1998). In fact, hunter and gatherer societies with an immediate return system stress only the present in their interaction. Expecting a return gift some time in the future diametrically contradicts their whole way of thinking.

#### **4.5.2 Generalised Reciprocity**

Generalised reciprocity differs from the reciprocity discussed above in that not a specific good is expected but some sort of return gift, which might be in the same currency. The "return gift" being the same currency, but being returned at another point in time, allows to defer the consumption of that good. Similar to storing, sharing allows then insuring oneself against variations in the availability of food (Cashdan 1985, Wiessner 1982, Bliege Bird and Bird 1997).<sup>9</sup> To cite just one example: in her study on the Kung, Marshall notes on the benefits of sharing:

<sup>9</sup> See also Ingold 1980, Lee 1968, Woodburn 1972, Wiessner 1982, Smith 1988, all in Bird-David 1990.

"The fear of hunger is mitigated; the person one shares with will share in turn when he gets meat and people are sustained by a web of mutual obligation." (Marshall 1961: 236)

According to this account, it does make sense for the individual to share because he can expect to receive something in return in future. However, while some authors very much stress that reciprocity is a prime motivation for sharing, Woodburn (1998) refutes this claim and argues that in many immediate return systems of hunter-gatherers giving or sharing does not provide any claim on future return gifts:

"Receiving meat does not bind the recipient to reciprocate. Many men are ineffective hunters because they are lazy or lack the necessary abilities or skills. They never, or almost never, reciprocate with meat or in other ways...This does not affect their entitlement...*donors tend to remain on balance donors over long periods.*" (Woodburn 1998: 49, my italics)

#### **4.5.3 Demand Sharing and Tolerated Theft**

Systems of demand sharing make it very costly for an individual not to share if a fellow hunter-gatherer asks for a certain item.

Woodburn (1998) argues forcefully that sharing is not a voluntary act, but that members of the community are expected to share, or, perhaps more adequate: they are expected to give if somebody asks them to share. Sharing is, for Woodburn, very similar to an income tax in modern societies. The individual has no choice: if he wants to live in the traditional society, he has to share. Within this context Wiessner (1982) describes how members of the !Kung face the difficult decision between accumulating more material goods which they highly desire on the one hand or remaining in the traditional society which requires them to give up much of the items they are able to purchase when taking on a wage-job.

Bliege Bird and Bird (1997) go even a step further and argue that at least in the society they have studied, responding to a demand is simply less costly than not to share: the utility of keeping more food is low and the cost of defending one's possessions is high. They no longer speak of "sharing" but of "tolerated theft" - goods are given away not voluntarily, but simply because defending them is too costly.

#### **4.5.4 Lack of Storage**

The perhaps most intuitive explanation of sharing within hunter and gatherer societies which springs to mind is the potential lack of storage capacity. In fact, hunters and gatherers do rarely store food, as has been remarked on numerous accounts (see for example Bender, Kagi and Mohr 2001, Wiessner 1982).

The widespread absence of storing food does not coincide with the general lack of capability to conserve food or with a general lack of storage capacity. Traditional fishers on the island of Lofanga (Kingdom of Tonga) do normally not use deep freezing facilities which are available by now (Bender, Kagi and Mohr 2001) and the Kung and Hazda are found to understand to dry meat allowing to store meat for months, but still hardly ever do dry or store meat (Woodburn 1998).

Yet, even though the capacity to store food might be available in principle, it has to be recognised that eating fresh food is preferred to eating conserved food due to the better taste and due to the higher nutritional value of fresh food. Furthermore, conserving food requires additional effort. Marshall does not ignore the option to conserve and store food but notes: "The practical value of using up the meat when it is fresh is obvious to all..." (Marshall 1961: 236).

#### **4.5.5 Risk**

The explanation of sharing in traditional hunter-gatherer societies most commonly found in the literature is that sharing allows insuring these people against inter-temporal risks (Kaplan and Hill 1985, Cashdan 1985, Winterhalder 1986, Smith 1988, Hawkes 1993).

Arguably, hunter-gatherers do not have the means of reducing risk commonly used in sedentary societies (Wiessner 1982). These peoples have very little control over their environment which does not allow them to prevent risk effectively; storage is not practical; to transfer risk to any single person, family or band which would play the role of an insurance does not make sense as no one family or band will have guaranteed supply of food any time. According to Wiessner the "most efficient method of risk reduction open to hunters and gatherers in environments like that of

the Kung ... is a social method of pooling risk through storage of social obligation" (Wiessner 1982: 65). And Bliege-Bird and Bird summarise a number of sources and find as a general conclusion of this literature:

"Foraging for resources which have highly variable return rates (high risk) can result in a great deal of short-term consumption variance between individual foragers. Sharing between successful and unsuccessful foragers is a good way of smoothing out short-term variance in consumption when hunters' success and failures are unsynchronised, when individual foragers have highly variable returns but no forager is any more successful on average than another, and when there is little cost to giving up surplus food (i.e., there is sharply diminishing benefit for keeping more to oneself)." (Bliege-Bird and Bird (1997: 50).

However, some authors on the grounds of evidence demonstrating that in many societies there is no systematic reciprocity refute sharing being primarily a form of insurance. As mentioned already above, some hunters always hunt more than others. They are simply more skilled than their fellow-hunters and always give away more than they receive from others (Woodburn 1998). Woodburn concludes: success in hunting provides little insurance for the future (Woodburn 1998: 49).

#### **4.5.6 The Giving Environment**

Bird-David in his article "the giving environment" argues that hunter-gatherers give their fellow men because they see the environment as giving to them (Bird-David 1990). In fact, he goes as far as saying that the "giving environment" constitutes a third "kind of economy" being perhaps equally important than the other two principle kinds of economic systems, the "commodity economy" and the "gift economy".

In some ways, viewing the environment as a "giving environment" resembles more a value-system or a religion than an economic system - at least if one defines economic systems as dealing with the utility of man. In the Australian "giving environment" people don't consider economic interactions between them as a reason to share but rather they take into account the environment as a subject.

#### **4.5.7 Redistribution and the Egalitarian Society**

The concepts of demand sharing and tolerated theft are very much in line with the view that sharing in traditional societies has to be seen primarily as a means of redistribution. Woodburn (1998) sees the prime benefit in sharing in the prevention of individuals accumulating wealth, in the equality between the members of the society and in the reduction of social conflict. Marshall has also mentioned the benefit of equality:

"There are no distinct haves and have-nots. One is not alone. To have a concept of the potential stress and jealousy which meat-sharing mitigates in Kung society one has only to imagine one family eating meat and others not when they are settled only five or ten feet apart in a fire lit werf and there are no walls for privacy..." (Marshall 1961: 236)

And she adds:

"...the idea of eating alone and not sharing is shocking to the Kung. It makes them shriek with an uneasy laughter. Lions could do that, they say, not men." (Marshall 1961: 236)

#### **4.5.8 Social Bonds and Sexual Access**

Finally, both from an individual point of view and from the whole group's interest sharing is interesting because it allows establishing and reinforcing social bonds between different bands. Socialising thereby is seen as a very important aspect of life in traditional hunter-gatherer societies: "...social interaction, which most people see as essential for a happy and satisfying life" (Kent 1993). Among other social benefits, sharing increases "sexual access" (Hill 1983 in Kent 1993), meaning that sharing allows to meet members of the opposite sex. Again, both from an individual's and from the society's point of view this may very well motivate to engage into a sharing relationship.

## **4.6 Conclusion**

Sharing is a widespread phenomenon in traditional hunter-gatherer societies, especially in those that have an immediate return system. The literature of the past decades has produced a number of possible explanations of the role of the sharing system: the two most compelling ones are thereby that sharing has a) an insurance function and b) fosters equality and social stability within the community. Which of the two effects of sharing is to be seen as the prime cause of the very establishment of sharing systems remains a matter of contest, but quite clearly there is evidence that the sharing system provides in many cases some insurance and also contributes to equality within society.

## **5 CPRs and Sharing: Two complementary Institutions**

### ***5.1 Introduction***

This chapter proposes that sharing systems fulfil another important function - apart from the functions identified in chapter 4 above. Sharing systems, so the argument, play a key role in the sustainability of many traditional CPR systems. After explaining in some more detail why sharing should affect resource use of CPRs, the claim is substantiated by means of circumstantial evidence. Firstly, it will be shown that many traditional societies are characterised by both, CPR and sharing systems. Secondly, empirical evidence is presented which suggests that sharing *does* reduce work effort and the level of resource use. Thirdly it is discussed how the wide-spread sharing systems may have evolved.

It is argued that the two systems of sharing and CPR are in many ways complements, they are two sides of the same coin. The natural resource is used communally and the harvest is also used communally. Or put in other words: there is usufruct property right on both, natural resources and the yield of the resource.

### ***5.2 The Theoretical Argument***

The argument this chapter makes is that sharing reduces the pressure on natural resources, which are not owned individually, but are common property or even under open access. Thereby sharing may reduce resource pressure due to two different mechanisms:

Firstly, *giving up* part of one's resource harvest has the same effect as paying a resource tax. Since Pigou (1923), we know that economic activities, which cause negative external effects should be taxed so as to cause a reduction of this activity. In the case of CPRs, harvesting the communally owned resource for individual use is associated with negative externalities for the other members of the community. Therefore, this activity should be taxed - which is exactly the effect of the sharing system. Sharing can thus be seen as a traditional form of an environmental tax,

which reduces the effort of the individual hunter or gatherer. For a formal analysis of the incentive effects of such a resource tax within a traditional society see Chakraborty (2001a), for the general argument see also Kagi (1998b, 2000) and Bender, Kagi, Mohr (2001).

Secondly, *receiving* part of the harvest of other members of the society in the case of illness or bad fishing or hunting luck, may lead to reduced harvesting effort due to a moral hazard problem. Members of the community have thus an additional incentive to reduce their effort devoted to harvesting the resource, as they are very unlikely to starve, even if they are not successful in their individual food quest. For a formal analysis of this effect see Chakraborty (2001b); for the general argument see also Kagi (1998b, 2000) and Bender, Kagi and Mohr (2001).

Finally, one more argument could be made (but is not elaborated on here): the business of sharing itself requires substantial time, which reduces time available for food quest.

### **5.3 *Sharing and CPR in Hunter-Gatherer Societies***

Most traditional societies are characterised by both, sharing systems and some form of non-private property rights (open access or common property) on natural resources. Sahlins notes, for example:

"The household in the tribal societies is usually not the exclusive owner of its resources: farmlands, pastures, hunting or fishing territories..." (Sahlins 1972: 94)

Also some form of sharing is to be found within most traditional societies, although the extent of sharing and household autonomy varies somewhat (Sahlins 1972, Lee and DeVore 1968, Woodburn 1998).

The following table lists a number of peoples and ethnic groupings, indicating whether they have a) communal access to natural resources and b) have established a sharing system.

**Table 1: Coexistence of CPR and Sharing System in Traditional Societies**

People	CPR System	Sharing System
Generally: immediate-return systems:	access to natural resources is open to all (Vogt 1992: 70, Sahlins 1972: 10)	
Batek	x	x (Vogt 1992: 84)
Alcaluf (South American Indians)	"no territorial rights" (Bird, 1946 in Vogt 1992: 70)	
Hadza (Southern Africa)	"no rights over land and its ungarnered resources" (Woodburn 1987 in Vogt 1992: 70)	x (Vogt 1992: 84)
Kaingang	"no territorial boundaries to limit the range of the hunter" (Henry 1964 in Vogt 1992: 70)	x (Vogt 1992: 84)
Nayaka	"...all Nayaka are born with rights of direct personal access to land and unearned resources" (Bird-David 1990 in Vogt 1992: 70-71)	x (Bird-David 1990 in Vogt 1992: 82)
Pandaram	x (Vogt 1992)	
Penan	x (Vogt 1992)	x (Vogt 1992: 84)
!Kung	(x) (Vogt 1992)	x (Bird-David 1990 in Vogt 1992: 82)
Mbuti		x (Bird-David 1990 in Vogt 1992: 82)
Nayaka		x (Bird-David 1990 in Vogt 1992: 82)
Aché (Northern Paraguay)		x (Vogt 1992: 84, Bliege Bird and Bird 1997: 49, Kaplan and Hill 1985 in Peterson 1995: 865 )
Mrabri		x (Vogt 1992: 84)
Yahgan		x (Vogt 1992: 84)
!Ko		x (Vogt 1992: 86)
Meriam, Melanesian gardeners and fishers in Australia's Torres Strait		x (Bliege Bird and Bird 1997: 49)
Netsilik Eskimos	?	x (Balikci 1968: 80-81)

Source: see table

Thus there is strong evidence that many traditional societies are characterised by *both* sharing systems and CPR systems.

#### **5.4 Effects of Sharing on Work Effort and Resource Use**

The literature on traditional hunter-gatherers provides ample evidence that work effort is extremely low in traditional societies and that natural resources are not overexploited but rather under-exploited. However, this low intensity of production has been associated only in passing with the system of sharing. We suggest now that sharing might well play a very important role with this respect.

## 5.4.1 Work Effort / Time spent on Production

Much of the literature on sharing in traditional societies either does not discuss effects of sharing on work effort, on time spent producing and on production technology at all or mentions such effects in passing only. A recent contribution on sharing notes, for example:

"Few studies ... actually address patterns of distribution and consumption as constraints on behaviour rather than as behavioural variables to be explained." (Minnegal 1997)

Having to share the fruits of one's labour with the whole community one would intuitively expect a depressed level of work effort - an effect this section attempts to explore such effects in some detail.

While the interaction between the sharing system and work effort is mentioned only in passing - if at all - the anthropological literature has discussed in great detail the time hunter-gatherers spend on food gathering and hunting.

Until the middle of the twentieth century, it was taken for granted that life of "primitive society" was - saying it in the words of Hobbes - "nasty, brutish and short". In the 1960s the emerging overwhelming evidence on hunter-gatherers foragers who were far from starving then struck anthropologists. Quite to the contrary, they enjoyed food of greater quantity and better quality than many "more developed" people. Many reports on hunter-gatherers subsequently described the nutritional status of hunter-gatherers and their work pattern.

Incidentally, many studies show that hunter-gatherers not only hardly ever starve, but also spend very little time for food quest. It is this latter aspect I want to concentrate on here, drawing together evidence from various sources.

In his influential work on the production patterns of hunter-gatherers, Lee (1968) calculates the average time spent working by the Kung Bushmen of Botswana. He found the average workweek to range from 1.2 - 3.2 days per week, with an average of 2.5 days per week (Lee 1968: Table 4). One work day of the Kung thereby was six hours, as is noted by Sahlins referring to the Lee study (Sahlins 1972: 21). The Lee

findings might even overestimate the average time spent on working as Lee carried out his field study from October 1963 until January 1965, a period of drought (resulting in a relatively high work effort necessary to gather food). During an average year the still less time may be spent on working.

Furthermore, a large percentage of Kung bushmen population does not gather or hunt at all. Children, youngsters and elderly are not expected to contribute to food gathering or hunting; only 60% of the population contribute food (Lee 1968: 36). Young people are not expected to work before they marry and elderly people cease to work at the age of 60. As girls marry at the age of 15-20 and young men approximately 5 years later, Kung enjoy a relatively long carefree childhood and adolescence. Lee: "...it is not unusual to find healthy, active teenagers visiting from camp to camp while their older relatives provide food for them" (Lee 1968: 36).

The following quote gives flair of the level of activity Lee encountered in his field study:

"If food getting occupies such a small proportion of a bushman's waking hours, then how *do* people allocate their time? A woman gathers on one day enough food to feed her family for three days, and spends the rest of her time resting in camp, doing embroidery, visiting other camps, or entertaining visitors from other camps. For each day at home, kitchen routines, such as cooking, nut cracking, collecting firewood, and fetching water, occupy one to three hours of her time. This rhythm of steady work and steady leisure is maintained throughout the year. The hunters tend to work more frequently than the women, but their schedule is uneven. It is not unusual for a man to hunt avidly for a week and then do no hunting at all for two to three weeks. Since hunting is an unpredictable business and subject to magical control, hunters sometimes experience a run of bad luck and stop hunting for a month or longer. During these periods, visiting, entertaining, and especially dancing are the primary activities of men." (Lee 1968: 37).

Other studies support Lee's finding on work effort. Woodburn (1968) estimates the average number of days the Hadza spend working per week to be two (Woodburn 1968: 54). Studies on Australian Aborigines work effort conclude that adults work roughly between four and six hours per day (Sahlins 1972: 14-16).

McCarthy and McArthur analysed data collected in two groups of Australian aborigines. They conclude that members of one group worked somewhat more than 3.5 hours per day, the other group's members somewhat less than 6 hours per day

(McCarthy and MacArthur 1960, in Sahlins 1972: figures 1.1 and 1.2). Apart from this study, Sahlins quotes a number of anecdotal evidence from the middle of the 19th century, settlers reporting on the work effort of aborigines. The quotes demonstrate the settler's astonishment - if not to say bewilderment - by the little work aborigines needed to do in order to survive.

One western person settling in the 1840s in southeastern Australia wondered "how that sage people managed to pass their time before my party came and taught them to smoke" (Curr 1965: 109 in Sahlins 1972: 24). That same person remarks with respect to the observed 6-hour working day: "...half of that time being loitered away in the shade or by the fire". (Curr 1965: 118 in Sahlins 1972: 24). Also in the 1840s, Eyre and Sir George Grey report from the same part of Australia: "...they can obtain in two or three hours a sufficient supply of food for the day, but their usual custom is to roam indolently from spot to spot, lazily collecting it as they wander along" (Eyre, 1845 in Sahlins 1972: 24).

Similarly, reports on South American (former) hunter-gatherers state that they had no tradition of extraordinary hard work:

"...the Yamana are not capable of continuous, daily hard labour, much to the chagrin of European farmers and employers for whom they often work. Their work is more a matter of fits and starts, and in these occasional efforts they can develop considerable energy for a certain time. After that, however, they show a desire for an incalculably long rest period during which they lie about doing nothing, without showing great fatigue..." (Gusinde 1961: 27 in Sahlins 1972: 28).

The list of evidence on the low level of effort foragers put into food gathering and hunting could be continued. One more quote shall be added here for reasons of the beauty of the observation (although the quote is from a subsistence agricultural society rather than from hunter-gatherers):

"But let us follow a (Tikopian) working party as they leave home on a fine morning, bound for the cultivations. They are going to dig turmeric, for it is August, the season for the preparation of this highly valued sacred dye. The group sets off from the village of Matautu, straggles along the beach....to reach the orchard. ...the tempo of the work is an easy one. From time to time members of the party drop out for a rest, and to chew betel. To this end, Vaitere, who takes no very active part in the work itself, climbs a nearby tree to collect some leaves of pita, the betel plant....About mid-morning the customary refreshment is provided in the shape of green

coconuts, for which Vaitere is again sent to climb....The whole atmosphere is one of labour diversified by recreation at will....Vaitere, as the morning draws on, busies himself with the construction of a cap out of banana leaf, his own invention, and of no practical use....So between work and leisure the time passes..." (Firth 1936: 92-93 in Sahlins 1972: 56-57)

The question now is: could this low level of work effort be due to the sharing system which operates in practically all of these traditional societies? I have argued that for a number of reasons the sharing system will reduce time spent on food gathering and hunting: firstly, the "business of sharing" by itself requires time. Secondly, having to give away part of one's food reduces the marginal utility of food with the quantity of food obtained and thirdly, sharing allows a hunter and gatherer to enjoy leisure for some time and wait for others to support him.

*Time spent on the business of sharing:* Wiessner (1982) points out that the Kung do in fact spend relatively little time in hunting and collection of fruit, but if one includes time spent on entertaining their sharing relationships, it emerges that the Kung do work as much as 40 hours per week:

"...just because only 12-15 hours a week are put into procuring and preparing food, the remaining hours are not necessarily ones of leisure. Many hours are put into maintaining critical social relations. Participating adequately in hxaro involves taking the time to make or remake gifts, gathering information about who has and who is in need, and finally making sure that one gets one's fair share of goods and resources. Showing interest in a relationship involves collecting, as much as it does giving..." (Wiessner 1982: 78)

In fact, hunter-gatherers seem to allocate their time carefully between different activities in such a way as to generate a relatively stable income over time. This interpretation is in fact in line with results from many agricultural economic studies on traditional societies, which argue that many of these societies don't maximise production but rather food security.

Having chosen not to ensure food security via storage but via social relations, they allocate some of their time to food production/collection and some to engaging in sharing activities. Sharing activities thereby are not restricted to somehow dividing the food and sharing it with neighbours. It requires being constantly informed about the resources and production activities of others and in some societies members

have built up extensive sharing systems and spend substantial time attending their network. Thus, hunter-gatherers such as the Kung consciously decide to allocate part of their time to "networking", to use a modern idiom.

*Reduced productivity:* I have argued above that it appears to be intuitive that having to share reduces the incentives to gather or hunt. There is a great deal of evidence on the low level of work effort, but in fact hardly any systematic analysis how the culture of sharing affects work effort. Sahlins, for example, formulates vaguely:

"In sum, for a variety of cultural reasons, the life time working span may be seriously curtailed..." (Sahlins 1972: 54)

Some authors mention in passing that sharing does reduce the efforts people put into hunting and gathering. Wiessner writes, for example:

"...I argue that the limits on time the Kung put into the food quest is partially the result of people preventing themselves from being exploited in their relationships of reciprocity..." (Wiessner 1982: 78)

Woodburn concludes from his study on the Hazda:

"The system is one that restrains the individual hunter from maximising and tends to restrict the amount of hunting carried out." (Woodburn 1998: 50)

*Waiting for others to bring food:* It has also been documented that hunter-gatherers seize working at all from time to time and simply expect others to care for them.

"...men who have killed a number of large animals sit back for a pause to enjoy reciprocation. Women gather enough for their families for a few days, but rarely more. Those working for wages in Namibia today hold their jobs for a few months or even a few years, supporting others with their income, but eventually quit work and take time to sit back and 'rest' and let others support them." (Wiessner 1982: 79)

## **5.4.2 Effects on Production Technology**

We might also expect that sharing does affect production technology in a sense that the way of food quest or food production is different in societies with sharing as compared to societies which have no culture of sharing. In particular one would

expect that production technologies which require (individual) investment are difficult if not impossible in societies which practice sharing: if the current income (be it in the form of fish, game or field harvest) is to be distributed among the community, it is difficult for the individual to keep savings in order to invest in later periods. If, for example, all harvested corn has to be shared, no seed corn can be saved.

There is not much but some evidence on this point. Woodburn finds with respect to the !Kung that the successful hunter is *prevented* to

"...decide whether to use it (the meat) fresh or to dry and store it, to decide whether to exchange it for other goods or services or to pay off past debts or to establish future claims. They are prevented from doing all of these things by the obligation to share..." (Woodburn 1998: 50).

Governments in southern Africa have attempted to settle the Bushmen people. However, for Kung bushmen it has proven extremely difficult to switch from their mode of food production to agriculture. The main reason thereby is not lack of ability. Kung have worked successfully on farms of settlers and have acquired the technical capability to do agriculture. The problem, however, is that once they farm their own land, they are obliged to share their produce with their people which drastically reduces the incentives to engage in agriculture or make it even impossible. Woodburn notes with respect to the problems faced by Kung as well as by Hadza who engage in agriculture:

"The overwhelming difficulties lie in the egalitarian levelling mechanisms...Kung... are unable to restrain their kin and affines from coming to eat the harvested grain. Exactly the same has occurred again and again in the in the Hadza government-run settlements...those few who apply their labour systematically and skilfully and obtain a good crop have found that their fields are raided by other Hadza even before the grain is harvested, and once it has been harvested those with grain in store are under relentless pressure to share it with other Hadza rather than to ration its use so that it will last *until the next harvest is obtained*. In the fact of such obstacles, even the successful farmer is likely to give up." (Woodburn 1982: 447, my italics)

On the other hand, the need to share may also require a hunter or fisher to bring back home larger quantities of food than he would need for his family's consumption needs. Minnegal (1997) shows in a detailed study that fishers of the village of

Gwaimasi in Papua New Guinea use different fishing strategies, depending on the number of people who are in the camp.

### **5.4.3 Sharing and Intensity of Natural Resources Use**

Additionally to the low work effort of traditional hunter-gatherers there is ample evidence of low-intensity use of other production factors, most notably the natural resources. Sahlins (1972) presents literally dozens of examples of under-use of natural resources in traditional hunter-gatherer societies. Thus in these societies traditionally overexploitation is not a problem - natural resources could sustain in some cases as much as 50 times more people per ha (Sahlins 1972).

Similar to the effect of sharing on work effort, the effect of sharing on the intensity of the use of natural resources has hardly been touched upon. We have seen some anecdotal evidence on suggesting that sharing reduces work effort. In societies where work effort is to a large extent targeted on using natural resources, reduced work effort is directly associated with reduced utilisation of natural resources.

The following hypothesis can be formulated: Sharing systems reduce the intensity of the use of natural resources and can thus be seen as a means to manage CPR resources sustainably.

## **5.5 Co-existence of Sharing and CPR - Evolutionary Approach**

In many traditional societies, it has been argued, communal access to natural resources is combined with a system of sharing. It has also been argued that the two systems appear to be complements in a sense of one supporting the other.

But why have the rules and in fact the whole value systems of many traditional societies been set up or developed in such a way as to make sharing such a dominant feature of society? And why are CPRs so widespread in traditional hunter-gatherer societies?

Both, CPR and the system of sharing yield a number of economic and social advantages. Sharing produces social stability, insurance and social contacts. CPR

allows making use of economies of scale and scope and using the land in a way that is most suited to the environmental and social conditions. The combination of the two systems stabilises both systems and thus allows the local population to benefit from these systems, which would on their own perhaps not be viable.

The question will now be traced how this combination of the two systems might have come about. Thereby an evolutionary approach is taken. It is argued that over the years those systems establish themselves, which are most conducive for human reproduction and human development. Or: it is assumed that the fittest societal system survives.

### **5.5.1 Non-environmental Benefits of Sharing Systems**

As has been lined out in chapter 3 above, sharing has a large number of advantages to traditional societies. It is now conceivable that the sharing system has been established, or better: has become such a dominant system selected by an evolutionary process from other systems, precisely because of these non-environmental benefits. Below those non-environmental benefits of sharing are summarised again briefly.

#### **Social Contacts**

Sharing provides a platform and an opportunity to make social contact outside the own band. Sharing institutionalises these contacts, which would otherwise be less intensive, and result in less regular meetings. Woodburn (1998), for example, had the opportunity to observe within the same culture families, which were integrated into the sharing, network an insulated families, which were not integrated. The result very clearly was that without being integrated into the sharing community frequency of visits was much lower.

Social contacts have a large number of positive effects. Ultimately it leads to increased opportunities to find marriage partners outside the own band - an effect that is a classic evolutionary explanation for the dominance of the culture of sharing.

### **Equality and Social Stability**

Sharing leads to social bonds, which is a first important presupposition for social stability. More importantly, however, sharing increases equity within a society. Marshall (1961), for example, reports from the Kung that there is no quarrel about access to food.

### **Insurance**

Hunting and gathering is - at least partially - subject to large random fluctuations. Sharing provides an insurance against such fluctuations. There is some discussion on the necessity of such an insurance, but there is evidence on the benefits of the system (Wiessner 1982)

### **Trade**

Sharing is not restricted to inter-temporal exchanges within the same currency, but also a number of different products pass from person to person. This allows the individual to obtain products he is not able to produce in the same quality himself. Where these products are of significant practical value, for example high quality spear or arrows, it is obvious that a system, which encourages such trade, increases the success and survival of the members of this society.

## **5.5.2 Benefits of CPR Systems**

However, also CPR settings have within certain environmental settings, economic and ecological advantages. And in fact, the same is true for open access systems where resource use is not limited or regulated in any way.

### **Costs of Assigning and Defending Property Rights**

Whether fishing quotas have to be designed and defined, whether land has to be parcelled into individual blocks or whether water taken from a well has to be measured: assigning property rights in many circumstances is very costly. Naturally, the costs of assigning and defining property rights depend very much on the circumstances such as the geographical conditions. In Patagonia, for example, costs of fencing land exceed the costs of the land itself. Even more costly than assigning

property rights can be defending property rights, especially where these rights are not recognised by everybody.

### **Economies of Scale and Scope**

Using a very large area of land communally, people as a group can make use of economies of scale and scope; it allows much better to use the land in an optimal fashion. Within such a system, people can move from one place to another depending on the requirements of the climatic conditions. For example in semi-arid regions of Sub-Saharan Africa, traditional societies made extensive use of the possibility to move great distances depending on climatic conditions. When private property was introduced by European settlers, the carrying capacity of the land in some of the private parcels of land was significantly lower than the average carrying capacity of the land prior to the privatisation. In fact, there have been development projects, which restored CPR management of land exactly because the benefits of scale and scope realised in CPR systems were being finally recognised.

### **5.5.3 Evolution of Sharing and CPRs: Suggestions**

In the following, suggestions on the potential evolution of the sharing system and CPR systems are made. It is thereby discussed briefly if the two systems - sharing and CPR systems - might have evolved as a response to natural conditions or if one of the two systems might have developed in *response* to the other system. Thereby three possible variants are discussed.

Firstly, it appears to be conceivable that both systems, sharing and CPRs, are evolutionary dominant under some natural conditions, for example in conditions as they are found in semi-arid areas in Southern Africa: Each of the two systems, the sharing system and the CPR system, provide advantages to societies living in the regions in question and for this reason both CPRs and sharing systems are wide-spread. Secondly, it is possible that first and foremost the system of sharing provides advantages and that as a *consequence*, CPR systems have become common and thirdly it is conceivable that CPR systems provide the key advantages and that sharing has evolved *in response* to the wide-spread existence of CPR systems.

In the following, options two and three are discussed in some more detail. In chapter 4 above it has been shown that sharing systems provide many advantages to traditional societies. It is thus conceivable that many traditional societies have established sharing systems for various reasons. This in turn has reduced the necessity to manage common pool resources by means of access restrictions. If we assume that sharing is evolutionary dominant in many traditional societies, it can thus be argued that the very existence of sharing systems allowed using common property or even open access resources without overexploiting them. Considering that natural resources are in their natural status (situation without human intervention) open to all and taking into account that property rights have to be established and defended, it is well conceivable that societies which practise sharing never saw the need to impose access restrictions on natural resources such as fish or game. Thus, one could conclude: sharing is evolutionary dominant, CPR not necessarily, but due to the lower costs of CPR in comparison to private property, CPR will prevail where systems of sharing have been established.

However, I believe the most sensible argument runs just the other way round and thus option three as sketched out above is true. In some environmental settings, access restrictions to natural resources are simply not feasible. Also other ways and means of managing the use of the natural resource might be difficult to establish and potentially not stable. Thus one can argue that common property or open access to natural resources is evolutionary dominant in the sense that other property systems are hardly feasible for practical reasons. When no means were found to manage the common property or open access natural resource in a sustainable manner, the resource was overexploited, resource stocks started to fall, sustainable annual yields declined. In fact, a situation arises as it has been described by Brander and Taylor for Easter Island where the failure to manage natural resource in a sustainable manner is seen the prime cause for the cultural decline of that society (Brander and Taylor 1998).

Where systems of sharing have been established as a response to a common-pool resource situation, higher sustainable resource yields became possible. This resulted in conditions for humans to establish enduring cultures. Thus, within a situation where for practical reasons only common property or open access are feasible property systems for natural resources, so the argument, either sharing is

practised or the natural resource is overused, leading to the decline of the society which overuses the natural resource. For this reason, so the suggestion, we find today many traditional societies which have CPR systems and which do practise sharing.

## **5.6 Conclusion**

There is a large literature on CPR management in traditional societies, as has been mentioned in chapter 2. However, within this literature, a whole category of CPR systems was thereby overlooked: CPR systems of societies, which have a strong culture of sharing. These societies very often do have common property (or, depending on the definition, even open access) but they don't have any sophisticated rules on resource extraction. Hunter-gatherer societies in fact don't need sophisticated rules on resource utilisation, because the system of sharing provides incentives, which reduce pressure on natural resource use.

This chapter argues that in many traditional hunter-gatherer societies the CPR system and the culture of sharing are cultural complements. The two systems allow the sustainable use of the natural resources and thereby make best use of the fragile environment.

## **6 Learning from Traditional Societies**

### ***6.1 Introduction***

After having discussed mechanisms which help to stabilise resource use in traditional societies, it may be asked whether the study of traditional societies allows to draw certain lessons for the management of natural resources in modern societies. This final chapter therefore asks: What can we deduct from the work on traditional societies for our western societies? Can we learn from them? Can we better understand how natural resources must be managed so as to use them sustainably over time?

Thereby the chapters proceeds as follows: first it is discussed why it might make sense to look at traditional societies in search for solution models for the management of natural resources in modern society. Secondly, sharing systems in traditional societies are compared with the proposed environmental tax reform in modern societies. Based on this comparison and based on the analysis of traditional sharing systems in the previous chapters, it is then discussed to what extent the study of traditional societies might inspire a reappraisal of the merits of ecological tax reforms.

### ***6.2 Why learn from Traditional Societies?***

Traditional societies such as the fishing communities in Tonga have lived with scarce natural resources for long periods of time - in some regions such as the Pacific Islands for several centuries, in other cases presumably for dozens of millennia; they produced economic and social systems, which proved suitable to induce sustainable use of common-pool resources. During the process of developing societal structures which enabled these societies to cope with scarce common pool resources, however, some tribes or even whole cultures will most likely not have survived due to their failure to implement the most adequate system of resource management, the Easter Island case may be quoted as an example (Brander and Taylor 1998).

Western societies, in contrast, have no such profound tradition of managing resources, which are common property or are even open to all -- and where such a tradition might have existed previously, it has been largely lost. Two trends can be seen as prime causes for the lack of such a tradition to manage common pool resources in industrial western societies. Firstly, during the past two centuries technological change and colonialisation allowed modern western societies to alleviate many resource constraints. To speak in economic terms: the production possibility frontier was extended. Instead of managing resources in a sustainable manner, simply new resources were found and exploited and new technologies were discovered. Secondly, many resource and environmental problems could readily be addressed by privatisation or by regulating the resource use *directly*. Privatisation of land, for example, was technically possible and compatible to both agricultural and pastoral land use.

However, industrial societies are now starting to hit environmental constraints in a serious fashion. The limitations of the global atmosphere to take up anthropogenic greenhouse gases have become obvious only in the 1990s. Similarly, the global loss of biodiversity, similarly, has been of little concern until recently and scarcity of water resources becomes, on a global scale, a problem only now. The consequences of these new resource problems will, to a large extent, not be avoidable by the invention of new technologies. And they might not be easy to manage by traditional environmental policy tools. In particular, privatisation of resource access might be difficult to realise in the case of global environmental or global resource problems.

In finding solutions to the new environmental challenges we can not afford to take the traditional society's "trial and error" route; an "error" might be fatal to human civilisation as we know it. Analysing systems which have allowed traditional societies to use scarce natural resources in a sustainable manner without restricting access to the resource directly might be useful for generating ideas on how to deal with the new and challenging global environmental problems.

### **6.3 Traditional Sharing and Ecological Tax Reform: A Comparison**

One key result of the analysis in chapters 1-5 is that many traditional societies achieve sustainability of resource use not by rules regulating resource use *directly*

but by means of a *culture of sharing*, which obliges members of the society to share the proceeds of resource use activities. The system of sharing thereby resembles in some ways the proposed "ecological tax reform" which has been identified since long by economists as a means to reduce environmental degradation in western industrial societies.

Since Pigou it has been known that resource use should be taxed so as to reduce the level of resource use to sustainable levels. For two decades, an alliance of environmentalists and economists has fought for the introduction of environmental taxes in western societies, the revenues of which were to be used - at least in some models - for the reduction of labour taxes and social security contributions.

Bender, Kagi and Mohr (2001) first made the connection between the system of sharing on the island of Lofanga in the Kingdom of Tonga and modern ecological tax reforms and Kagi (1998a) argued in a somewhat popular fashion that the fishermen of Tonga had first "invented" an ecological tax reform in order to manage their scarce natural resources. Bender, Kagi and Mohr (2001) were somewhat more cautious; they stressed that ecological tax reforms in western societies are intrinsically more complicated and potentially much less efficient than the "ecological tax" in the Kingdom of Tonga.

In this chapter, this discussion is taken up. If we want to analyse whether western societies can draw lessons for their ecological tax reforms from traditional societies' sharing systems, we have to consider first whether and to what extent the two systems are comparable. We have to focus on whether there are features of the two systems, which are similar, and to what extent the two systems are inherently different. The various potential similarities, but also the differences between an ecological tax reform and the wide-spread traditional systems of sharing are discussed in the following sections with the aim of finally being able to discuss if and to what extent we might learn from traditional societies with respect to systems of sustainable resource management.

### **6.3.1 Non-environmental Benefits of the "Ecological Policy"**

In chapters 4 and 5, it has been suggested that the system of sharing in traditional societies may be driven by non-environmental benefits produced by the system. In other words: traditional societies do not share because they know that by sharing the intensity of resource use is reduced and, thus, long-term sustainability is fostered, but they do share because of other benefits produced by the system.

In industrial societies, a very similar argument is put forward with respect to an ecological tax: environmental taxes should be introduced not (only) because they generate environmental benefits in the long term, but also because economic prosperity is increased irrespective of the environmental effects of the reform (double dividend argument).

These non-environmental benefits are discussed in some more detail below, and a comparison is made between such benefits of the traditional sharing system and potential benefits of an ecological tax reform. Note: No distinction is made here between reasons for *introducing* the sharing system (or ecological tax) and reasons for *keeping* the respective systems. It is only argued that both systems can appear to have significant non-environmental benefits.

#### ***Insurance Effects***

The incomes of individuals of traditional societies are characterised in many cases by a high level of volatility, which are inherent to the production systems of these societies. In chapter 4 we have seen that in particular those activities that are subject to large risks (with respect to the income produced by the activity) are by tendency included in the sharing system, while other, less risky activities, are not included. For example, while game hunting is subject to sharing, gathering of wheat is not.

Sharing now allows the individual hunter and fisher to insure himself against those random variations in his yield and his income. The sharing system thus yields utility additional to the environmental benefits produced. In fact, the utility derived from the insurance properties of the sharing system arguably are the prime motivation for individuals to take part in the system; many scholars have sought to explain the very

existence of the sharing systems of traditional societies with the benefits derived from the insurance effect of the system.

Modern western societies, in contrast, are characterised by wage employment, which generates a constant stream of income over the year. There might be little need to insure oneself against short-term income fluctuations. However, significant risks for the individual remain. Examples are unemployment, illness, and accidents. In fact, we do observe a very large demand for insurance in western societies, for example against unemployment, income loss due to accident and long-term health problems and insurance covering medical expenses. At present, in most cases the insurance premium is paid out of the income generated through labour. This causes net incomes to be reduced to relatively low levels compared to gross incomes and it is one of the prime proposals of environmental tax reforms to pay part of the insurance premium out of the revenues generated through the taxation of resource use. Thus it is argued that an ecological tax reform would produce the co-benefit of increased net incomes (net of direct income taxes) - or reduced gross incomes in case net incomes are held constant - both of which in turn would reduce unemployment.

### ***Equity as a Benefit of Sharing Systems / Tax Systems***

Some authors have argued that the prime benefit from sharing systems in traditional societies is to be seen in the equity it generates. Equity, in turn, generates social stability, which contributes to the long-term sustainability of the society in question (see chapter 4 above). In traditional communities, social stability and equity are arguably of crucial importance for the very survival of society.

In fact, also in western societies income is redistributed in order to decrease inequality and promote social stability; high levels of implicit or explicit taxes were introduced in many countries. Of course, if the use of environmental goods and natural resources is taxed more heavily and the tax revenue is used for supporting individuals with low incomes, direct income taxes used for redistribution can be reduced.

### ***Sharing as Alternative to Storing Resources***

Traditional societies do arguably encounter difficulties in storing food. Sharing is an alternative to storing food. While most societies have the technical means to store food (for example drying fish and storing it), the methods for food storage are costly both in terms of labour costs involved in making the food durable and also in terms of reduced taste and perceived food quality. Thus, traditional societies have an additional incentive to engage in sharing while in western societies, income can be stored without cost. Modern society's potential resource tax systems do not produce a comparable benefit.

### ***Social Contacts as a Benefit of the Sharing System***

Arguably, the sharing systems in traditional societies is also motivated by the demand for social contact. Sharing gives the opportunity to meet people from the own village or tribe, but also from neighbouring peoples/tribes/villages. In modern society, tax payment hardly serves this purpose due to the nature of the transaction.

### ***Conclusions on Co-benefits***

Taking these arguments together, it emerges that both, sharing systems in traditional societies and an ecological tax in modern societies, have the potential to produce a number of non-environmental benefits.

Yet, there are differences. Firstly: traditional sharing systems perform additional tasks, which an ecological tax in western society does not perform. Examples are the contribution of the sharing system to social contacts and the food storage function of the sharing system. Secondly: due to the fact that in traditional societies a major part of the income is generated directly from resource use, a resource tax can a) more readily serve the means of income redistribution and insurance than an ecological tax in western societies and b) is often the *only means* to provide for insurance and income redistribution<sup>10</sup>, an issue which is taken up in the sub-chapter below.

In modern societies environmental taxes might, in contrast, not be the most suitable means for income redistribution due to the small tax base of an environmental tax compared to the income as a tax base. Or the other way round: while in traditional societies a resource tax is the only means to

### **6.3.2 Currencies Used**

Above it has been argued that the traditional sharing systems' benefits derived from income insurance and income redistribution may be a significant motivation for the very existence of the sharing system. And the question now is whether ecological taxes in modern societies might generate similar co-benefits and whether the very generation of such co-benefits could also motivate modern societies to introduce ecological taxes.

First, it was noted above, that in traditional societies there might be incentives to share incomes (and share risks), which do not exist in modern industrial societies to such an extent. Yet, also in modern societies, income is redistributed and insurance purchased. However, the largest part of the funds required for insurance and redistribution is not attained by levying environmental taxes, but from income taxes and insurance premia which are paid out of income.

A key difference between traditional societies and industrial societies is that in traditional societies, much of the income is generated from activities, which are associated directly with the use of natural resources. In some cases, the products obtained from the natural resource (fish in the case of Tonga) are the prime currency within the economy.

In traditional societies, income taxes (needed for income redistribution) and also the payment of insurance premium automatically is equal to a resource tax if the only income available is the product taken from the resource base. Or in other words: if the currency of the economy equals the product obtained from the natural resource (such as fish, in the example of Tonga), then any income-based tax and insurance premium paid will automatically have the effects of a resource tax.

In western societies this is fundamentally different: if income is taxed for reasons of redistribution, and insurance premium has to be paid, a whole bundle of activities

achieve income redistribution (and income redistribution can thus be seen as a central co-benefit of a resource tax), western societies have more (and probably more adequate) options to achieve income redistribution.

is affected, only some of them being directly associated with negative external environmental effects. This is so, because the currency in western societies is not a product obtained from scarce natural resources.

#### ***6.4 Ecological Tax Reform Revisited***

It has been argued, that the system used by traditional societies to manage resource use resembles an ecological tax. However, environmental taxes appear to be difficult to introduce in western societies - at least if they are to reach a meaningful level that would in fact result in a significant reduction of pollution and resource use. Only one recent example is the attempt to introduce environmental taxes in Switzerland in September 2000 - all three proposals on such taxes were refuted by popular referendum.

Ecological taxes are only one out of a number of policy instruments, which could help to manage natural resources in a sustainable manner. Apart from ecological taxes, command and control instruments are used, tradable resource use credits (most notably emission credits) are discussed widely and in some circumstances even used and there is also the option to introduce stringent liability rules in order to cause private agents to consider environmental protection in their decision making process.

However, none of these instruments out of the policy formulators' tool box have so far been able to address in a sufficient manner some of the most pressing environmental and resource problems such as global warming, biodiversity loss and the rapid loss of good quality water reserves.

The question this chapter wants to address now is whether the experience of traditional societies with systems of sharing and the long-term success of these systems should make us reconsider environmental protection policies in western societies. In particular I want to discuss whether the study of traditional societies produces any new arguments in favour of an environmental tax reform as opposed to other policy instruments aiming to tackle environmental problems.

## 6.4.1 Efficient environmental Policy

Both, traditional sharing systems and ecological tax reforms generate non-environmental economic benefits. And it is conceivable that the system of sharing has in fact developed solely due to the non-environmental benefits it generates.

In industrial societies there is now an intense debate as to whether an ecological tax reform should be introduced for non-environmental reasons alone; it is discussed to what extent an ecological tax reform generates a "double dividend" which might even offset the costs of environmental protection.

It would be somewhat far fetched to argue that studying traditional systems of managing common pool resources would be beneficial in that it draws our attention to non-environmental benefits of environmental policy in industrial countries; the debate has been going on for some time now and there is no particular need to be noticing that non-environmental benefits of an ecological tax reform are an important issue to watch out for. The debate on the "double dividend" is a complex one and there is no way that within the context of this work any significant contribution to this debate can be made.

The bottom line of the ongoing discussion on an ecological tax reform appears to be that an ecological tax reform will generate a double dividend, but it is probably not large enough to offset the costs of the environmental policy; if an environmental tax reform is to be introduced, it should be done for reasons of environmental protection and not solely for the double dividend (see for example Bovenberg and Goulder 1995). But it is also common wisdom today that any environmental policy should be formulated in such a way as to minimise economic costs associated with the policy. An environmental policy should be efficient in a sense that the environmental goal is to be reached at minimum costs.

It thereby has to be realised that the traditional system of sharing differs from an ecological tax reform in a number of significant ways, as lined out above. Also, we have only noticed the very existence of the system of sharing, but studying the existing culture of traditional societies we can say very little on how the prevailing

system has come about and thus we can hardly deduct any recommendations or lessons on how to *introduce* an ecological tax reform in industrial societies.

Yet it is worth noting that in traditional societies which have developed a system of managing natural resource during a lengthy period of time, have resorted to a system which not only regulates resource use, but generates also positive non-environmental benefits.

#### **6.4.2 Stable environmental Policy**

We do not know whether traditional societies have introduced sharing consciously. Above it has been argued that the system may well have been established by an evolutionary trial and error process. Once introduced (or chosen by accident), however, it appears to be a *stable* means to regulate resource use. The stability of the system is due to the non-environmental benefits the system produces. Arguably, the system is not abolished because many members of society would lose benefits such as health insurance, old-age pensions, food storing options and opportunities to keep social contacts.

Drawing parallels between traditional societies' systems of sharing and ecological tax reforms, one may postulate that both systems are potentially relatively stable. The stability in both systems is thereby due to the non-environmental benefits produced by the system. As for the ecological tax reform, this is a new argument favouring such an ecological tax reform.

The ecological tax reform proposals suggest to use - just as in traditional systems of sharing -- the revenues generated from taxing resource use in order to finance the social security system. It thereby links two different political and economic issues. If now in later years, society might be tempted to abolish the ecological tax (perhaps in order to reduce costs of environmental protection and generate higher economic growth), the complex system of financing the social security system must be restructured, as a result of which potentially numerous members of society will lose out. The rigidity of an ecologically reformed tax system, the potential difficulty to reverse such a reform and the resulting stability of the environmental policy based on

an ecological tax reform might in fact be a new argument favouring an ecological tax reform.

Of course, other ecological policies will also face opposition if they are to be reversed. There are (economic) winners and losers of any ecological policy and the winners will always oppose a reversal of an ecological policy. But an ecological tax reform differs from many other environmental policies such as command and control policies, which impose certain environmental standards upon industry or even the introduction of tradable emissions rights or an environmental tax that is reimbursed to industry. While all these traditional environmental policies focus primarily on the environment and aim to interfere as little as possible in the economy as a whole, the ecological tax reform does just the opposite. As a result, the whole fiscal system including the state-run social security system is affected.

On economic efficiency grounds, an ecologically motivated tax reform might be questionable. Inefficiencies in the tax system should be addressed independently from the ecological aim of a resource tax. The argument which is made here, however, would favour such an issue linking. The argument is thereby not based on an efficiency consideration as described in chapter 6.4.1. above, but the proposition that issue linking will make the *reversal* of the policy much more difficult.

Why is stability of an ecological policy potentially important? There are two issues to be considered:

Firstly, stability of the policy allows economic agents to engage in long-term planning, taking into account the ecological tax. This will lead to the development and application of technologies and consumption patterns, which use less natural resources than current patterns. Over time, society and economy are locked into a sustainable pattern of resource use.

Secondly, the stability and non-reversibility of national environmental policies have important implications in the case of international environmental problems. The introduction of environmental policies, which are difficult to reverse, allow countries to credibly signal their willingness to stick to international environmental agreements. This can be a significant positive contribution to the negotiation process of such

agreements and reduces the risk and fear that environmental agreements are not adhered to once they are agreed upon.

An ecological policy must thus not only be long-term efficient for society as a whole. It must be formulated in such a way as to generate short-term benefits for a large number of people. While the former might help the *introduction* of the system, the latter is important to ensure the *stability* of the system.

### **6.4.3 The Morality of Environmental Policy**

Market-based environmental policy is seen by many environmentalists as morally not acceptable (Weimann 1991). The criticism thereby refers to both, tradable emission quotas and environmental taxes. Environmentalists do not find it acceptable that emissions are in principle permitted under the condition to either pay a tax (in the case of environmental taxes) or to acquire a quota (in the case of a tradable quota system). Command and control policies, in contrast, appear to be more acceptable. In fact, environmental taxes are sometimes even seen as unjust: Those who are sufficiently rich to pay the tax are allowed to emit, while others can not pay the tax and are may thus not emit as much.

As a final potential stimulation we might gain from looking at the resource regulation system of traditional societies, I will address the *morality* of environmental policy. In particular, I want to address the issue that environmental taxes are seen by some as morally inferior to other environmental policy instruments.

When we started to analyse the fishing system on Lofanga/Tonga, we were puzzled by the fact that fishers, which shore large quantities of fish, are not sanctioned. From studying other CPR management systems (for example Ostrom 1990) we had expected some form of fishing quotas, which ensured that fishers were not over-fishing the resource. In the absence of any spatial and temporal allocation of fishing spots and any formal quantity quota system, we would have at least expected that those fishers shoring regularly quantities of fish which are far above average would have been subject to some sort of pressure to reduce their effort. However, quite to the opposite is the case on Lofanga. Good fishers, fishing large quantities of fish, have a particularly good reputation.

The resource management system on Tonga is so stable, the management of the natural resource functions so well that there is no danger whatsoever that a large catch would cause the fishing resource to be depleted. Quite to the contrary, the sharing system has reduced the incentives to shore large quantities of fish to such a low level that everybody is pleased if a large catch is shored. Nobody is ever concerned about over-fishing; the field study did produce ample evidence that the local population is absolutely convinced that the fish will be there for ever and there is no need whatsoever to worry about resource degradation.

The question I would like to pose now is the following: would a very efficient environmental policy based on resource taxes in western societies perhaps be able to change the attitude towards using the environment in a very fundamental fashion?

Currently, society is very much focused on seeing the negative environmental impacts of certain activities. Take, for example, the neighbour purchasing a new 4-wheel drive car with a 6-liter engine, using about five times as much petrol than the own little car. We will be concerned about the neighbour driving such a car for two reasons: firstly, we are aware that too much CO<sub>2</sub> is blown into the atmosphere and our neighbour does now contribute very significantly to global warming. Secondly, we have no benefit whatsoever from our neighbour having the big car.

I argue now that the situation would change if all neighbours were allowed to use the 4-wheel drive car without any restriction. Once such a law was introduced, not many people would buy a 4-wheel drive car in the first place, environmental damage would be reduced very significantly and we would become less concerned about the global climate problem. Secondly - and this is perhaps even the more interesting issue - if our neighbour was to afford his 4-wheel drive 6-liter-engine car after all, we would not worry about the environmental damage done, but we would in fact all be happy to participate in the luxury.

The example is surely somewhat oversimplified. But I trust that with an ecological tax reform a similar effect might be taking place. What I have in mind has, however, little to do with the "environmental tax" introduced in some European countries these days. What I have in mind is a meaningful tax, which would very significantly reduce energy consumption and emissions. As a consequence of such a tax reform,

environmental damage would be reduced significantly. We would have to be much less concerned about environmental damage. And as a consequence we might (again) learn to appreciate somebody using the environment, for example by pumping up oil and burning it. This would be so because a) the activity would not really endanger the environment in a serious way and b) because we would all benefit from individuals using the environment due to the high tax revenues generated by such activities.

## 7 Conclusion

There is a large literature on CPRs in traditional societies. However, this literature predominantly if not exclusively discusses rules for managing resource use by quantity and access restrictions. Parallel to the literature on CPRs a literature on *sharing systems* in traditional societies has been developed. This paper has now argued that in fact these two systems, which have so far been analysed in isolation, need to be considered simultaneously. The sharing system stabilises CPR systems; CPRs and sharing systems are complements.

Chapters 2-5 of this work have reviewed the literature on CPRs and sharing systems and finally demonstrated that there is a strong case that in fact the literature on CPRs has overlooked an important mechanism that stabilises many traditional CPRs - the system of sharing. Chapter 3 thereby has used a case study on the island of Lofanga / Kingdom of Tonga, motivating and illustrating the argument.

The final chapter of this paper argued that by looking at traditional societies one might be able to draw lessons for tackling environmental problems of industrial society. Traditional societies had to live with CPR systems for long periods of time - and managed those scarce natural resources in many cases successfully in a sustainable manner. Industrial society, in contrast, has been able to alleviate many resource and environmental problems by means of extending the production possibility frontier (by means of technological change and/or finding new resources). Furthermore, often allocation of private property rights to natural resources and environmental goods could solve the problem.

However, now industrial society does face global environmental problems for which the solution mechanisms developed in these societies seem to fail. Looking at the solutions of traditional societies gives interesting insights.

Sharing systems used by traditional societies resemble the tax structures envisioned by proponents of an ecological tax reform: the activity associated with negative external effects is taxed, while the tax proceeds are used to support the "social security system" of the society. Within the debate on ecological tax reform in industrial societies, the argument of using the tax revenues in order to support the

social security system has been made repeatedly and there is ample literature on the potentially resulting "double dividend". This work does not aim to make a contribution to the debate on the double dividend. However, looking at traditional sharing systems, a second effect of the "recycling" of environmental tax revenues has been noted: depending on the use of the revenues from resource taxes, an "environmentally reformed" tax system has the potential to *stabilise* the resource tax system by linking various policy issues.

The sharing system has been operating for centuries if not many millenniums. The individual member of society does not support the system because he is aware of the ecological long-term consequences of complying with the sharing rule. However, there are a number of non-environmental benefits of the sharing system and it appears that it is for these benefits that the system is supported by a large majority in these societies. A new argument for an ecological tax reform emerges from the proceeding analysis: issue linking may be beneficial not only for generating a double dividend, but also (and perhaps even more so) for *stabilising* environmental policy.

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