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Abstract

Northeastern India is a veritable laboratory for understanding the transformations that relatively autonomous, subsistence based small scale societies undergo as they develop links with the larger scale, market oriented society. This paper, focussing on Gangtes of Manipur, presents a case study of the time course of such changes through the three phases of autonomy till the end of nineteenth century, of pacification during the British rule in the first half of the twentieth century and of commodification following independence in 1947. This last phase has been characterised by a process of sequential exploitation of forest resources. Only a small fraction of the profits realised in this process reaches the ordinary people, a somewhat larger fraction reaches the village Chiefs, while the bulk goes to the contractors with an understanding of markets and trade. This process of exhaustion of forest resources goes hand in hand with the privatization of control over land and tree resources, and a breakdown of the community based social organization. The Gangtes offer specific suggestions for averting this process of forest degradation reaching out into the areas as yet remote from roads and markets. These suggestions include more secure community land rights, and financial rewards to encourage more sustainable patterns of resource use and continued protection to undisturbed patches of forest.

Introduction

Progressive technological changes have revolutionised patterns of natural resource use by human societies, especially since the beginning of agriculture and animal husbandry. Technological advances have permitted the intensification of production of resources for human use, as, for instance crop fields are irrigated or fossil fuels tapped as an energy source; transformation of a greater and greater range of resources into forms useful to people, for example when bamboos are woven into mats, or converted into paper with paper being used to

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produce books; and transport of resources over larger and larger distances, as when automobiles replaced bullocks and horses as key means of material transport and telephones have revolutionised communication. This has led to a continual expansion of the quantity and variety of material as well as informational resources consumed by societies and an increase in the distance from over which these resources are acquired. These changes have brought ever larger numbers of people from over larger and larger spatial scales in contact with each other. At two poles of this gradient of social change stand small scale, self governing, tribal societies of hunter-gatherers or shifting cultivators and the large scale, stratified, industrial societies. The latter have at their disposal enormously greater quantity and variety of material and informational resources; this confers on them greater abilities to control the behaviour of smaller scale societies (Lenski and Lenski 1978; Service, 1975).

Technological changes have proceeded at different rates in different human societies. As a result India is today a mosaic of communities practising a whole variety of technologies, ranging over hunter-gatherers, such as on the Sentinel Islands of Andaman, shifting cultivators in the hill states of Northeast, nomadic pastorals in the desert of Rajasthan, subsistence agriculturists throughout tracts of rain fed agriculture, commercial farmers in irrigated tracts of Punjab, artisanal fisherfolk on the Chilika lake, modern shrimp aquaculturists in the Godavari and Krishna deltas, rural artisans such as weavers of bamboo and reed baskets and workers in the modern industrial and services sectors. In this complex society, communities at lower technological levels have tended to retain a degree of autonomy and features of smaller scale societies. Jarwas and Sentinelese of Andaman islands, for instance, still maintain near total control over the natural resources of their own territories and do not exchange resources in any form with the larger scale society in which they are embedded. But these are exceptional cases. Over most of the remaining Indian subcontinent smaller scale societies with an economic base of simpler technologies are engaged in more or less extensive exchanges of resources with the larger scale national society. These exchanges are accompanied by transformations of patterns

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of control and use of natural resources as well as forms of social organisation of the smaller scale societies. These changes often promote less sustainable forms of natural resource use and lead to a breakdown of social cohesion within the smaller scale societies. These are matters of concern, especially in context of the current focus on sustainable development and quality of human lives (Gadgil and Guha 1992;1995).

The Indian subcontinent is a veritable laboratory for understanding such transformations of relatively autonomous, subsistence based small scale societies as they gradually develop links with the larger scale, marked oriented national society. Indeed, in regions such as north eastern hill states we find a whole range of variation in the strength and time course of the establishment of such linkages. We report in this a paper a case study from the state of Manipur that attempts to trace the course of changes in patterns of natural resource use and social organisation in response to growing linkages with the larger scale society over the last two centuries. We then examine whether there are negative aspects to these patterns of change; and enquire as to how such undesirable consequences could be avoided in coming years as more and more remote tracts of north eastern India develop links with the mainstream society.

Material and Methods

Our field investigations conducted over a period of 18 months during 1991-1994 focussed on Gangtes, one of the Kuki tribes largely confined to the Churchandpur district of Manipur close to India–China–Myanmar border (Gangte 1975, Gangte 1993, Hudson, 1911) (Fig. 1). The Gangte population numbering about 10,000 is distributed in several villages and the town of Churchandpur over a tract of 4000-5000 km^2. The rural population is engaged almost wholly in shifting cultivation and collection and sale of forest produce, though there is a limited amount of settled cultivation and a small number are serving in paramilitary and armed forces. Some of the town families are engaged in a variety of trade and service activities. The detailed field studies involved household as well as community level inquiries into demography,

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health status and economy and patterns of natural resources use in 7 villages selected to represent varying levels of road access and links to markets and the town of Churchandpur. An additional 15 road side villages along a distance of 90 km from Churchandpur on the Tipaimukh road were studied to record the time course of changing patterns of use of land and forest resources (Hemam 1997).

Phases of Transition

Autonomy

One may discern three major phases in the history of changing relationships of Gangte community with the larger society; phases that may be termed autonomy, pacification and commodification. In the first phase which lasted till early years of twentieth century, the community members had extremely limited links with outside society. There were no roads and people had to walk for four or more days to reach markets where they may exchange hand woven cloth or honey for iron tools or rice. These journeys were hazardous as they may involve passage through territories of alien tribes which continued head hunting till the middle of nineteenth century. Each settlement was in consequence a largely self-sufficient and self-governing entity. Their base of subsistence was shifting cultivation with long fallows of about 15 years. There were no fixed village boundaries and individual social groups presumably shifted around from time to time. The settlements were located on hill tops; the valleys were considered unsafe and more vulnerable to raids from alien groups. Hereditary village Chiefs determined through primogeniture made all group level decisions in consultations with a council of elders. They assigned lands for cultivation and received about 16 kg of grain from all families in the group as a tribute for use in entertaining any visitors. In the course of cultivation the densest, tallest forest tracts were left alone as requiring too much labour for conversion to fields; the more recent fallows were also avoided. The people worshipped many natural elements including mountain peaks, streams, plants and animals. They strictly protected patches of

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sacred groves called gamkhap as also other spirit possessed lands called nungens. Also protected were bamboo groves called mauhak from which bamboo may be extracted only for house construction, but the shoots, much relished as food, were left alone. This preserved a luxuriant vegetation which led Captain Pemberton to remark in 1835: I know no spot in India, in which the products of the Forest are more varied and magnificent but their utility is entirely local (Pemberton, 1835).

Pacification

Late nineteenth and early twentieth century witnessed a transformation of this system with the development of incipient links with the mainstream India, then ruled by the British. Initially the British interest was guided by their ongoing wars in Myanmar; they wanted to ensure safe movements of British troops in the hill tracts of Manipur bordering Myanmar. A people without fixed, well defined villages and with traditions of killing aliens coming into their territories were an obvious threat. The British therefore concentrated on fixing village boundaries and assigning land ownership. Given the Gangte system of hereditary village Chiefs having a major role in all decisions including assigning land for shifting fields, they decided to confer on the Chiefs all ownership over land, converting others into tenant farmers from a legal perspective. However, during the British reign this made little operational difference in most areas, with no acceptance of private property in land by Gangtes, except in the Churchandpur town area beginning 1930's. Elsewhere Gangte community members continued to pay the village Chief a yearly tribute of 16 kg of grain as before.

Late nineteenth and early twentieth century not only witnessed the introduction of legal land ownership, but also of Christianity. Christianity spread slowly in the initial phase and had little impact on patterns of resource use or social organisation. However, Christianity rejects the attribution of sacred qualities and consequently taboos against killing of certain animals or

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felling of certain patches of forest like gamkhap. Conversion to Christianity therefore began to slowly erode the belief system underlying these conservation practices.

In this phase of colonial pacification there was little change in the economy. The road network remained extremely limited and the Gangte communities remained almost totally self-sufficient in terms of resource use. The fallow cycles for shifting cultivation were long, and substantial areas of forest retained protection in forms of sacred groves. By introducing the legal concept of private ownership and a religion that questioned attribution of sacred qualities to nature, this phase did set the stage for the radical changes that followed independence; but unlike on the mainland, it had limited impact in the absence of an access to markets.

Commodification

Indian freedom fighter, Subash Chandra Bose set up a “Free India Army” during the Second World War. This army collaborated with the Japanese and at one stage marched into Manipur through Myanmar. This action prompted the British to strengthen the road network of Manipur on a war footing, laying the foundation for the rapid development of transport and communication that began on independence in the 1950’s. This development of transport and communication was consistent with the policies of economic development and national integration that were adopted at the time of independence. These development policies encouraged forest based industries by offering them many resources including wood at highly subsidised rates (Gadgil and Guha 1992, 1995) . As the production of these industries grew at a rapid pace the demands outstripped supplies of the areas that were expected to meet the industrial requirements on a long term sustainable basis. The results were waves of sequential exploitation (Gadgil 1991).

The process of sequential exploitation may be visualised in the context of a heterogeneous resource base. For instance, in case of a plywood industry, the heterogeneity

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may involve trees of different species with varying levels of suitability for plywood manufacture, or trees of different girths, the larger ones being more desirable. The stocks may be located at variable distances from the factory, or at variable distances from a convenient railhead. Let there be N such distinct classes or components of a given resource with S_i denoting the standing stock of i^{th} component. Although questions have been raised about the concept of maximum sustainable yield, let us assume that there is a limit Y_i per unit time, say, a year, for yields from stocks of i^{th} component, such that an annual harvest H_i will lead to a decrease in Si if $H_i > Y_i$. Let V_i be the unit value of the resource component at its final point of consumption and C_i the unit cost of acquiring , harvesting and transporting the i^{th} component to that point, so that $P_i = V_i - C_i$ is the net profit per unit of the i^{th} resource component from its final consumption. One may then rank the N components in descending order of P_i, the component R_1 of rank 1 bringing in the highest level of net profit; R_N the lowest.

An optimal forager in ecological terms, or a rational consumer in economic terms would then tend to harvest the various resource components beginning with R_1 (Smith 1983). If the total annual demand $D \leq Y_1$, then the consumer meets all the requirements without depleting any resource stock. If total annual demand exceeds Y_1, then the most preferred resource would be overused. It is however possible that $D < Y_I$ for some less preferred resource i, which would be utilized in a sustainable fashion. In case, the total annual demand is greater than the sum of

$$\sum_{I+1}^{N} Y_i$$

sustainable yield limits of all the N components, i.e., $D > \sum_{I+1}^{N} Y_i$ then satisfying such demand would inevitably lead to a successive depletion of standing stocks of all resource components. Such overharvest and depletion would proceed in a sequence, beginning with component of rank one, and finally progressing towards exhaustion of stocks of the component of rank N. In the process the net profit realised would steadily decline from P_1 in the first year to P_N. How long

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this takes would depend on the relative magnitudes of annual demand D and total resource stocks

$$\sum_{I=1}^{N} S_I \qquad \text{(Fig.2)}$$

Market Economy

Bringing Churchandpur district within the mainstream of the market economy in 1950 s seems to have triggered off just such a process of sequential exploitation for two reasons; because the total forest resource demand was substantially stepped up, and because there was no social group sufficiently motivated to ensure a more sustainable pattern of resource use with a secure enough control over the resource stocks. Access to markets means that a community will no longer suffer an inevitable shortage of resources if those from their own vicinity are overused and exhausted. Neither is such a difficulty experienced by an industry consuming resources from over a larger spatial scale. Market access therefore reduces the motivation of the various parties concerned, local communities, such as those of Gangtes, as well as other consumers such as plywood industry for restraints on levels of harvests. At the same time conversion to Christianity has eroded the conservation motivation of local communities grounded in attribution of sacred qualities to various natural elements. Linkages to the larger national society also dilute the control of any one agency over any given resource base by bringing a variety of actors into play. Thus in the autonomous phase where a person might even be killed while passing through alien territory, there is a clear cut control by a local community. In the pacification phase this is legally recognised as the control in terms of ownership by the local chieftains. But in the post-independence phase of market economy the state Forest Department has stepped in to claim control over forest lands and forest resources. How this

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claim is to be reconciled with the claim over land ownership by the Gangte Chiefs has not been clarified. This uncertainty has affected the security of resource control by both parties. At the same time the traditional authority structure of a Gangte village community headed by a hereditary Chief with a council of elders has also been affected by the institution of a democratically elected village council. There are continuing contradictions in this system as well since the hereditary Chief remains at the head of the elected village council.

Under these circumstances, forest resources of Gangte villages have been affected by demands exceeding sustainable yield levels. These demands are no longer local, but reflect the markets not only of remaining parts of the state of Manipur, but rest of the country as well. Indeed market pulls come from even beyond national borders as Indian plywood was over some periods exported in substantial quantities to the mid-east. This has triggered off a process of sequential exploitation resulting in over harvests and exhaustion of components in the decreasing orders of net profits obtainable from their sale. This net value has two major determinants; the value of the material, and the cost of its transport to the market town of Churchandpur. Consequently, valuable wood such as Agor (Aquilaria aquatocha) close to the market town would be the highest ranked component, followed by other high valued produce such as cane. Low valued products such as fuelwood away from the market town or from roadhead would be amongst lowest ranked components. As figures 3 and 4 show there has indeed been such a history of exhaustion of different components of forest resources starting with those of the highest rank in terms of net profitability and progressing towards components of lower rank.

The traditional Gangte society is largely egalitarian. The hereditary Chief does enjoy certain authority in consultation with his councillors in the allocation of fields for cultivation, and in dispute resolution; he also receives a small tribute in the form of grain from all other households. However the grain is expected to help the Chief meet his obligations to offer hospitality to visitors, so that there is little differentiation in terms of wealth. This situation has

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drastically changed with the linkages to the market economy with the Chiefs now motivated to take advantage of the individual ownership of vast tracts of lands assigned to them. Their assertion of such ownership rights over the land or the tree resources standing on the land is against customary norms. The Chiefs therefore press home such assertions to a variable degree, depending on the level of the expected monetary gain. The higher the level of expected gain, the more firmly is ownership asserted by the Chiefs. In general such gains are highest close to the market town of Churchandpur, they decline with distance from the town and from the roadhead. As Table 1 shows this is reflected in the Chiefs' forcing all cultivators to buy plots of land close to the town; while in remote areas all that the cultivators pay is the traditional annual tribute of 16 kg of grain. Similarly close to the town community members pay a royalty to the Chief even for collection of fuelwood; while further afield they have free access to even more valuable timber.

This process of sequential exploitation of forest resources has also shaped patterns of use of land. Since the forest resources bring in highest levels of net profits closest to the market town of Churchandpur, all tree stocks have been exhausted in this area. In response settled cultivation on terraced fields has replaced shifting cultivation. New cash crops such as pineapple are now cultivated in these terraced fields. Even in more remote areas commercial plantations have been taken up of species like Agor, the highly valued wood that was the first to be exhausted even from areas far from markets.

The traditional land use pattern of Gangtes included leaving aside substantial areas as gamkhaps or so-called village forest reserves, as well as bamboo reserves and other spirit lands. These practices have been completely abolished in villages close to market towns where land and its produce have acquired high value. In some of the more remote villages the practice of protection of a village reserve forest (VRF) encircling the settlement has been revived after having been abandoned. This was a result of the recognition of the value of this VRF as a firebreak preventing the spread of fire to the settlement during the slash and burn operations

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(Gadgil, Hemam, Reddy 1998). The traditions of protection of such forest patches still continues in other more remote areas.

Links to markets has meant access to many new goods such as soaps and transistor radios for the Gangtes; goods that need cash for purchase. Sale of timber, fuelwood and other forest produce such as cane is the only source of cash for Gangtes. But generation of this cash has led to a reduction in the return of nutrients to the fields in slash and burn cycle with a depletion of the standing tree stocks. This has reduced the levels of productivity of shifting cultivation (Ramakrishnan, 1992) . The spurt in population growth, with a rate as high as 4% in some of the north eastern hill areas has also increased the pressure on land, led to a shortening of fallow cycle and a reduction in productivity of shifting cultivation. The net result is that today Gangtes depend on market for about 30% of their food requirements and over 50% of other needs. Cash incomes have therefore become an important necessity for them (Hemam,1997).

These cash incomes come from harvests of forest produce, either through its sale, or through wages earned as labourers in tree felling operations taken up by contractors. With the assertion of land ownership and demand for royalty by Chiefs, part of the profits go to them. However the Chiefs are unfamiliar with the skills of development of infrastructure such as roads, organising transport and marketing of forest produce. As a result outside contractors carry out most of the timber harvesting operations, retaining bulk of the profits for themselves. Thus in Nalwan village the contractor paid Rs.50,000 (US $ 1600) for rights to harvest timber from an area of over 1000 ha. A conservative estimate of the value of timber thus accessed is Rs.60 million given a standing stock of 100 tonnes/ha and price of timber at Rs.600/tonne. The Chief was then paid less than 0.1% of the timber value. Of course the contractor would have to invest in labour charges, making roads and transport. Nevertheless, it is clear that bulk of the cash income flows to the contractor, a part to the Chief, and a very small fraction to members of Gangte community. The Gangtes use this cash flow to meet their routine requirements. None of it is saved, or invested productively in ventures such as developing horticultural plantations to

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replace shifting cultivation fields. In the long run then the whole process of forest resource use taking place today is leading to exhaustion of these resources with little gains for the Gangte community members.

Options for the future

The current non-sustainable pattern of forest resource use thus has many negative implications. It is nevertheless inevitably progressing to more and more remote areas of Churchandpur district, as also to other parts of north eastern hill states with continuing development of transport and communication. It is pertinent then to enquire whether it may be possible to put in its place a more sustainable pattern of forest resource use, which would also bring in a more equitable share of benefits to the people. There are two major schools of thought in this context, schools that have been termed wilderness enthusiasts and technocratic conservationists (Gadgil and Guha 1995). We have discussed the ideas of the two schools with Gangtes during the course of our field work, as also solicited their own proposals.

The wilderness enthusiasts suggest that forest and biodiversity resources be protected through ensuring that the currently well preserved areas do not get linked to markets. The prescription then is to retain poor transport, communication facilities to such areas. But there are no remote areas in Churchandpur devoid of Gangte or other settlements. The reaction of Gangtes themselves to such a proposal is unfavourable. All of them do wish to avail of improved transport and communication facilities. The development policies of the state, wishing to tap resource stocks from more and more remote areas are also in conformity. It thus appears inevitable that communications and with them market forces would continue to reach out to ever more remote areas, and that the prescriptions of wilderness enthusiasts have little chance of success in the long term.

The technocratic conservationists repose their faith in the efficiency of state machinery to manage forest resources in a sustainable fashion in the broader national interests. They

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therefore advocate state control over all forest lands, such as those of Gangtes, and state sponsored switchover from shifting to settled agriculture and horticulture. The empirical evidence on this score however does not sustain the claims of technocratic conservationists. The forest departments everywhere in the country have presided over non-sustainable use of forest resources supplied at highly subsidised rates to the industry (Gadgil 1991). The development programmes aimed at switchover of shifting to settled agriculture and horticulture have also by and large failed to achieve the objectives (Ramakrishnan 1992). Gangtes too respond negatively to proposals of technocratic conservationists. They contend that the state machinery is inefficient, corrupt and interested only in serving its own interests in league with other economically powerful actors such as timber contractors.

What then are the alternatives? The proposals put forth by Gangtes call for clarity in the regime of control over the resource base. They would like the ambiguity as to what the rights of the Chief, other community members and Forest Department are removed. They also propose that the rights primarily reside with the Chief and the local community with the Forest Department playing a facilitatory role. The Gangtes definitely wish to make a transition to a cash economy, and they would like Government support in helping them do so. They suggest that such support take the form of development of infrastructure such as roads and marketing facilities. Furthermore, they propose that they would be willing to take the responsibility of ensuring continuing protection to well preserved patches of forests such as gamkhaps in the more remote villages where they persist to this day. In return for guaranteeing continuing protection to these forest patches they would like financial assistance towards developing cash crops such as pepper and cardamom in place of shifting cultivation (Gadgil and Rao, 1994, 1995).

The solution that the Gangtes propose is neither continued isolation, nor state control, but a more secure resource control for the community coupled to state support to make a successful transition to a cash crop economy. They believe that under such a system they

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would be able to participate in a programme to ensure that substantial tracts of forest land, around 10% or so, remain under good forest cover and continue to serve as a dispersed system for conservation of biological diversity (Gadgil, Hemam and Reddy 1998).

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Figure Legends

Figure 1 : Map of the state of Manipur showing the location of district headquarters and Gangte villages

Figure 2: Schematic representation of the process of sequential exploitation. Where harvests exceed sustainable yields from various resource elements, maximisation of immediate levels of net profit would lead to concentration of harvests on the immediately most profitable resource elements, and sequential exhaustion of their stocks. In consequence levels of net profits would drop continually. Harvest levels may be maintained high for a time despite the drop in profits by switching to resource elements of lower ranks. The whole process ultimately grinds to a halt with near total exhaustion of all resource elements.

Figure 3 : Collection of royalty towards collection of timber or fuel wood by the village Chief. In the more accessible villages Chiefs assert ownership rights over all forest resources. For a distance of 35 km from Churchandpur town each family has to pay a royalty to the Chief for collection of fuel wood for sale; no collection of timber is allowed. Between 35 and 55 km from Churchandpur town community members are barred from collecting timber, but may collect fuel wood for sale without paying any royalty. Beyond 55 km from Churchandpur town the community members focus on collection of timber for sale on market. For this they pay no royalty to the Chief. At these distances there is no interest in sale of fuelwood since the transport costs are high. The circles and squares represent the distances to study sites from Churchandpur.

Figure 4: Year of near exhaustion of timber in relation to the distance from Churchandpur town. Timber resources from the vicinity of Churchandpur had been exhausted by early '40. Such exhaustion was restricted to a distance of 10 km from the town before the opening of Tipaimukh road in 1972. The opening of this road triggered rapid exhaustion of timber for a distance of 10 to 60 km from Churchandpur town over the next 20 years. Today timber is totally exhausted up to 60 km, and in a few localities beyond that up to 90 km. Some timber collection extends up to a distance of more than 200 km.

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Table 1: Resource ownership, sharing and utilization patterns among different sections of Gangte tribe at different levels of accessibility and modernization

		Shifting cultivation area		Settled agriculture area	Town area
		Less accessible	Easily accessible		
1.	Ownership	Village chief	Village chief	Private	Private
2.	Commercialization of forest and current forest condition	Little commercial exploitation and less degradation	Under heavy commercial exploitation , and degraded condition	No forest	No forest
3.	Onset of commercial forest exploitation	Still untouched, except for domestic use	Early 1970's	Early 1950s	Early 1930s
4.	Current status of exploitation	Little exploited, good forest cover	Heavily exploited, degraded forest	Completely exhausted	Completely exhausted
5.	Collection of timber	Free access	Pay royalty to the chief	No collection	No collection
6.	Collection of fuelwood	Free access	Free access for domestic use	Pay royalty to the chief	Pay royalty to the chief
7.	Maintenance of VRF[1] and Bamboo reserve	Still intact	No more	No more	No more
8.	Traditional rights of resource sharing and use	Still followed	All have disappeared except for free use of shifting fields and fuelwood collection for domestic use	No more	No more
9.	Collection from forest	Fuelwood, wild vegetables, timber and other NTFP[2]	Fuelwood, wild vegetables, timber and other NTFP	Fuelwood collected from forests of other villages	Occaional collection of fuelwood from nearby forests
10.	Land use	Shifting cultivation	Shifting cultivation, terraced cultivation	Wet rice cultivation, pineapple plantation	Habitation
11.	Commercial crop plantation	Chili and other vegetables	Banana, chili and vegetables	Pineapple, ginger, and other vegetables	Habitation
12.	Energy use	Human muscle power, fuelwood and little use of fossil fuel	Human muscle power, fuelwood and little use of fossil fuel	Human muscle power, animal power, fuelwood fossil fuel and electricity	Fuelwood, electricity, fossil fuel and less use of human and animal muscle power

1 = Village Reserve forest (VRF); 2 = Non-timber Forest Produce (NTFP)

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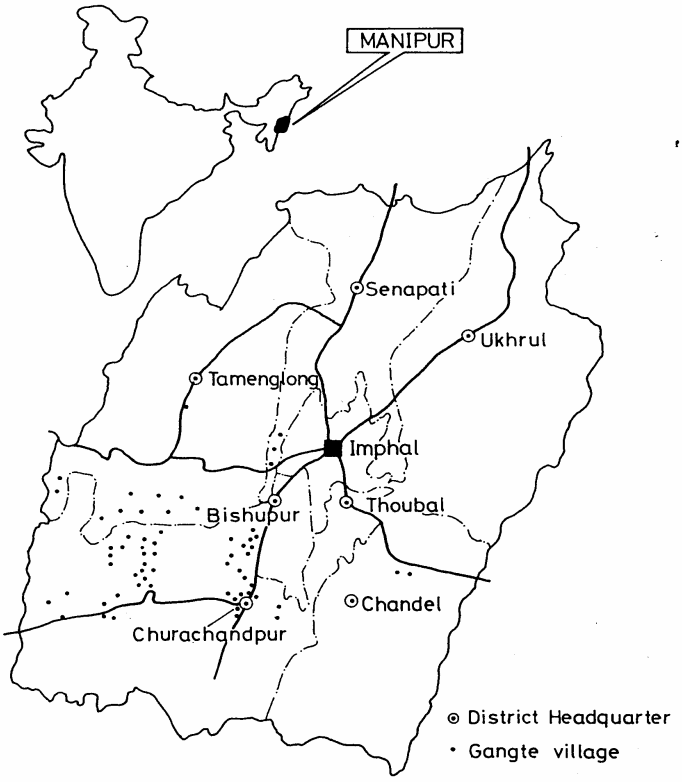
MANIPUR
Senapati
Ukhrul
Tamenglong
Imphal
Bishupur
Thoubal
Chandel
Churachandpur
District Headquarter
Gangte village

Fig 1

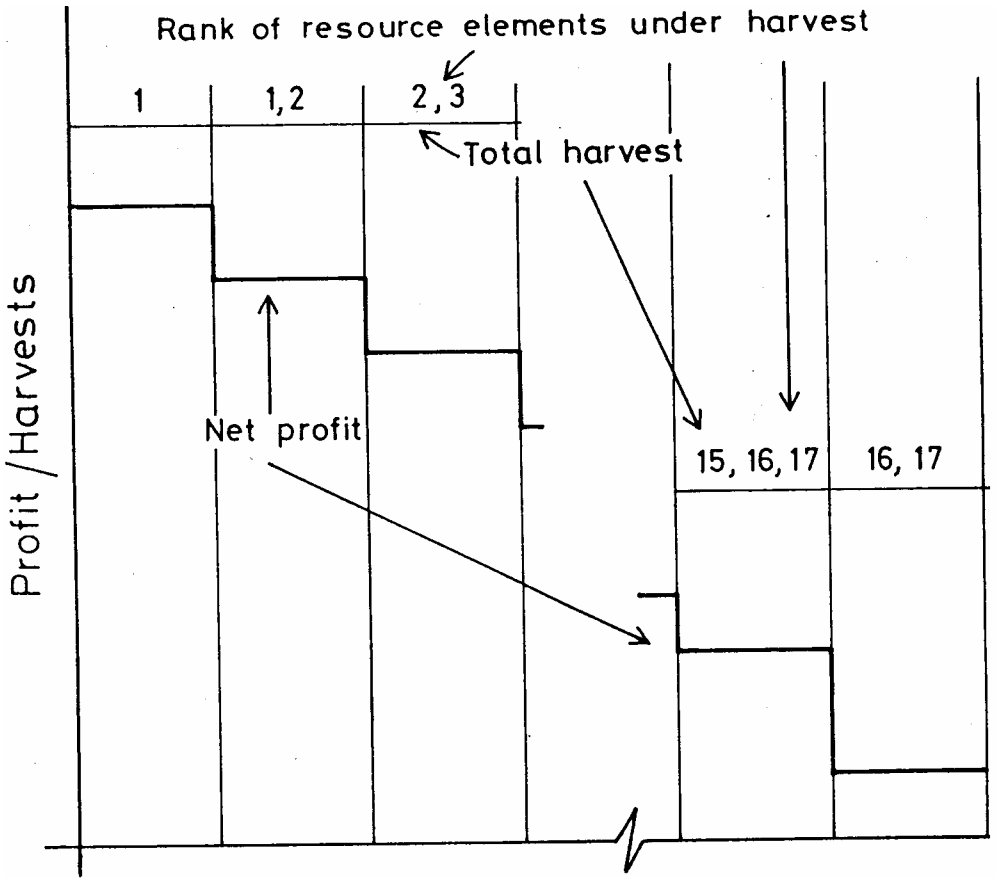
Rank of resource elements under harvest
1
1,2
2,3
Total harvest
Net profit
15, 16, 17
16, 17
Profit /Harvests
Years since inception of resource harvest

Figure 2

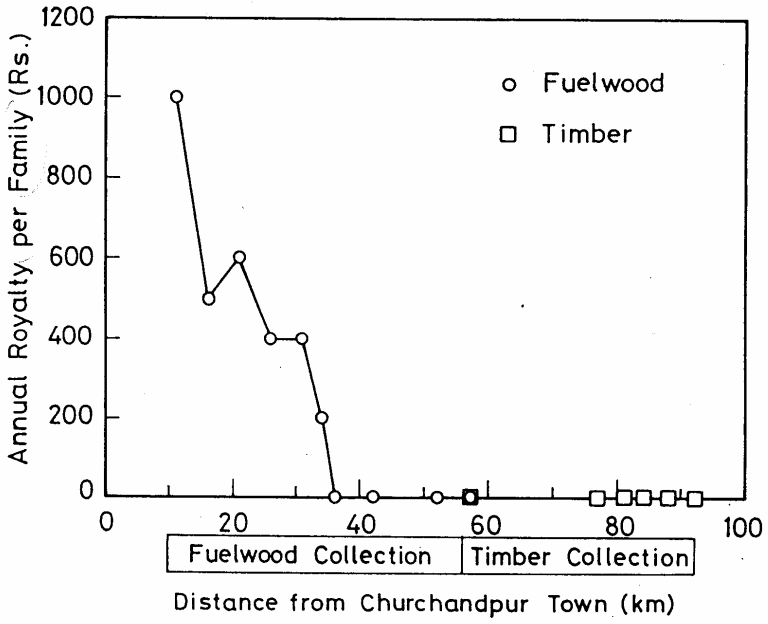
Annual Royalty per Family (Rs.)
1200
1000
800
600
400
200
0
0
20
40
60
80
100
Fuelwood
Timber
Fuelwood Collection
Timber Collection
Distance from Churchandpur Town (km)

Fig. 3

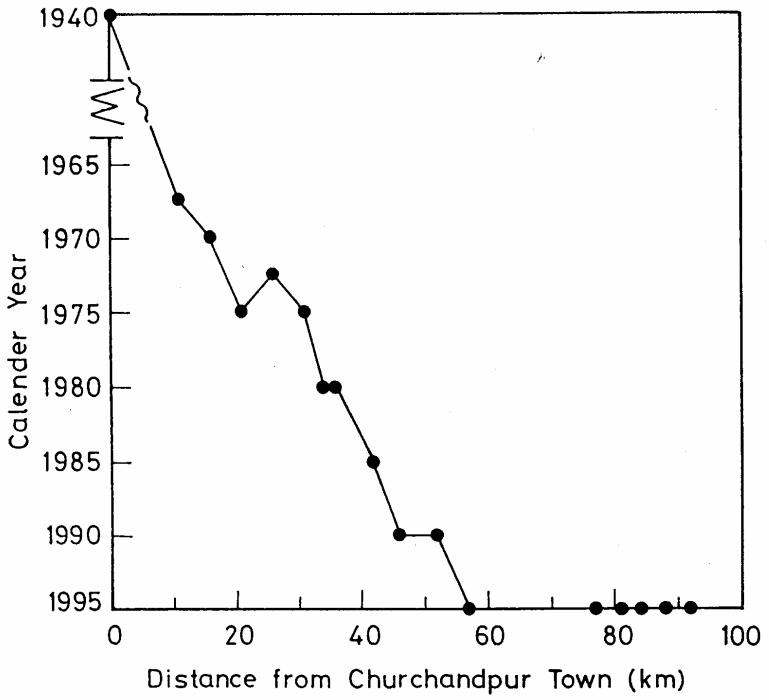
1940
1965
1970
1975
1980
1985
1990
1995
Calender Year
0
20
40
60
80
100
Distance from Churchandpur Town (km)

Fig. 4.