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Forest Farmers: A Case Study of Traditional Shifting Cultivation in Honduras

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Introduction

Smouldering areas of felled trees, heralding the conversion of ancient rain forest into yet more permanent, open grassland, have become one of the more poignant images of our time. Destructive conversion of forest to degraded farmland is often justified by citing the supposedly unsustainable nature of shifting agriculture in the forest environment. Agriculture has, therefore, gradually become synonymous with forest destruction in the tropics. Yet various indigenous peoples have been successfully practising agriculture within the world's tropical rain forests for thousands of years and these forests survived almost in their entirety until well into this century. The agricultural practices of one of these indigenous groups of forest farmers – the Tawahka in Honduras – illustrate that agriculture can be sustainable without inflicting irreparable damage on the forest. A comparison with the practices of the neighbouring campesino immigrants shows that it is not agriculture *per se* but rather a lack of knowledge and a variety of other external factors that can lead to permanent conversion of forest to other land uses.

The Tawahka

The Tawahka are a small group of Amerindians living along the Río Patuca in the Honduran Mosquitia region about 70 km inland from the Caribbean coast of Central America. The 900 or so people live in just five communities spread along some 50 km of the Río Patuca. The Tawahka are a riverine and forest people who fish and travel along the river and cultivate its margins, and hunt and gather in the surrounding forest. The language they speak is related to those of southern Central America and northern Colombia rather than those of the rest of Honduras, and linguistic studies suggest that the Tawahka have inhabited the Río Patuca region since ancient times, perhaps for as long as 4,500 years (Constenla Umana 1991) (fig. 1).

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Figure 1: The Tawahka region in Central America

The Tawahka understand that the river and their fields are ultimately part of a much wider environment which they call simply '*panpas*' – the forest. The streams which feed the river come from the *panpas*; the fields which the Tawahka harvest are cut from the *panpas*. It is a vast resource with which their lives are inextricably linked. The forest is viewed in a holistic sense as almost a living thing and plays a central role in people's vision of the cosmos. The expression of this feeling is seen most often in references to forest spirits. For example, it is deemed dangerous to make too much noise in the forest as this might upset the forest spirits, and killing too many animals or killing without reason will annoy the spirits. Allowing the forest to burn extensively while clearing fields insults all forest spirits. The Tawahka feel it is necessary to demonstrate their respect for the forest by observing certain rules, such as not hunting taboo animals like the howler monkey.

Tawahka Agriculture

The Tawahka farm primarily for subsistence. Although they have adopted new crops and agricultural practices in recent years they have retained many traditional ones. Despite being geographically isolated from the rest of Honduran society, the Tawahka are becoming part of the wider Honduran economy and the need to generate a cash income is an increasingly important concern for them.

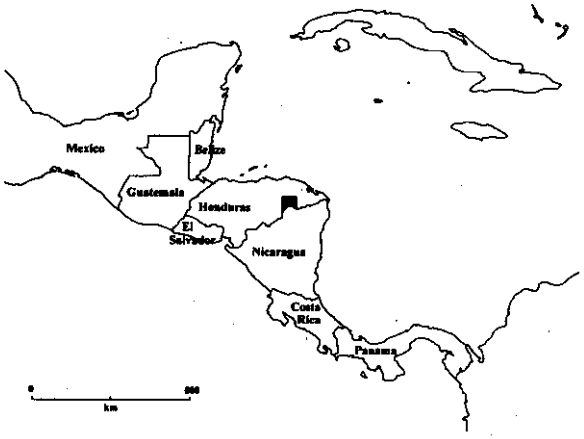

Figure 1: The Tawahka region in Central America

The Tawahka make extensive use of two major agricultural environments, the lowland along the river margins; and the upland above and away from the river. The quality of the lowland and upland soils differs considerably, the former being rich and fertile, the latter generally much less so. The Tawahka recognise 14 soil types, giving each one a different fertility rating. The tropical climate, with an annual rainfall of 2754 mm, enables crops to be sown all year round but a short, two month dry period adds seasonal diversity. The Tawahka also utilize the genetic diversity found between and within their crops to exploit fully both the physical and seasonal variations of their environment. These three elements – a rich diversity of crops and crop types, the diversity of soil types and the seasonal variation in rainfall – are combined with sophisticated management techniques to create the complex agricultural systems found in the communities today.

The Tawahka farm as individuals or as small family groups. The male head of a family has rights of usage both to the land he cultivates now and any he has cultivated in the past, and each farmer has both upland and lowland fields. The lowland fields are under almost continuous cultivation but the upland fields are managed on a swidden/fallow cycle where a short period of cultivation (the swidden part of the cycle) is followed by a long period of non-cultivation (the fallow). A typical upland site will consist of one swidden and several fallow fields. A Tawahka can only claim land he himself has farmed and stops expansion as soon as he comes up against neighbouring field sites. The farmer then moves on to another site, temporarily abandoning a group of fallow fields. When, or even if, the farmer returns to these fields depends on soil quality and distance from the community. Fields close to the community with good soil will be returned to earlier than more distant and less fertile fields. The amount of land held by an individual farmer is strongly correlated with his age. On average, a man acquires about one hectare of new land per year, so a young man in his twenties will hold around 10 ha whereas an older man in his fifties will hold around 40 ha.

Distribution of fields

The concentration of settlements along the river margin almost certainly existed before European contact and is very important in any analysis of Tawahka fields. The annually flooded beaches and low-lying flood plains of the river are relatively small but extremely fertile. Despite their fertility, however, these areas are at risk from flooding. The older and more weathered soils of the uplands are extensive and have the advantage of being free from the risk of flood.

The major agricultural environments around a community can be defined by the principal crops grown in each one. Krausirpi is the largest community and is a typical model. Here there are six major environments: orchard gardens, riverside gardens and bean fields occur in the lowlands; manioc fields and rice fields occur in the uplands, and house gardens are found within the community itself, which rises some 20 m above river-level (fig. 2).

Figure 2: Field patterns around the community of Krausirpi

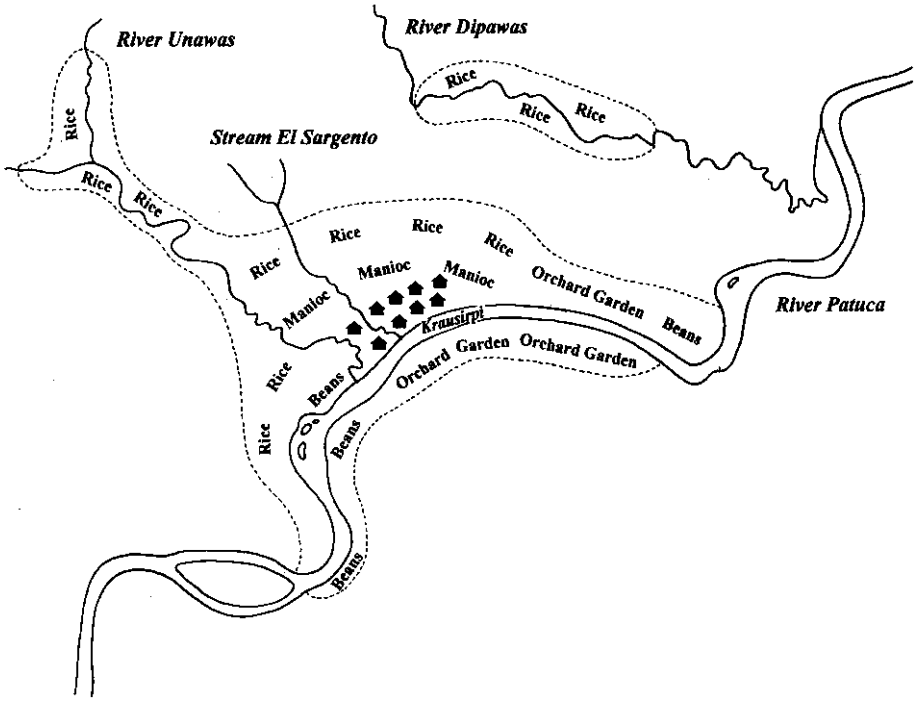

Figure 2: Field patterns around the community of Krausirpi

On the rich alluvial soils along the river is a whole series of orchard gardens. These blend imperceptibly together, so that the entire southern side of the river appears as a single, huge garden. Only the individual owners are able to ascertain where their gardens end and those of their neighbours begin. A similar but smaller series of orchard gardens is found on the north bank of the river, to the east of the community. The orchard gardens have been continually cultivated since the founding of Krausirpi and lie at the very heart of Tawahka agricultural practices. They are by far the most species-rich of the agricultural environments, containing all of the 76 species and more than 90 varieties of crop grown by the Tawahka. On the south bank of the river, in front of the orchard gardens and contiguous with them, are the riverside gardens, small clearings made on the river bank as the water level falls in the dry season.

In the uplands behind Krausirpi (i.e. away from the river) lie the manioc fields. These fields are separated from one another by fallow fields of various ages. In a large arc beyond the manioc fields are the rice fields. Recently, rice cultivation has been started along the banks of two small rivers, the Dapawas to the north and the Unawas to the west.

In any one year a Tawahka farmer usually cultivates four distinct field sites; rice field, manioc field, orchard garden and bean field. Sometimes a beach garden is also sown and the harvest of sugar-cane, pineapple and peach palm continues from fallow fields.

Farming in the Uplands

The upland fields supply the Tawahka with their staple foods, manioc and rice. Today, rice is probably the more important of the two in terms of caloric intake and certainly in total area sown. Rice fields are usually around three times the size of manioc fields. Both crops are incorporated in swidden/fallow cycles, though of different periodicity. Because of the different field sizes and ecological demands of the two crops, the decision to sow either manioc or rice at a site is taken before the area is cleared. Once this decision is made the early preparation of the field is the same for either crop. The fields are cleared by slash-and-burn in the dry season and sown or planted for harvesting in the wet season.

When an area has been selected the undergrowth is cleared from around the larger trees with a machete. A few days later the farmer returns with an axe to fell the remaining trees in groups. First the smaller trees of a group are partially cut through but left standing. Next, the larger trees are cut completely, pulling down the smaller members of the group as they fall. The farmers take pride in the number of trees that can be felled simultaneously in this way and in some cases almost the entire field can be brought down at one time. A few very tall and large trees may be retained in the field and protected by a fire break. These are created by felling surrounding saplings to fall outwards in a circle with the large tree at its centre.

Figure 3: Farming calendar for the major crops and associated agricultural activities in relation to seasons. The graph shows average monthly rainfall in millimetres; the shaded sections represent the dry season.
U=Upland; L=Lowland

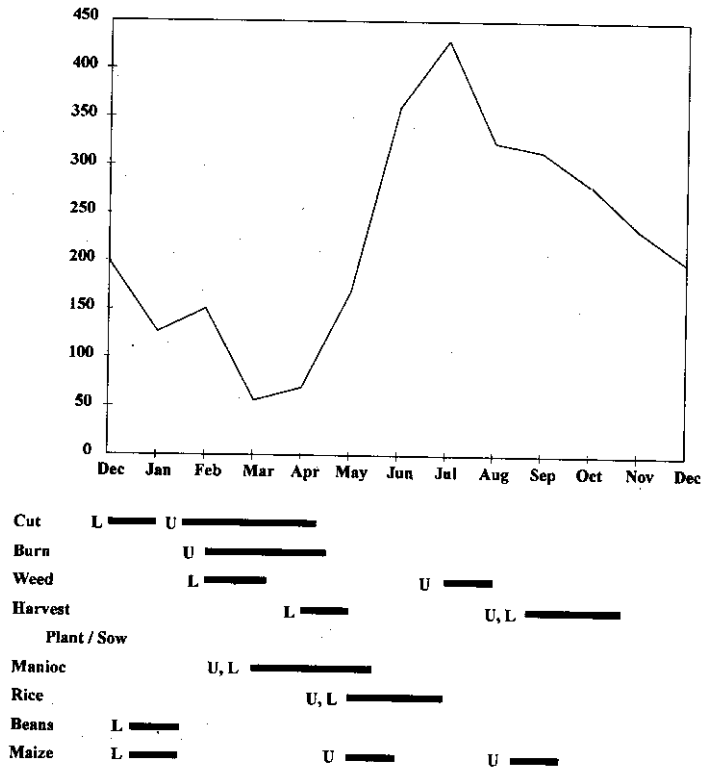

Figure 3: Farming calendar for the major crops and associated agricultural activities in relation to seasons. The graph shows average monthly rainfall in millimetres; the shaded sections represent the dry season.
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When cutting a new field from forest, more time is spent felling with the axe than clearing with the machete. In a fallow field of any age the reverse is true, and if the field is cut from young fallow it will only need to be cleared by machete. Fields are cut during the dry season (fig. 3), with most farmers leaving the undergrowth and felled trees to dry for a period of three weeks to a month before burning. Great care is taken to prevent the fire passing on to the surrounding forest. Fire breaks are made by cutting trees along the field margins to fall inwards, the row of parallel trunks creating a gap between the combustible crowns and the forest edge. Individuals are very aware of the activities of their neighbours and like to burn their fields at around the same time as other farmers. This need to keep in line with the rest of the community in agricultural practice is deeply ingrained in the Tawahka, and no-one likes to stand alone. Once the field has been burnt, however, individual management practices vary according to the crop grown.

Swidden/fallow cycles – quick, quick, slow

The practice of swidden/fallow is dependent on the fallow periods between successive periods of cultivation (the swidden part of the cycle) being sufficiently long for the soil to recover its fertility fully. The vegetation which invades fallow areas follows a succession which culminates in secondary forest. The Tawahka unanimously agree that the fallow does not mature for at least 10 years, but the length of time before the Tawahka return an upland field to cultivation is often less than this. The average age for manioc fallow, for example, is only four years and some fallows are even younger when they are planted again. The explanation for this reduction in fallow period lies partly in the ability of manioc to tolerate poor soil and competition from weeds (and thus to be worthwhile planting in fields which have not fully recovered) and partly in an understanding of the full swidden/fallow cycle which the Tawahka apply in the uplands.

Traditionally, the Tawahka sow only one crop before allowing a field to lie fallow. The most pernicious agricultural weeds, such as grass, do not have time to take hold before they are shaded out by a thick layer of invading, broad-leaved trees and shrubs. The speed with which this woody layer becomes established allows the field to be cultivated again within four years with very few problems from weeds. However, continuous cultivation on a four-year cycle would not allow a sufficiently long recovery period for the soil. To obviate this, the Tawahka appear to operate a ‘quick, quick, slow’ fallow cycle. Typically, a forest field is cleared and sown, normally with rice, then left fallow for about four years. Manioc or rice are grown

again, followed by a second fallow of four years before manioc is replanted. The field is then put down to a long fallow of up to 25 years. In this way, the Tawahka are able to exploit the full fertility of the soil without facing the problems of copious weeds in successive crops. It seems that even though the Tawahka view the establishment of mature fallow, i.e. one in which pioneer trees form a continuous and unbroken canopy, as being a useful guide to soil fertility, in practice they make individual assessments of soil fertility in each field, depending upon factors including soil type and previous harvests, and lengthen or shorten the fallow period accordingly.

Although even mature fallows are distinct from primary forest, a striking aspect of forest regeneration in Tawahka fallow is the speed with which woody pioneer and forest species come to dominate, and the high species diversity that is recreated. In a study of 24 fallow fields of different ages between 1 and 27 years, all the 1-year fallows were already dominated by shrubs and pioneer tree species, and virtually all agricultural herbaceous weeds including the grasses had been eliminated. In 10-year fallows pioneer trees were the most dominant group forming a low canopy of around 8 m. The second most dominant group at this stage were forest trees. In 25-year fallows these forest species were beginning to dominate the fallow, forming a canopy of around 20 m. 310 species were recorded in the fallows including 110 trees. This compares with 180 tree species recorded in a 4.5 ha. sample of the surrounding forest, albeit using different sample sizes and recording methods. Of the 110 ‘fallow’ tree species, 73 were also found in the forest sample, indicating that, although old Tawahkan fallows are dominated by primary forest species, their composition still differs from that of primary forest. Nevertheless, in terms of the rapid regeneration of a wide array of forest species, Tawahkan fallows appear to mimic behaviour observed in natural forest gaps.

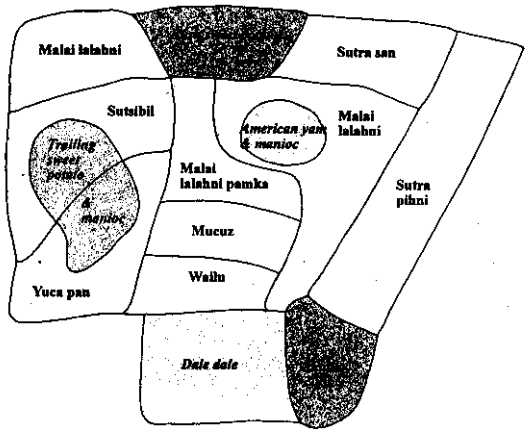
Upland manioc

The Tawahka maintain a total of 22 varieties of manioc with an average of nine varieties planted in any single field (fig. 4). Tawahka farmers stress that a loose and well drained soil is more important for cultivating manioc than one with a high humus content. Thus any of the sandy or stony soils around Krausirpi are favoured. Distance is another factor taken into account when selecting sites for manioc fields. Manioc is harvested once or twice each week over a period of nearly 12 months so it is desirable to have the field within easy walking distance of the community. Women are normally involved in harvesting manioc but any field situated a long

way from the community is harvested exclusively by men as the women do not like to travel far from their homes. As no original forest remains in the immediate environs of the community, manioc is now almost exclusively grown in fields cut from fallow. Fields are usually about 0.25 ha in size.

The first manioc harvest begins about four months after planting. Once the new manioc fields come into production, manioc is no longer harvested from the old ones but interplanted minor crops remain important. These may be planted in separate patches scattered around the field, or intersown with the manioc in a genuine polyculture (fig. 4). The most important minor crops are sweet potato (*Ipomoea batatas*), yautia (*Xanthosoma sagittifolium*), American yam (*Dioscorea trifida*), dale dale (*Calathea allouia*), sugar-cane (*Saccharum* sp.) and pineapple (*Ananas comosus*). The life of the manioc field thus continues long after the main manioc harvest period, with both sugar-cane and pineapple continuing to be gathered for up to five years.

Figure 4: Diagram of a manioc field, typically 0.25 ha in area. Minor crops are interspersed with a patchwork of manioc varieties.



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Rice monoculture

Rice was introduced to the Tawahka communities in the 1950s and has since become one of their most important crops. Rice fields are easily the largest sown by the Tawahka farmers (excluding those of plantain, which accumulate over a number of years), and are commonly between 0.5 ha and 1 ha in area (fig. 5). While manioc fields are cut from fallow, rice fields are mostly cut from primary forest. This is partly because rice is a nutrient-greedy crop and forest-cut fields are very fertile. They also appear to have fewer weeds than fallow-cut fields, an important consideration as rice is more susceptible to weed competition than manioc, more laborious to weed and grown on a larger scale. The distance of the field from the community is less important than for manioc fields as the rice harvest is a single event and regular access is not so necessary.

Some farmers do cultivate rice in fallow-cut fields. Indeed, some farmers claim that the richest soils are to be found in particular fallow-cut fields. The age of fallow used for rice is always either four to five years or more than ten years. When the soil of an area is particularly suited to rice cultivation and a good harvest has been achieved, the farmers tend to re-sow the field with rice after four or five years. On the darker, moister soils of valley floors and depressions this seems to be the period needed for woody material, both trunks and roots, from the first felling to break down completely and enrich the soil, and for the regenerating woody layer to shade out herbaceous weeds. On poorer soils the longer fallow of ten years or more is required for soil recovery. Such soils may be less fertile either intrinsically or because they have been cultivated two or three times before being given over to fallow.

Figure 5: Diagram of an upland rice field, typically between 0.5 ha and 1 ha in area. Different varieties of rice and any minor crops are grown in separate blocks within the field.

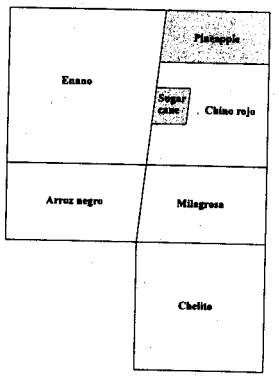

Figure 5: Diagram of an upland rice field, typically between 0.5 ha and 1 ha in area. Different varieties of rice and any minor crops are grown in separate blocks within the field.

Most rice fields are sown with three or four distinct varieties in separate blocks marked out before sowing begins (fig. 5). The Tawahka have 11 varieties of rice and by growing varieties which mature at different times farmers can spread the harvest and insure against the possible failure of a variety. Rice is intolerant of competition and is not intercropped by the Tawahka although separate patches of some other species, such as pineapple and sugar-cane, do share the same field.

Other upland crops

Maize is cultivated in the upland in the wet season although it is most often seen interplanted with beans as a lowland dry season crop. The Tawahka have four varieties of maize, though they claim once to have had more. Sugar-cane is frequently associated with rice and, like maize, is usually grown in a separate patch in a corner of the rice field. Some farmers grow only a few plants while others will plant an area of 0.25 ha or more. Twelve varieties of sugar-cane are distinguished.

Patches of pineapple are also grown around the rice field. This very popular fruit is consumed in vast amounts during the harvest season and some farmers will dedicate as much as 1 ha to one or more of six varieties. Both pineapple and sugar-cane are left in the field after the rice harvest and may remain productive for several years.

Both beans and plantain are predominantly cultivated in the lowlands, but are occasionally found in the uplands. Beans are grown in the wet season but only where the soil is very fertile and well-drained. Their yields are well below those of dry-season lowland beans, and the plants seem to suffer more from animal damage, but the crop comes in at a time when beans are otherwise scarce. Drought-resistant varieties of plantain may be planted as a follow-on crop to manioc or rice on fertile and moist valley-bottom soils in the uplands. They are harvested for several years after which the site is abandoned to fallow.

Lowland Fields and Gardens

Bean fields

The common bean (*Phaseolus vulgaris*) was introduced to Krausirpi along with rice in the 1950s. It is eaten whenever available and can form a part of each of the three

daily meals. It entirely replaced the native sinak bean (*Phaseolus lunatus*), which was only re-introduced to Krausirpi in 1995. Like manioc and rice, beans are often planted as monocrops, although they may also be interplanted with maize. Farmers lucky enough to own two or even three lowland sites are able to plant orchard gardens and separate bean fields. Farmers who own only one site plant an orchard garden and grow beans within it.

The fields that are farthest from the community and most prone to flooding are generally best suited to bean cultivation. Flooding raises the fertility level of the soil and the length of fallow between bean crops can vary from a single dry season to as long as 15 years, depending on the frequency of inundation. Fields which are flooded less often are usually planted with plantain during the fallow period. In this rotation the period between bean crops settles to around five years, the same as that used when beans are grown among plantains in orchard gardens.

Clearing and preparation of bean fields occurs at the end of the wet season and necessarily differs somewhat from that of upland sites. The cut foliage is too wet to be burnt easily so it is left to form a mulch of decaying organic matter. Large, unwanted trees are not felled until after sowing, which is done through the mulch.

Orchard gardens

On fertile lowland soils the Tawahka exchange the swidden/fallow cycles of the uplands for an agricultural succession or rotation which allows the alluvial soils to remain in almost continuous cultivation. All of the suitable sites within the immediate area of Krausirpi are now used in this way and the term garden is used to reflect the intensity and continuity of cultivation in these areas. The only time such gardens cease production is during periods of extreme flooding which occur every seven to eight years.

Orchard gardens are commonly between one and four hectares in size. Comparison of these areas with similar but uncultivated alluvial sites further along the Río Patuca suggests the original vegetation was probably a mixture of low forest, liana forest, gamalote grass (*Gynerium sagittatum*) and more or less isolated trees such as ceiba (*Ceiba pentandra*) and higuera (*Ficus insipida*). These large, buttress-rooted species are difficult to cut down and survivors still dominate the orchard gardens today. Both trees are believed to provide homes for forest spirits and have strong taboos against felling associated with them. Around and beneath these huge

trees is a mixture of fruit trees, plantain groves, cacao plantations, agricultural clearings, and sometimes separate patches of rice.

Plantain groves are the dominant feature of orchard gardens, covering up to 3 ha. The Tawahka have 22 different types of plantain which are a central, year-round part of their diet. An orchard always contains new and mature groves of large, cooking plantains. These last for only two years so a new patch is planted annually to guarantee a continual supply. All other plantain varieties remain in production over a much longer period. The Tawahka select the strongest and healthiest parents for reproductive material and weed out any seemingly unhealthy individuals.

Increasingly nowadays, cacao is being interplanted with plantains. Some farmers grow as much as three hectares of cacao, having converted almost their entire orchard gardens to exploit this new market. Within the last five years almost all Tawahka have started to grow cacao, which is the most valuable cash crop on the river. So far, the increase in cacao production has not resulted in a reduction of staple crops, only their displacement to other areas. The cacao plantations occupy land which previously supported plantain groves and bean fields. The knock-on effect means that farmers now travel to more distant fields to cultivate beans and more time is spent cleaning and harvesting in the orchard garden, with up to three visits required each week. These visits almost certainly coincide with the collection of plantains and may last only an hour or so but increasingly large cacao plantations will mean ever longer periods in the agricultural calendar devoted to their care.

Apart from plantains and now cacao, orchard gardens are also the site for many different fruit trees. The most frequent of these is the peach palm, or pejibaye (*Bactris gasipaes*), but citrus, avocado, malacca apple (*Syzygium malaccense*), zapote (*Pouteria sapota*) and breadfruit (*Artocarpus altilis*) are all common. The trees are separated as widely as possible across the garden. Shaded ground under the fruit trees may be used for small nurseries in which various plants are reproduced. Lowland gardens are also the test beds for new ideas and the Tawahka frequently introduce wild plants to their gardens. These are mostly medicinal species. Increasingly, however, the Tawahka are sowing valuable timber trees such as cedro (*Cedrela odorata*) and caoba (*Swietenia macrophylla*) as these species become more difficult to find in the surrounding forest.

House gardens

House gardens have an important role within the Tawahka communities and are the responsibility of the women of the house. In these small gardens it is possible to find a whole series of useful plants from vegetables to common medicinal remedies and craft plants. The most prominent of these remains the tall perennial cotton (*Gossypium barbadense*) even though the Tawahka no longer possess the knowledge of making cotton thread. The important craft tree *Crescentia cujete* is also found here; its fruit is used to make bowls, cups and plates. The much-used dye plant turmeric (*Curcuma longa*) is commonly grown. Lemon grass (*Cympopogon citratus*) is a medicinal plant that is also popular drunk as a refreshing tea. Commonly grown condiments include albahaca (*Ocimum micranthum*), turuh tun (*Eryngium foetidum*) and the all important chili pepper (*Capsicum annuum* and *Capsicum frutescens*). Vegetables such as attii (*Cucurbita moschata*) are frequent. Some medicinal plants also have ornamental value, such as wahmactbu (*Urena lobata*) and bapula (*Tagetes erecta*).

Riverside gardens

One type of agricultural site falls outside both the upland swidden/fallow system and the lowland gardens. In December, as soon as the river level falls, the Tawahka cut small gardens from the long grass that grows along the river banks. These areas lie below the water-line for much of the year so riverside gardens are an ephemeral agricultural environment but one which enjoys high soil fertility, moisture content and good drainage. The crops from riverside gardens though minor are usually highly valued, both as an income supplement and for family consumption. Commonly these include beans, tobacco, tomatoes and watermelons.

Comparisons of Tawahka Agriculture with that of Other Indigenous Groups

Far from being an isolated case, the Tawahka are only one of a number of indigenous groups in the Neotropics who have developed agricultural practices that are closely in tune with their forest environment. Swidden/fallow rotations and orchard gardens are key components of many of these agricultural systems.

One well-studied but unrelated group are the Huastec Maya of Veracruz, Mexico. Unlike the Tawahka, the Huastec are not a riverine people. Huastec communities are much less concentrated, each farmer occupying his own farmstead (Alcorn 1984). The Huastec Maya's reliance on maize contrasts with the Tawahka's reliance on manioc and rice. Both the Huastec and the Tawahka, however, utilize and actively manage the secondary forest of fallow areas and the similarities become even stronger when we look at the Huastec *te'lom* which, like the Tawahka orchard garden, is an area of one to three hectares dedicated to agroforestry. Both *te'lom* and orchard gardens are found grouped together on rich soils in valley bottoms or by streams. The Huastec have less access to primary forest than the Tawahka and appear to plant proportionally more native trees within their orchard gardens.

Comparisons of Tawahka agricultural systems with those of riverine communities in the more distant humid Amazon lowlands also reveal many similarities. The Amuesha of the Peruvian Amazon, for example, maintain the same lowland/upland dichotomy as the Tawahka with very similar crop associations and seasonal variations (Salick 1989). The Amuesha resemble the Tawahka in planting manioc on the upland in the wet season and beans and maize on the lowland in the dry season. They also have orchard gardens on the lowland which contain considerable quantities of plantains. The Amuesha cultivate all the minor crops of the Tawahka and also duplicate some of the more subtle elements of Tawahka agriculture such as the lowland, dry season and upland, wet season cultivation of maize. The only major differences between the two systems would appear to be in rice cultivation. Whereas the Tawahka cultivate rice in separate fields and sow one wet season crop, the Amuesha include rice in the mixed structure of the manioc field and apparently plant two rice crops each year.

The Yanomami of the Venezuelan Amazon are another group which has similar patterns of concentrated settlement and cultivation of the river margins. The Yanomami are almost unique amongst Amazonian groups in using plantain as their main staple, rather than manioc (Lizot 1993). Like the Tawahka, they grow plantains on lowland alluvial soils by the river and possess an impressive number of varieties. The Tawahka were probably similarly reliant on plantain as a staple crop before the introduction of rice to the Mosquitia.

The Old and the New: Tawahka and Campesino Cultures

While the agricultural practices of the Tawahka have much in common with those of other indigenous groups to the North and South, they contrast dramatically with those of their nearest neighbours, Spanish-speaking campesinos who have over the last three decades migrated from the dry and ecologically degraded South of Honduras. They have settled both to the West and North West of the Tawahka reserve along the banks of River Patuca and River Wampu. The closest campesino communities are found along the River Wampu some 25 km North West of Krausirpi.

The Tawahka are successful forest farmers who understand fully the limits of each particular micro-environment in the area. The sharp distinction between management practices on rich lowland and poor upland soils illustrates this clearly. Permanent cultivation in the upland is not practised as it is known to be unproductive in the long run – a view not shared by their campesino neighbours. The conversion of rainforest to ranch land is the inevitable outcome of campesino agricultural practices, but while cattle ranchers drive the conversion of rainforest to grassland they are rarely the cause of the initial destruction. The most active converters of rainforest to grassland are small farmers. Like the Tawahka they are subsistence farmers, burning and cutting the forest to grow crops to feed themselves and their families, but they differ fundamentally from the Tawahka in how they view the agricultural cycle. The campesino farmers do not practise shifting cultivation or swidden/fallow cycles but are semi-permanent cultivators of the land.

Agricultural cycles and field patterns

The campesino farmers clear the forest, then repeatedly sow on the same site, year after year, until weed competition and soil depletion force them to abandon their fields. This semi-permanent cultivation has profound effects on the regenerative powers of the forest. As a campesino field is cultivated for several years it becomes completely surrounded by other, younger and still actively farmed fields before being abandoned, by which time the forest has been pushed back too far for easy or rapid recolonization to occur. The Tawahka sow a field only once before abandoning it so any field is surrounded by fallow fields of different ages and patches of mature forest. The resulting complex mosaic of field, fallow and forest created by the Tawahka may appear agriculturally inefficient but this very mosaic of habitats provides a rich reservoir, principally in the form of seeds, from which

regeneration of secondary forest in the abandoned fields can commence. Tawahka fallow fields are extraordinarily rich in species within a year after being abandoned. A considerable number of these species will be seedlings of trees found within the mature forest, not because their seeds have survived the burning and tilling process but because the natural seed fall in fallow fields includes seeds from mature trees still growing in the surrounding area. These simple differences between agricultural cycles and field patterns can explain the very different effects on the environment of Tawahka and campesino agricultural practices. But to understand why the Tawahka and their campesino counterparts follow these different systems, one must examine some of the driving forces within the two societies.

Crop diversity versus concentration

As this paper illustrates, the Tawahka farmer grows a diverse range of forms of numerous crops. While usually concentrating on a select few, he does not rely exclusively on any one of them. Even a shortfall in the bean harvest, whose protein content cannot be easily duplicated agriculturally, can be made up with fish and hunted meat. The Tawahka are almost entirely subsistence farmers to whom it makes little sense to sow more food than a family can consume, as access to the market place for disposing of surplus is very limited. By contrast, the campesino farmer grows far fewer crops in total and relies on just two of them – beans and maize – to produce the bulk of his agricultural output and the loss of either causes serious hardship. The campesino farmer also relies heavily on these species to produce a cash income. This reliance on only two crops means that when entering new forest sites he cultivates as much land as is physically possible in order to guarantee a successful harvest, knowing that any surplus can be readily sold. This locks the frontier campesino farmer into a 'boom and bust' cycle of large harvest and good times while the soil fertility lasts, and poor harvest and possible hardship as the soils are depleted.

Cattle ranching

Fertilizers could return some fertility to the soils but are expensive, and the entry of cattle ranchers into the equation makes this an uneconomical and unpopular option. Campesino farming turns forest into grassland ideal for cattle and ranchers move in behind the subsistence farmers, buying up degraded agricultural land at favourable prices. The subsistence farmers then move on, vowing next time to put the profit from early harvests into cattle, the ultimate dream of most campesino subsistence farmers on the agricultural frontier. One curb to the establishment of

cattle ranches in the Tawahka area is the tradition in which all land is viewed as communal and therefore the property of no one individual. A man may have right of usage to the land, and can even own the trees growing on it, but he cannot own the land itself.

Indigenous knowledge

A more potent force is at work within the Tawahka communities, however, and one which is not found amongst the campesino farmers. This is the Tawahka's appreciation of the intrinsic value of primary and secondary forests, both of which are viewed as important resources. In a study of four and a half hectares of primary forest the Tawahka could name all 180 species of tree present, 95% of which are considered useful. Even when firewood (the most common use of any tree) was removed from the list of uses, more than 80% of the trees had at least one specific use to the Tawahka. In a study of secondary forest species, the Tawahka named 90% of all the species found along a two kilometre-long transect through 20 fallow fields of different ages (fig. 6) and reported that 60% of them had uses.

Figure 6: Diagram of a transect running for 2 km through Krausirpi and the areas north and south of the Río Patuca and including all of the main agricultural environments of the Tawahka.

The Tawahka also appreciate the value in real monetary terms of individual forest species. *Caoba* (mahogany) is a timber much-valued on the river for making dugout canoes which can be sold to neighbours further downstream. As well as *caoba*, the

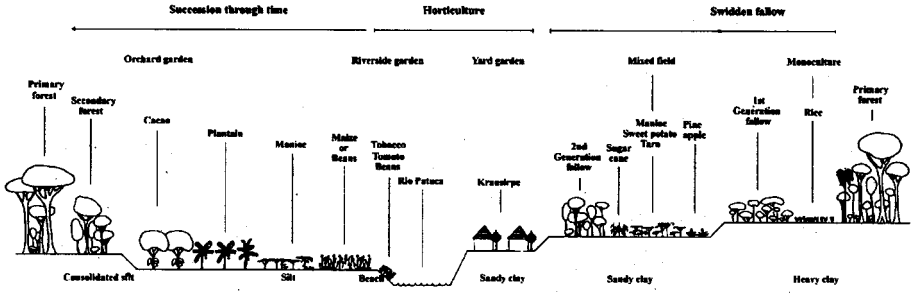

Figure 6: Diagram of a transect running for 2 km through Krausirpi and the areas north and south of the Río Patuca and including all of the main agricultural environments of the Tawahka.

Tawahka use *cedro* (Spanish cedar), a tree found in old fallows, to make canoes. Other forest products have or once had genuine monetary value for the Tawahka. In the last century rubber was a major export, followed later by the latex of both *chicle* (*Manilkara chicle*) and *tuno* (*Castilla tunu*), which is also the traditional source of bark cloth. Today cacao is the main cash crop of the Tawahka: it grows wild within the forest and the first cultivated trees were brought from there. A continued interest in medicinal plants from the region means that certain species have sufficient value to be worthwhile exporting from the forest to the Honduran capital of Tegucigalpa. For the Tawahka farmer, therefore, any plant is a potential future asset and might become the export crop of tomorrow. The campesino, however, is a true frontier cultivator who knows little or nothing of the forest he is destroying. As it has no obvious value to him the idea of protecting parts of the primary forest or particular species within it is not taken seriously. The impenetrable secondary forest is regarded as a hindrance requiring considerable effort to cut and burn and is never allowed to develop.

Because cattle ranching is profitable only when carried out on a large scale it is unsuited to the campesino farmers who, from economic necessity, operate on a small scale and are rarely successful with cattle. Forest resource management, and particularly agroforestry, can be very profitable on a small scale but the lack of interest in it from campesino farmers appears to stem from their lack of understanding of the local flora, together with pressure from cattle ranchers and others with vested interests in the continued conversion of forest to pasture. The Tawahka do have campesino neighbours living much closer than the agricultural frontier. For at least the last 50 years, a small community of campesino farmers have lived only a one-day canoe ride up the Río Patuca. The residents of Tabacón are Spanish-speaking but have adopted indigenous practices and live in a style almost identical to that of the Tawahka themselves. It seems that their isolation over generations has forced the residents of Tabacón to employ more sustainable practices, a change both enabled and reinforced by their accrued knowledge of the local flora.

Stabilising the campesino communities and slowing their advance would clearly be of enormous benefit to the Tawahka since it would guarantee continued access to their most precious resource – the forest. Equally clear is the fact that the Tawahka have practices and knowledge that could benefit campesino communities in return. A major problem is persuading the campesino communities to adopt more

sustainable practices, to exchange the risks of short term gain for more certain profits from long term natural resource management and agroforestry. Even then, the factor of continued inward migration to the Mosquitia from other areas of Honduras would need to be addressed.

The Future

The Tawahka's traditional way of life – like that of many other indigenous shifting cultivators – is subject to change imposed by a number of social and economic factors beyond their control. In this case, the threat stems particularly from the cultural and agricultural frontier that is moving towards the Tawahka from Spanish-speaking Honduras. This frontier extends all along the southwestern edge of the Honduran rainforest belt, from the Caribbean coast to the frontier with Nicaragua. It exhibits a stark contrast between open grassland and cattle ranches on one side and rainforest on the other, a contrast made more potent by the fact that even a few years ago these open areas were supporting Tawahka villages and Tawahka forest agricultural systems.

Figure 7: Extent of the proposed Tawahka Asangni Biosphere Reserve, as formulated by the American ethnographer Peter Herlihly.

Aware of this force for change, the Tawahka are taking steps to safeguard their environment and way of life by setting up a biological and cultural conservation area which they hope will be incorporated into the UNESCO Biosphere Reserve

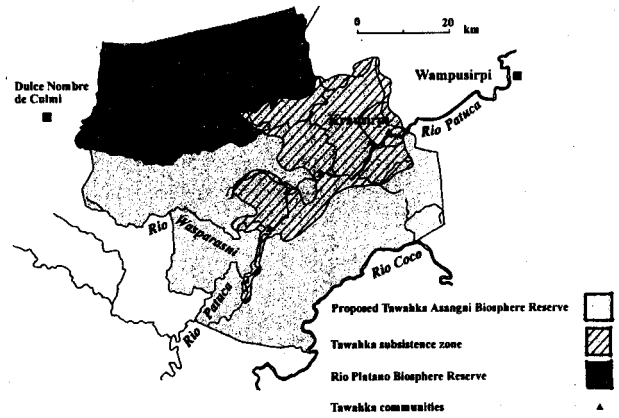

Figure 7: Extent of the proposed Tawahka Asangni Biosphere Reserve, as formulated by the American ethnographer Peter Herlihly.

programme. The Tawahka claim the right to manage this vast reserve, basing their claim on their pre-Columbian presence in the area and the continued prime condition of the surrounding forest.

A proposal for a cultural and biological reserve covering the remains of the traditional Tawahka homelands was drawn up by the American geographer Peter Herlihy in 1990 (fig. 7). With collaboration from the Tawahka people, he calculated the area required for subsistence for the Tawahka, including their hunting and gathering activities, as some 77,000 ha, of which 3,700 ha was agricultural land. Herlihy also proposed a buffer zone around this subsistence area, giving a total area of 233,142 ha (Herlihy & Leake 1990). The proposed reserve is some 150 km from the coast, in low mountains just west of the coastal plain of the Honduran Mosquitia. The southern limit is the Río Coco, which also forms the international boundary between Honduras and Nicaragua: the northern limit is the Río Platano Biosphere Reserve. This would make the proposed Tawahka Asangni Biosphere Reserve a link between the Río Platano Reserve in the north and the Bosawas Reserve to the south, in Nicaragua (fig. 8). In 1995 a draft law for setting up the Tawahka Asangni Biosphere Reserve was presented to the Honduran Congress following Herlihy's specification. The law is still before the Honduran Congress, meaning that the reserve's current status depends on a Presidential Decree issued in 1994 which identifies it as a legally proposed reserve.

Figure 8: The proposed Tawahka Asangni Biosphere Reserve will link two existing reserves, in Honduras and neighbouring Nicaragua.

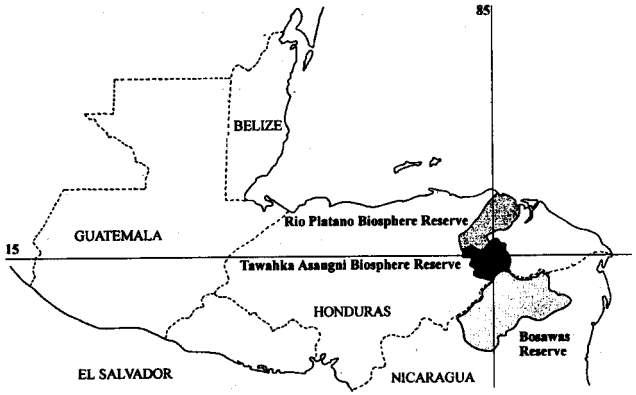

Figure 8: The proposed Tawahka Asangni Biosphere Reserve will link two existing reserves, in Honduras and neighbouring Nicaragua.

The Tawahka have become tireless campaigners for a reserve, believing that the future of their nation lies in preserving the forest frontier that separates them from their Spanish-speaking neighbours. They are well-organized politically and have an elected body, the Federación Indigena Tawahka de Honduras (FITH), which has taken on the responsibility of turning the proposed reserve into reality. FITH quickly realized that the biological diversity of the area and the traditional Tawahka management practices needed to be documented as part of this process and have made contact with various institutions keen to collaborate with them. The study on which this paper is based resulted from those contacts. All the studies carried out in the area so far show it to be a unique and important environment. The Tawahka confidently claim that they have lived and farmed in this area for hundreds of years and have not damaged its biological importance or integrity in any significant way. Some of the reasons for this are self-evident or have been elucidated by this study. For example the highly diverse and efficient swidden/fallow agricultural system of the Tawahka, which actively encourages forest regeneration, is supported by their detailed knowledge of the importance and value of all forest products. But it is evident that some aspects of their lives are changing.

Formerly, Tawahka communities were only semi-permanent: after a generation or so they would be abandoned as the distance to fields and hunting grounds became too great, allowing the forest to fully recover. Today the presence of permanent structures such as schools and churches means the Tawahka are much less likely to consider abandoning their communities. Indeed, the opposite is occurring, with families moving into the larger communities to take advantage of their better infrastructure. The increasing need to generate a cash income is also new to the Tawahka people. These factors need to be assessed as to their possible effects on the forest environment and, therefore, on the reserve. The Tawahka do have the advantage that every member of the communities is, in practice, a working ecologist with firsthand knowledge and an appreciation of the workings of the natural environment. They do not need to be convinced of the value of the biological integrity of any reserve. In addition, traditional practices such as swidden/fallow farming, agroforestry and sustainable harvesting of the forest itself point to a genuinely sustainable way of life that can also supply sufficient income to maintain an acceptable modern standard of living.

Doubtless, the Tawahka in the future will face some difficult decisions in their chosen role as guardians of the forest, but they are eminently qualified to tackle

these. As a society, the Tawahka fully appreciate the impossibility of remaining a cultural island, isolated from the outside world. They are coming to terms with this by actively developing their own programmes to address the problems of larger communities, cash income generation, clean water and sewage systems. They are also interested in establishing a botanical garden to investigate the potential of both native and introduced plants as part of a sustainable agroforestry project. Other possibilities include a craft industry working with sustainable forest products for export. Most important of all, they are commencing their own environmental education programme, in the Tawahka language, to teach their children how the Tawahka have always lived in the forest and must continue to do so without destroying it, for without the forest there can be no Tawahka.

References

Alcorn, J B, (1984), *Huastec Mayan Ethnobotany*, University of Texas Press, Austin.

Constenla Umana, A, (1991), *Las lenguas del Área Intermedia: Introducción a su estudio areal*, Editorial de la Universidad de Costa Rica, Costa Rica.

Herlihy, P H, & Leake, (1990), 'The Tawahka Sumu: A delicate balance in the Mosquitia', *Cultural Survival Quarterly* 14 (4):13-16.

Lizot, J, (1993), 'Yanomami natural resource use: an inclusive cultural strategy', pp 479-486 in: Hladik, C M, Hladik, A, Linares, O F, Pagezy, H, Semple, A & Hadley, M, (eds), *Tropical Forests, People and Food: Biocultural interactions and applications to development*, Man and the Biosphere series Vol 13, UNESCO, Paris.

Salick, J, (1989), 'Ecological basis of Amuesha agriculture, Peruvian Upper Amazon', *Advances in Economic Botany* 7:189-212, New York Botanic Garden.

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