

## Chapter 2

# **“Shifting Cultivators Conserve More Forests on Their Land than any Other Farmers, and Make It Productive at the Same Time”**

### **Forest Fallows and Their Importance**

Forest fallows are the most important component of shifting cultivation farming systems. Fallowing is a common agricultural practice all over the world. It is defined as ‘allowing crop land to lie idle, either tilled or untilled, during the whole or a greater portion of a growing season,’ or ‘land rested from deliberate cropping, not necessarily without cultivation or grazing but without sowing.’ Fallows are used to rest and revitalise soils after cropping. The precise role and appearance of fallows varies depending on the local ecological circumstances. Fallows vary from barren plains for moisture collection in arid regions to rain forests in humid areas. Forest fallows are fallows in which forests are allowed to regenerate on land after it has been used to grow crops. Trees take a comparatively long time to grow, thus forest fallows last longer and comprise a much greater proportion of the cropping cycle, and corresponding larger area of land, than fallows in rotational arable systems. Forest fallows enable restoration and conservation of forest ecosystem functions, while making the land suitable for the cropping phase that follows. They show variation depending on the local circumstances.

The problem with fallow land, and particularly forest fallow, is that it is rarely recognised for what it is. Particularly in tropical forest areas, land without a visible agricultural crop is often considered to be ‘unused’ or ‘wasteland’, and when it contains regenerating forest of various ages, it is considered to be ‘government forest’. From an outside perspective, fallow forest land appears to be unmanaged ‘open access’ land, available for use, and particularly for economic exploitation. There is a general lack of recognition of the interdependency of forest and cropping. Similarly, shifting cultivation is often interpreted as destroying forests to make way for agriculture, whereas in fact the farmers are nurturing trees and forests on their agricultural land (Figure 5).

One of the reasons for the misconceptions and misunderstanding of shifting cultivation lies in the different circumstances prevailing in shifting cultivation areas in comparison with the areas that the majority of policymakers and development workers come from, where forest land has been and is being cleared permanently to make way for agriculture. In areas with tropical and sub-tropical forests on steep slopes often subjected to extremes of rainfall farmers have chosen to develop rotational forests, rather than clearing the forests permanently and exposing the



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Figure 5: Forests are regenerating on what is technically agricultural land – (a) in the Garo Hills, Meghalaya, India and (b) in Dhading, Nepal

slopes to degradation. They clear small patches for a short period to use for growing crops, and then allow secondary forests to regenerate. Growing of crops and maintenance of forest cover are thus reconciled rather than becoming opposing uses.

Understanding and recognising the role of forest fallows is crucial to addressing the sustainability of shifting cultivation and the management of natural resources in general in the eastern Himalayas. In order to understand why forest fallowing developed as a methodology, and the importance of the fallow forests and trees, it is necessary to understand the ecological circumstances prevailing in the shifting cultivation areas.

The eastern Himalayas are characterised by tropical and sub-tropical semi-evergreen moist forests. The area is characterised by high average annual rainfall, most of which falls during a short period and thus has a marked effect on soils and vegetation. The soils have a high water drainage capacity, which means that most of the nutrients are stored in the vegetation rather than the soil. A thick humus and root mat is formed on top of the soil through which nutrients can be exchanged. If the vegetation is cleared for a longer period, soil fertility is no longer replenished and – more importantly – the root mat disappears and nutrients are no longer available for take up by crops. Trees are important to maintain the structural quality and drainage capacity of the soil, and to prevent the formation of impermeable hard pans that inhibit crop growth and water infiltration into the soil. For example, Cherrapunjee in Meghalaya, India, has one of the highest levels of rainfall on earth. After the forests in the area were cleared, there were no deep roots left penetrating the soil and a hard pan was formed. The topsoil was washed off exposing the hard pan, and now vegetation can no longer regenerate.

Forest fallows ensure that the structure and drainage capacity of the soil is maintained, and that there is a good humus and root mat. Thus they are the single most important component of shifting cultivation that makes it an appropriate and sustainable form of agricultural land use for sloping areas of subtropical and tropical forest. Finding alternatives that are suitable for these sloping tropical forest soils would be challenging. The disturbance for cropping is only temporary; and the tree cover needed to maintain fertility is retained (Box 1). The result is a patchy landscape with forest fallows at different stages and different types of agricultural plots<sup>1</sup>. The rotational pattern of forests and crop fields is managed at a landscape level, and maintained by local leaders or village heads who select and allocate plots to farmers each year. This requires a good knowledge of land properties as well as of the status of each of the fallow areas.

The economic function of forest fallows is substantial and forestry is a prominent part of shifting cultivators' livelihoods. Many poor farmers collect wild fruits and vegetables from the forests, which they sell in the local market to make a living (see Box 2). Different ages of forest provide different sets of products, which is an

<sup>1</sup> Cairns (2004, Figure 8) provides a summary of cultivation history and shows the typical layout of shifting cultivation blocks.

additional benefit of the patchy landscape. Fallows are managed in such a way as to provide a variety of products, including timber, firewood, bamboo, wild food, and medicinal plants. Although as yet little recognised, wild foods collected from forest fallows are vitally important for the livelihood security of farmers, and especially of the poorest.

### **Box 1: Shifting Cultivation and Soil and Water Conservation**

“An obvious question is what would have happened to the local environment in the absence of this fallow. Although there is lack of quantitative data, dryland areas are experiencing more soil erosion than ‘tseri’ [shifting cultivation] areas as per the observation of the local extension agents.” (Wangchuk and Tashi 2004)

There are almost no accurate data available. Quantitative data have been collected on soil erosion in a few studies, but only from the period right after the clearing, when runoff levels are highest. These are presented as average soil erosion levels from shifting cultivation land, even though data from the remainder of the cropping and fallow phases are missing.

### **Box 2: Most Useful Trees Are Not in Primary but in Secondary or Fallow Vegetation**

“Timber trees found commonly around the house are similar to those of the secondary or fallow vegetation. It is likely that there are more useful species in the fallows than in the primary forest. They include the following timber species: kanak (*Schima wallichii*), gamar (*Gmelina arborea*), goda (*Vitex* sp.), dharmara (*Sterospermum personatum*), bot (*Ficus* sp.), jam (*Syzigium cumini*), silkoroi (*Albizia procera*), and tetua koroi (*Albizia odoratissima*). Some hill slopes are also covered with muli bamboo (*Melocanna baccifera*) as secondary vegetation. Some recent fallows are covered with *Thunbergia grandiflora*, *Mucuna* spp., *Pueria* spp., sun grass (*Imperata cylindrica*), broom grass (*Thysanolaena maxima*), and other species.” (Khisa et al. 2004)

## **How Do Shifting Cultivators Manage and Enhance Forest Fallows?**

The presence of forest fallows is the main difference between permanent and shifting agriculture (Box 3). Shifting cultivation has certain practices in place to facilitate the forest fallows. The main ones are: 1) the rotation of agricultural fields, involving land planning and allocation at the landscape level; 2) planting and maintenance of trees in the cropping phase; 3) common-property land tenure regimes to allow shifting of plots; and 4) controlled burning for the re-opening of fallows. Slashing and controlled burning involve substantial labour costs as well as a level of community organisation that sedentary farmers do not have to deal with. Some typical practices related to the rotation of agricultural fields and tree management during the cropping phase are described below. The other two are discussed in later chapters.

### Box 3: The Fallow Cycle and Fallow Stages

The purpose of ‘forestry’ in the context of shifting cultivation is to maintain a healthy growth of secondary forests with enough biomass, but devoid of too many big trees. Clearing of large size trees is time consuming, especially considering the simple tools used by shifting cultivators.

The length of the shifting cultivation (jhum) cycle plays a critical role in soil recuperation and the natural regeneration of vegetation, which in turn determines the health of the local economy. The ideal jhum cycle of 20-30 years passes through three successions of weedy profusion, bamboo exuberance, and finally tree dominance. Each of these stages contributes to the conditioning of soils and biomass reservation. If the jhum cycle is less than 30 years, there is not enough time for a stable broad leaf forest to become established. If the cycle is less than 20 years or so, only two successions are possible and bamboo becomes dominant. When the cycle is further reduced to less than 5 years, the succession becomes arrested at the early stage of weed profusion, whereby the natural process of regeneration and recuperation of soil fertility is abruptly arrested or terminated even before it begins (Darlong 2004).

“Recent research, however, has produced a large body of work that has demonstrated the efficacy of many of these ‘weeds’, particularly *Asteraceae*, *Mimosa*, and others, in scavenging nutrients, building biomass, smothering grasses, and performing other fallow functions even in such shortened fallows.” (M. Cairns, personal communication)

## Land allocation

For the management of the plot rotation and distribution, the crop/fallow sequence is translated into terms of area. For example, if the shifting cultivation cycle is a total of eight years, with two years cropping and six years of fallow phase, a farmer (or group of farmers) will in any one year have on average two plots under cultivation and six plots under fallows of different ages. Thus the individual farmer’s land or the total shifting cultivation land area of the village can be divided into eight phases, with different crop combinations and fallow ages, depending on the prevalent land tenure regime and local customs. This area does not include any areas of permanent fields, community-protected forests, orchards, or commercial tree plantations that the village or individual farmers own.

Figures 6a and b show typical examples of shifting cultivation landscapes as seen from the air, with crop fields and forest fallows of various ages. The geographical spread pattern of plots and fallows depends on the way plot allocation and distribution are organised as per the customary institutions of each community. Some villages divide the shifting cultivation land into fixed blocks, within which each family is allocated a plot. In other communities, farmers rotate individually among their own fixed plots. The rules of access to plots vary from community to community, as does the level of control by customary village authorities. This perception of plot management at landscape level by the community differs greatly





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Figure 6: Forest fallows of various ages form a prominent part of the shifting cultivation landscape – (a), Meghalaya, India and (b) Nagaland, India

from the commonly held idea that the farmer opens plots at random in the jungle and ‘abandons’ the fields that are no longer of use. In general, the fallows and plot allocation are strictly managed and not open access. In the following, some examples are given from the case studies of different methods of plot allocation. They show that farmers make use of zoning and land capability assessment, as well as site selection criteria, when allocating land for cultivation and other purposes.

The Chakma community in Bangladesh traditionally classifies its land into various zones or land suitability classes. According to these classes, the land is allocated for cropping, forestry, and other purposes. The defined zones are villages, cultivation sites, fallows, and water bodies. Selection of sites for cultivation is based on soil texture and taste, soil colour, and the presence of certain species – with preference given to black soils with burrows of earthworms and covered with vegetation, preferably bamboo (Alam and Mohiuddin 2001).

In the case of the pangzhing type of shifting cultivation in Bhutan (Figure 7), women select the sites because they manage the fields and crops. The criteria used are:

- Closeness to the homestead – for convenience and effective use of scarce family labour;
- Fallow length – fallows of about 8 years are identified based on several vegetation characteristics;
- Soil characteristics – preferably blackish, and breakable with a fist (indicator of workability);
- Vegetation – pine seedlings and ferns should be enough to yield sufficient biomass for burning;
- Availability of mosses – as an indication of moisture in the soil and maturity of land. The farmers consider this last criterion to be the most important of all.

In many villages in North East India, the village land is traditionally subdivided into fixed blocks. Figure 8 shows a map of the jhum-blocks in Mongsenyimti, Nagaland, India. There are as many blocks as there are years in the shifting cultivation cycle. Each year the community cultivates the next block in a fixed sequence; each of the farmers is allocated a plot in this block. These blocks have been fixed for centuries, and sometimes they even have a name. This shows that in these villages the shifting cultivation cycle has never been reduced. This fixed pattern for occupying the blocks also has a cultural connotation; people remember their age by remembering the block that was cultivated in their birth year. Nowadays, in many villages shifting cultivation is no longer the only source of livelihood and labour is not as readily available as previously. Thus communities may decide to give up an entire block for conservation, and in other areas the blocks are split into two or three smaller ones, which results in a substantial lengthening of the fallow phase.

In response to the increasing pressure on land resources, farmers in some areas are developing innovations that allow them to produce more and stay longer on the same plot, under the same soil fertility conditions. They can thus postpone the



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Figure 7: Pangzing: high-altitude shifting cultivation in Bhutan



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Figure 8: Map of the jhum blocks that are cultivated in turn in Mongsenyimti village (Nagaland, India)



clearing of a new plot, and allow the forest on that plot to grow a few years longer, which in the long run saves labour.

The case studies on Ukhrul (Manipur, India) and Zunheboto (Nagaland, India) provided two examples of this. In Ukhrul, cropping has expanded from three to five years, and beyond in exceptional cases, and in Zunheboto to up to five or six years. This intensification is made possible by innovations in the crop selection, combination, and sequencing, and adoption of erosion prevention measures. The main restriction to how many years a particular plot can be cropped is actually the increasing occurrence of weeds, and the second is soil quality. A further benefit of this innovation is that it does not compromise on the basic tenets of shifting cultivation, particularly mixed cropping, sequential harvesting, and risk spreading, and is therefore particularly convenient to farmers.

The use of plots for cropping or fallowing is affected by the prevailing land tenure arrangements and government policy. In Nepal, during the cadastral survey, most fallows were classified as government forestland because they did not have any visible crops or crop remains on them. In the one case where a land title was granted, the fallow length has increased. In Bhutan, by law, land can only be fallowed for twelve years, after which it reverts to the government unless it is re-opened. In India, Bangladesh, and Myanmar, cases are seen where wealthier farmers are claiming parts of the communal land by establishing orchards or other types of perennial crops and trees. As long as these trees are on the land, they keep unofficial tenure of the land.

### **Maintenance of trees during the cropping phase**

In general more trees are planted on cropland in shifting cultivation systems than in most sedentary farming systems. Farmers enhance the biological efficiency of the forest fallows through sophisticated practices to maintain useful trees on their cropland, thereby intensifying the shifting cultivation. Multipurpose (usually nitrogen-fixing) tree species are protected during the clearance (slash-and-burn) phase, and managed during the cropping phase. Coppicing and pruning are used to reduce competition for sunlight, and also to optimise the production of fodder, mulch, and other tree products.

A typical example is the management of *Macaranga denticulata* by the Konyaks in Nagaland. The trees are fast growing and early colonising, they grow well in poor sites and regenerate prolifically. The Konyaks manage them as they would their crops, applying selective weeding, protection during burning, spacing of seedlings, and cutting of lower branches. The tree density of this system is up to 3000 trees per hectare, which is relatively high. Figure 9 shows examples in the Garo Hills, India, and Dhading, Nepal. Box 4 describes one example in detail, pollarding of alder in Khonoma. It is illustrated in Figure 10. A considerable level of sophistication is required for proper tree management.



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Figure 9: Tree stumps that are maintained during the cropping phase and early fallows provide seed for speedy regeneration – (a) Garo Hills, Meghalaya, India, (b) Dhading, Nepal

#### Box 4: Pollarding of Alder in Khonoma, Nagaland, India

The shifting cultivation area in Khonoma is characterised by terraces and dispersed alders (*Alnus nepalensis*) that have been pollarded for a very long time. Farmers often interplant a few fruit trees (e.g. *Eleagnus conferata*, *Dacynia indica*) or timber trees (e.g. *Melia composita*, *Hovenia dulcis*) among the alders. These are protected through subsequent jhum cycles, at which time the side branches are pruned to reduce shading on nearby crops.

The alders are pollarded yearly at an optimum time for seed to ripen, whilst avoiding insect damage, and when most energy is available for coppicing. The pollarding is done by climbing up the tree and chopping off the branches as well as any parasite epiphytes, leaving the bare stumps. The coppices are thinned twice in the first cropping year.

Alder trees are usually pollarded for the first time at about nine to twelve years of age, when they are both large enough and young enough to survive pollarding and support the coppices that will then grow. The cutting height is chosen so that it is sufficient to ensure the continued vigour of the tree and strong coppice growth, and further depends on competition with crops for light and space and the reach of grazing cattle. The proper pollarding technique is viewed as vital to the alder fallow system and is reserved for skilled hands.

The benefits of pollarding are that it allows for crop cultivation in two out of every four years, and that it increases the productivity of the alder. According to former Chief Minister Jasokie Zinyü: “Khonoma can only exist because of the alder trees.” (Cairns 2004)



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Figure 10: Pollarded alders in a jhum field in Manipur

## Forests other than fallows

Apart from the forest fallows, there are other kinds of forests in shifting cultivation areas, which are not part of the cycle, but do have a role in the farming system. Communities have conserved patches of primary vegetation from historic times, mainly for ecological and religious purposes. In recent times, home gardens have expanded and fallows have been converted to orchards and forest plantations to comply with the demands of the market economy. Some typical examples are described in the following.

In Empu para village, Bangladesh, the community has retained a 25 ha patch of intact three-storey tropical forest to protect its only water source, and to protect the village against accidental fire. Such village forests are quite common in the Chittagong Hill Tracts. Additional ecological benefits include regulating the village microclimate, wind breaking, and as mother trees to enhance natural regeneration in the fallows.

For the same reasons, the Konyak in Mon (Nagaland, India) maintain small islands of primary forests in between the shifting cultivation area, specifically in the outskirts of villages and in uncultivable areas. Although these are not production forests, hunting and collection of minor forest products is often allowed. They also have 'toko' gardens (the local name for *Livistona jenkinsiana*, a midsize palm tree which provides fruit as well as leaves, used as roofing material) which combined can cover up to 30% of a village area. Almost all communities keep patches of bamboo. In Nepal, the government has been harnessing and formalising such indigenous forestry practices through the community and leasehold forestry programmes, in which government forestland is handed over to communities to be managed for forestry purposes.

Plantations are promoted by governments and extension agencies in a bid to find alternatives to shifting cultivation that provide farmers with a livelihood, while at the same time maintaining forest cover. Species often used for this include several timbers, rubber, and cashew and areca nut.

## What Are the Opportunities and Constraints for Fallow Management in the Current Situation?

The studies show clearly that shifting cultivators conserve more forests on their land than permanent farmers, and make it productive at the same time. Farmers are well aware of the importance of forest fallows for reviving their soils. Therefore they try to do what is possible to maintain (or at least not undermine) the fallow functions even when introducing new farming practices. Efforts to maintain a high diversity of useful trees have been shown in recent farmer innovations like home gardens. In Chandigre village (Meghalaya, India) 37 seasonal crops and 30 perennial crops were identified. Some of this is discussed in the following chapters. Some of the opportunities and constraints for fallow management in the modern situation are summarised below.

## Improved fallow management

There are shifting cultivation areas in the eastern Himalayas where the fallow phase needs strengthening through technical, institutional, and/or policy options. In the above, we have shown how farmers manage the fallow phase, but such practices need policy and research-and-development support. One example of technical options for improved fallow management is enrichment planting, either during the cropping phase (as described above) or at the start of the fallow phase. In Nagaland, for example, farmers have planted timber species on their fallow land in an attempt to increase the value of the fallow forests, and lengthen the fallow period (Figure 11). This has met with mixed results, however, for lack of proper marketing and policy measures; there is a ban on selling unsawn timber outside the state and farmers have lost interest in the timber species.

In addition, other fallow functions, such as the recuperation of soil fertility and the production of minor forest products, should not be compromised too much. The question is whether the land is not too depleted of the nutrients needed for cropping after harvesting the plantation crop. Reports from Bangladesh indicated that orchards exhausted the soil rather than replenishing it, and cropping was not possible after cultivating orchards instead of fallow forests. This impinges on food security and increases pressure on the remainder of the shifting cultivation land. Indigenous commercial species may have the potential to provide income while performing fallow functions. All over the world, indigenous species (timber as well as fruit) are being identified that have both subsistence and commercial value.

The establishment of permanent plantations on fallow land has several drawbacks that need attention. The market for cash crops like rubber, coffee, and tea is highly dependent on the world economy as they are produced all over the world. Furthermore, farmers usually need a strong business partner to deal with the market, and farmers' cooperatives can only play a secondary role. Although timber harvesting may be allowed in certain areas, the timber market is often inaccessible for farmers, as they are faced with strong regulations on the one hand and illegal timber trade on the other.

## Community-based forestry

The option of community and leasehold forestry programmes in Nepal and joint forest management in India, though generally appreciated (Sharma and Chettri 2003), are controversial in shifting cultivation areas. In Nepal, some of the areas under consideration are shifting cultivation fallows that have been mistakenly identified as government land. The forests are now handed over to community groups, but often these are not the traditional tenure holders. The latter prefer to use the land for shifting cultivation, including fallows, rather than just forestry, and they maintain their traditional land claims. In India, joint forest management means sharing forest responsibilities and rights between government and communities. However, in communal fallows this means increasing government control and loss of rights for communities.





Nagaland Environmental Protection and Economic Development Project (NEPED)

Figure 11: Improved fallow management through outside intervention in Nagaland, India



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Figure 12: Participatory 3-dimensional modelling in Sasatgre, Meghalaya, India

## Participatory land use planning

The use of participatory 3-dimensional modelling (sometimes called P3DM) for participatory mapping and planning has helped communities to strengthen their resource management practices because it recognises shifting cultivation as a forest management strategy at the landscape level, and not just as agriculture (Figure 12).

As explained above, village councils manage shifting cultivation from a landscape perspective, identifying different areas for different uses at different times. This process has now been greatly improved, because participatory 3-dimensional modelling has made it possible for the community as a whole to discuss land capability and allocation, rather than just the leaders alone. When this tool was used for participatory planning in Sasatgre, Garo Hills (Meghalaya, India), the area that the community decided to clear that year was reduced from 141 to 40 ha. This, in turn allowed for a longer fallow period. The main reasons why this reduction was possible, was because land allocation could be done properly according to how much a family could actually work, and because the most suitable land could be selected.

Participatory 3-dimensional modelling was further used for planning during settlement expansion, identifying a good place for establishing orchards, and for negotiating with government officials about priorities for water source protection. Without the model, the government officials would have had to walk extensively to the different places, and the farmers concerned would not have been able to make their point.

## Policy Points

Some of the major points that should be taken into consideration during policy development are as follows.

- **Fallow land (even that with forest on it) should be classified as agricultural land for the benefit of both governments and shifting cultivators.**

All shifting cultivation land should be classified as agricultural land, including the fallow although it has forest on it. To the present day, fallow land is often considered to be forestland in which agriculture is practised. Others identify it as wasteland due to a supposed 'open access' regime. However, shifting cultivators put the land to valuable use and observe a strict common property regime, as opposed to every one taking whatever they please (Box 5).

- **The allocation of forest fallows to other purposes increases the pressure on the remaining shifting cultivation land.**

This includes re-allocation for settled farming with cash crops, plantations, reserved forests and protected areas, inundation for hydropower, and others. Allocation of forest fallow, rather than increases in rural population, may be the main cause for the shortening of shifting cultivation cycles. If the total land

available for shifting cultivation is reduced, greater tenurial rights and/or alternative non-farming income opportunities need to be developed, to alleviate pressure on the remaining shifting cultivation land.

- **Options for improving the livelihoods of shifting cultivators are more successful if they are in line with the ruling principles of shifting cultivation at the local level.**

Such principles include, soil regeneration through forest fallows, a common property regime, risk spreading, and agrobiodiversity.

**Conclusion:** “Shifting cultivation is more than just an agricultural practice - it is a forest management practice at the landscape level”.

#### **Box 5: Shifting Cultivation as Rotational Forestry**

“Shifting cultivation is widely condemned as one of the major causative agents in tropical deforestation, a primitive remnant of the past, and in need of reform. This thinking presupposes that these are forest lands periodically despoiled by marauding forest dwellers. Even the term ‘shifting cultivation’ suggests, misleadingly, not only nomadism, but also that agriculture is periodically imposed upon permanent forest lands. The logic appears to be that since these lands are intermittently covered with trees, then they should properly fall within the domain of forestry and agriculture should be discouraged. Careful analysis of the reality suggests that this argument should be turned upside down and, at least in some cases, these areas should more accurately be considered as agricultural lands on which farmers intentionally encourage trees to grow as an integral phase of a cyclical and sustainable farming system.

I therefore propose a revisionist view of ‘shifting forests on an agricultural landscape’, dramatically recasting the role of swidden [shifting cultivation] farmers from forest destroyers to forest planters and managers. This is more consistent with the world view of tribal peoples such as the Karen of northern Thailand, who describe upland cultivation as ‘baa muan wiang’, translating literally as ‘rotating forests’.”

From: Cairns, Keitzar and Yaden (2006)