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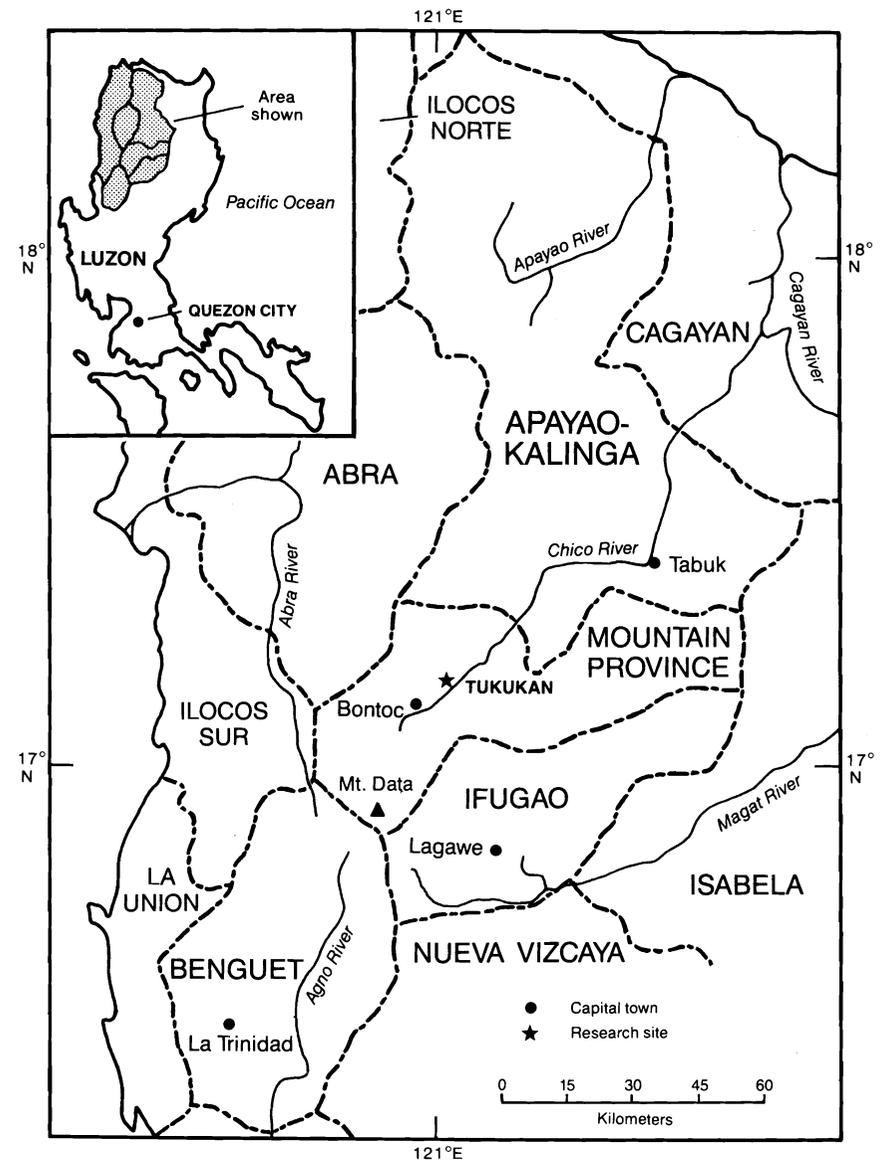
## The Bontok: Traditional Wet-Rice and Swidden Cultivators of the Philippines

June Prill-Brett

The Bontok live in the Central Cordillera of Northern Luzon. Because of their relative isolation until recent years, their culture and agriculture are still highly traditional. Bontok agriculture is primarily for subsistence although a small part of their produce is sold at town markets for cash to purchase such items as sugar, dried fish, kerosene, soap, clothing, and school supplies. Their agriculture is of particular interest because they have cultivated wet-rice and swidden gardens on rugged mountain slopes for centuries without the land degradation so frequently associated with agriculture in such areas. This chapter describes traditional agricultural practices that have enabled the Bontok to derive a secure and sustainable living and how those practices are structured by custom and ritual. Although the description applies to the Bontok in general, it is with particular reference to the village of Tukuran (Figure 3.1), located next to the Chico River at an altitude of 800 meters (m) and whose territory embraces an area of approximately 22 km<sup>2</sup> extending to an altitude of 1,680 m.

Bontok settlements are situated in river valleys and on mountain shoulders at elevations ranging from 800 to 2,100 m, wherever water sources are sufficient for rice irrigation. Village populations range from 600 to 3,000 persons. Three natural vegetation types occupy the area: broadleaf-evergreen montane forest at the highest elevations and pine forest (*Pinus insularis*) and grassland at the middle and lower elevations. While swidden agriculture has had little permanent effect on the montane forests occupying gentle slopes and summits, it has been responsible for replacement of the original montane and submontane forests on steeper slopes with pine forests and grassland. This appears to be a consequence not only of clearing the forest but also of fires set by the people during the dry season to keep the land open. It is possibly also a consequence of an accelerated rate of soil erosion when steep slopes are no longer protected by dense forest cover (Kowal 1966).

Figure 3.1. Location of Tukuran Village in the Central Cordillera of the Philippines



Many agricultural practices of the Bontok have developed as a product of continuous interaction and coadaptation of their agroecosystems and their social system. The knowledge these farmers have about their agroecosystems is a product of centuries of trial-and-error experimentation in farming techniques such as seed selection, the timing of crops, and water control. The successes have been adopted and institutionalized. Some of the Bontok farming practices, and the rituals that accompany those practices, may appear difficult to explain today since their rationales were set in the past. Nonetheless, many of the practices make sense in terms of the relations these people have with their natural resources such as land and water.

The Bontok population in ancient times was considerably smaller than it is now, and shifting cultivation was the main form of agriculture. Population pressure caused groups to split off to colonize new lands, a process that has accelerated particularly during the past several centuries, though there is evidence of earlier population movements in ritual myths (Brett 1977). Village territoriality has been important for structuring relations between the Bontok people and their natural resources by compelling each village to run its affairs within the clearly defined and finite natural resources of its territorial boundaries. Some of the rice fields in the area are known to date back at least three centuries, and an increasing role of rice over the years has led to a cumulative investment in permanent terraces and irrigation canals on the steep slopes. Construction and maintenance of these structures have necessitated the development of cooperative groups to deal with labor requirements when they exceed the capacity of a single household. These labor requirements, plus the need at times to enforce strict village territoriality by intervillage warfare, have led to an extremely tight social organization and high level of cooperation within the village. The scheduling of agricultural activities, for instance, is controlled by village elders who make decisions regarding all matters affecting the welfare of households in the community.

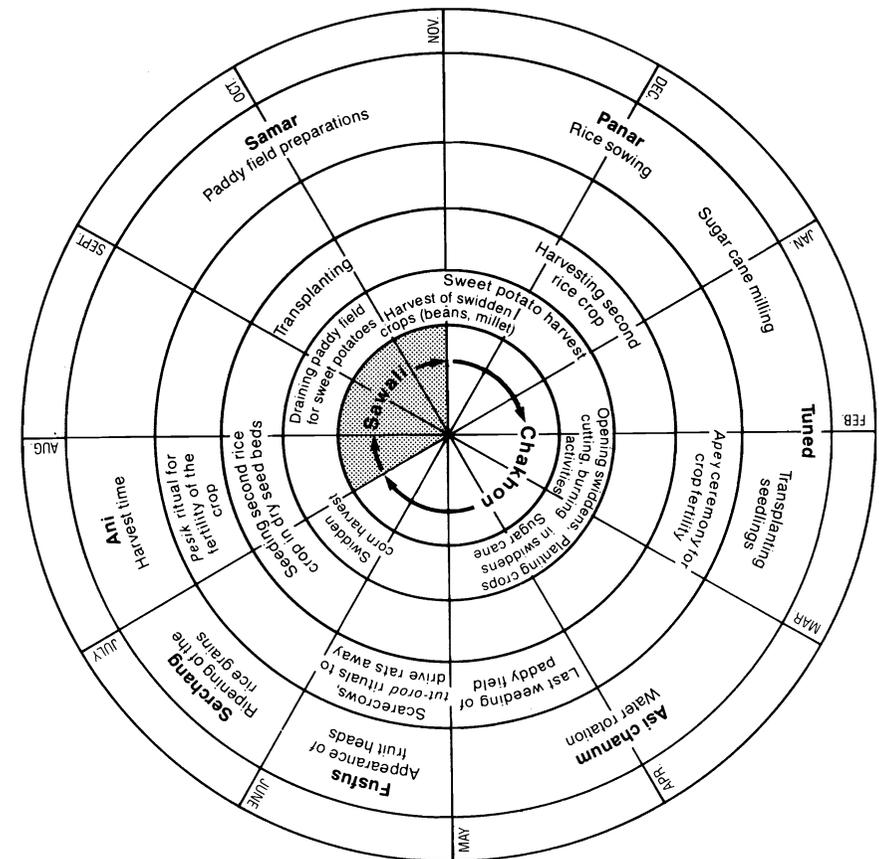
The Bontok agricultural calendar (Figure 3.2) is designed to make full use of available labor throughout the year while matching agricultural activities as well as possible to the annual climatic cycle. The calendar has two basic phases: (1) an irrigated rice crop during the dry season, and (2) a rainfed swidden crop during the wet season. Everyone still grows the traditional dry-season rice crop, but a number of other agricultural (and off-farm) activities have supplemented or replaced the swidden crop during the wet season.

**LAND CLASSIFICATION**

The Bontok consider the land to be sacred while they recognize its practical values for their survival needs. The following are Bontok terrain categories:

- *chep-ras*—rocky terrain; nothing can be grown
- *chao-wang*—riversides and banks (also refers to the river in general)

Figure 3.2. The Bontok Agricultural Calendar

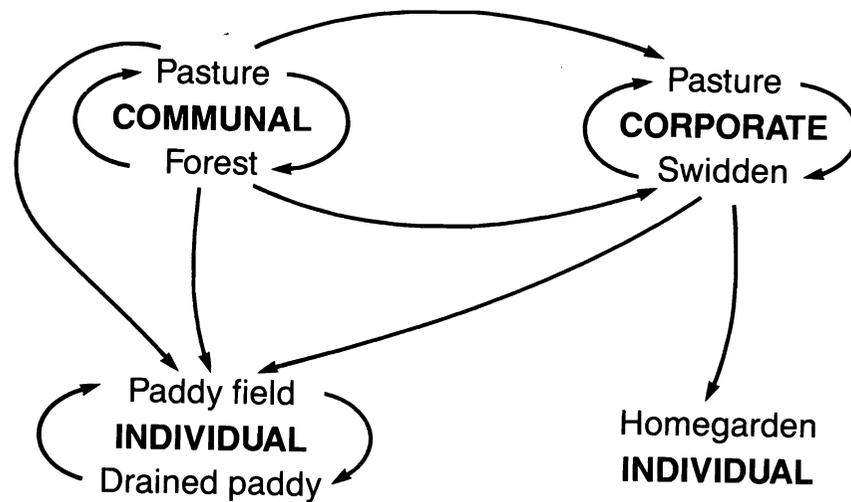


- *chetar*—level portion of a hill or mountain, usually grassland
- *chal-log*—a mountain draw on sloping terrain where water runs during the rainy season but which may be dry the other half of the year
- *tengab*—steep cliffs
- *tik-kid*—steep land, vertical climb
- *chumachanak* or *mamaber*—swampy land
- *karayakay*—erodable land

The following are Bontok landform and land-use categories (Figure 3.3), which form the basis for discussing land use in the remainder of this chapter:

1. Mountain land (*filig*)

Figure 3.3. Land Use and Ownership Transformations



- Mossy cloud forest (*pagbag*)—springs and streams the whole year round; usually climax oak or pine forest. Exploited for timber, medicinal plants and herbs, mushrooms, wild animals, rattan vines, bamboo, and irrigation water.
  - Pine forest (*fatangan*)—sloping land with secondary tree growth (e.g., open pine stands), short grass (*Miscanthus*), and various stages of cane grass. Generally not used for agriculture (i.e., unworked soil), but some areas have been claimed by corporate groups for swidden. Exploited for timber, roofing, thatching, and mushrooms.
  - Pasture land (*punchag*)—level portions of mountain tops, unworked land, short grass sometimes fenced by corporate groups. Exploited for grazing (water buffalo and cows) and thatch roofing.
  - Grassland (*kolonan*)—short, low, open grass. Untilled land, arid, with a lack of water sources. Source of *cogon* (*Imperata*) roof thatching. This category may also be considered part of the pasture land category.
2. Swidden land (*uma*)—located on gentle mountain slopes, usually close to small water sources. Fallowed every four to five years. Succession is usually to cane grass. Has improvements such as earthen or wooden fences to hold the soil and keep wild animals away. Crops include millet, sweet potatoes, beans, squash, corn, bananas, and fruit trees.
    - Sugarcane fields (*unasan*)—Found on *uma* swidden land or in *fa-ang* house lots that have been converted to agriculture.
  3. Village real estate (*fa-ang*)—partitioned parcels of houselots, and potential houselots, on sloping or leveled land. When houses are dismantled or transferred to another site the land is turned into a

sugarcane field or a sweet potato patch for pig feed. When a house is constructed, the garden is converted to a houselot (*sa-ad*). Boundary markers are usually of stone or resinous pine wood.

4. Irrigated land (*payew*)—permanent stone wall terraces with boundary markers, intensive labor inputs, wet rice, and taro.
  - Drained rice fields (*faliling*)—ditch-mounded for drainage and cultivation of rainfed crops such as sweet potatoes or cash crops (white beans, garlic, or other vegetables).

The different kinds of land have distinctly different patterns of use and each has a different kind of ownership in accordance with its use. Forest land is unimproved land surrounding the village. Forest products such as timber, firewood, rattan for lashings and baskets, bamboo for musical instruments, baskets, household utensils and containers, medicinal plants, honey, mushrooms, wild animals, and other materials used by the villagers are gathered without restriction on all forest land within the jurisdiction of the village. Except for some parcels of land that have been improved and claimed by corporate groups (*sinpangapo*, which are bilateral descent groups with common ancestors), forest land is communal property exploited equally by any member of the village. Pasture land is scattered through the forest land wherever trees and shrubs are sparse and grass for grazing is abundant enough to feed water buffalo or cows. Pasture lands are usually owned communally, but portions of pasture land adjacent to a swidden garden may be owned by the corporate group that owns the swidden. Swidden land usually belongs to a corporate group, except when it has been sold by the group to an individual. The variety of foods produced in the swidden gardens accounts for about one-fourth of the Bontok food consumption.

Irrigated land in the form of paddy fields is located on mountain slopes wherever water is available and differs from other types of agricultural land because it is terraced. Because irrigated land is the most valuable kind of land, it has a unique set of rules for ownership and transfer of ownership. Its management differs from swidden gardens because it is generally not left to fallow for more than a year. A paddy field that is left unflooded and uncultivated for more than a year develops an overgrowth of grass and bushes whose roots may break up the stone walls holding up the terraces. Moreover, the terraces may collapse if the mud at the edge of the field dries out and starts to crumble.

Two crops are planted in the paddy fields each year. The first crop (which occurs in the dry season) is usually traditional rice, the primary staple food of the Bontok that accounts for about half their food consumption. A paddy field may be planted to sweet potatoes in the dry season, however, if there is not enough irrigation water for rice. The first rice crop may be followed by a second rice crop during the wet season, but most farmers opt to drain the paddy fields after the first rice crop so they can plant sweet potatoes, which account for about one-fourth of their food consumption.

The farmers say planting sweet potatoes is better in the long run because that crop improves the soil for subsequent rice cultivation. This is because it is necessary to turn the soil and mound it for the sweet potatoes, a process that aerates the soil.

Crops such as rice, dried beans, and sweet potatoes can be stored for long periods. Since rice is a standard of value and a medium of exchange, it is stored carefully in granaries and is brought out only when needed. Some upper-ranking families are known to have left their rice granaries unopened for as long as eight years (Jenks 1905), opening them only for the feasts in which they acquire prestige by redistributing surplus food supplies to other villagers.

### TRADITIONAL RICE CROP

#### *Paddy Field Preparation (samar)*

Work begins in the native month of *asi-samar* (literally "time for working in paddy fields," usually in the early part of October) with preparation of the fields, starting with those set aside for seedbeds. This is also the time that the irrigation groups call on their members to clean the canals. This is called *kha-at si arak* (cutting the grass). Once representatives in the group have decided on the day to clean, a crier announces the decision by shouting to all corners of the village the night before. Each household is required to send someone to help remove twigs and grass from the canals and repair eroded portions. All bushes and tall grass around the canal are cut, and any accumulated silt that obstructs the flow of water is cleared away. Cleaning begins at the main source, which is a temporary dam, and proceeds to the end of the canal where paddy fields receive the water. Some of the canals are as much as 4.8 km long. Households that do not send someone to work on the canals are required to pay compensation to the others. A typical fine is five bundles of unhusked rice for each day missed or the equivalent in cash, sugarcane wine, chickens, or tobacco leaves.

Initial preparation of the paddy fields is done by women who use a short weeding tool (called *sangkap* or *suwan*) or a spade (*pala*) to turn over weeds and rice stalks from the previous harvest and trample them into the mud to rot. This process is called *chesches*. Mud from the paddy fields is packed on top of the bunds surrounding the fields (*faneng*) and against all paddy field margins to plug earthworm holes and improve the moisture seal of the field. Taro is planted along the terrace top or laced on the rims of the paddy field and is believed to improve drainage. Some farmers plant a few beans or sweet potato cuttings at the sides of the bunds where they have placed excess mud from the paddy field.

Traditionally, the Bontok have done their plowing (*infaalin*) by hand with a wooden spade (*aklo*) carved from a piece of hardwood, but this traditional

agricultural implement is now being replaced by iron spading forks and shovels. Farmers can plow paddy fields more quickly with water buffalo, which also trample weeds, dried stalks, and green manure into the mud, provided the fields are not located on steep slopes and are wide enough to accommodate a buffalo.

Harrowing also is done by water buffalo. The harrow, called *sakhad* (broom), was introduced from the lowlands and consists of a wooden board, 25–30 centimeters (cm) by 40–45 cm, with a number of 20-cm spikes set in the bottom. A man stands on the spiked board and makes a harnessed buffalo move around in a circle or pull him across the field. The spikes are dragged through the mud so that decaying rice stalks cling to them and are scattered again, assuring that the stalks will rot and not take root. After the soil is turned, the field is flooded again, and the mud layer is leveled with the palms of the hand.

When weeds begin to resprout after a week or two, it is time for another weeding (*kamey*), which is done by hand, and once more the weeds are trampled into the mud to rot. The stone walls and areas surrounding the terraces are also weeded with a trowel to remove grass roots from between the stones in the walls. Rat holes are stuffed with grass and small stones loosened by weeding. With a *suwan*, grassy slopes immediately above the fields are cleared of weeds that are thrown into the fields and trampled into the mud. Some fields are bounded by unterraced upper slopes called *tafan*, which are also cleared and weeded, so there is no area around the rice fields in which rats can build their nests. The paddy field is then flooded, and rice stalks and other vegetable debris previously trampled into the mud but not decomposed are removed from the field and plastered onto the bunds. Manuring is an important part of field preparation. Men, women, and children carry compost in baskets from the settlement to the rice fields, where it is scattered evenly and trampled into the mud until it is mixed thoroughly. The paddy field mud must have a smooth consistency for receiving the rice seedlings.

Men usually work alone at field preparation, whereas women work in cooperative labor groups. Prior to the field preparation season, a group of women including young girls agrees to work together until the end of the transplanting season. Strong ties within peer groups of the "girls' dormitory" (*pangis/ulog*) endure for life and constitute the basis for a permanent pool of agricultural labor that is available more or less whenever needed.

There are two kinds of labor recruitment: *ogfu* and *inakhag*. *Ogfu* refers to reciprocal labor groups where the group works in each of the members' fields on a rotation basis. *Inakhag* is paid labor. A paddy field owner informs other community members that he needs help, and interested men and women come to his house. The daily pay for each worker is ten bundles of unhusked rice plus two meals. Workers also may bring along family members to eat at the home of the field owner. Paid labor is increasingly being used instead of reciprocal labor exchange.

*Rice Seeding (panar)*

In mid-November paddy fields with a history of particularly high fertility are chosen to be seedbeds (*papanaran*). A small section of the field is cordoned off by a small ditch that allows that area to remain flooded even when the rest of the field is drained. The seedbed is strewn with rice husks, dried bean pods, and sunflower leaves and stems that are trampled into the mud to rot.

Entire rice panicles (*log-ey*), each about a foot in length, are planted into the seedbed. The lower end of the panicle stalk is bent, and the bent section is pushed straight into the mud so the panicle and rice grains lie flat about 10–12 cm apart. Water is temporarily drained from the field so the rice panicles do not float during the seeding activity. Panicles for the seedbed chosen during the previous harvest are selected for full-rounded seeds, plant height, palatability, resilience to conditions of agricultural stress, expandability when cooked, and resistance to pests. The seeds should not have been touched by ricebirds, rats, or worms. Since not all of these qualities may be found in a single rice variety, several different varieties may be planted.

About one week after planting, the rice grains burst, the tiny shoots turn from white to green, and the seedlings take root. The seedbed is then flooded to just below the level of the sprout tops. This improves nutrient circulation and discourages animals such as rats, birds, and lizards from eating the seedlings. If the seedlings do not appear healthy, ashes are spread around them to increase the fertility of the seedbed (Drucker 1974). Rice seedlings planted in seedbeds known to have root nematodes are not allowed to be transplanted to other localities where the rice fields are not contaminated. All seedbed construction and seeding is done by women, primarily in reciprocal labor groups.

*Transplanting (tuned)*

Seedlings are ready for transplanting to the paddy fields during February and March, when the seedlings attain a height of 25–30 cm about seven weeks after planting. In preparation, the paddy fields receive their final smoothing, kneading, and leveling, as the earth is again reworked with a harrow or spading fork and shovel and subjected to another puddling with the feet. All of the dried up or resprouting weeds are worked into the mud by hand. The field is drained, and the top 12–15 cm of soil is given a final working over with the hands (*inpeteng*, “to make perfect”). Making the water shallower provides better working conditions for the transplanters and is said to facilitate insertion of the seedlings. Some farmers believe that mud in shallower water will get warmer than in deeper water, thus enhancing growth and flowering of the rice plants.

Transplanting is done by women in reciprocal labor groups or paid labor groups. If the field is not level, some of the women drain the field and give the mud a final leveling with their hands. They again plaster mud on

the margins of the field to ensure that water does not drain out at an excessive rate. Simultaneously, other members of the work group gather seedlings from the seedbed taking care not to tear the roots. The sprouts from five or six panicles (approximately 100–150 seedlings) are bundled together, and mud is washed off the roots, a practice that may reduce the spread of root diseases. The seedlings are twisted together at the roots and stacked at the sides of the seedbed for transport to the paddy fields in large rattan baskets.

Bundles of seedlings are placed along the terrace walls or allowed to stand temporarily in the paddy field before planting. A woman takes a handful of seedlings and tears off the top 8 cm as she wades through the mud back to her place in the field. Removing the top leaves from the seedlings is said to make the plant grow faster. (The scientific explanation may be that a reduction in transpiration makes the seedlings more resistant to drought.) Each seedling is separated from the others in the bunch and thrust into the mud as it is held between the thumb and forefinger. The seedling is pushed into the mud until only the top 10–12 cm of the seedling are above the surface. The seedlings are planted in rows 12 cm apart, each woman transplanting fifty to eighty seedlings per minute. The most distant rice fields are generally the first to be planted.

Seedlings that die after transplanting are replaced by seedlings from other fields. A paddy field with too little water can suffer severe seedling mortality. Since all the rice fields are planted at the same time of year and rainfall alone is not sufficient to meet the water needs, this is the peak period for use of the irrigation system. By February and March the flow of water from mountain springs has dwindled, so community cooperation through a water rotation system is imperative for dividing the scarce water supply as equitably as possible (Brett 1983).

The *apey* ceremony (“to build a fire,” i.e., “warming up” the newly planted crop) is carried out by individual households to ensure the fertility of their newly transplanted rice plants. The village elders declare a rest day for everyone to perform this ritual at all rice fields. Those who participate in the ceremony must dress in their finest attire (preferably new, to symbolize the rice plants becoming “new”) and carry a pot, a piece of pork fat, a chicken, and rice or sugarcane wine to the fields. The chicken is butchered, singed, and quartered beside the rice field where the position of the bile sac in relation to the liver is observed to give a prognosis for the rice crop and state of health of the household. A prayer is said while erecting a *Miscanthus* reed (*runo*) with knotted leaves in each paddy. The *chengra* (*Cordyline terminales*) and *paruki* (a milkweed of the genus *Hoya*) are ritual plants tied to the upright *runo* sticks to symbolize fertility and resilience to environmental stress. Prayers are addressed to ancestors who were the original builders of the paddy fields. Spirits of the “unseen” are also requested to help keep the rice plants safe from rice predators and typhoons and make them fertile so they will produce a bountiful harvest.

### Weeding (sakhamsam) and Irrigating (mannum)

During March and April the paddy field is weeded by women, either alone or in *ogfu* groups, one month after transplanting, when the rice seedlings are 45–50 cm high. This last weeding of the paddy fields must be complete before the rice fruit heads appear, because the fruit heads are susceptible to damage by body contact during weeding. *Azola* (*fakew*), a floating plant that fixes nitrogen, as well as other floating plants such as *Lemna* and *Spirodela*, have spread over the surface of the water by this time and are left to coexist with the rice plants. These floating aquatic plants suppress the growth of rooted weeds that compete with the rice crop for soil nutrients (Omengan 1981). The terrace walls are also given another weeding, and all rat holes are stuffed with dirt and uprooted weeds. Freshwater snails, an edible fern that grows on the terrace walls, and *fakfakrong* (*Monochria vaginalis*) are gathered as food.

Once the rice crop is transplanted into the paddy field, a continuous and substantial supply of water is essential to realize a high yield. The Bontoks have tried to deal with this need through a system of water rotation aimed at equitable distribution (Brett 1985). Each paddy field owner receives a share of the water supply in proportion to his needs. To ensure delivery of the proper share, a farmer or household representative usually observes the water distribution directly. There may be disputes between neighboring paddy field owners concerning the division of water, and each farmer makes sure that a neighboring field owner does not take more than his share. Tempers may wear thin at this time of year. During the night, rice field areas with the most critical water supplies are characterized by the flickering torches of farmers checking on their water shares.

### Appearance of Fruit Heads (fusfus)

The main activity during the month of May is setting up scarecrows. After the rice heads begin to form, the village elders decide when to perform the ceremony for mobilizing the village to drive away small brown birds, called *tilin*, which descend on the fields in large numbers to feed on the young rice grains. The most effective scarecrows are noisemakers run by wind or water power. Some are humanlike figures draped with old clothes. Sometimes they are strung together with long lines pulled by a string attached to a paddle device that is placed in a stream to move the string and make tin cans bump each other to produce a clanging sound. This is also the time that terrace walls and surroundings (*charus*) receive their final weeding.

### Ripening of the Rice Grains (serchang)

By June, when scarecrows are no longer so effective because the birds have become accustomed to them, village elders announce a rest day for the *tut-orod* ("push away") ritual, to rid the rice fields of rats and ricebirds. This day provides an opportunity for the farmers to organize their efforts.

Rituals coordinate this villagewide activity to make sure that everyone takes care of the area around his field, thereby minimizing the problem.

Rat holes and nesting places around the rice fields are destroyed by cutting grass and bushes to plug the rat holes. At the same time, villagers supplement the ritual by going to their rice fields to drive the pests away (*ferew*), a task often delegated to children and older people. Little huts are constructed where children and old people remain on guard to pull noisemaker lines. Farmers also rely on the natural enemy of the ricebird, the *tarar*, an insectivorous mocking bird that drives the birds away. Reeds and *runo* sticks are placed along the edges of the fields as perches, and children are taught never to harm or catch these birds. An area is quarantined if its rice plants are infected with insect pests.

### Harvest Season (ani)

The harvest extends from late July through August and begins with a rest day for the *pesik* ritual that ensures an abundant harvest. A woman who is a hereditary practitioner of this ritual and who has a record of good harvests when she has performed the ritual in the past is delegated by the elders to perform the ritual.

By late July the rice fruit heads turn golden brown and are ready for harvest. This is a time of great hazards. The typhoon season is about to start, and pests such as ricebirds and rats step up their attacks on the ripening grain. The most distant rice fields, which were planted first, are harvested first. This ensures that the more inaccessible fields are harvested before trails to those areas are cut off by landslides or swollen rivers during the typhoon season.

An entire season's crop can be destroyed by typhoons if the proper agricultural calendar has not been followed. If the rice seeds were not sowed as soon as the migratory birds appeared, transplanting and harvesting are correspondingly delayed. Adherence to the agricultural calendar and ritual rest days is coordinated by village elders to beat the typhoon season and ensure a safe crop. Once the crop is ready for harvest, sufficient labor must be mobilized to harvest it quickly, because even a few days' delay can lead to shattering of overripe grain and serious losses. Bontok nuclear households generally cannot meet their own labor needs during the peak working periods. Traditionally, the Bontok assure sufficient labor for transplanting and harvesting by staggering activities on the different fields of different households and deploying cooperative labor groups to each field at the proper time.

Harvesting tools and transport baskets usually are provided by each individual in the labor group. Each harvester wears a ring (*rakem*) on the middle finger with a blade protruding between the third and the fourth fingers. The harvester reaches out with a clawing motion to grasp a rice panicle and uses the blade to cut the top 30–35 cm from the 100-cm-tall rice stalks. The cut panicles are collected in the other hand, fruit heads facing downward, until they form a bunch about 3–5 cm in diameter at

the base. The bundle is tied with a bamboo strip pulled tight by the front teeth. Every family prepares its own tying strips, and many (especially higher-ranking families) notch them to identify their rice bundles.

When working in a group, the harvesters align themselves in a line across the field to maximize harvesting efficiency. All the group members do harvesting except one or two whose job is to bundle the unhusked rice (*palay*) harvested by the others. When the day's harvesting is finished, the rice is transported to the field owner's granary, which is located close to the settlement. Men carry about 35 kilograms (kg) of unhusked rice in a pair of rattan baskets (*khimata*) strapped to the ends of a pole carried over their shoulders. Women carry 30 kg in baskets (*luwa*) they balance on their heads. The rice bundles are spread on the ground to dry in the sun for at least three days before being placed in the granary. It is important for the grain to be completely dry in order to prevent molding or premature germination.

The rice granaries are built to be rat and moisture proof. They are constructed from 8-cm-thick seasoned pine lumber and fitted together to prevent any gaps between the walls. Gaps between the boards are plastered with buffalo dung mixed with beeswax. The wooden ceiling is covered with a thatched roof to prevent moisture condensation. Rice stored in these traditional granaries is said to last for eight to ten years (Jenks 1905). Modern rice granaries made with commercial building materials and having galvanized roofs are not as effective at preserving the rice crop; the rice generally takes on a bitter taste within three years.

The closing ceremonies of the *chinakon* rice harvest are a series of household rituals called "chicken sacrifice" (*manmanok*). During this "thanksgiving," the household, relatives, and neighbors reciprocate in inviting one another to eat in their homes. A *patay* ceremony is performed after a five-day rest period to mark the end of the traditional rice-growing season and lift the restrictions that accompany it.

## WET-SEASON CROPPING IN RICE PADDIES

### *Second Rice Crop* (sinawali)

According to people in the area, a second rice crop (i.e., one cultivated during the rainy season from July to December) has been in effect only since the first decade of this century. The second rice crop does not entail the ritual observations, rest days, and village cooperation characteristic of the traditional crop. The second crop matures and is ready for harvest within four months after transplanting the seedlings, but the yields are correspondingly lower than those from the traditional rice crop, which takes six months to mature. The second rice crop also is said to have more problems with insect pests than the traditional crop.

Only a third of the paddy fields are used for the second rice crop. Fields at lower elevations (e.g., 1,000 m) are best suited for rice at this time of

year because rice planted at higher elevations during this season will leaf but not develop many fruit heads. The strains of rice used in the second rice crop are believed to have been introduced from the lowlands and include *sed-sed*, *kam-mati*, *waray*, *layag*, *saba*, *madney*, *fastikang*, and *langka*. Bontok farmers say that the Ministry of Agriculture also introduced some high-yielding rice varieties, but after trying the high-yielding varieties they stopped using them because (1) the short stalks of the higher-yielding varieties made harvesting difficult, (2) they lacked resistance to pests, (3) the yields were lower than the traditional varieties unless large quantities of chemical fertilizers and pesticides were used, and (4) panicles tended to shatter from their connections once the grains matured.

The short stalks of high-yielding varieties also require harvesting the crop with a sickle, which would upset the traditional crop storage system. The traditional method of harvesting long-stalked rice plants requires each panicle to be cut about 30 cm from the rice stalk, making it easier to bundle and dry in the sun. Moreover, because a bundle (*feñger*) of unhusked rice is the traditional medium of exchange among the Bontok for ritual requirements in deaths, marriages, and other feasts, short varieties of rice would disrupt an established system of exchange that extends through numerous social, economic, and religious institutions in the village.

Two borrowed varieties that are used for the second rice crop (*waray* and *saba*) also are planted during the traditional rice season. They have been found suitable for the traditional season because of their long stalks and drought resistance. Even though these two varieties have been adopted, they are not accepted for ritual exchanges, especially for deaths. They are husked or milled for household consumption or sale on the market.

Seeds for the second rice crop are broadcast in dry seedbeds during July, just before harvesting the first rice crop. Clearing and channeling the irrigation canals is not done by corporate groups, since only some would benefit from the labor input. It is therefore the responsibility of those who decide to plant a second rice crop to get their own irrigation water, but water is not much of a problem during the rainy season.

Field preparation, transplanting, weeding, and harvesting may be done by work groups, though they are smaller and less formal than those in the traditional rice season. Transplanting takes place in September, and women weed the paddy fields as frequently as needed until fruit heads begin to appear. The fruit heads of the second crop begin to ripen in December, three months after transplanting the rice seedlings. Small work groups carry out the harvest in the same way as the first rice harvest but without any rituals.

A disadvantage of a second rice crop is that it delays the start of work on the traditional rice crop. Instead of preparing the fields for the traditional crop as soon as migratory birds appear in the village, farmers have to wait until the second crop is harvested. A delay in starting the traditional crop can lead to a delay in its harvest and therefore an increased risk of crop losses due to typhoons that start around harvest time.

### Drained Paddy Fields (faliling)

If a paddy field is not planted to a second rice crop, it may be left flooded and fallowed until the following dry season. Almost one-half of the rice fields are left in this kind of fallow during the second cropping season. Alternately, the paddy field can be drained for a field crop such as sweet potatoes, peanuts, beans, or garlic to be grown during the rainy season. Whatever crop is grown in drained paddy fields, it is always timed so as not to interfere with the traditional rice crop.

To prepare a paddy field for a sweet potato garden, sunflower leaves and stems are added to the rice stalks remaining from the last harvest, trampled into the mud as green manure, and left to rot. After one or two weeks, the field is drained, and the earth is ditch mounded to provide drainage. Sweet potato cuttings are inserted about 15–20 cm into the mounds at a 45-degree angle. After new roots have formed and runners appear, the garden is weeded by women in small reciprocal labor groups. The sweet potatoes are harvested in December by the women, but household men help in transporting sweet potatoes if there is a large harvest. Sweet potatoes are stored in a corner of the house without washing off any of the soil clinging to the surface because it is said the soil protects them from deterioration. Young runners on the sweet potato vine are gathered for human consumption, and mature leaves are brought home to feed the pigs. Some farmers produce sweet potatoes for cash and have adopted new varieties that mature more quickly.

### SWIDDEN AGRICULTURE

*Uma* is a general term referring to land used for rainfed swidden gardens containing a variety of interplanted crops such as legumes, vegetables, and fruits. Unlike rice-paddy fields, which are highly artificial, swidden gardens mimic natural ecosystems.

Bontok farmers consider swiddens to be the “partner” of what is harvested from rice fields, providing foods not available from the rice fields (Table 3.1). Food production from swidden gardens acts as a safeguard against a poor rice harvest. Villagers will not go hungry if drought, typhoons, or pests destroy their rice crop, since produce from their swiddens can tide them over until the next harvest season. It is not uncommon to supplement rice with sweet potatoes, millet (*Setaria italica*), *fukkakew* (*Sorghum* sp.), and taro. Sweet potatoes are cut into cubes and mixed with rice to give it bulk, thus stretching the rice supply. Some semidomesticated swidden crops such as *ufi* (*Dioscorea alata*), *lipte* (*Dioscorea esculenta*), and *agkhey* (*Coix lachryma-jobi*) are consumed only when other food is scarce.

Unlike traditional wet-rice cropping where elders make agricultural decisions for the whole community, decisions involving swidden gardening are made by each household. Swidden gardens belong to households, which are either members of a corporate group with individual use rights or own them privately. Rights to these lands are acquired through purchase or

Table 3.1. Crops Grown in Swidden Gardens

Crops	Planting Season	Harvest Season
Black beans ( <i>Vigna</i> sp.)	March–April	August–September
Corn	March–April	July–August
Millet	March–April	October
Squash	March–April	September
<i>Kerchis</i> ( <i>Cajanus cajan</i> )	February–March	After 5–6 months
<i>Itab</i> ( <i>Dolichos lablab</i> )	February–March	August–September
Sweet potatoes	March–April	August–September
<i>Karap</i> ( <i>Vigna</i> sp.)	March–April	August–September
Sugar cane	March–April	December–January
Peanuts	March–April	August–September
Garlic	February	May–June
White beans ( <i>Vigna</i> sp.)	March–April	August–September
Cassava	March–April	March–April

through labor expended in clearing communal forest land. Some of the swiddens on communal land are about 4–5 km away from the settlement while others, usually owned by the upper rank, are only 1–2 km away.

### Field Preparation

Swiddens usually are cleared in February and March, one to two months before the first rains are expected. Before clearing a swidden it is necessary to perform a ritual called *en-awid* (“to return”). For this ritual, the people who are planning to clear the swidden choose from among them one person to make the initial, ritual clearing at the swidden site. This ritual performer must be of good moral and social standing, preferably past the stage of procreation, and not have experienced the death of any offspring more than twelve years old. The ritual performer watches for omens such as sounds of the omen bird (*echew*) while walking to the swidden site. If no bad omens are observed, the ritual performer clears a small piece of land, taking great care not to lose control of the axe or *bolo* and wound himself. On the way home he must watch for omens such as snakes, rats, frogs, or birds crossing his path. If no negative events occur in the village (e.g., a death, the burning of a house, or the appearance of a rainbow) by the following morning, the ritual is considered successful, and all those who wish may join the ritual performer to clear their swiddens.

There are some restrictions to be observed by everyone while clearing the swidden, such as not eating fresh meat, fish, or shell food and not attending wakes or feasts where animals are butchered. It is believed that eating such foods symbolizes the destruction of their swidden crops by animapests. The prohibition from eating these foods is lifted only after performing the *kao-kao* (ritual fishing in the river). The restriction imposed

on attending wakes and feasts is lifted only after farmers have planted their swidden gardens or when the gardens are completely fenced. These ritual prohibitions, and prayers addressed to "the unseen," are believed to bring about their intervention to protect the newly planted crops and make them productive.

The cutting of trees and bushes (*mangoma*), as well as the subsequent burning of the slash (*inkerang* or *enpo-or*), usually is done only by men and boys. Before burning, timber for fencing the garden must be segregated from the bushes, branches, and tall grass that are cut into smaller pieces to make it easier for them to dry and burn. Fencing (*enfaked*) is done immediately after the burning. When the fencing is finished, all restrictions are officially lifted, but some of the farmers may still observe them until after they have planted their crops (*in-esek*).

#### Organization of Crops in Space and Time

A number of crops may be planted at the same time in the same garden. If two or more varieties of beans are planted in the same swidden garden, one variety will be in one part of the garden and another variety will be in another part of the garden. Other bean crops may also be included in the same swidden, but they must follow the same pattern (Figure 3.4). Beans are interplanted with corn and peanuts in a triangular pattern (Figure 3.5). The different crops are organized in space and time so that no one crop crowds out the others. The result is a nearly continuous cover of crops for the duration of the garden; this makes full use of sunlight and protects the soil from erosion.

Every crop must be planted at its proper time or there will not be a good harvest. Corn must be planted before black beans so the corn can attain a height of about 15–20 cm before the beans start to grow. In contrast, corn, millet, and sweet potatoes all can be planted at the same time because sweet potatoes will not shade corn and millet. Corn and millet are harvested first, leaving the sweet potato to mature until its harvest during September to December. *Kerchis* (*Cajanus cajan*), a shrub about 2.5 m tall, is also interplanted with sweet potatoes and continues to bear fruit for about four years. The traditional variety has smaller peas and takes a longer time to cook but is considered by the local people to be tastier. Some tobacco is also planted in swidden fields, but it is not mixed or grown with any other crop.

Most of the swidden crops of Bontok farmers are legumes, which can be stored for up to a year after drying in the sun. Millet used to be the most important swidden crop, but its use has diminished because of the labor required to pound the grains.

Farmers usually begin to work in the swidden after planting the traditional rice crop (see Figure 3.2). After the black bean crop is gathered, the swidden garden is left unplanted for some months before it is cleared again to be planted to white beans. Swidden fields planted to sweet potatoes can be cultivated as long as the crop is good, but they are left to fallow as soon

Figure 3.4. Two Common Spatial Arrangements of Different Bean Varieties in a Swidden Garden

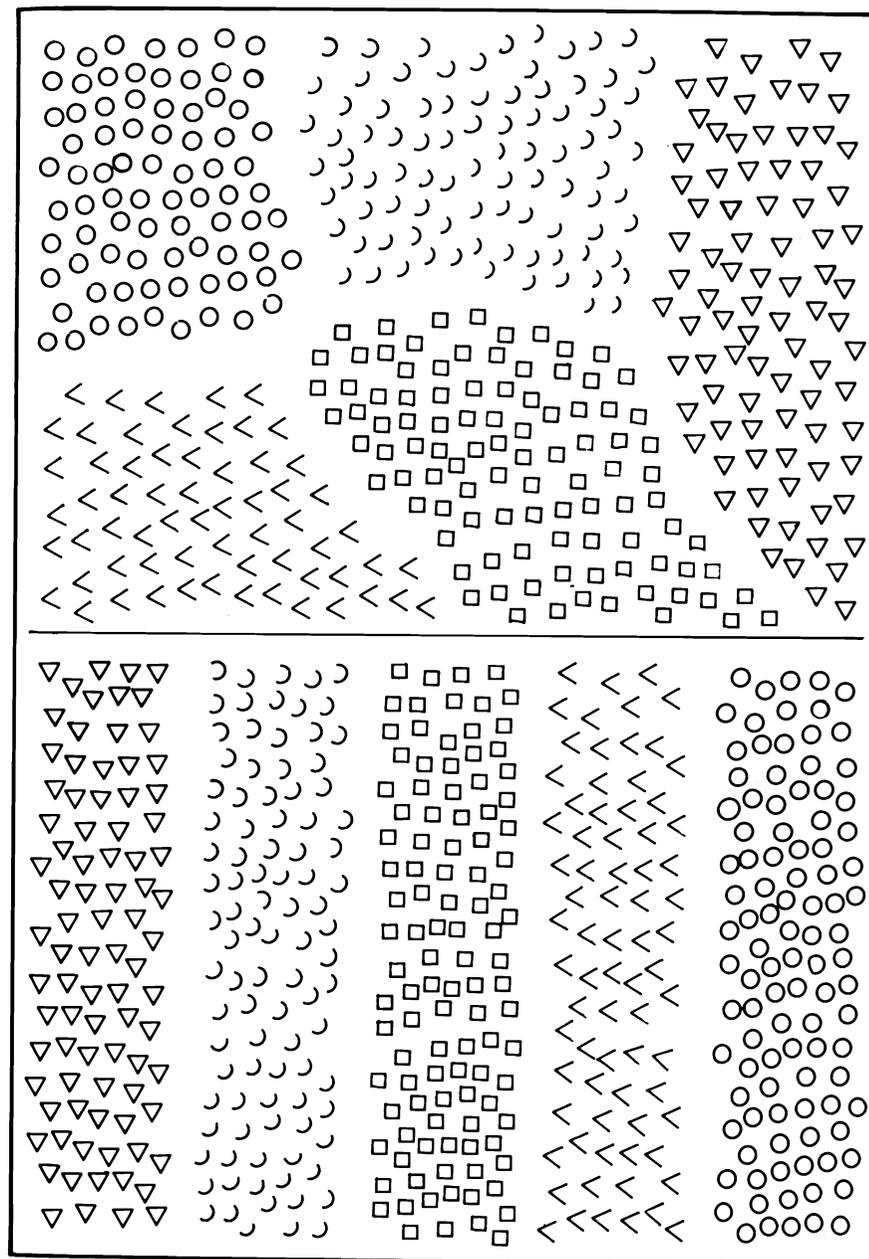
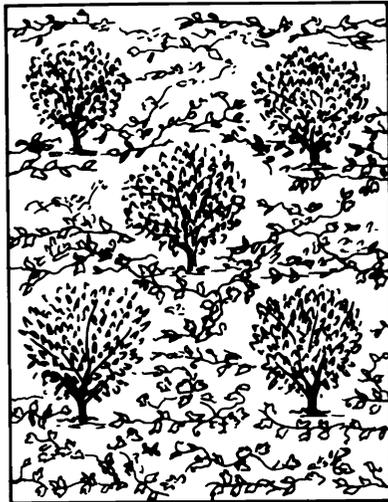
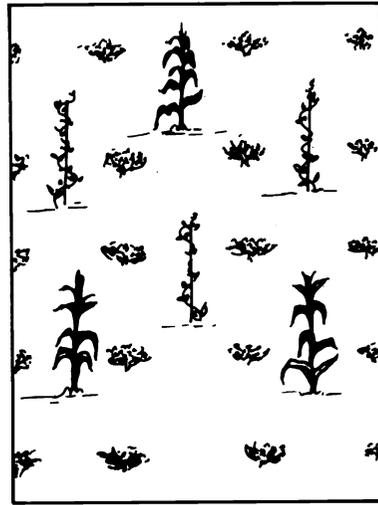


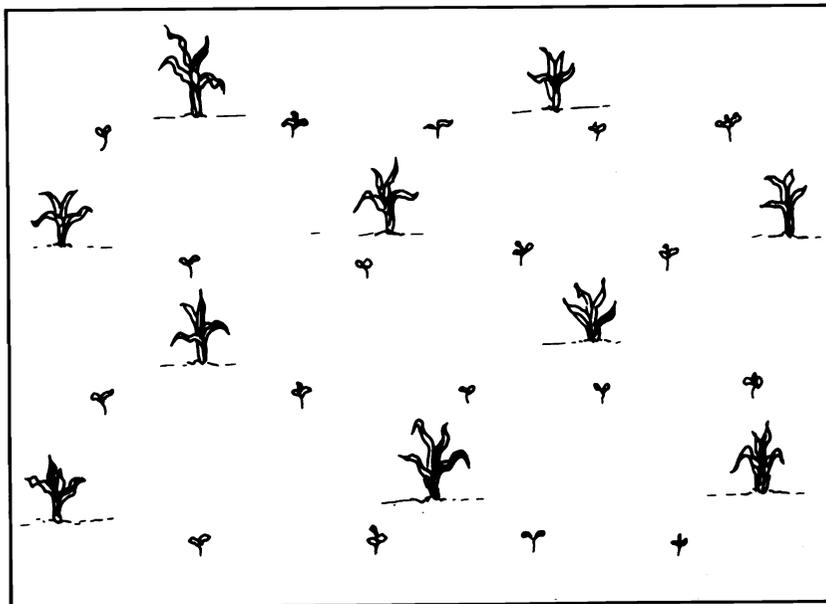
Figure 3.5. Typical Interplanting Patterns in a Swidden Garden



Cajanus cajan and sweet potatoes



Peanuts, corn, and a variety of beans



Spatial arrangement of beans and corn

as sweet potato yields start to decline. The fallow period is usually five years whether the field is far from or near the settlement.

#### Sugarcane

Sugarcane is planted in swidden gardens at the onset of the first rains (late March or early April). Many of these fields are planted year after year to sugarcane. Some of the gardens are located far from the settlement, but sugarcane is also planted in homegardens within the village. During the harvest season the topmost segments of the sugarcane plants (about 25 cm long) are cut, bundled, and saved for the next planting season. These bundled cuttings are kept in a damp or moist place where young shoots begin to sprout from the segments.

Although the harvesting of sugarcane is a villagewide activity that is coupled with rituals, the planting does not attract the same attention. There seems to be very little risk, if any, involved in growing this crop, and it does not demand much care after it is planted. Before planting, the field is cleared of grass and dried leaves left over from the last harvest. Stubs of previously harvested sugarcane are left to sprout, and cuttings from the last crop are planted at a 45-degree angle where necessary. No fertilizer is applied to sugarcane fields, and farmers weed the fields only occasionally. The plants attain a height of 1.5–3 m before they are harvested.

The sugarcane is harvested (*saknit*) by men and boys in mid-December to January when the women are busy with field preparation activities for the traditional rice crop. The harvest starts when a sacred rest day is declared by the village elders. Harvesting and processing generally is done by large reciprocal labor groups usually composed of men from the same ward. The cane is cut and stripped of its leaves, the outer bark is stripped away, and the cane is sliced into sections about 60 cm long. The stripped cane is bundled and transported to a granary where a sugarcane mill (*fal-liwes*) powered by buffalo has been assembled.

Each piece of sugarcane is fed through the gears of the mill (turned by a water buffalo walking in a circle) until all the juice has been extracted. The liquid is collected in a large plastic container or tin pail, which in turn is emptied into a large, cast-iron cooking vat (*sangchar*). The cane juice is boiled until at least half the liquid has evaporated. Part of the cane juice is processed into lump sugar and molasses, but the main purpose of sugarcane is to produce a wine (*fayas*) that forms an indispensable part of rituals and everyday sociability among the elders and married men.

#### SOIL CONSERVATION

Soil erosion and slippage due to wet-rice cultivation in this mountainous terrain are prevented by terracing the slopes, constructing stone retaining walls, and building drainage canals to maintain a balance of water intake and outflow and avoid overflowing paddy fields during heavy rains. Continuous cropping of paddy fields prevents excessive growth of deep-rooting grasses and bushes that can damage the stone walls that hold up the terraces.

**Table 3.2. Known Inputs and Losses of Nitrogen and Phosphorus During the Traditional Wet-Rice Cropping Cycle<sup>a</sup>**

	Nitrogen (kg/ha)	Phosphorus (kg/ha)
Inputs		
Precipitation	4	1
Pig manure	260	124
Irrigation water (inflow minus outflow)	32	115
Losses		
Harvest	110	25

Source: Omengan (1981).

<sup>a</sup>Inputs such as nitrogen fixation and losses such as leaching and denitrification were not measured.

Yields from the traditional rice crop are high—typically 6 tons per hectare (ha)—even though much of the paddy land has been used continuously for centuries (Omengan 1981). Soil fertility is maintained by inputs of compost and green manure along with detritus in the irrigation water. A significant fraction of each year's production is left on the field as crop residues, and a significant fraction of what is removed from the field is returned in the form of composted fertilizer. Weeding in and around paddy fields provides a major source of green manure, and litter can be collected from the adjacent forest and dumped in paddy fields as green manure if necessary. Table 3.2 shows that nitrogen and phosphorus inputs to the traditional wet-rice crop are more than sufficient to maintain the levels of these nutrients in the soil.

The compost is produced primarily from pig manure. Pigs are the most pampered of Bontok animals. They are confined in a walled, stone-paved pit dug into the ground, which averages 1 m wide by 1.5–2.5 m long by 1.2–1.5 m deep, and fed cooked sweet potatoes twice a day. One end of the pit is at least 60 cm deeper than the other end. Dry grass, kitchen garbage, rice husks and straw, and other vegetable matter are thrown into the low end to absorb liquids from urine and manure and eventually to rot. Human wastes also go into the pit. The pig pens are cleaned when manure is needed for paddy fields.

Swidden gardens located on mountain slopes are terraced with rocks or logs that are placed on the surface of the soil and aligned with the contour to reduce soil runoff during heavy rainstorms. Mulch is applied to shrubs and fruit trees to retain soil moisture and to protect the soil from erosion. Soil erosion in swidden fields is further checked by a full vegetative cover throughout the swidden cycle, i.e., a mixture of many interplanted crops during the cropping phase of the cycle and natural vegetation when the field is in fallow.

## SOCIAL CONTROL OF LAND AND WATER RESOURCES

### Land Allocation Among Villages

Each Bontok village is an autonomous agricultural community that is socially, politically, and economically independent of all others. While settlements are nucleated for defense purposes, most of the rice fields, water sources, pasture lands, and swidden gardens are located some distance away from the villages, making them vulnerable to hostile groups from other communities. Historically, the location and extent of land developed for paddy fields, cleared or improved for swidden gardens, used for hunting, or used as a source of irrigation water established the claims of a village to its territorial boundaries (Brett 1975). Valuable land resources within the boundaries were guarded against intruders who trespassed at the risk of their lives. An atmosphere of armed conflict prevailed because each group defended what it considered to be its territory. Outsiders could enter the village territory only if a peace pact was established and if the outsiders were sponsored by friends or relatives who took responsibility for their safety and good conduct.

Disputes still occur among villages, primarily over the use of water sources but also over the use of land resources such as pastures. Intervillage conflict is a serious matter, but there are numerous social mechanisms (such as intervillage marriage) for promoting peaceful relations. Peaceful exchanges between villages encourage cooperation such as intervillage labor groups reinforced by rituals, feasts, and trading. One example is the *khakhayam*, a verbal contract between the young unmarried men of one village and the unmarried women of another village for reciprocal agricultural labor. Such institutions for recruiting labor from friendly villages are extremely important during peak periods such as rice harvesting.

Peace treaties generally include the following agreements:

- Location of territorial and safety zone boundaries;
- Fines to be paid for crimes (e.g., violation of neutrality, pollution of one's territory, or theft) committed by a member of one village against a member of the other village; and
- Fines to be imposed on those who break the peace pact by wounding or killing someone in the other village.

If a person is killed by a member of another village, peaceful relations between the two villages are possible only after the death has been avenged. Villages with a history of friendship settle their scores by meeting at designated battlegrounds where intermarried persons (*pinakarsu*) umpire the conflict conducted with spears, head axes, and shields (Brett 1975). (This practice is now outlawed by the national government.) It is a function of these intermarried persons to prevent further conflict and facilitate nego-

tiations that will lead to a resumption of peaceful relations between the two villages.

If the score is not settled with a formal battle, the victim's ward must then resort to raid or ambush. Under these circumstances it is necessary for members of the target village to be on guard while working in the fields, many of which are located dangerously far from the settlement, and while sleeping next to their rice fields when monitoring their water shares. As a consequence, agricultural labor is usually done in groups, and men guard the women against enemies that might ambush them as they weed their rice fields or transplant rice seedlings.

Only revenge killing carries prestige; it is best to kill the person responsible, but anyone in the offending village (other than children) will suffice. Killing is documented by taking the victim's head. The skull is buried in a corner of the ward site, and the jawbone is used as a gong-handle trophy. Head-taking is celebrated with a ward ceremony to appease the spirit of the victim and honor the successful warrior, for whom the ceremony is costly because he must provide all the sacrificial animals and sugarcane wine. The taking of heads has declined in recent years because the police can use them as evidence, but all other aspects of revenge killing are still in effect.

During times of intervillage hostility it is considered dangerous to eat, drink, or smoke tobacco on enemy soil for fear of supernatural infliction of harm, as indicated by the expression *maknatas nan luta* ("the soil consumes us"). The affliction might involve, for example, a swelling of the stomach and lower extremities, blurred vision, and possibly even a coma. It is only by evening the score and forging a peace pact that this supernatural danger can be neutralized and deactivated.

The restoration of peace is celebrated with a feast between the two villages. The guests must wait at the edge of the host village to be escorted by an elder and village priest who perform the *paranga* purification ritual to protect the visitors from the previously described supernatural afflictions before they enter the settlement. A guest in any Bontok village is immediately encouraged to eat, because this act automatically establishes a bond to protect the life and possessions of the guest while he is within the boundaries of the village (Brett 1975).

#### Sacred Sites

Bontok villagers view their land as a gift from "the one in the highest" (*entutong-cho*). To them land is the source of all life; "it belongs to no one or to everyone." They have reverence for the land. All of their ancestors who lived and died before them were buried in the soil, where their bodies merged with the earth and became part of it. They believe that the spirits of the departed (*leng-ag*) still remain in the soil. The soil (*luta*) is invoked during oath-swearing rituals (*sapata*) whenever a person is accused of a crime where there are no witnesses and the spirits of the dead are invoked to witness and punish the wrongdoer.

Specific localities within the village territory are considered sacred. One is the *papatayan* ("where sacrifices are offered"), a group of pine trees above

the village where rice cultivation rituals are performed on village rest days. The guardian spirits of the village who reside here communicate a prognosis on village welfare through the butchering of sacrificial animals and the reading of their bile sacs and gall bladders. Cutting trees or branches from this site is punishable by fines and supernatural sanction, the latter usually invoked.

Also located above the village is a sacred grove for weather ceremonies (*peray*). Whenever storms hit the village with winds strong enough to damage the rice crop, a ceremony is performed at this site by the village hereditary priest (*pumapatay*). This ceremony is believed to stop the strong winds and calm the storm. A third sacred grove is located above the entrance to the village. This is for the feast of merit and fertility (*chuno*), provided to the village by upper-ranking families.

There are other sites with sacred associations such as springs used in bathing rituals for births and deaths. Some sections of the river are ritual sites related to head-hunting, while other sections are fishing sites that belong to corporate groups. A cliff close to the settlement is believed to be the spirit abode of babies who died in infancy or before they were born. Some localities are considered the abode of spirits of the upper rank who occupy a different space from those of the lower rank. The spirits of the dead are believed to occupy a horizontal world that is neither "underworld" nor "skyworld." People who die of natural causes (old age or illness) are buried in individual burial places or corporate-owned tombs (*par-yung*) built on corporate-owned land within the village. Those who die of violent deaths (e.g., murder, drowning, or falling accidents) and those who die during childbirth are considered "polluting" and are not buried within the settlement. They are buried at the edge of the village facing the direction where they met their death. Women who die in childbirth are buried below the settlement where drainage passing through the grave will not pollute house lots or gardens. Shrines related to warfare are situated on the outskirts of the village territory, each shrine facing a neighboring village or one of the traditional four directions: upstream, downstream, where the sun rises, and where the sun sets.

Ward (*ator*) sites, which usually occupy an area 4.5–6 m wide by 6–9 m long, are generally concentrated at the center of the village. They are considered permanent occupation sites (Brett 1975, 1977) that may not be removed—even abandoned ward sites are included in rituals—since they have acquired sacred rights to the site. A ward site contains a ceremonial open-court platform and, behind this, a sleeping hut for boys, bachelors, and widowers; this place is taboo to women. The open space is paved with flat river rocks, has upright backrests polished by generations of body contact, and serves as a daytime lounging place for men during compulsory agricultural rest days. The yard surrounding the ward is planted in sweet potatoes for pig feed. The sweet potatoes are harvested immediately before ward feasts because they would be trampled during the feast.

There are other sites, such as village entrances and exits, that are associated with community welfare ceremonies (e.g., ceremonies to ward off

epidemics, evil, or bad luck). Scattered in small localities around the settlement are sacred sites where sacrificial food and drink are offered to ancestor spirits or "unseen guardians" of the village.

There are designated times of the day, from 11 A.M. to noon and from 5:30 P.M. to 6:30 P.M., that are believed to be dangerous for walking mountain trails. These designated times are dusk and the hottest part of the day, times when malevolent spirits that push people over mountainsides are believed to be roaming around. Beliefs like these are based on the assumption that for all activities there is a proper time and place to be observed and respected in order to be in harmony with the supernatural beings in the area. This is the Bontok's way of structuring their relationships with the environment, since they perceive themselves to be sharing the land with these supernatural beings who hold them responsible for their stewardship of the land.

#### Land Tenure

The villagers recognize three general categories of land rights, each with its own form of ownership and rules for succession (Figure 3.3): (1) communal land; (2) corporate land; (3) individually owned land.

Communal land (*lamoram*), belonging to all village citizens, is forest land that includes hunting grounds, pasture lands, and woods. This land is usually unimproved, far from the settlement, and may be close to borders with other villages. Any member of the village may graze his water buffalo or cows, cut timber, gather firewood or forest products, and divert water from this land. If he finds suitable land for swidden, he may clear the site. Once he invests labor and improvements, he acquires ownership rights to the improved area, which then becomes corporate land.

Corporate land (*tayan*) refers to communal land that was acquired by clearing part of the forest for a swidden garden and fencing the area to protect it from wild animals. The person who clears the forest erects boundary markers, such as large rocks buried into the ground or stumps of resinous trees, and may plant some fruit trees (e.g., mango or bananas) that help to consolidate his claim to the site. The land is segregated from the communal reserve to become the property of the founder, who bequeaths equal rights of access and exploitation to all his descendants. Corporate land may also be acquired as a reward for services rendered to another corporate group or in exchange for materials a neighbor needs for ceremonial requirements (e.g., sacrificial animals, sugarcane wine, or special iron vats). In the land tenure rules of corporate land, individual use rights are enjoyed by members of the bilateral descent group (i.e., both male and female descendants). Access to corporate land is a birthright that is not lost by marrying or residing outside the village.

It is a rule that a member of the corporate group has the right to cultivate as much land as he can with his own labor. Once he allows the land to fallow for more than five years, however, any other member of the corporate group has the right to succeed him in cultivating the same land.

Table 3.3. Land Holdings of Kin-Based Corporate Groups in Tukuran

Land-Use Categories	Number of Holdings
Swidden land	28
Pasture land	11
Forest land	13
Graveyards	18
Fishing sites	17

This system of land rotation, marked by a fallow period of five to six years for land farther away from the village, appears to be a mechanism for equitable allocation of swidden gardens among the members of a corporate group.

Households in Tukuran have individual use rights to as many as eighteen pieces of corporate swidden land, and none of the households is landless (Table 3.3). Property rights are transmitted equally to all of an individual's offspring, with the land undivided and held in common by all, preventing an individual's interest from extending beyond his lifetime. Corporate land cannot be sold by individual members. As ownership rights pass bilaterally from generation to generation, the landholding unit (i.e., the bilateral descent group) grows larger. The entire descent group may sell its property to a single individual.

*Tayan* corporate land does not always remain with descendants. Some circulation of these lands is controlled by ritual, where selling of corporate land is sanctioned by the group when ritual requirements related to a killing must be met. If a member of a corporate group breaks a peace pact by killing a citizen of a co-pact village, he must shoulder the penalty for violating the pact. His corporate group has to give up its land to satisfy ritual requirements and help pay the fine. The land may be acquired by an individual or another corporate group. If sold to an individual, the land may again go into corporate ownership as it passes to descendants of the purchaser.

The ward (*ator*) is another corporate group that owns private land in the village. The ward is an association of men who represent their families, and each household in Tukuran is affiliated with one of eleven wards. Although the ward is not a kin-based group, a man tends to be a member where his father belonged. Ward property is usually acquired from an upper-ranking member of the ward who transfers a parcel of his land to the ward in payment or exchange for group labor in building newly opened irrigation works, paddy fields, or other structures (Table 3.4). Ward land also may be purchased with contributions from ward members. All members and their families have equal rights to use ward land. Members who transfer to another ward still retain use rights to the land of their prior ward as long as the ward still owns it.

Table 3.4. Land Transfers to Wards During 1950–82

Kind of Land	Original Owner	Number of Transfers
Swidden land	Individual	2
Sugar cane land	Corporate group	1
Forest land	Corporate group	1

Ward lands also may be transferred when the ward decides to sponsor a feast (related to head-hunting or welfare ceremonies) that requires the butchering of animals. Thus, warfare and other crises in Bontok society that are related to killings have played a major role in the regulation and allocation of corporate land. The need to perform required rituals has maintained the circulation of land among the villagers so it is not monopolized by any particular individuals or groups. Out of eleven wards in the village of Tukukan, only three still retain their property. The other wards that used to own land have lost it in order to meet ritual requirements.

Individual land ownership (*fukod*, to “monopolize”) derives from the labor expended for building permanent structures such as stone walls, for transporting soil, or for constructing irrigation works. In this way property that was once corporate or communal is transformed into private individual ownership and regulated by a different set of rules for land tenure. The portion of land within a corporate landholding where permanent improvements are constructed by a member passes permanently out of the corporate group’s ownership and changes to restricted inheritance. The other members of the corporate group who have rights to the unimproved property no longer have any claims to the permanently improved section, which passes to the constructor’s children or heirs according to specified rules of inheritance.

Ownership of irrigated paddy fields is one of the important criteria for Bontok social ranking, so paddy fields are considered to be particularly valuable. The inheritance rule is primogeniture (first born gets the lion’s share) and homoparentalism (first born son inherits from his father’s property and first born daughter inherits from her mother’s property), a rule aimed at preventing land fragmentation. Villagers do their best to preserve the ownership of inherited paddy fields from generation to generation without losing them, but there are cultural events that can break this continuity. For example, a person may not be able to supply the sacrificial animals or other requirements for a death ceremony, payment of fines, or performance of a required feast of merit (*chuno*) among the upper rank. Transfers of paddy fields due to such family crises are regulated by rules that restrict their sale. When a paddy field is to be sold, it is a rule that kinsmen (brothers, sisters, uncles, aunts, cousins) should first be notified to give them a chance to acquire the property before it goes out of the kin group. The closer the relationship, the higher the priority for purchase and the less the exchange value. A kinsman who wishes to acquire the property should

present the appropriate pigs, sugarcane wine, or death clothes. One pig, for instance, may entitle him to enjoy limited ownership of the land, a transfer that is actually a kind of mortgage. Ownership may pass to the heirs of the kinsman-buyer, but if his descendants decide to sell the field during a similar crisis, it should revert to any of the heirs of the original owner. This is a device for allowing relatives who do not have sufficient paddy fields to enjoy the use of kinsmen’s fields.

If no one in the kin group is able to purchase the paddy field, it eventually leaves the kin group. In any sale to a nonkinsman, the full market value is requested, and the buyers are not obliged to return the field if a descendant of the original owner wishes to redeem it.

Water is not considered to be owned by individuals. In principle, everyone has an equal right to any water within the village boundaries, but exclusive rights to water can be justified whenever the labor has been invested to build the channels and check dams that divert water from a mountain source and store it for use in an irrigation system. This is an investment that usually was made many generations ago, and rights to the use of that water are the exclusive priority of corporate group members descended from the original builders of the system. The sale of paddy fields automatically includes the right to use the water, but any rice terraces subsequently constructed along the main irrigation canal are not allowed to use its water. Anyone who channels water to newly constructed fields is fined by the members of the irrigation group.

The distribution of water within the irrigation system is a particularly sensitive matter. It is considered the responsibility of every household to monitor its water supply closely to ensure it receives its fair share. Whenever a water theft is discovered, it is reported to other members of the irrigation system, who publicly scold the offender. The lack of stricter sanctions for such a serious offense may give the impression the system is ripe for abuse, but feelings about irrigation water are so intense that more severe punishments (e.g., withholding water) are considered counterproductive because they would divert precious labor from working in the fields to time-consuming litigations over water thefts. Moreover, it is believed to withhold water would interfere with the basic right of every family to produce the food it needs for survival.

#### THE ROLE OF RITUAL

Fertility rituals to increase the water supply are performed annually at the end of the irrigation canal. They are said to “warm up” the irrigation water symbolically. Contributions of labor and materials (including sacrificial animals) for maintaining the system are made by members of the irrigation group.

The allocation of land, water, and other natural resources is regulated through customary law and ritual that enable the Bontok to attain a relatively equitable distribution of those resources. Rituals prevent the accumulation

of agricultural land in the hands of a few who could use it as a power base to exploit the labor of covillagers in a tenant-landlord relationship. A person who tries to oppress another is believed by the Bontoks to be punished by "unseen" beings. It is believed that the oppressor's family will be cursed, and if punishment does not occur during his lifetime, his descendants will pay for his deed. This ensures that no one in the village is deprived of his right to cultivate land, produce food, and procreate.

Upper-ranking families are expected to open their granaries to lend rice to families that have run out of rice during a food shortage. Repayment of the rice is expected when there is a good harvest, but there is no concept of interest in traditional Bontok society. A custom in the past was mandatory provision of a fertility feast (*fakil*) consisting of rice and buffalo meat by upper-class families for the entire village in times of food shortage. This is a way the upper class redistributed surplus production in exchange for prestige.

Rituals have played an important role in the adaptation of Bontok farmers to ecological constraints they have faced for many generations. These rituals emphasize the relationship between the human social world, the material (i.e., biophysical) world, and the supernatural world. Rituals provide reassurance, giving these people a feeling that they have some degree of control in their continuous encounters with unpredictable natural phenomena. Rituals also structure the way the Bontok interact with their environment on a sustainable basis. For example, every household must raise pigs for regularly scheduled rituals in the course of the agricultural cycle as well as ritual sacrifices for family crises such as death. However, those same pigs also provide both valuable nutrition and manure for maintaining the fertility of the paddy fields.

Rituals also help to organize cooperation between neighbors and further reinforce their group solidarity in the face of common crises and toward common benefits. Village territoriality, which is heavily proscribed by ritual, has been extremely important for keeping the Bontok people in harmony with their land by preventing their population from exceeding what the land can support.

Rituals serve to coordinate the village agricultural calendar. Rest days provide the time to organize communal efforts in the village—decisions on work allocations among household members, formation of work groups, and assessment of available resources. Rest days also force a break from continuous heavy labor in the fields, thereby preventing physical exhaustion in a cultural setting where industriousness is highly valued and laziness is condemned. Rest days are terminated after successfully performing the *patay* ceremony at the sacred trees site. A chicken is sacrificed and the bile sac examined. If the prognosis is good, agricultural activity can resume. If the prognosis is bad, the village elders declare a continuation of the rest through the following day, when another sacrifice is performed.

Rest days appear to be critical to minimizing pest damage to the traditional rice crop, because each step of the cultivation cycle is synchronized

throughout the village. This means that the grains ripen everywhere at about the same time, forcing the pests to spread themselves over all the fields. Farmers who stagger their planting and harvesting activities can be faced with a concentration of pests in fields where the grains ripen later than the others.

#### IMPACT OF THE OUTER WORLD

Bontok farmers have tried to be selective in adopting only those outside agricultural practices they can control, thus avoiding dependence on outside influences that might interfere with their village affairs. There has been an increasing impact by the outside world, however, due to greater cash needs, outmigration of villagers, their involvement in nontraditional employment, and a growing presence of the national government. Tukukan farmers are now selling some of their surplus of swidden and drained-paddy-field crops such as beans, eggplant, and fruit. Some Tukukan farmers have started to plant garlic in their drained paddy fields. Garlic commands a high price in the urban market but is sold locally to middlemen who pay a much lower price. Villagers at higher altitudes are growing vegetable cash crops such as potatoes, cabbages, tomatoes, stringbeans, and carrots in paddy fields that lack sufficient irrigation water for a rice crop. The fact that these vegetables are grown on terraces means they are not causing the kind of erosion that has occurred in some other parts of the Cordillera where in recent years extensive cash cropping of temperate-zone vegetables has been established on steep hillsides without terracing.

As cash has become more essential to pay for college educations, hospital bills, gambling debts, bad business deals, lawyers' fees (in homicide cases), and construction of "modern" houses, villagers are working away from the village more (e.g., in copper and gold mines located at Benguet). The result has been an agricultural labor shortage in the village, especially during harvest time. Farmers employed away from the village are increasingly lending out their paddy fields on share-cropping arrangements or selling them for cash, and reciprocal labor groups are beginning to be paid in cash when the owner of a paddy field is employed outside the village and cannot reciprocate the labor exchange. Swidden gardens have sometimes been neglected in recent years due to insufficient labor, and an increasing number have passed into fallow.

Commercial fertilizers were not taken up by the villagers during the 1960s and 1970s, but chemical fertilizers are now being adopted by farmers who have sufficient cash but are short on the household labor to use compost, which is labor intensive in its production, transport to fields, and application. Some farmers who have adopted commercial fertilizers in the past five years are beginning to complain about a change in the consistency and stability of their paddy field soil. Although they agree that yields have increased, they also say they are able to maintain the higher yield only by increasing the amount of fertilizer they apply each year.

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