

# Ifugao Rice Terraces: Agricultural Heritage Systems dynamic conservation and practices

*Samuel Peñafiel*

---



## Introduction

An outstanding upland agroecosystem using indigenous forest watershed management, irrigation and bench terracing engineering principles has been practiced for over 2,000 years in the landlocked mountainous province of Ifugao in the cordillera region of Northern Luzon Philippines. It is a product of the ingenuity, dedication and industriousness of the Ifugaos in response to a mountainous habitat. The Muyong/Pinugo - rice terraces farming system occurring at an elevation above 1,000 m above sea level is a series of benches of irrigated terraces carved out following the contour of the mountain slopes which are devoted to growing rice. The terraced rice paddies in the municipalities of Banaue, Hingyon, Hongduan, Kiangan, Lagawe, Mayoyao and Tinoc cover a surface area of approximately 20,000 hectares. All have withstood over time the forces of nature such as the alternating annual heavy monsoon rains followed by rainless months and the occurrences of earthquakes. Today this marvelous irrigation and upland rice farming system remains generally stable although there are now threats to its future as an agroecosystem. In 1996, the Ifugao Rice Terraces was declared a World Heritage Site by the UNESCO.

## Ifugao Rice Terraces Mountain Landscape

The major characteristics of the Ifugao Rice Terraces mountain landscape are the series of paddy rice terraces constructed along the contours of the mountain slopes and the forests locally called Muyong and Pinugo on the upper portions of the terraced farm (payoh) and on the ridges of the mountain slopes. One can also notice intermittent small patches of swidden farms. The terraces located at the lower portions of the slopes are wider and supported by stone retaining walls. As the slopes get steeper narrower paddies which are sometimes less than two meters wide occur and are not supported by stonewalls. The spaces between terraces along the slope vary less than 0.5 m and sometimes reaching as high as 5 meters.

## Irrigation Water

Water that is fed to irrigate the terraced rice paddies come from the streams, creeks and rivers in the forested sub watersheds which are made up of family woodlots called Muyong and Pinugo (natural forests) that dominate the ridges and upper parts of the mountains. The water is diverted to small canals and flows to terraces and to next lower terraces. The ter-

racess/paddies supplied by a common irrigation system is called a payoh-cha. The terraces are supplied with water all year round even after harvesting to keep the soil wet. The reasons for this are two fold: 1) to avoid drying and cracking of the soil which may cause the terrace to collapse as introduction of water causes soil to expand and 2) to induce faster decomposition of rice straws which are left buried in the paddies after harvesting. Members of the village are assigned to clean and maintain the irrigation canals and others are assigned to watch any diversion of water to other terraces. As compared to ordinary upland farming, terracing as practiced by the Ifugaos has been a soil conservation practice that significantly minimized soil erosion.



## Rice Farming

The Ifugaos are a tribe with a rich culture. Numerous centuries old rituals are performed in their rice growing. The rice culture leader called tomona determines the start of the planting season. Rice planting season is ushered in by the tumod ritual in the tumun-ok or payoh which is the main terrace selected hundreds of years ago from among those belonging to the kadangyan (nobility). A statue of a rice god called bulol in a sitting position is touched by the hand with blood from butchered chicken or pig. Seeding starts in the months of November and December and planting of rice seedlings commences in January and February. The planting calendar must be strictly observed so that the terraces are fully planted and the pests are distributed resulting in less destruction.

There are about 9 indigenous rice varieties grown and the most popular is the tinawon, a fragrant native upland variety. Most farmers follow a single cropping per year although a few can grow two croppings. Also, harvesting in all the paddies has to be

completed as soon as possible to deprive rodents of food causing them to starve and die or migrate to other places. Attempts by the Department of Agriculture to introduce new varieties have so far received very low acceptance due to its non-compatibility with traditional way of rice culture. Paddy field preparation is done using spades. Weeding and pest control are done with the bare hands. No inorganic fertilizers and pesticides are applied. Rice straw from previous harvests are left in the paddies and pressed to the terraces to decompose. The nitrogen fixing azolla are abundantly growing in the rice terraces. In the wider rice terraces, native fish and shellfish species are allowed to grow. According to Ngidio (1998) the raising of the native fish dalag is made possible thru the Luhok technology which involves the digging of pits more than 1 foot deep in the terraces. The pits are fenced with plant materials to corral the fish. Three months after planting, a ritual called paad is performed in the main village granary in the belief that it will result in good grain production and maturity. It is worthy to note that this ritual also binds villagers not to eat fish and shellfish during the rice growing season. This allows the aquatic life to reproduce and its population to increase (off season fishing). Crop diversification is also being practiced in the rice farming through the construction of low mud mounds or ditches made out of decaying rice and other plant materials.

These are planted to vegetables and root crops like taro. There are other rituals performed after planting until harvest. According to local tribes, a native priest called mumbaki performs the tungoh (rest day) ritual in mid-April or the post planting rituals called gotad or kulpi. Farm labor is provided by group effort (ubbu) among neighbors, families/clans. Men do the site preparations including irrigation ditch and terrace maintenance while women help in the weeding, pest control and harvesting. Another group called the bad-dang helps in constructing and maintaining the terraced walls and canals. Others act as monitors for the canals checking on a daily basis the clogging of the canals and to guard against diversion of the water to other canals.

### **The Muyong / Pinugo– Private Forests**

The life support system for the Ifugao rice terraces are the muyongs or family forests/woodlots that are traditionally owned by the ifugaos who also own rice terraces. It is therefore common to see small forests above the upper most rice terraces. The muyong and pinugo are maintained as forest cover for the watersheds that supply the irrigation water of the ter-

aces. In addition, the woodlots are sources of fuelwood, timber for house and granary construction and food.

The sizes of the muyongs vary from about 0.50 hectare to as large as 2.50 hectares (Dacawi 1982; Klock and Tindungan 1999).

In order to maintain the integrity of muyongs an entire area is to be inherited and cannot be subdivided into smaller area. Muyongs are natural forests that evolved through natural plant succession and are rich in biodiversity. According to Rondolo (2001) as many as 264 species belonging to 71 plant families have been recorded in muyongs. Several species of rattan (*Calamus*) are also commonly grown. In recent times, exotic tree species such as *Gmelina arborea*, *Swietenia macrophylla* and *Samanea saman* are planted in the muyongs. Likewise, for so many years coffee, cocoa, betel palm (*Areca catechu*), citrus and ikmo (*Piper* spp.) have been integrated making muyongs an agroforestry system.

Owners of muyong harvest or cut only the trees or plants they need according to use e.g. for lumber the big trees and for fuelwood only branches. For the felled trees, the branches are cut into smaller sizes bundled and utilized as fuelwood whereas the twigs and leaves are left to decompose in the woodlot. Neighbors are allowed to collect fuelwood and other plant products provided they ask permission from the owners. Access to and resource uses are based on customary laws and traditional socio and political structures.



The Ifugaos also tend their muyongs at times when their rice fields do not require labor. They prune the branches of trees, cut the vines that interfere with the growth of the trees and plant additional seedlings when necessary.

Among the plant species recorded in muyongs,

171 are for fuelwood, 11 species for construction and woodcarving, another 70 species as sources of food, 10 species of rattan used for food, basketry and tying and 45 species are used for herbal medicine (Rondolo 2001). The Muyongs are also sources of natural pesticides that are used in their rice culture. Researchers of the Department of Environment and Natural Resources are closely working with farmers of their discovery of a plant that kills destructive alien snails feeding on young rice plants. The natural forest in the ridges is the habitat of the striped shrew rat (*Chrotomys whitebeadi*) which feeds on giant earthworms and golden apple snails. The Ifugaos are known for their wood carving skills and a wood carving industry thrives in the locality especially with the opening of the rice terraces to tourists.

The source of wood for woodcarving industry comes from the muyong, however, the demand for raw materials have alarmed government agencies due to the increase in tree cuttings within the muyongs. In 1996, the Department of Environment and Natural Resources after recognizing the traditional forest ownership and indigenous forest management system of the Ifugaos formulated a special cutting policy that allows the issuance of permits for the cutting of trees in the muyongs. Swidden farming (*umah*) is also practiced by the Ifugaos but in a limited scale. The *umahs* are small patches of forest clearings and are surrounded by muyongs. These are planted to sweet potatoes, taro, banana and some legumes.

During fallow periods seeds from the adjacent woodlots will regenerate the *umah* and new muyongs are later allowed to develop.



### Dynamic Conservation and Practices

From the Ifugao rice terraces production system and muyong/pinugo forest management the following are some indigenous conservation and prac-

tices:

- Terracing of the mountain slopes stabilizes the slopes and prevents surface soil erosion. It helps maintain clear water in the creeks and rivers;
- Irrigation water is maintained throughout the year in the terraces to prevent their collapse.
- Maintaining muyongs and pinugos is a good watershed management practice that sustains the water needs of the rice terraces and control streamflow during heavy rains.
- The imposition of paad (vow) as part of the paad rice ritual which prohibits eating of aquatic life allows enough time for fish and shellfish species in the terraces to reproduce;
- Traditional rice varieties are continually planted. Although it requires six months from planting to harvest, it does not require inorganic fertilizers and is less susceptible to pests that commonly attack new rice varieties;
- Plant parts coming from the plants growing in the muyong are used as pesticide in the rice terraces;
- Rice grain harvesting is through detaching only the panicles. Rice straw and leaves are left and slightly buried in the paddies;
- There is a diversity of plant species maintained in the Muyong which provides for food, medicine, construction, pesticides and raw materials for making baskets and wood carvings;
- Trees and other plants are harvested in the Muyong only when needed. Plant parts such as twigs and leaves are left to decompose in the woodlots;
- Owners of Muyong undertake silvicultural practices such as pruning, thinning and cutting of vines that suppress the growth of plants thereby allowing better tree growth;
- The integration of banana, coffee, cacao, citrus, rattan, betel nut and other fruit bearing trees makes it one of the best indigenous agroforestry practice;
- Inheritance of the whole muyong and its non partitioning prevents area reduction and thus has made forest cover intact and enough to provide family needs and sustain water for irrigation as well;
- The imposition of planting calendar such as planting the rice almost within the same period distributes the pests population thereby reducing total pest damages. Likewise, the practice of harvesting also within a short period deprives the rats of food supply causing them to either starve or migrate; and
- The centuries old indigenous customs and beliefs related to natural resource use and management are major factors that deter over exploitation of land resources and biodiversity.

## Threats and Issues

The cultural beliefs, customs and traditions of the Ifugaos related to the use of their natural resources under their harsh physical environment have been mainly the factors that allowed the rice terraces-muyong agroecosystem to remain a sustainable life support system of the Ifugaos. However, recent introduction of modern farming technologies, christianity, changes in local governance, access to education and modern means of living including transportation have started to impact on one of the oldest rice and forest farming system.

The introduction of high value vegetable crops which do not require year round inundation and are very dependent on inorganic fertilizer and pesticide inputs have contributed to the collapse of some terraces due to the absence of water in the terraces. Absence of inundation promoted the growth of large earthworms (*Polypheretima elongata*) that bore into the soil creating tunnels where water passes thereby weakening the terraces. Changes in cropping have also increased pests incidence especially rats (*Ratus tanezumi*).

With out migration by the young who look for better jobs, better education, and modern living, farm labor is becoming a problem. Thus, the mastery of traditional rice farming, terracing and maintenance and upkeep of muyongs is steadily being lost. The demand for raw materials in the wood carving industry also encouraged muyong owners to cut the bigger trees creating canopy gaps and reducing the water absorption of the watersheds. Evangelization among villagers has likewise discouraged many to disregard some of the customary rituals related to resource use and rice culture. Traditional socio-political structures and institutions such as the village work groups *ubbu* and *bad-dang*, the *tomonas* and *mumbakis* have lost their roles in the villages when the democratic processes required that local leaders be elected and school teachers, government technocrats and community development workers have been immersed into the communities. According to Medina (2003) the rice terraces are a creation of Ifugao culture. Any intervention that tends to alter the social organization that evolved the ifugao physical and social structures for thousands of years is the very threat to the disruption of the ifugao rice terraces-muyong agroecosystem.

## References

- Butic, M. and R. Ngidio. 2004. *Muyong Forest of Ifugao: Assisted Natural Regeneration in Traditional Forest Management*. Monograph. FAO RAPA. 6 pp.
- Dacawi, R. 1982. *The Ifugao Way of Forest Conservation*. Phil. Upland World1, 2: 14-15
- Hangdaan, N.B. 2000. *The Muyong System of the Ifugaos*. Unpublished Monograph. 9 pp.
- Klock, J. and M. Tindongan. 1999. *The Past and the Present. A Meeting of Forces for a Sustainable Future*. Forest, Trees and People Newsletter Issue 9. FTP Program Network
- Marquez, C.D. 2002. *Ridding Philippine Rice Terraces of Rats and Worms*. SciDev.Net
- Medina, C.R. 2003. *Understanding the Ifugao Rice Terraces*. St. Louis University. Cordillera Research and Development Foundation. Baguio City, Philippines
- Ngidlo, R. T. 1998. *Conserving Biodiversity: The Case of the Ifugao Farming System*. People, Earth and Culture. PCARRD. Los Baños, Laguna Philippines
- Rondolo, M. T. 1999. *The Changing Ifugao Woodlots: Implications for indigenous plant knowledge and biodiversity*. Ph.D. Thesis Australian National University.

