What can institutional analysis tell us about long lived societies? The case of the 2000 year old Ifugao society [1]

Eduardo Araral [2]

I. Introduction and research question

Anthropologists have speculated on a variety of reasons why ancient societies have collapsed overtime. Examples of these include the Eastern Island, Pitcairn Island, Henderson Island, the Anasazi, the Classic Lowland Maya and the Greenland Norse. There are several themes in the literature that attempts to explain this phenomena: 1) the Malthusian population growth – resource depletion theories; 2) conflict or integration theories; 3) theories that explain the structure of incentives (class conflict, social dysfunction; elite mismanagement); 4) chance events or insurmountable catastrophes; and 5) economic models of collapse such as theories of marginal productivity of increasing complexity. Of these, only the economic models identify a definite causal chain between explanatory variables and outcomes observed (Tainter, 1988).

A dominant theme of the economic model is summarized by Diamond (2005) as a Malthusian echo i.e. that the collapse of ancient societies tended to follow a somewhat similar course: population growth forcing people to adopt intensified agricultural production and to expand farming from the prime lands onto marginal land. Unsustainable practices led to environmental damage (deforestation and habitat destruction, soil problems, water management problems etc) and the consequent food shortages, starvation, wars, disease and consequently the loss of some of the economic, social, political and cultural complexity that they developed at their peak.

Tainter (1988), on the other hand, using a comparative analyses, suggests that the collapse of societies can be understood in terms of four concepts: 1) human societies are

[1] This research was funded by the Center for the Study of Institutional Diversity – Arizona State University through US NSF Grant xxxx.
[2] Assistant Professor, Lee Kuan Yew School of Public Policy, National University of Singapore.

problem solving organizations; 2) socio-political systems require energy for their maintenance; 3) increased complexity carries with it increased costs per capita; and 4) investment in socio-political complexity as a problem solving response often reaches a point of declining marginal returns.

The phenomenon of collapsed societies raises an interesting question: why have these societies failed to produce a sufficient response to their circumstances? This question has prompted other scholars – for example Diamond (2005) - to explain how some societies survived in difficult environments and persist overtime, 1,100 years in the case of Icelanders, 3,200 years in the case of Tonga and some 7,000 years in the case of New Guinea Highlands.

This paper examines the case of the 2000 year old Ifugao rice terraces in the Philippines - a UNESCO World Heritage Site and a globally important agricultural heritage site by the Food and Agriculture Organization - to explain, using the theoretical lenses of institutional analysis, why they have remained robust overtime.[3] The rice terraces are not only interesting because of their longevity but more so because of the complexity involved in maintaining a delicate socio-ecological system. Because of their nature, maintaining the terraces require constant repair, extension, restructuring and dynamic recycling of resources which makes them a compelling case study. The terraces cover an area of 400 square miles (Annex1) in mountainous slopes of as high as 5,000 feet and with terrace embankments stretching

[3] The age of the terraces would vary from place to place. Anthropologists report that, based on a series of radio carbon dating by the University of Georgia Center for Applied Isotope Studies, some terraces could have been established as early as 1555 AD ± 60 years. In other sites, carbon dating estimates put the dates around 7th to 11th Century while in higher elevation sites at 16th century (see Maher 1973, 1977). UNESCO officially refers to the age of terraces as around 2000 years old.

some 20,000 km, equal to the distance halfway around the world, of which 7,000 km are stone walled.

My findings suggest that institutional analysis – especially the study of informal institutions embedded in customary law - can shed important insights to explain the longevity of the Ifugao rice terraces. In essence, these informal institutions created incentives to reduce conflict and increase cooperation in the Ifugao society. As Conklin (1980) puts it, "the Ifugaos have been guided through conditions of local change by widely held principles of social organization."

In particular, the paper illustrates how the Ifugao customary laws on property, family, labor, penal, procedural and personal laws, as well as farming, religious and ritual practices have reinforced the Ifugao incentive structure that has kept their delicate socio-ecological system in a stable equilibrium for centuries. More interestingly, the Ifugao case study reveals the incremental evolution of a polycentric pattern of social order that did not depend upon a complex bureaucracy or a centralized authority akin to Wittfoegel's hydraulic societies.

The paper will also illustrate how institutional analysis can help explain the limitations of the Ifugao customary law in the face of contemporary challenges particularly the breakdown of social capital and the loss of indigenous knowledge resulting from the integration of the terraces into the market economy.

II. Data and Methodology

This study employed multiple methods of data collection including extensive and intensive archival research, review of ethnographic atlas produced by anthropologists and ethnographers, participant observation, ground truthing and field surveys, focus group discussion and key informant interviews, participation in an international conference, use of secondary data as well as aerial and ground photography.

Participation in the 1st International Conference on the Cordilleras held at the University of the Philippines (Baguio) - Cordillera Studies Center from February 7 to 10 2008 provided opportunities to meet and discuss with experts on the Ifugao culture. These include i) Maria Stanyukovich, a researcher on the Ifugao Hudhud tradition from the Peter the Great Museum of Anthropology and Ethnography, Russian Academy of Sciences; ii) Prof. June Prill-Brett from the University of the Philippines Baguio-

Cordillera Studies Center; iii) Prof. Gaston Kibiten (St. Louis University), an expert on the role of clan-reunions; iv) Prof. Bonifacio Ramos (St. Mary's University) on the work of Fr. Lambrecht, a missionary who spent considerable time documenting the culture of the Ifugaos; and v) Prof. John Palina (St. Mary's University), himself an Ifugao, on the importance of triangulation in doing research among the Ifugao. Some 90 papers dealing with various aspects of the Cordilleras were presented at the conference including several panels on the Ifugao rice terraces and its people and papers on ethnographic work on the Ifugaos.

Interaction with experts also led to an extensive archival research at the library of the University of the Philippines (Baguio) which has a collection of the most authoritative studies on the Ifugaos. The archival research covered the pioneering work of Conklin (1967; 1980) who wrote the seminal Ifugao ethnographic atlas; Barton (1919, 1922) who studied Ifugao customary law in depth and whose work greatly informed this paper; Lambrecht (1967; 1951); Hoebel (1949); Scott (1966,1975) on the social history of the Ifugao; Beyer (1912, 1955), among others. Together, these collections represent the most extensive archival record available on the Ifugao rice terraces, its people and their culture.

Archival work was complemented with field work by research assistants in the Ifugao rice terraces particularly in the municipalities and districts of Banaue, Batad, Asipulo, Hengyon and Mayaoyao. The field work was undertaken from May 2008 to October 2008 through a team of local researchers. The field work involved focus group discussion among indigenous knowledge experts in Ifugao, mumbaki (village priests), members of the Save the Ifugao Terraces Movement (NGO) and officials of various units of the provincial government of Ifugao especially the Department of Agriculture and Provincial Planning and Development Office which keeps statistical records on the rice terraces. The aerial photography by A. Javellana (2008) was very valuable in providing a visualization of the conditions of the rice terraces and hopefully would make the report more interesting to read.

III. Findings and Analyses

Overall, my findings suggest that institutional analysis – especially the study of informal institutions embedded in customary law - can shed important insights to explain the longevity of the Ifugao rice terraces. In essence, these informal institutions created incentives to reduce conflict and increase cooperation in the Ifugao society. As Conklin (1980) puts it, "the Ifugaos have been guided through conditions of local change by widely held principles of social organization."

In particular, the paper illustrates how the Ifugao customary laws on property, family, labor, penal, procedural and personal laws, as well as farming, religious and ritual practices have reinforced the Ifugao incentive structure that has kept their delicate socio-ecological system in a stable equilibrium for centuries. More interestingly, the Ifugao case study reveals the incremental evolution of a polycentric pattern of social order that did not depend upon a complex bureaucracy or a centralized authority akin to Wittfoegel's hydraulic societies.

The paper will also illustrate how institutional analysis can help explain the limitations of the Ifugao customary law in the face of contemporary challenges particularly the breakdown of social capital and the loss of indigenous knowledge resulting from the integration of the terraces into the market economy.

A delicate socio-ecological system

As a World Heritage Site, the Ifugao rice terraces have been officially described by UNESCO as follows:

> "For over 2000 years, the high rice fields of Ifugao have followed the contours of the mountains. The fruit of knowledge passed on from one generation to the next, of sacred traditions and a delicate social balance, they helped form a delicate landscape of great beauty that expresses conquered and conserved harmony between the humankind and the environment." - UNESCO, 1995.

Anthropologists and ethnographers are also unanimous in their assessment of the Ifugao terraces. For instance, Conklin (1965), Molano (1801), Keesing (1962), Scott (1965); Lambrecht (1967), Barton (1919) are all unanimous in their view that the terraces exhibits a remarkably high degree of cultural and environmental interdependence. They agree that the Ifugaos are "known for their astonishing feats of engineering in the

construction and maintenance of extensive rive terraces, the most visually impressive aspect of the intricately patterned landscape."

There is no question that the Ifugao rice terraces are embedded in a delicate socio-ecological balance. The vulnerabilities of the terraces are numerous and serious: the mountains of Ifugao are bisected by geological fault lines, the Philippines being in the Pacific Ring of Fire. The frequent occurrence of earthquakes – both of low and high intensity – could easily alter streams and destroy the terraces. Earthquakes are so common in Ifugao that they are often the subject of the *hud-hud* – the oral history of the Ifugaos. The Ifugao's also has an earthquake deity. In a survey in 2005, 25% of respondents blame earthquakes as a frequent cause of concern in the maintenance of their terraces.

As well, landslides and soil erosion due to annual monsoon rains, typhoons and cloudbursts are also frequent - Ifugao being a typhoon belt - and aggravated by the steep slopes of the terraces. Conklin (1980) reported that in one hamlet, he observed at least 250 landslides after a cloudburst. Pests and diseases are also common such as giant earthworms which damage the terrace bunds as well as rodents and snails that pester the crops. Conflicts on rice and forest lands and water allocation are a common occurrence in terraced rice farming.

Institutional - ecological adaptation

The Ifugaos have managed to cope with these vulnerabilities in large part because they have evolved overtime a set of informal institutions or customary laws that created incentives to reduce conflict and increase cooperation. This is the crux of the argument to explain the robustness of the rice terraces.

Most anthropologists who have studied the Ifugaos agree that the Ifugaos are guided through conditions of constant local change by widely held principles of social organization. They suggest that the Ifugao's abiding concern for the competitive

development of land for terracing and rice production, elaborate traditional rituals that in all occasions involve interaction with deceased kinsmen and a deep interest in status and rank all underlie the fabric of the Ifugao culture (see Barton 1919; Beyer, 1964; Lambrecht 1967; Keesing 1962; Scott 1974).

What follows below is an attempt to illustrate how the Ifugao customary laws on property, family, labor, penal, procedural and personal laws, as well as farming, religious and ritual practices have reinforced the incentive structure among the Ifugaos that has kept their delicate socio-ecological system in stable equilibrium for centuries. Institutional analysis can also help explain the limitations of the Ifugao customary law in the face of contemporary challenges.

Customary Law

Barton (1919), an authority on Ifugao law, notes that the Ifugaos have no form of writing and therefore there is no written law. Oral tradition such as the *hud-hud* serves as the mechanism for transferring knowledge form one generation to the next. They have no form of political government and therefore they have no constitutional or statutory law. They have no courts or judges and there is no law based on judicial decisions. In its stage of development, Ifugao law has been characterized by Hoebel (1949) as similar to Mohammedan or Hebrew Law in their early stage of development.

Ifugao law has their origins in taboo and custom. Most taboos govern individual behavior and the behavior of those closely related to him by blood ties. Taboos are to the Ifugaos the equivalent of rules of propriety. The Ifugao customary law embraces matters related property, inheritance, water rights and family law and procedure. Religion and law appear conjointly in matters of 1) transfer of property; 2) ordeals; 3) payment of large fines and 4) peace making. Ifugaos state that a large part of their customary law and procedure was handed down by a deity of the Skyworld.

There are several general principles to describe the Ifugao legal system according to Hoebel (1949). The first is collective responsibility. Not only the individual who commits an act but his kin in proportion to the nearness of their kinship, is responsible for the act. This applies not only to crimes but to debts and civil injuries. The second principle is collective procedure. Legal procedure is by and between families. A family therefore should be “strong to demand and strong enough to resist demands”. These

principles are derived from the fact that among Ifugaos, bilateral kinship is the primary legal and social unit of society. Each individual or sibling is the center of a kinship or family group whose unity must be preserved at all times and at all cost. An individual's responsibility to his kinship takes precedence over any self interest.

Property law

Property law forms the core of the Ifugao's customary law and the purpose of its property law is to meet the Ifugao household's key objective of expanding, improving and maximizing the use of woodlot and pond fields holdings. As Conklin (1980), an expert on the Ifugao culture notes, many if not most of the serious discussions and actions by the Ifugaos – ranging from marriage and funeral to legal settlements and property exchanges – are directed towards these ends.

A legal anthropologist, Hoebel (1949) observes that "the Ifugaos have developed through the ages a most elaborate system of substantive property law and personal law – a system that operates almost entirely without benefit of government".

Family property among the Ifugao's consists of rice lands, forestlands and watershed and heirlooms. The Ifugao's attitude to family property such as rice and forest lands is that these properties - which have been handed down from one generation to the next - cannot be the property of the individual. Possession is more in the nature of trust than an absolute ownership. As Barton (1919) documents, "present holders possess only a transient and fleeting possession or occupation which is insignificant in duration in comparison with the decades and centuries which have elapsed since these properties came into the possession of the family. Inherited property cannot be disposed of without exhausting every effort to keep it within the family."

The Ifugao's property law has been described by anthropologists as primogeniture i.e. inherited rice fields and woodlots / watersheds are not split up and are privately owned by the family (Barton 1919; Conklin 1980). According to Conklin (1980), if there are seven children in a family, only the eldest will get the lion's share of the landholdings and the rest of the siblings have to look for livelihoods elsewhere.

The logic of this institutional arrangement is that for the terraces to properly function overtime there has to be sufficient water supply year round. Year round inundation of the fields is necessary in order to: 1) prevent the drying and cracking of the

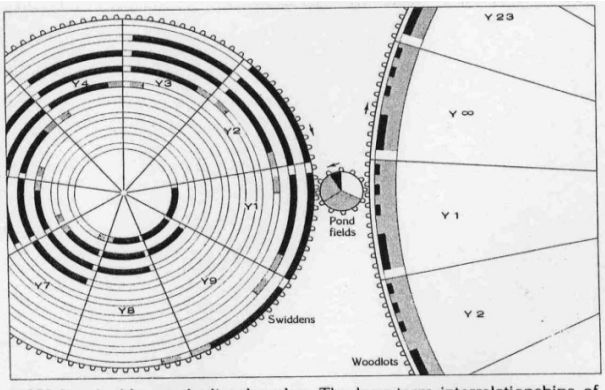
soil which may cause the terrace to collapse as introduction of water causes soil to expand and 2) to induce faster decomposition of rice straws which are left buried in the paddies after harvesting which in turn helps strengthen the terraces and prevent water from seeping.

Year round water supply in turn depends on the functioning of the life support system for the rice terraces - the *muyongs* or family forests and woodlots - which are located above the upper most part of the rice terraces (see photo). The muyong and pinugo are maintained as forest cover for the watersheds that supply the irrigation water of the terraces. In addition, the woodlots are sources of fuelwood, timber for house and granary construction and food.

In order to maintain the integrity of muyongs, an entire area is to be inherited and cannot be subdivided into smaller area. If the muyongs are fragmented, it could spell problems for the sustainability of the terraces. This is the logic of having the primogeniture property rights structure of the Ifugaos. This might also explain the relatively small and stable population of the villages which in turn makes it easier to maintain a stable institutional matrix.

Furthermore, Conklin notes that there is no such thing as absentee landlords and that very little land is controlled by non-Ifugaos, despite the migration of farmers from nearby non-Ifugao provinces. Land tenure and usage in Ifugao have been tightly managed and is integrated culturally. Absentee landlords and non-Ifugao landowners could spell problems for maintaining the watersheds and pond fields for which other farmers down stream the terraces are much dependent upon for the functioning of their fields. If the terraces and watersheds in the upper slopes of the mountain are not well maintained, it would pose problems for water management downstream or could result in soil erosion that would damage pond fields down- stream.

The primogeniture system of property rights of the Ifugaos is also essential in preserving the long term interlocking relationships of swidden and woodlot cycles to the annual round of pond field cultivation (see figure 2). The interlocking cycles are meant to ensure the long term sustainability of the swidden, woodlot and pond field farms in a harmonious manner as possible which is a key to the robustness of the rice terraces. If the swidden farms are not fallowed for a sufficient number of years as to allow the growth of woodlots necessary to keep the watershed functioning, this would have an adverse effect on the availability of water for the terraces. By balancing long term ecological cycles with agricultural practices, the Ifugaos were able to sustain the functioning of their terraces for a long period of time. The aerial survey of the Ifugao terraces by Conklin and Javellana (2008) shows that forest cover in much of Ifugao has remained intact since Conklin did a ground survey in the 1960s. Conklin notes that the "luxuriousness, density and height of the forest landscape" in Ifugao is remarkable.



[182] Interlocking agricultural cycles. The long-term interrelationships of *swidden* and *woodlot* cycles to the annual round of *pond-field* cultivation is shown here schematically in the form of a mechanical diagram. *Arrows* indicate the direction of gear movement, not that of time. Other key information: *Y number,* year (beginning with the present); *circular banding,* same surface or ground area through time; *gray,* initial cultivation period (for pond fields and swiddens), initial and continued growth period (for woodlots); *solid black,* harvesting periods for rice, sweet potato, and tree crops (for pond fields, swiddens, and woodlots, respectively); *white* (within bands), fallow or inactive periods. See also [1] and [64].

Finally, the primogeniture system of property rights was necessary for maintaining kinship as the primary basis for social relations among the Ifugaos. As barton notes "it is preferable for the Ifugaos that a family has at least a powerful member around whom the kin may rally and to whom they may look for aid than to have the family property split into insignificant parcels that would affect little the property of all." The unity of the family is primodial and must be preserved at all times and at all cost.

Property tenure

The structure of the Ifugao property law was designed to create incentives to minimize conflicts and increase cooperation. To reduce conflicts over property ownership, Ifugao property law allows for perpetual tenure over rice and forest land. As Barton notes, "in case an owner abandons a rice field for any period of time, however long, and another man takes up the field without objections from the true owner, and

makes the land productive again, the latter has the right to use the field for the same number of years that it was abandoned."

In another example, Barton observes that transfers of property such as rice and forest lands through pawning is governed by a rule that such property cannot be pawned to another party for an amount higher than the original pawn price. This rule ensures the prompt return of the field to the original owner as soon as he is able to get the amount to redeem the pawned property.

Water rights

Irrigation is the lifeblood of the rice terraces and the Ifugaos have devised elaborate rules to manage their water resources equitably. The rule mainly follows the established principle "first in time, first in line." For example, in opening of new rice fields, Ifugao law provides that if all the land below a spring is a common land – i.e. without a land owner – he who makes the first rice field below the water source is entitled to all the water needed for his rice field.

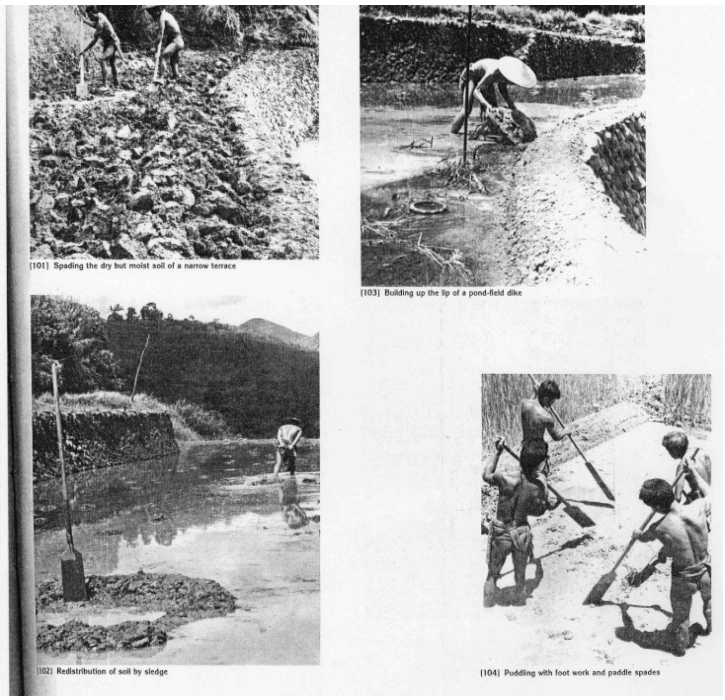
The Ifugaos also have their own version of the Judeo-Roman and Confucian principle of "do not do unto others what you want don't want others do unto you" which applies to water allocation. For example, as Barton (1919) documents, if another man is making a rice field between the field of the first comer and the source of the water supply, the new comer may not use the spring or stream to the detriment of the first comer. Water which is already flowing to an irrigated land may under no circumstances be diverted to irrigate another area even though that area is close to the water source. When the first in time, first in line rule does not apply, ownership of the land takes precedence on water allocation.

A spring belongs to a farmer on whose land it is situated and so does all the water from the spring. The owner may sell the surplus water to whom he pleases and the water rights sold are perpetual. Thus: farmer A has a rice field in which there is a spring sells water to another farmer B whose field is at a considerable distance from A. Farmer C has a field immediately below A's and purchases A's field and unites it with his own. Land ownership in this case does not involve automatic water rights. Farmer C would have to buy the water rights for farmer B.

Elaborate rules on water allocation can also be found on rules governing irrigation canals. Constructors of irrigation canals may sell their interest in the ditch and the ditch shared with others becomes an equal burden as to upkeep on all the owners. The constructors of the irrigation ditch who have sold part of the water from their ditch must share the water in time of water scarcity in proportion to the respective areas of the rice fields. Repetitive and malicious destruction of an irrigation ditch is a serious offense and is punishable by fine and in some case death. First time offenders are not punished but are warned.

Institutions for collective action

Complementing the Ifugao's customary laws on land and water are laws governing labor exchange, an essential component of rice terracing. The need for cooperative mechanisms for labor exchange is noted by Beyer (1964), an anthropologist, who described terrace building as follows:


[101] Spading the dry but moist soil of a narrow terrace
[103] Building up the lip of a pond-field dike
[102] Redistribution of soil by sledge
[104] Puddling with foot work and paddle spades

"To terrace one hectare of mountain slope would require 10,000 cubic meters of excavation, filling and masonry. Thus, the Ifugao rice terraces alone, which cover an area of 400 square miles, would require 103.6 million cubic meters of earthworks using bare hands and crude tools. The rice terrace, properly built, consisted first in digging out a terrace from the hillside and building up a stone wall on the edge of that terrace. The back of the wall is filled up with layers of materials carried up from river beds or of the brought down from the hillsides which required a great deal of labor to get into place. First, farmers level the area behind the wall so as to form a foundation. Over that, they put gravel and sand, then over that, some clay. This is to make the terrace water proof. Then inside the lining they put a foot or so of sand and then

> some gravel. When people in the mountainside build rice terraces, they do not build them out of river bed stones but from broken stones. But later on, nature dissolves these broken stones and they erode away. As they decay and fall out, one by one, people who own these terraces carry up the slopes round hard stones from the river which may be far down the mountainside. After filling the first hole, they may see another hole. They then bring up another round stone and fill it up again. And they do this month after month, year after year, until finally the terraces are stone walled.

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 *baddang* helps in constructing and maintaining the terraced walls and canals. (It is estimated that the stoned wall terraces in Ifugao would stretch some 7,000 km). 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.

In addition, Conklin in describing the farming practices of the Ifugao, observed that during the long off season, men channel, impound, and sluice vast amounts of water and invest much labor to amass, move and use tons of stone and earth in the repair and expansion of their pond fields. Stream water for irrigation is diverted and conveyed by canals for distances of up to six kilometers. In one hamlet studied by Conklin, the network of water channels (streams, canals, drainage, irrigation) totaled 130 km.

Rocks and stones are broken and carried for hundreds of meters much like soil and fill. Valley slopes and ridges are reshaped by extensive terracing. Women mulch rice straw, make vegetable mounds, clean margins and do their year-long weeding in and around both swidden covered and terraced hillsides as well as repairing water works. Men and women have specialized and clearly defined functions. Women provide 63% of the labor requirement for the whole rice cycle while men are generally responsible for tasks that require more strength and effort such as land preparation, terrace /stonewall and canal maintenance, among others (Table 1).

Table 1: Division and specialization of labor

Male			Female		
Farm sequence	*Farm activities*	*Farm labor (person-days/ha)*	*Farm sequence*	*Farm activities*	*Farm labor (person-days/ha)*
2	Stonewall/terrace maintenance	12.5	1	Seedbed prep/sowing/ maintenance	7.7
3	Land preparation	27.3	4	Transplanting/ replanting	42.2
5	Irrigation canal repair and maintenance	11.3	6	Cleaning / weeding	20.3
7	Fertilizer application	1.7	7	Fertilizer application	0.3
8	Pest control (male child)	5.1	8	Pest control	3.1
			9	Harvesting	40
10	Threshing and hauling	8.3	11	Seed selection	0.8
13	Storing	3.1	12	Drying	7
14	Milling/powdering	4.7	14	Milling/powdering	3.9
	Total	74		Total	125.3
	Percent (%)	37		Percent (%)	63

Source: Provincial Agriculture Office, Ifugao.

Conklin estimates that one hectare of highland pond field rice requires a minimum of 630 days of farm labor per year. When terraces and waterworks are under heavy repair or construction, the annual labor requirement may rise to over 1,000 days. Male labor varies from 200 to 550+ days per year while women work relatively constant at 450 days according to Conklin's field work estimates.

Indeed, the scarcity of land, water and labor in the mountainous habitat of the Ifugaos have led them to aspire for the expansion, improvement, and maximization of the use of their two most valuable properties - woodlot and pond-field holdings (Conklin 1980). As Conklin observed and as earlier noted, many of the most serious discussions and actions among Ifugaos -ranging from marriage and funeral arrangements to legal settlements and property exchanges are directed towards achieving these objectives. The ownership and effective management of extensive pond field land among Ifugaos is a universally coveted status. Such status is celebrated with lengthy prestige feasts in which

nearby villagers are invited to help establish, validate and promote an individual's claim to the "*adangyan*" rank, the highest status symbol in Ifugao.

Religion and Rituals

Any explanation of the longevity of the rice terraces is not complete without a reference to role of religion and rituals among the Ifugaos. As Barton notes, a horde of major and minor deities are invoked by the Ifugaos at every ritual. The pantheon of deities among the Ifugaos rival that of India with as many as 1,500 deities in various ranks from gods, to demons, monsters, imps and spirits dwelling in trees, stones, mountains, and rivers aside from the omnipresent ancestor spirits (Barton, 1919).

Rituals play a central role in the transmission of indigenous knowledge from one generation to the next because the Ifugaos rely on oral tradition. The robustness of the terraces overtime, to a significant degree, has been made possible because of the evolution of these rituals. All major transactions – particularly those involving risk, uncertainty and death require some form of ritual and the invocation of deities. Annex 2 provides an illustration of the rituals involved in every stage of the production process.

To illustrate the social and economic significance of these rituals, Conklin recorded the occurrence of rituals in a small hamlet of Bayninan which has 50 inhabitants from 11 households. As Table 2 shows, Ifugaos hold rituals every month for an average of 16 days a month. In all he recorded 37 types of rituals which were held every month for an average of 16 days a month, with some rituals lasting 26 days. In all, at least 191 days were spent for rituals in this hamlet during the year 1962-1963, which is still a conservative figure.

Table 2: Partial record of ritual performances in Bayninan hamlet, Banaue, Ifugao 1962-1963

Month	No. of days on which rituals occurred	No. of chicken sacrificed	No. of pigs sacrificed	No. of carabaos sacrificed
Sept	22	40	13	1
Oct	10	23	1	0
Nov	12	21	0	0
Dec	13	20	5	0
Jan	16	26	5	1
Feb	17	31	8	0
Mar	9	39	11	0
Apr	16	38	5	1
May	16	28	4	1
Jun	13	24	3	0
Jul	21	126	11	0
Aug	26	51	10	0
Total	191	467	76	4

Source: Conklin 1980

Social networks

The Ifugao's social network can be described as dense and hierarchical. Their dense social networks are derived from bilateral consanguineal kinship – which forms the strongest bonds – to kinship derived from marriage, economic circumstances, neighborhood and propinquity (Conklin, 1980). The constant practice of rituals, a communal activity, serves to reinforce these bonds of kinship. Monogamy is the rule and the incest taboo against close-cousin marriage is strictly enforced.

The Ifugao's social network also extends to their departed kin. According to Barton, most Ifugaos know their ancestor's back to the tenth or even the 14^{th} generation and in addition, the brothers and sisters of these ancestors. These genealogical networks is important for keeping the Ifugao social order. Priests and other "go betweens" among the Ifugao refer to these networks in keeping track of economic and other transactions and in maintaining proper relationships with their ancestors. They were thus of great importance in the settlement of disputes over land, water, forest and inherited property.

Eco-technological Adaptation

In addition to institutional adaptation, the Ifugaos have also evolved ways to adapt their farming technologies to their ecosystem. An example of this is illustrated by the diversity of rice varieties under cultivation in Ifugao rice fields. A survey by Padilla and Pangod (1999) of 26 villages throughout the Cordillera region including Ifugao showed that there about 308 rice varieties being cultivated - 246 staple varieties, 21 upland rice varieties and 41 glutinous rice varieties. The survey also showed that farmers in each barangay (village) use as many as 11 to 38 varieties, with each farmer using an average of at least 3 varieties. Experts suggest this partly explains why there has been no major pest outbreak recorded in rice in the Cordillera which in turn has kept rice economy stable. According to the Padilla-Pangod survey, the age-old practice of maintaining biodiversity is done for the following reasons:

- To combat pests and diseases (e.g. birds, rats, chickens)
- To adapt to stresses (e.g. temperature) brought about by the different elevations
- To suit the cropping season and the varied ecosystems (upland, irrigated, rainfed)
- To meet diverse rice quality preferences (e.g., soft, hard)
- To keep the culture and the tradition (e.g., *canao, imbayah*)

As an example, farmers plant tall and long-awned varieties, such as *Imbuokan, Haponesa, Pinuklo,* or *Aynon,* in the border rows to protect their preferred varieties (awnless *Linawang* type) against birds and chickens. Farmers also mix *Bumike,* a glutinous variety, with their staple rice variety during sowing to improve its eating quality. Farmers grow mostly traditional varieties and this preference has further contributed to the high level of rice biodiversity in the region.

Small, stable and isolated populations

The longevity of the terraces can also be attributed to the fact that the Ifugao communities – in the past – tended to have small, stable and isolated populations. Ifugao families tended to live in small dispersed hamlets of one to several dozen households located in agriculturally developed property. The number of individuals per square kilometer of cultivable area is in the range of 165-360 individuals. Table 3 provides a picture of population growth in several Ifugao municipalities

Table 3: Population of Ifugao municipalities, in thousands, 1918 to 1970.

Municipality	1918	1939	1948*	1960	1970
Kiangan	37	16	11	13	15
Hungduan	-	13	4	8	9
Lagawe	-	13	12	14	14
Lamut	-	-	-	6	8
Mayaoyao	10	9	8	15	20
Potia	-	-	-	4	6
Banaue	17	17	15	18	20

* Reflects losses during World War II and emigration due to food shortages after the war
Source: Conklin (1980) base of official census

A small and stable population reduces the pressure on their fragile resource base. It also substantially reduces the transaction cost to create and maintain stable institutional matrix overtime which helps promote cooperation, reduce conflict, and help them cope with uncertainties and change. An isolated population reduces external influences and thus slows down the rate of social change.

Shared understanding

A small, isolated and stable population, a tightly knit kinship network reinforced by a common language, intermarriages, rituals and infinite repeat interaction has made it possible to develop among the Ifugao population a shared understanding of their relationship with nature. As Conklin (1980) notes, most elements of agricultural vocabulary are widely shared among closely related language communities in Ifugao. Names of places consist almost totally of recognizably indigenous forms revealing a remarkable linguistic homogeneity. Many settlements mentioned in myths as well as those first reported in early historical documents consistently tally with those of contemporary ethnographic locations.

CONTEMPORARY CHALLENGES

In addition to conventional challenges, the Ifugaos also face the following contemporary challenges: mass tourism and its attendant problems, migration pressures, introduction of chemical farming, labor shortages due to declining interest by the younger generation on rice farming and availability of exit options because of better educational opportunities and the consequent erosion of customary law among the Ifugaos as evidenced by the decline in rituals and the loss of indigenous knowledge. The introduction of Christianity among the Ifugaos and their integration into the market economy in the last century is also slowly affecting their customary laws.

Rituals – the indigenous mechanism to transfer indigenous knowledge from one generation to the next and an instrument to strengthen social capital - have become a taboo among Christianized Ifugaos because they are associated with pagan beliefs. The cost of rituals has also become prohibitive in the context of a cash economy. As earlier noted, ancient ritual practices – based on the cropping calendar alone - last on average 16 days a month involving substantial resources. Consequently, the decline in the practice of rituals overtime has had a corrosive effect on the social capital of the Ifugaos and affects the transmission of indigenous knowledge and the practice of communal labor exchange.

Salience of Rice Farming

At the same time that the foundation of the Ifugao's social capital is being slowly being eroded, the salience of rice farming is also being eroded slowly because of increasing costs. Mountain farming is a labor intensive, high risk and a low return livelihood. Losses from pests and diseases, typhoons and flooding are some of the inherent risks with farming. Table 4 shows the comparison of cost and benefit analyses between rice farming in lowland and high land areas. The high demand for labor and its shortage in some areas are two factors that drive up the cost of rice terraced farming. The labor cost in high altitude farming is about twice the cost in lowland farming. In areas where the system of labor exchange has been replaced by the cash economy, this problem becomes more pronounced.

Table 4: Cost-benefit comparison of farming in high vs. low elevations

	Low elevation up to 600 masl	*Medium Elevation 600-900 masl*	*High Elevation 900 masl or higher*	*Average*
Production (kg/ha)	2,621	3,057	1,341	2,340
Gross income (P)	26,205	30,571	13,410	23,395
Unit price	10	10	10	10
Farm expenses				
- Land rent	5,801	6,553	2,603	4,986
- Seeds	817	613	640	690
- Labor	12,500	12,860	24,700	16,687
- Fertilizer/pesticide	475	120	0	198
Total farm expenses	**19,593**	**20,146**	**27,943**	**22,561**
Net profit (loss)	6,612	10,425	-14,533	835
Variable cost/kg	5.26	4.45	18.90	7.51
Total cost/kg	7.48	6.59	20.84	9.64
Gross margin/unit	4.74	5.55	-8.9	2.49
Break-even units (kg)	1,224.67	1,179.90	-292.54	2,003.92
Break-even %	0.47	0.39	-0.22	0.86
Return/unit labor	0.53	0.81	-0.59	0.05
Return/unit labor*	0.99	1.32	-0.48	0.35

*excludes land rent

Source: Ifugao Provincial Agriculture Office, 1998.

Exit options

The introduction of roads, mass education, media and tourism has created exit options for the population of Ifugao. In the last decade, out migration to adjacent provinces, cities and foreign lands have increased overtime in large part because rice farming is not profitable while other more profitable livelihood options have become available. Table 5 shows that overseas employment has become one of the main sources of employment in Ifugao followed by driving motor vehicles for hire, working as hire labor in nearby provinces, wood carving and weaving to supply the tourist industry. Agriculture based livelihoods including rice farming has gone down in importance overtime. This pattern is repeated in most towns in Ifugao. An important part of the reason for this preference for non-farm based livelihood can be attributed to the primogeniture property law practiced by the Ifugaos (i.e. only the eldest in the family inherits property while other siblings have to look for other sources of livelihood). While

this property law has served its purpose in the past (i.e. to have a strong and prestigious member of the family), its current form appears not to be suitable to the market economy.

Table5: Sources of livelihood, Nanulditan, Ifugao (1998), N= 90.

Livelihood activity	Frequency	%
Overseas employment	42	23%
Tricycle driving	38	21%
Farming out of the province	30	17%
Wood carving	27	15%
Weaving	21	12%
Cash cropping	15	8%
Hog raising	8	4%
Poultry raising	4	2%

Source: Bulayo (1998).

Migration

From 1985 to 1990, some 4,161 individuals from Ifugao were reported by the census bureau to have migrated to adjacent provinces, throughout the country as well as to foreign lands. In-migration for the same period was reported at 2,634. Within the Province, migration among towns / villages was also apparent. Remote towns like Aguinaldo, Mayaoyao and Kiangan has seen their populations decline considerably (Table 6). Urbanized centers such as Banaue, Lamut and Lagawe have seen their populations increase considerably. Less than 50% of the population in Banaue are engaged in farming as a primary source of livelihood, suggesting that the other half of the population are engaged in some kind of non-farm based source of livelihood. The result is a labor shortage (Table 7). In 1980, a hectare of terraced rice farm employed on average 628 person days. In 1998, this was down to 217 person days, down by 65%. Terraced farms are increasingly being abandoned in some municipalities in Ifugao due to labor shortages. When farms are abandoned, weeds grow and the terraces dry up and collapse occurs at the onset of the rainy season.

Table 6: Population changes overtime

Municipality	*1990 Pop'n May 1*	*1995 Pop'n Sept 1*	*2000 Pop'n May 1*
IFUGAO	147,281	149,598	161,623
Aguinaldo	19,830	12,623	16,377
A. Lista	14,816	17,552	21,167
Asipulo	9,508	9,964	12,294
Banaue	16,943	20,514	20,563
Hingyon	8,373	9,724	9,769
Hungduan	7,254	9,491	9,380
Kiangan	21,304	13,514	14,099
Lagawe	12,437	14,898	15,269
Lamut	14,101	17,081	18,731
Mayoyao	23,942	14,733	14,191
Tinoc	8,256	9,504	9,783

Table 7: Farm labor utilization in the rice terraces

Year	*Source*	*Labor/0.25 ha person-days*	*Labor/ha person-days*	*Difference with Conklin*
1980	Conklin	157	628	
1985	Wackenmagel	105	420	208
1994	CECAP	60	240	388
1998	CECAP (600-900 masl)	46	183	445
1998	CECAP (900-1,300 masl)	54	217	411

** Average for medium to high elevation rice terraces - 199.4 person-days/ha. Source: Philrice, 2000*

Population pressure, tourism and urbanization

Population pressure, tourism and urbanization are also putting pressure on the fragile socio-ecological system of the Ifugaos. In the commercial and tourist center of Banaue, its population has increased by 37% to 23,800 since 1990 due to migration from nearby towns and provinces (see photo below). The population density in 2000 is 92 persons per square km. Tourism based livelihood is a strong pull factor. Since the 1990s, some 100,000 tourists visit Banaue annually and its surrounding attractions. The government has invested in tourism infrastructure and marketing to promote Banaue as a tourism site. Some 84% of the town is accessible by all weather road.

While Banaue has become more accessible, rice terraces farming has become less resilient to a host of pest and diseases. In a bid to modernize rice farming in Ifugao, the government promoted in the 1980s the use of high yielding rice and vegetable varieties which are heavily dependent on fertilizers and chemicals for pest control and do not require year round inundation. Absence of inundation promoted the growth of large earthworms (Polypheretima elongata) that bore into the soil creating tunnels where water passes and thereby weaken the terraces. Changes in cropping have also increased pests incidence especially rats (Ratus tanezumi).

An entomological study in 2005 shows that Banaue is plagued with a host of pest and diseases more significantly compared with less accessible rice terraces such as those in the Hunduan District (Table 8). For example, 90% of farmers in Banaue report that earthworms pose a major problem to their farms compared with only 53% in Hungduan. Farmers in Banaue also report that the use of pesticides to get rid of earthworms has not been effective and the problem has only gotten worse overtime. It appears that the worms have become resistant to pesticides used by farmers. Ground observations reveal that more terraces are crumbling in Banaue compared with Hungduan. The cost of maintaining these crumbling terraces in Banaue has become more and more expensive because of the need for hired labor. Labor cost in terraced farming range from 75-88%.

Table 8: Farmers' Ranking of various rice pests and physiological disorders in Accessible (Banaue) vs. inaccessible municipalities (Hungduan)

Pest Constraints	***Banaue*** *n=103*	***Hungduan*** *n=32*	Total
Insect Pests			
Planthoppers/leafhoppers	31	6	37
Cutworms/Armyworms	1	2	3
Stem-borers	3	-	3
Rice bugs	48	12	60
Leaf-folders	17	17	34
Non-insect Pests			
Earthworms	93	17	110
Golden apple snails	78	7	85
House sparrows	50	12	62
Rats	87	20	110
Plant diseases			
Blast	1	5	6
Sheath rot	1	3	4
Leaf blight	-	1	1
Foot rot	2	-	2
Tungro	1	-	1
Other diseases	2	2	4
Other Pests			
Water fern and other weeds	9	-	9
Other disorders			
Zinc defficiency	51	16	67
Yellowing of rice	1	-	1
Panicle not fully exerted	-	1	1

Source: Joshi, et al (2005)

Three out of four farmers in Banaue also report that golden apple snails have become a major pest in rice farming compared with only 21% in Hungduan. The apple snails were introduced by US Peace Corps Volunteers, with government encouragement, in the 1980s as a source of protein for farmers in mountainous areas. Since then, the snails have become a major rice pest. In addition, 84% of farmers in Banaue report that rats have become a major pest in rice farming compared with only 60% in Hungduan. Urbanization has led to the growth of rat colonies in Banaue.

Intensification of chemical farming

In the in the last three decades, chemical farming has intensified in the terraces along with the introduction of modern rice varieties during the green revolution of the 1970s. Chemical farming has a particularly corrosive effect on the rice terraces. Soil saturated with chemicals tends to loosen and dry up and crack easily (Figure 1) and thus become more prone to soil erosion (Figure 2). Heavy downpour accelerates the collapse of these dried up terraces. All of these require more labor costs for maintenance which makes terrace farming less and less attractive. In contrast, terraced farms applied with inorganic inputs tend to have more robust bunds (Figure 3 below).

Clockwise: Figures 1 to 3: Contrasts among farms with inorganic and organic methods

Photo by Dustin Butler: May 2008

CONCLUSION

Institutional analysis – especially the study of informal institutions embedded in customary law - can shed important insights to explain the longevity of the Ifugao rice terraces. In essence, these informal institutions created incentives to reduce conflict and increase cooperation in the Ifugao society. As Conklin (1980) puts it, "the Ifugaos have been guided through conditions of local change by widely held principles of social organization." The Ifugao customary laws on property, family, labor, penal, procedural and personal laws, as well as farming, religious and ritual practices have reinforced the Ifugao incentive structure that has kept their delicate socio-ecological system in a stable equilibrium for centuries. The Ifugao case study also reveals the incremental evolution of a polycentric pattern of social order that did not depend upon a complex bureaucracy or a centralized authority.

Institutional analysis can also help explain the limitations of the Ifugao customary law in the face of contemporary challenges particularly the breakdown of social capital and the loss of indigenous knowledge resulting from the integration of the terraces into the market economy. The Ifugao indigenous knowledge and social capital are slowly being eroded as the practice of practices of rituals become more expensive. Kinship networks that have kept the Ifugao society intact for a long period of time is being eroded because of exit options and the increasing cost of rice farming brought about by labor shortages. The customary property laws that have kept the integrity of the terraces are undergoing changes in response to labor shortages. In areas where the value of rice land has increased due to their proximity to urban areas, the trustee nature of holding a rice field and woodlot property is giving way to a practice of trading the land as another commodity to be bought and sold in the market.

All told, it remains to be seen whether the ancient social order fashioned by the Ifugaos to respond to local changes would be sufficient to adapt to a more, systemic, non-local, persistent and accelerating rate of change. It appears that the Ifugao customary laws are struggling to cope with these changes. 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 centuries poses a threat to the robustness of the rice terraces.

REFERENCES

Barton, R. 1919 [1965]. Ifugao Law. University of California. Berkeley pp 1-186

_____. 1922. Ifugao Economics. University of California. Berkeley pp. 385-446

_____. 1946. The Religion of the Ifugaos. American Anthropologist. 48: 4(2):1-219.

Beyer, O. 1955. The origin and history of the Philippine Rice Terraces. Proceedings of the 8th Pacific Science Congress, 1953, 1:387-398.

_____1912. The history and ethnology of the Ifugao people. 10 Vol. Manila

Bulayo, Z. 1998. Tinawon Production Among the Namulditan Farmers in Hingyon, Ifugao. Master's Thesis. University of the Philippines, College of Baguio.

Conklin, H. 1980. Ethnographic Atlas of the Ifugao. Yale University Press

_____ (1967). Some Aspects of ethnographic research in Ifugao. *Transactions of the New York Academy of Sciences* Series II, Vol. 30 No. 1 pp. 99-121. November 1967.

Keesing, F. 1962. The Ethnohistory of northern Luzon. 362 p. Stanford University Press: Stanford.

Lambrecht, F. 1967. The Hud-hud of Dinulawan and Bugan. Saint Louis Quarterly. 267-713. Baguio.

Joshi, R., Cabigat, J., Bahatan, R. and James, S. 2005. A Survey of Pest Incidence in the Ifugao Rice Terraces. Manucript. Ifugao Rice Terraces Commission.

Maher, R. 1973. Archaeological investigations in Central Ifugao. Asian Perspectives 16. 1:39-70. Honolulu.

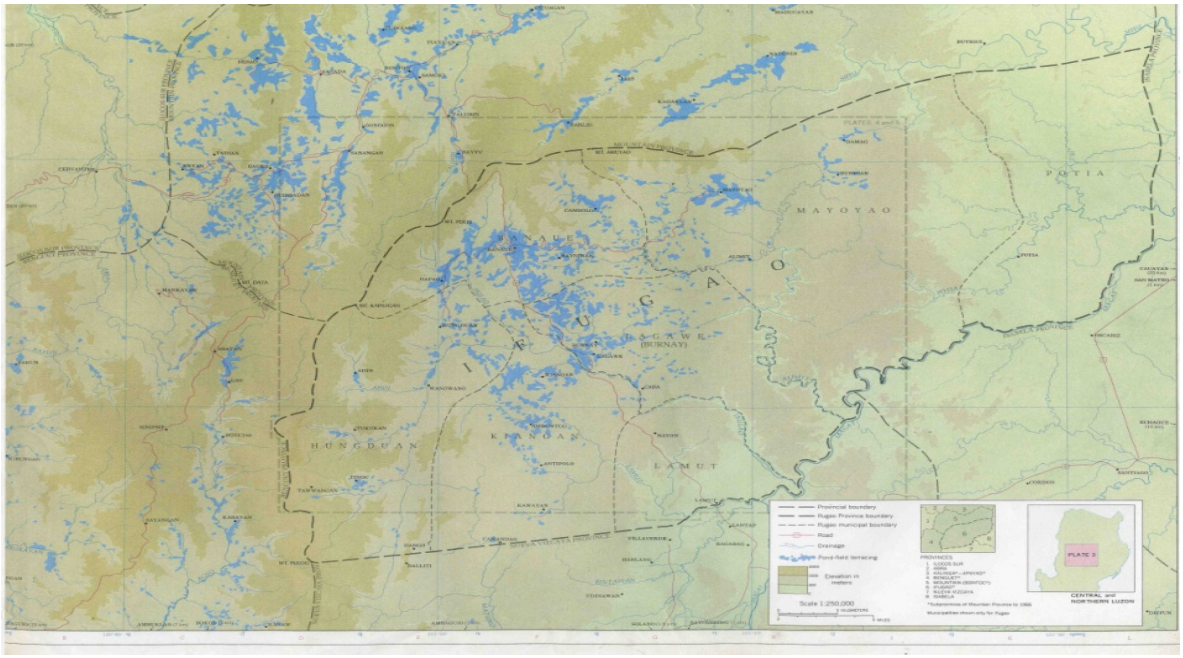
Scott, W.H. 1966. On the Cordillera. A look at the people of Mountain Province. 352. Manila

_____. 1975. Cordillera Bibliography. Philippine National Museum. Publication 8.

ANNEX 1

LOCATION AND DISPERSION OF THE IFUGAO RICE TERRACES

(colored blue)



ANNEX 2
RICE PRODUCTION RITUALS

Land Preparation/Sowing

Impanal Ritual: Before the seed is brought to the seedbed, the farmer offers rice wine and two chickens to *Kabuniyan*. This is done to ask his favor to bless the bundles of palay of seeds so that calamities and pests will not disturb them. During land preparation, the Mumbaki and the seed-sowers are expected to abstain from sex. In the nearby Mt. Province, nobody is expected to bring fire out of their houses, after sowing, otherwise it is believed that pests such as rats and birds will attack the newly- sown rice seeds.

Planting

Loh-wang ritual . When the seedlings are ready for transplanting, rice wine and the two chickens are again offered. This is the chance for the workers to drink wine and be merry.

Pudong. *Pudong* is a green *suno* or seed stocked in the rice field. A young shoot of the *suno* or seed with a slip at the top is inserted above the palay pile in the granary or *palan*. This indicates that the owner has performed *olpi* ritual. No one is allowed to enter the field when the *pudong* is placed at the door or gate of any farm.

Asi Apoy Ritual. The crier announces tengao (rest days) for three or more days. The old folks kill chickens at the *ato* (center of barangay activities) to signal the households to start the *(apoy)* killing of chickens in the rice fields. These are stuck with *tob-ek*, *pudong* in Ifugao (weeds with leaves) in each field to indicate that apoy had been conducted. The purpose of this is to protect the newly planted rice . The household members kill another chicken in their homes after the *apoy* has been completed. This is mixed with salted meat for the members of the family and relatives to partake in the evening.

Beliefs. In Kalinga, the farmers are asked to leave their tools in the rice field after transplanting. This is an indication that the farmers will be coming back the next day for another day of work in the fields. At night, everyone is invited to partake the prepared meals. The farmers and members of the family go to the farm and scare destructive animals in the field by making noise. A *pakopak* or *patatag* is used to drive them away.

Olpi Ritual . After the rice fields have been planted, farmers celebrate in their own homes. This serves as a thanksgiving for the work done in the rice fields. This is also the time when they ask *Kabuniyan* to spiritually protect their rice plants for a successful harvest.
Hagophop ritual . A month after the *olpi ritual*, the ceremony is repeated, specifically by those who can afford a second celebration.
Hanglag or Mamague ritual. This ritual is performed as soon as the rice plants in the field change color, from evergreen to purple yellow. The farmer announces to all the rice goddesses that the harvest season is fast approaching. The offerings (rice wine and one chicken) are not shared with visitors.

Harvesting
Tungo ritual . This ritual is done in their respective houses or granaries. The people call the goddesses of rice to come down and ask their favors to make the harvest fruitful and abundant and to guard the fields from evil spirits. Two days before this ritual, the leader of the community will announce the day of the holiday after harvest. This is a thanksgiving ritual to *Kabuniyan* for the successful harvest. This ends the rituals for harvesting. In Ifugao, noise is prohibited during this time. Therefore, each family is expected to have enough rice for the day so that there should be no pounding of rice. No one is also expected to go out into the fields. When the rich gets drunk during harvest rituals, they start to boast and say that they will be performing the *Imbayah* in the months ahead.
Post-harvest Beliefs
At the end of the harvest period, the old folks do the ritual at the *ato* and announce the *lawit.* Again, each household butchers chicken in their homes for the family to partake. This is the sign that the harvest period has ended.