

TRADITIONAL ECOLOGICAL KNOWLEDGE OF THE WILD YAM *BULOY* (*Dioscorea divaricata*) AND ITS VALUE TO THE MAGBUKÚN AYTA OF KANAWAN, MORONG, BATAAN, PHILIPPINES

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Dioscorea divaricata (Dioscoreaceae) is a wild yam locally known as *buloy* in the Magbukún Ayta community of Morong, Bataan, Philippines. Using passive observation, participant-observation, and semi-structured interviews with key informants, the Aytas' traditional ecological knowledge (TEK) concerning *buloy* was documented regarding the yam's biology, harvest, cultural significance, preparation and handling, and relationship with the environment. The interviews revealed that *buloy* symbolizes satiation and food security for the Aytas. The Aytas have a deep and intimate relationship with the yam, which is part of their cultural identity. The knowledge is held mostly by the elders, who pass it on to the younger generation. However, due to the youth's increasing lack of interest, *buloy* harvesting is not as heavily practiced as before, and knowledge is starting to slip from the community.

Keywords: *Dioscorea divaricata*, wild yam, traditional ecological knowledge, Magbukún Ayta, Philippines

Introduction

Yams are important to the people of Southeast Asia and Africa as staple and famine foods (Alexander & Coursey 1969, Eder 1978, Dumont *et al.* 2006, Maneenoon *et al.* 2008, Tamiru *et al.* 2008). In the Philippines, a local species of wild yam called *buloy* (*Dioscorea divaricata* Blanco of the family Dioscoreaceae) is a root food that the Magbukún Aytas have traditionally valued, and described as a symbol of satiation. There are special techniques, tools, terms and taboos associated with the harvest of this yam, which is

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locally available and consumed throughout the year, but becomes more important during lean months or times of hardship. The ecological knowledge associated with *buloy* is held especially by the elders.

This article examines *buloy* and its significance to the community of Magbukún Ayta in Morong, Bataan. This paper aims to: (1) document the traditional ecological knowledge of the community in finding and harvesting *buloy* from the forest; and (2) analyze the changing relationship of the Magbukun Aytas with this traditional food. Traditional ecological knowledge (TEK) is defined as “a cumulative body of knowledge, practice, and belief, evolving by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment” (Berkes 2008:7).

The Magbukun Ayta

The research was conducted in the Kanawan Reservation of the Magbukún Ayta in Morong, Bataan, Philippines. The Magbukún Ayta are traditionally hunter-gatherers and their ancestors are believed to have been the first human settlers in Morong. However, the Aytas’ area was restricted after their settlement was converted into a park, the Bataan National Park, in 1945. Later, Kanawan became a Negrito reservation in 1987, and in 2004 the Aytas obtained a Certificate of Land Ownership Award (CLOA) over it. If they are able to obtain a Certificate of Ancestral Domain Title (CADT) from the government, this would expand their area (Motin *et al.* 2006).

In 2006, the Magbukún Ayta of Kanawan had a population of 289 distributed across 64 households. About half of the households were of pure Ayta ancestry, one-fourth were mixed, and the remaining one-fourth were non-Ayta. The Ayta language is called Magbukún, but most of the youth today are unable to speak it. Generally, the Ayta today also speak Tagalog. The Ayta gather their needs from their environment and generally have communal ownership of the land. Over the years, the Ayta have learned to cultivate crops such as rice, corn, vegetables and fruit trees. For subsistence and income, they still hunt and gather food. They also grow crops and seek employment which can be found in the Subic Bay Freeport Zone— mostly as adventure guides, ground maintenance crew, or forest rangers (Motin *et al.* 2006). Christianity has also reached the Kanawan Reservation.

The study which is the basis of this paper complied with many requirements for the conduct of research. Human subjects training, approval from the Internal Review Board of the University of Hawaii (IRB approval #15463), and the process of securing Free and Prior and Informed Consent

(supervised by the National Commission for Indigenous Peoples) from the Ayta community were accomplished. Voucher specimens of the yams were collected and deposited in the Philippine University Herbarium in Diliman. The approach was participatory, with every step done in consultation with the community (cf Medley & Kalibo 2005). Interviews were predominantly conducted in the local languages of Magbukún Ayta and Tagalog. A member of the community was always present in every research activity. Meetings with the community were held after each research activity for data verification and to seek approval to publish the information gathered.

The rights of the Aytas are protected by the Indigenous Peoples Rights Act. The Aytas' indigenous laws hold within their ancestral domain, and the tribal council makes sure that it is followed. Community meetings are formal meetings called by the tribal council to discuss important matters. In these meetings, the members of the Tribal Council are present, together with representatives coming from the ranks of the elders, women, and the youth. The Tribal Chieftain is elected by the community, and may be male or female. Elders are defined as being at least 45 years old. These meetings were open to all, except when the matter for discussion was considered sensitive and not for public disclosure. Any decisions made during the meetings were considered legally binding, at least within the Ayta ancestral domain. All the meetings called for by the tribal council in relation to the conduct of the research were made public. The meeting would usually start with a prayer, then an introduction of everyone present, and then the discussion of the agenda. During the meetings, data verification, identification of sensitive matters, and authorship issues were also discussed.

The documentation of Magbukún knowledge of *buloy*

Based on their knowledge and experience with *buloy*, ten key informants were chosen by the community to participate in the research. These key informants – six females, four males, whose ages ranged from 36 to 70 – were interviewed using open and semi-structured questions (cf Bernard 2006). Interviews conducted in 2008 sought to place *D. divaricata* in its cultural context. The questions asked concerned the nature of the yam, its parts, life history, the different types of yams, their distribution, habitat preferences, harvest practices, food preparation and storage, relationship to other root crops, conservation status, sustainability of harvest, plant-animal interactions, and significance to the community in terms of identity, food, economy, cultural practice and sacredness (see Appendix). Participant-observation was employed during yam harvest and consumption. The main author was present to observe the actual harvest but was not competent enough to help in digging up *buloy*.

Research for this paper was conducted in July to August 2008, November to January 2009, July 2009, September to October 2010, and December 2010. Documentation by way of note-taking and photos was also done during the interviews. All information collected from interviews and observation were collated. The data were then presented at a community meeting for verification and approval by the Magbukun Ayta community. Documentation was then revised to reflect the community's recommendations during the meeting. These community meetings were also video-recorded.

The interviews were conducted in Tagalog, with the occasional use of English and Magbukún words. These were then translated into English and transformed into a scientific rewrite. The authors kept the tone and style of the document as close as possible to the original interviews. If the Tagalog term referred to is a term in the scientific literature, the scientific term was used in translation or placed in parentheses. In this article, the italicized terms are Magbukún unless indicated as Tagalog. Organization of the collated material into its current form was done by the non-Ayta authors. The information recorded is based on the perceptions of the Aytas and may or may not have been observed (or recognized) by researchers in the disciplines of botany or ecology. Unfortunately, comparison of the Magbukún knowledge of the ecology of *Dioscorea divaricata* with the scientific literature could not be undertaken because no papers on it could be found. Plant specimens were identified with the help of Ulysses Ferreras, Burkill (1951) and Ticsay (1986).

The Magbukún Ayta community in Kanawan would also like to categorically state that *buloy* is found in different areas but may behave differently depending on where they are found. All the information appearing in this paper refers only to the *buloy* found within the ancestral domain of the Magbukun Ayta and may not necessarily be true elsewhere.

The Magbukún *buloy* plant

The term *buloy*. *Buloy* in the Magbukún language means “*the food of the indigenous people.*” This is what the Aytas eat to satisfy hunger especially during the rainy season or when food is scarce. The term refers to a wild herbaceous vine and all of its parts, but most especially the tuber. The vine is violet in color, and its leaves and fruit are found in the canopy because the vine climbs upward. The *buloy* tuber is very long; it could reach three meters in length. It has a 'fat' end, deep in the ground, from which it branches out. The tuber is dug up for food, and treated with respect by the Magbukún Ayta.

The anatomy of buloy. Magbukun has a name for every part of the *buloy*. The body or stem of the plant is called *jikjik*. It has nodes and internodes. The *jikjik* branches into what is called the *panambuna* or *panambo*. From the *panambo* develops the *dagway/dagmay*, or the smaller branches that lead to the leaves. Both *panambo* and *dagway* can be seen clinging to and wrapped around trees allowing the vine to climb upwards, twining to the right as they do so. The ends of the branches are called *agimay*, which are flowering branches. *Buloy* flowers are called *pakilap*, which become the fruits called *bukal*¹. The *bukal* have very tiny seeds that fall to the ground. When the seeds get wet especially during the rainy season, they grow into new *buloy* plants that become thick in the forest.

The *jikjik*, rooted in the soil, stands upright on the ground. Below the ground, the *jikjik* leads to the *tumpok*, which is is large, round and gives rise to the *wanyuy*. The *wanyuy* starts about as thick as a finger and then gets thicker and thicker, gradually becoming the tuber, which has a round, swollen end. The tuber continues to grow, pushing downwards as it gets larger and longer. The *buloy* tuber can reach 3 meters in length and is often longer than the height of a person.

When the plant gets older, the tuber may start producing branches, resulting in multiple tubers within one plant. This is referred to by the Aytas as the *buloy* 'having children.' The tuber gets wider and grows little tubers on the side called *hapa*. When a tuber starts producing *hapa*, it is called *indo*, which means 'mother.' Tiny *hapa* are called *guyguy*. These are branches that remain close to the *indo* and do not branch out.

When the tuber reaches around 3 meters in length, the *indo* dries up and thus becomes an *apo*. The *apo* is considered the dead part of the tuber. A new tuber may grow from the *tumpok*, and this will be a new *indo*. The *indo* and *apo* will be side by side underground.

On the origin and distribution of buloy. The origin of *buloy* is unknown. The Magbukun Ayta say that it did not 'come from' any particular place but had always been in their ancestral domain. *Buloy* can be found anywhere—near houses in the village, in the *gasak* (fields), in *kalaanan* (secondary forest) and *jikut* (primary forest). However, the high quality *buloy* is mostly in the *jikut* or thick forest, and one has to know how to find it. Even within the *jikut*, not all *buloy* are the desirable kind. There are places where the *buloy* tuber is large and full. In other places they are so small or so fibrous that they are useless.

¹ The term *bukal* is a general term for 'fruit' and is not specific to *buloy*.

There are no environmental clues as to where *buloy* may be found. It is not associated with certain plants, or with closeness to water. It is difficult to look for *buloy*. But if the eyes of the harvester are sharp, *buloy* will be found—even the small ones.

***Buloy* life history**

Growth. *Buloy* grows from seed. The leaves are violet when young. As a seedling it already climbs up and produces tubers, even if the plant has only two leaves. The tuber will be very shallow, and round, about as big as one's thumb. After 3-5 years, the tuber will start growing more deeply into the soil. Young *buloy* are called *tabayag*. When *buloy* matures, the branches are all over and the trees are connected to each other. *Buloy* from just one seed can become very thick in the forest. When *buloy* starts to flower, the tuber starts to grow bigger as well.

The age of the plant is not easy to determine because it is not cultivated. However, those who have been taught by the elders know clues about the plant's age. The colors of the stems change through time. Green stems are younger; darker stems are older and have larger tubers. The size and shape of a tuber can also suggest its age. If the tuber is only 1-2 years old, it has a rounded end. After ten years, half a sack's worth of *buloy* can be harvested from a single plant.



Figure 1. *Dioscorea divaricata* vine rooted into the soil. Large tubers are expected below thick stems such as this one.

Reproduction/Dispersal/Germination. Reproduction of *buloy* occurs through its flowers. Plants also grow from tubers; these are the same plants from which the tubers come. It just so happened that the tuber was left there, and so it grew new stems. However, it is still the same plant. If a tuber is taken out and planted, it will grow, but nobody entertains the notion of planting *buloy*. If it is planted, however, one needs to be careful of the seasons. A tuber planted during summer (March to May) will not grow. It will grow during the rainy season (May to November). It will dry up in the *next* rainy season, and that is when it can be harvested. If it is harvested fresh (as opposed to dry, when the plant stems have dried up and broken off), it will not have any tubers.

The flowers produce triangular fruits with three corners. When the flowers fall to the ground, they dry up and become fruits. There are thousands of seeds in one fruit. However, very few of the seeds become seedlings. Most of the new seedlings die, unless they have a thick skin.

Regeneration of the buloy vine and tuber. When *buloy* matures, the vine dies and only the tuber remains. The plant dries up—the leaves fall and the branches break off. However, the plant will grow again. New stems will come from the *tumpok*. When the *tumpok* receives rain during the rainy season, the *buloy* resurrects and the vine reappears. A new tuber grows from the *wanyuy*.

The new plant that sprouts from the *tumpok* during the rainy season is called *lambayo*. *Lambayo* means 'new growth' and refers to both the parts above the ground and below the ground. *Lambayo* usually appears in November, after the rainy season. This fresh growth starts to dry up in April, the start of summer, until during the rainy season, there is dry *buloy* once again. That is called a 'dry rainy season' (*tuyong tag-ulan*). When, during summer there is dry *buloy*, which happens sometimes, that is called a 'dry summer' (*tuyong tag-araw*). When the *buloy* plant is dry, the tuber and its roots are white. *Buloy* that are *lambayo* are harvested in September/October.

Lambayo tubers have brown skin (epidermis) and white flesh. They taste sweet, and there is a sharp end that can be eaten raw. *Lambayo* tubers do not have an '*apo*'. However, the tubers can grow next to an *indo* about to become an *apo*. When the *lambayo* tuber is long enough, the *indo* becomes an *apo* and decomposes. Each year, as long as the tuber is not harvested, the yam produces a new tuber to replace the *apo*.

The significance of *buloy* to the Magbukún Ayta

Buloy and Ayta identity. *Buloy* is a food heavily identified with Ayta culture. It is said that when one has eaten *buloy*, one can identify with the Ayta because one has partaken of the food they call their own, as *buloy* is part of Ayta life.

Harvesting *buloy* is part of the Ayta way of life, and only the Ayta do it. *Buloy* is not harvested by non-Ayta, except for the spouses of Ayta who have come to learn the Ayta way of life. In the past, only the Ayta knew how to dig for *buloy*. Non-Ayta would try to dig, but they would do it out of amusement and produce excessively enormous pits, unlike in the Ayta way of digging, wherein the size of the pit is minimized. The size of the pit is part of ecological knowledge about *buloy* that has been passed on through generations of experience. Once an Ayta has learned how to dig for *buloy* properly, the knowledge is never forgotten. Digging for *buloy* is something that the Magbukun Ayta enjoy immensely.

The Magbukun Ayta describe *buloy* as having a very unique taste. It can only be described as something that keeps them coming back for more.



Figure 2. Pit (*bito*) dug into the soil to harvest the tubers.

Food and Sustenance. To the Ayta, *buloy* symbolizes satiation (*makabusog* was the Tagalog term used) and salvation from hunger. One feels full immediately after eating *buloy*. It sustains the body, gives strength, and feels very heavy in the stomach. If *buloy* is eaten for breakfast, it will be mid-afternoon before hunger strikes again. In this regard it is superior to rice, which only alleviates hunger for a short period of time. During the rainy season (June to September/October), there is no rice and it is difficult to find food. This was especially true in the past when the Aytas' only sources of rice were their own small swidden fields.

When in the forest, one can survive on just *buloy*. One Ayta man reported that he was in the forest for one week and ate nothing but *buloy*—no rice, no vegetables. He maintained his strength and even continued to get stronger. When he went back to the village, he had to re-acustom himself to rice again. It seemed like he was always hungry because he was used to the satiating *buloy*. He had to cook twice as much rice. *Buloy* is more nutritious and more filling and lasts longer than rice or *kamoteng kahoy* (*Manihot esculenta*). When one eats *kamoteng kahoy*, one doesn't feel stronger and also gets tired of the taste easily. *Buloy* is the most important food that can be obtained below ground.

During the Japanese Occupation in World War II, the Ayta survived because of *buloy*. Everyone else in Bataan went hungry, but the Ayta did not. The Ayta depended on *buloy* and another root food, *kalot* (*Dioscorea hispida*), for strength and sustenance. Because of this dependence, even the very young learned how to harvest it. The Aytas feel like they owe their life to *buloy* because of this experience. If it weren't for *buloy*, they would have died; it was very difficult during the war time as they had to stay in the mountains.

The Aytas also say that "one cannot eat only *buloy* forever. Some variety is needed, and the stomach will hurt if you eat too much of it." *Buloy* would be exchanged for other food, because people from the town are also fond of *buloy*. The elders would trade it with lowlanders for rice, fish, coffee, tobacco, cigarettes, sugar, and other needs. About 4 kg *buloy* could be bartered for 2 kg of rice or fish. However, only the elders in town are familiar with *buloy* these days. *Buloy* wasn't weighed or sold in the past. Nowadays, it is exchanged for money and harvesting can be considered a form of work. *Buloy* can be sold in the town for ₱50-70/kg.

Buloy in riddle and song. The Aytas have a riddle² for which *buloy* is the answer. In Tagalog it goes: “*Hanap ng hanap, laging nalalampasan*”. Which means: ‘*You keep searching for it but always go beyond it*’. This line is an allusion to how difficult it is to find and dig for *buloy*. As one digs for the tuber deeper underground, the plant will always be above.

The Aytas also have a song about *buloy* that the children sing, especially for visitors. It is about an Ayta woman who digs yams to feed her hungry children. The song also mentions other yams and root crops. It was composed in 1995. This is the only song about food the Magbukún Ayta have. The lyrics:

<i>Hay babaying Ayta</i>	There is a lady Ayta
<i>Mapangaying buloy</i>	Harvesting <i>buloy</i>
<i>Nakakaginawa ti aw anak</i>	She gives relief to her children
<i>nu impapakawtuy na</i>	by cooking it for them
<i>Mayn mut lapnit</i>	There is also <i>lapnit</i> (possibly <i>D. luzonica</i>)
<i>Mayn mut tugi</i>	There is also <i>tugi</i> (<i>D. esculenta</i>)
<i>Mayn mut lima-lima</i>	There is also <i>lima-lima</i> (<i>D. pentaphylla</i>)
<i>Mayn mut kalot</i>	There is also <i>kalot</i> (<i>D. hispida</i>)
<i>Mayn mut gabi</i>	There is also <i>gabi</i> (<i>Colocosia esculenta</i>)
<i>Mayn mut ubi</i>	There is also <i>ubi</i> (<i>D. alata</i>)

Harvesting buloy

Both men and women may dig for *buloy*. However, the task is more associated with women; men do it only occasionally. The traditional role belongs to women, who learn how to dig for *buloy* during childhood initially by watching their mothers do it and, eventually, by helping to dig *buloy*. But some women started digging *buloy* later in life, just in order to have something to feed their children. In the past, people would dig for *buloy* often, around three times a month, or possibly more often, based on their needs. Nowadays, digging for *buloy* is not done very often. Women with children that are very young (0-2 years old) are unable to dig for *buloy* as they concentrate on caring for their children. Sometimes, if someone from town places an order for *buloy*, then the Ayta will dig for it. A person may also dig for *buloy* simply because he or she enjoys it rather than out of the necessity to provide food for the family as outlined above.

² Ayta riddles are traditionally told during wakes.

The digging tool. *Buloy* was traditionally harvested using a *tagusoltaguho*, a tool similar to a shovel that has a wide *talim* or blade tied with rattan to a *puluhan* or wooden handle made from the *kamandakaki* tree, which may refer to either *Tabernaemontana pandacaqui* Poir. or *Voacanga globosa* Blanco Merr., both from Family Apocynaceae. If this tool is used, it is believed that the harvested tubers are likely to be large, full, and fleshy. However, over the years, the *taguso* was gradually replaced by a machete or metal bar with a pointed end, and nobody makes the *taguso* anymore.

Searching for buloy. In digging for *buloy*, the first step is to search for good, desirable, fleshy, large *buloy*. This is usually done by looking for dagway that have dried up and are either hanging off trees or have fallen to the ground. This step is called *pangungupol buloy*. The breakage of the branches is followed until the main stem is reached. The term *napuputi* refers to when the broken branches of the vine are followed as they lead to the *buloy*. One has to be very careful while doing this so as not to disturb the order of the branches in the area, and also not to step on the *jikjik* or stem. If the *jikjik* is stepped on, the *buloy* will not be found anymore. *Buloy* is sensitive that way in certain places. Ayta often talk about *buloy* being capable of emotions and reacting to these emotions. It is unclear whether they refer to *buloy* itself or spirits that take care of *buloy*. More examples are mentioned in the section below on rituals/taboo.

If seedlings or flowers are seen, the main stalk is likely nearby. The main branches or *panambo* and the smaller branches or *dagway* of the mother plant will be sought. The best *buloy* is one in which the *jikjik* has dried up, especially when the above-ground parts of the plant (stem, leaves, etc.) have broken off. This means the tuber is already sweet. Whether the *buloy* tastes good or not depends on the nature of the plant and the soil. It will not taste good if the soil has plenty of rocks, and it tastes good if the ground is mostly soil. Good *buloy* can be found where there are *tabayag* or young *buloy* that have clumped together. Also, if the branches or *dagway* are large, the tuber is likely to be large as well.

There are also preferred areas for harvesting, and the Aytas search for *buloy* in these areas first. It is easier to dig for *buloy* on sloping land, because the tuber can be dug from the side. It is harder to dig for *buloy* on flat ground because this means the digging has to be deeper. If near a wall of stone, the tuber just goes around until it finds soft ground where it gets larger and grows longer. It is easy to start digging in the soft ground. This is why Ayta always look for soft ground.

The next step is called *pauyatan*. *Uyat* means 'root.' This is when the Ayta clears the leaf litter and debris from the ground to find the *jikjik*, especially if it had been separated from the *dagway* or branches. It must be noted that the *buloy* itself does not move after the seed germinates. It is just difficult to find because the vine branches climb over anything and then dry up and break off. When the *jikjik* is found, it will be followed until it reaches the part where the internodes are much shorter and thornier. That leads to the *tumpok*. Further clearing of debris reveals the roots of the plant, exposing the *tumpok*.

Sometimes it is very difficult to find *buloy*. Elders, however, are said to always find *buloy* without difficulty. When the elders see seedlings or *jikjik*, they start digging close by and look for roots of the plant. When they find a root, they peel it slightly to check if it is indeed a *buloy* root. If it is not *buloy*, they will abandon it and look for another root. If it is *buloy*, the root will be followed closely until the *tumpok/wanyuy* is reached

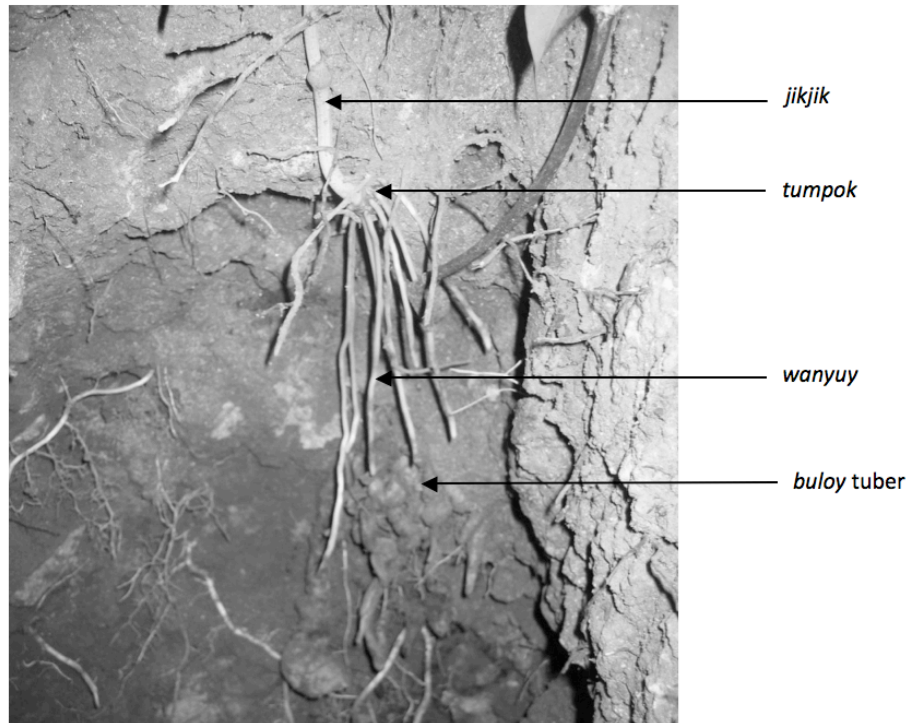


Figure 3. Parts of the *buloy* plant from the main stem (*jikjik*) to below the ground.

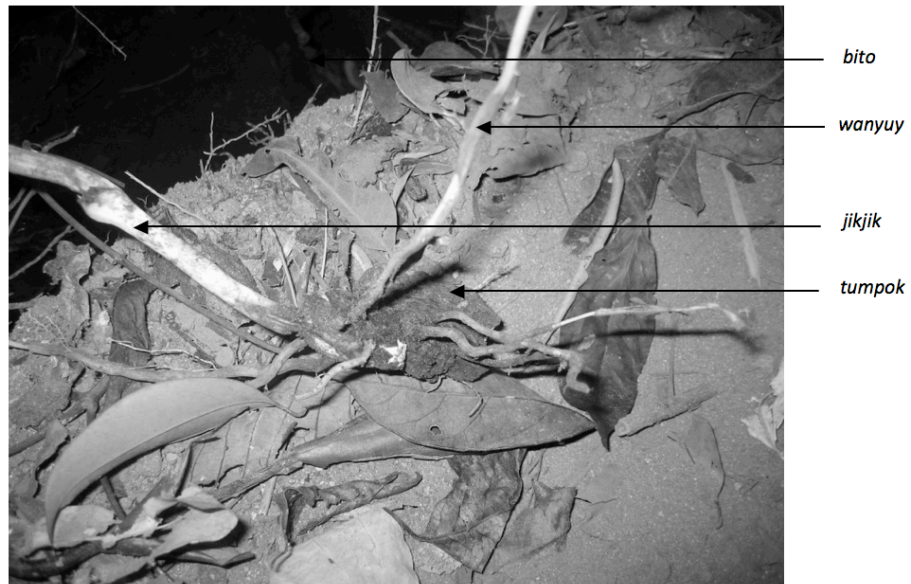


Figure 4. This photograph was taken after a harvest. The *tumpok* was brought out of the *bito* for a photograph, then placed back into the pit to encourage tuber regrowth.

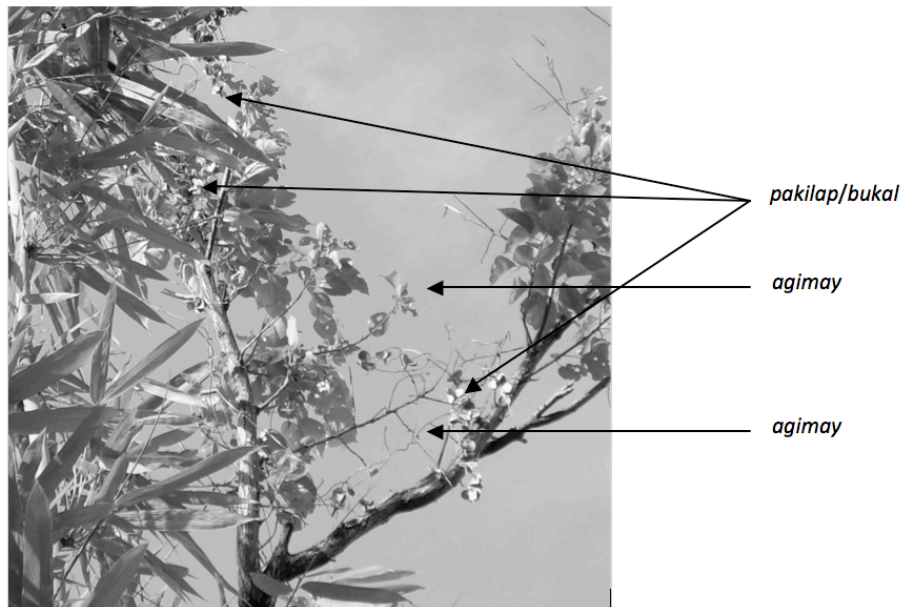


Figure 5. The vine climbs up, and so fruits are at the top of trees. The flowers (*pakilap*) and fruits (*bukal*) are borne on small branches called *agimay*.



Figure 6. Leaves of *buloy*.

The next step, called *ulhukan*, means initiation of digging. It is a tentative step, starting a small dig just to expose the *wanyuy* to check for *buloy* quality. If the *wanyuy* looks good, the digging will continue. If it is not good, the digging will stop and the Ayta will look for another *buloy*. If the *wanyuy* itself has branches, this means the *buloy* is desirable. If the *wanyuy* has red flesh, the *buloy* is undesirable and likely full of water.

Harvest Proper. Digging for *buloy* is initiated around one meter away from the *jikjik*, which is approached while digging. The removed soil is passed between the feet and thrown over the shoulder. If there are stones, these are cracked and smashed so digging can continue. One has to take care not to accidentally cut the *buloy* tuber. When the pit is big enough, the Ayta will reach into it and grope for the tuber. At first the tuber will feel small, but it will get bigger. When the *wanyuy* gets larger as it proceeds to the tuber, it is called *nangimwana*.

It is good to harvest long and deep tubers because these likely taste good. However, a deep and long *wanyuy* is not desirable. Aytas prefer the *wanyuy* to be short so the tuber can be harvested quickly. There are *buloy* with short *wanyuy*, wherein the length needed for the tuber to be reached is *abot-siko* (equivalent to the cubit; the length of a forearm). Sometimes, if that length is reached and the tuber is not found yet, the tuber is abandoned. If one sees a tuber where digging had been attempted and then abandoned, one does not repeat the attempt but moves on. When a harvest is abandoned because the *buloy* is undesirable, the soil that was removed is returned. This is because it

needs the soil. The *buloy* is obviously already having a hard time producing a tuber.

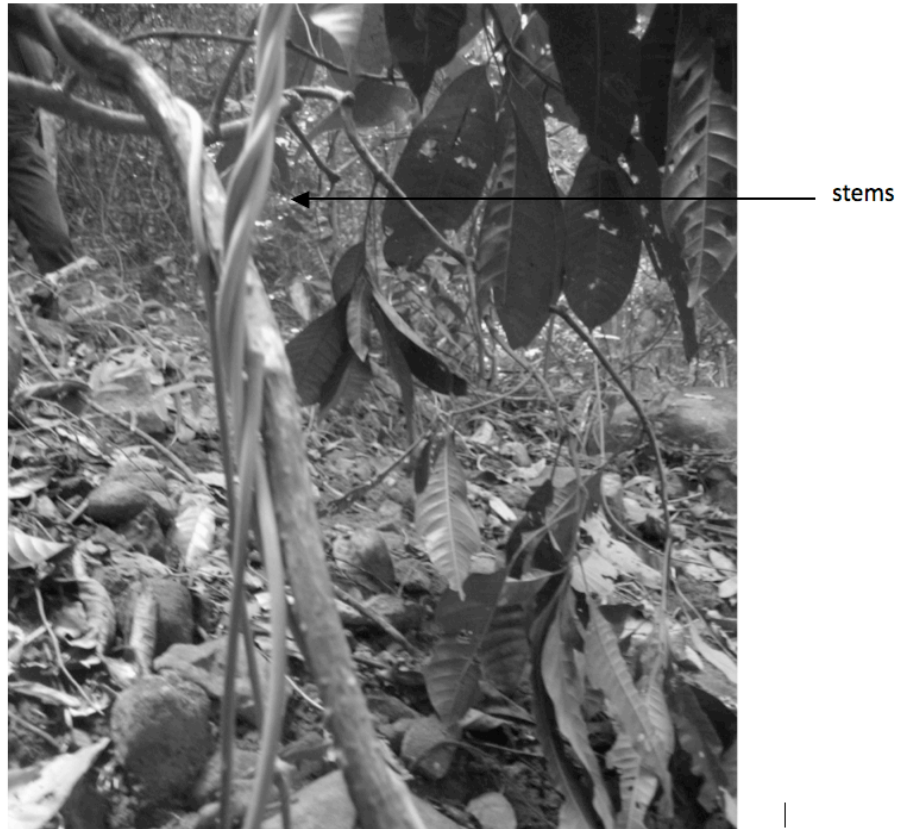


Figure 7. *Buloy* stems twining to the right as they climb.

However, some individuals dig for *buloy* even if the tuber is not good, because they are very hungry and can't afford to be picky. They just need to get strength and sustenance.

The huge pit dug during *buloy* harvest is called the *bito*. It is very deep and often beyond a person's height.

While digging, one kneels, squats or bends over. It is difficult to dig. One squats inside the *bito*, with knees touching the ground. After digging as far as one can reach, one enters inside the pit and starts digging where one was standing, once again as far down as one can reach. This results in the pit getting deeper and deeper. It is very hot inside the *bito*, even if it is cold or

raining outside. This is because the earth is hot. The soil that is removed is thrown outside the *bito*. Inside, one can use the feet to pack together the soil before throwing it outside. It is also itchy inside the *bito*, especially if it is raining. When it starts to rain, digging has to be done quickly so the tuber can be obtained before the *bito* fills up with water. Water inside the *bito* is very, very itchy and so the Ayta has to get out as soon as possible.

The *tumpok* is left connected to the *jikjik*, hanging in the *bito*. The *tumpok* will sprout tubers again. Because the tuber regrows, it can be harvested again and again indefinitely. When the tuber regrows and it is harvested again, the tuber is called *piyak*. The *bito* is also called *piyak* when it is dug again. After being harvested, it takes three to five years for the tuber to grow into a harvestable size once more.

Sometimes though, the entire tuber is not harvested. In this case, one can return to harvest what was left. However, the tuber will be deeper into the ground because a pit was formed above it from the previous harvest. In this way, the *buloy* gets deeper into the ground. The *buloy* that is left can still live, grow, flower and disperse in the forest, so there will always be *buloy*.

When no tuber is found or the identified tuber is very small, the situation is called *inupot/makaupot*, which means bad luck. If the first harvest is unsuccessful, it is seen as bad luck, and the Ayta will go home without looking for another one because he/she will likely encounter all bad *buloy* because of the day's luck. This is said to happen when one of the taboos is violated or the rituals are not strictly followed.

Rituals and taboos. While digging, minimal noise should be made until the tubers are removed. Only the Magbukún language can be spoken, and in a soft voice only. Photos or videos should also not be taken. If these taboos are broken, the spirits of the forest might get angry and lightning will flash, or an earthquake might occur, burying the harvester in the pit that he/she has dug. One should not stand up while digging or else the *wanyuy* will keep getting longer and longer before leading to the tuber. One should also not keep peeking into the *bito* (unless one is the harvester) trying to see how big the tuber is, because it is thought to make the *wanyuy* go deeper (*pinapalalo*) as well. One should also not roast or cook the *buloy* before digging is over because the *buloy* might become smaller. When the digging is over, the *buloy* may be cooked, but this should be done as close to the plant as possible (if it will not be brought home). Also, the harvester should not eat the *buloy*

that he harvested; this is bad luck for the next harvest³. Traditional dress during the harvest is a *lubay* (g-string) for men and a *pahilun* (skirt) for women.

There are spirits who watch and take care of the *buloy* and nature, but asking the spirits' permission to harvest is not necessary. There is no ritual or prayer before digging. However, one must give thanks afterwards. This is done by leaving food near the *bito*, such as part of the *buloy* roasted for eating. In the older days, offerings consisted of items such as tobacco and rice. All *buloy* is sacred. That is the reason why there are rituals and taboos concerning its harvest. Everything in the forest is sacred because it is food that the Aytas can use.

Time and frequency of harvest. There is no set date or ideal time to harvest *buloy*. One does it when one wants to or needs to. One can harvest *buloy* even at night, but it is not practical to dig in the dark. The rainy season is preferable because the ground is soft and easier to dig. But *buloy* is available all year round, whenever one feels hungry. There are ideal *buloy*, but a starving person does not need the ideal tuber. One of the elders dug for *buloy* all-year-round to feed her children when her husband passed away.

However, it is not advisable to dig for *buloy* two days in a row because it is very tiring. The earth takes away the lifeblood and strength of the harvester. Although there are some who do venture to do this (especially pregnant women craving for *buloy*), it is not recommended. Anyway, if one is able to harvest good *buloy*, one harvest is good for several days. For example, a 2-meter long tuber will not be consumed very quickly unless it is sold in the town. If there are a lot of *hapa* or little tubers on the side, *buloy* can fill many sacks (the same sack used for 1 *cavan* of rice). Once, someone was able to get 6 sacks of tubers from one plant.

The satisfaction of harvesting buloy. It is really difficult to dig for *buloy*. But it feels good and is an enjoyable endeavor, especially when the tuber has already revealed itself to be desirable. Exhaustion is not felt while digging because it is very exciting—it is exciting to anticipate whether or not the tuber will be large, fleshy and desirable; and if it is, it is exciting to anticipate eating it. One thinks about these things while digging, and the tiredness is eclipsed by excitement. The body feels tired later when the harvest is over

³ This may seem to conflict with the earlier paragraphs mentioning how an Ayta man survived on *buloy* for one week in the forest. However, the spirits are possibly expected to understand that if there is no other food and no other harvester, the harvester must eat his own harvest.

and the person is back in the village. Upon arrival at home, the tuber is boiled, roasted, eaten and enjoyed.

The *buloy* tuber: other terms and definitions

When the *wanyuy* becomes very long and does not lead to a tuber (i.e., the *wanyuy* is itself the end), the *buloy* is called *naniwatiw*. This is also called *nangikoy damulag* ('tail of a carabao'⁴) and "*Ikin lumalako*," meaning 'It does not get bigger.' The *wanyuy* is like that in rocky places. This is also said to happen when the taboo against standing up while harvest is on-going is violated. The *buloy* had rooted but did not produce a tuber. The *buloy* is abandoned in these cases, especially if one has dug more than one's height and there is still no tuber. The abandonment phrase is: *Ilabok koy na kayti*, 'I will leave this already.'

When the tuber is not completely harvested and there is still some in the *bito*, the tuber in the *bito* sprouts a new stem and grows up to the ground level, where it meets the *tumpok*. The *tumpok* also sprouts a new tuber that grows down. When this happens, the two tubers below the ground are called *naglalay*. This is good because you get two tubers in one harvest that are likely to be big and fleshy. Large *buloy* are called *ginian*. One Ayta lady was able to harvest such a tuber when she was 13 years old. It was quick because the soil was soft and there were few rocks. She left the village around 9 a.m. and finished digging at 1-2 p.m..

The textures of *buloy*

Buloy has brown skin, and the tuber inside is white. There are three types of *buloy* based on the characteristics of the tuber. These differences are natural and are based on the seed; it is in the nature of the plant itself. *Buloy* is also affected by the properties of the soil in which it roots and grows.

The three ways to characterize the *buloy* tuber are: *maugat/mauyat*, *matubyad*, and *malabó*. The *matubyad* type is full of water and naturally fibrous. Its fibers are long and the roots are thick. When a *buloy* plant is fresh, the tubers are *matubyad*; it is still young and retains moisture. And it does not soften when cooked. The *maugat* type on the other hand is very hard, fibrous and also undesirable. It is similar in texture to the root, the *wanyuy* and the stem of the vine. If the tuber is hairy or thorny, it is still hard.

⁴ Domesticated Asian water buffalo (*Bubalus bubalis carabanesis*)

The *malabó* tuber is the desirable tuber type. It tastes very good when cooked; it is very soft and crumbly. The good kind of *buloy* is smooth, thornless and has a thin skin. The tuber is white, with a few hairs and roots. Even if there are many roots coming out of the tuber, the roots are very fine. One of the best types of *buloy* is one that has not produced any *hapa* yet. This is called the *dalaga* tuber (which means 'unmarried woman'), and it is smooth and white. Even more delicious is the *hapa* itself. In tubers with *hapa*, the *hapa* is *malabo* and the *indo* or 'mother' tuber becomes *matubyad*.



Figure 8.
Part of a
harvested
tuber.

Good *buloy* can also be distinguished by a darkening of the stem close to the thorns of the stem near the base of the plant. If the *buloy* looks like this, then it will have a very desirable taste. Moreover, the deeper the *buloy* goes into the ground, the more *malabo* it becomes.

The three types are probably more of a function of tuber growth than genetic differences between varieties. All *buloy* tubers will have parts that are *maugat*, *malabó* and *matubyad* at some point. It depends on how deep the *buloy* is underground, the age of the plant, and where it is growing.

There is also the *inuyhang buloy* or *usang buloy/buloy-usa*. This kind has a red tuber and is *matubyad*. The epidermis is rough. The tuber is not considered to be delicious.

Preparation, consumption and storage

Buloy has to be washed and peeled before cooking. The outer layer skin is hairy and this is not eaten. The tuber could cause itchiness to human skin, especially when wet. After peeling, *buloy* is cut into pieces. Cutting the *buloy* produces a crunchy sound if it is *malabó*. The *matubyad* tuber does not produce the same crunchy sound.

There are many ways of cooking *buloy*. It can be roasted in bamboo or boiled and then eaten with salt or sugar. It can also be mixed with coconut milk. It can be boiled with vegetables. It is especially tasty with *ampalaya* (bitter melon, *Momordica charantia*) *Buloy* should not be fed to babies because their stomachs cannot handle it yet.



Figure 9.
Peeling the
tuber.

When the *buloy* has been harvested, it should be cooked right away. Otherwise, it is said that it 'will taste like the night' (*lahang yabi*). Whatever air the *buloy* is exposed to outside the earth, it will carry within it and the tuber will change in taste. To prevent 'tasting like the night' the tuber can be stored temporarily by burying it in the ground. However, the taste of the freshly harvested *buloy* is different from that stored underground. Furthermore, it should stay under the ground for a maximum of only two nights. After that, it will 'taste like the night' already. For the Ayta, the 'night

taste' is a bad taste. The *buloy* does not rot, but acquires a bad taste. Sometimes harvested *buloy* is left buried and it starts to grow shoots.



Figure 10. *Buloy* peeled, boiled, and eaten with sugar.

Decline in *buloy* harvesting

Digging for *buloy* does not occur very often anymore for the Aytas. There are too many tasks and concerns that keep them busy in the everyday life of the village such as cooking, cleaning, taking care of children, etc. Also, some people are said to be getting lazy to do it since it takes much effort to search for and harvest the tubers. One harvest could take one full day. The Ayta say that the frequency of digging varies per person, and there are probably less than ten individuals that are frequent harvesters of *buloy* these days. This is unfortunate because the old ways are being forgotten. It must be stressed though that even if digging does not occur as frequently as it did in the past, at least all the adults in the community know how to do it. The elders are also confident that the Ayta will go back to digging *buloy* more frequently. Work is not available all the time, and when there is no work and no food, *buloy* will be remembered and digging will happen again. Such is the circle of life: the Aytas will always go back to *buloy*.

It is hoped that the youth will also learn how to dig the wild yams so that the practice would persist in the Ayta culture. Unfortunately, parents do not bring their children to the forest as often as they used to because of school.

Some key informants also mentioned that the young people have become too sensitive to the forest. The girls, especially, don't like going into the forest because they fear mosquitoes, the forest is associated with getting dirty, it is far, it is itchy, and it is tiring to go there. It is difficult to teach the youth and to encourage them to learn about *buloy* because they are not too interested in the traditional ways of life in the forest. The elders feel discouraged and saddened by this and vow to teach their own children and grandchildren how to harvest the yam, whether they want to learn it or not. The elders also believe that when the youth have families of their own and they do not have anything to feed their children, they will remember *buloy* and they will start to seriously learn how to harvest it. And even if not everyone in the community learns how to dig for *buloy*, all Ayta will eat it and will also know how to prepare it.

Not all the youth are apathetic, however. There were a few that did attempt to harvest *buloy*, even if they hadn't been taught. They experimented on how to harvest it based on what they learned from casual conversations in the village. Sometimes they would attempt to dig, but then they would hesitate, afraid to go deep into the *bito* or pit. Even if the youth know how to dig for *buloy* theoretically, the mentorship of an elder is needed because it is difficult to find the *buloy* if one does not know how to find it. It is difficult to find the *tumpok*. They would not be able to do it on their own.

Environmental concerns

Buloy harvesting is believed to be harmless to the environment. While digging, the earth that is dug is displaced and thrown upon the ground. It covers many young seedlings and anything on the ground because the *bito* is very deep. Anything in the pit that gets in the way of the tuber is removed, be it rocks or roots of trees. The roots that are removed do not harm the tree, however.

Harvesting *buloy* does not affect the ability of the plant to survive and persist. Because the *tumpok* is left, the plant does not die and will continue to grow tubers. When *buloy* is dug up, the *jikjik* is left standing and the *tumpok* is left beneath the ground, ready to grow and regenerate. If the whole tuber was not harvested, whatever was left beneath the ground grows once more. Thus, *buloy* will never disappear.

Sometimes it may seem that *buloy* is harder to find these days. Presently, it takes them the whole day to find only one that is worth harvesting. - However, difficult days have also been experienced in the past. Both deep and shallow, large and small tubers existed before just as they do now. *Buloy* in the primary forest is still large and fleshy, just like before.

The reason why it seems more difficult to find good *buloy* these days is because the Ayta are not used to looking for *buloy* anymore. *Buloy* harvesters these days are easily discouraged and lack patience. This is not due to changes in the *buloy* but to changes in the lifestyle of the Ayta. *Buloy* might even be more abundant today because there are so few people digging for it.

However, good *buloy* disappears as the forest is degraded. When the forest is gone, the good *buloy* will be gone as well. The tubers in the primary forest are very desirable, unlike those in the *kalaanan* or secondary forest where they are small. *Buloy* does not grow well in the *kalaanan* because it is too hot and degraded when compared to the primary forest. But as long as the forest still stands, *buloy* will not disappear. Some Ayta believe that even if the forest itself disappears, *buloy* will still be around. It will still crawl and climb. But it will not taste good. It will not be large or fleshy, but rather it will be skinny. It will be useless as a food.

***Buloy*-animal interactions**

The *hira* or wild boar (Philippine warty pig, *Sus philippensis*) is the only mammal that eats *buloy*. The boar digs for it, but since it cannot dig too deeply, it only gets the part of the tubers close to the surface of the ground. This is helpful to the Aytas because the boar, in trying to get the tuber, has just identified a *buloy* that can be dug. The boar has also done the preliminary digging. When the Ayta sees a pit a boar made, *buloy* has been found.

The *buloy* is part of the life cycle of animals because it is eaten by the pigs, and the birds are able to take shelter within its leaves and stems. However, the leaves are not eaten.

The flowers of *buloy* are irritating and so insects do not visit them. The tuber is also irritating. If you put a sack of *buloy* on your back, it will itch. The flowers have a strong, pungent scent, not unlike the smell you get when you slice the vegetable *sigarilyas* (winged beans, *Psophocarpus tetragonolobus*).

Buloy can get sick when its tubers are eaten by an *uod*⁵, a large, hairy, red millipede with yellow feet (possibly *Spirobolus* sp.). The millipede will kill the tuber by filling it with holes. The millipede ruins the tuber, rendering

⁵ The term “*uod*” is a Tagalog term meaning 'worm' in general. The Ayta asked that the specific Magbukun name of the animal not be mentioned in the manuscript and that the word “*uod*” be used instead.

it useless. *Buloy* that has been eaten by the millipede is called *untulan*, or “unlucky”.

Other 'underground foods'

There are other underground foods eaten by the Aytas. A distinction is made between root foods that are wild (*kinakayi haluta*, literally 'dug food') and cultivated (*hinbutbot haluta*, literally 'planted food'). There is no collective term for 'yam' in the Magbukún language.

Kalot (*Dioscorea hispida*) is another wild yam. It grows shallower in the ground and therefore is easier to harvest. However, when consumed it causes dizziness. One has to know how to prepare it properly. It should be sliced thinly and washed in the river for days to remove the toxin. There are secrets on how to process *kalot*, and not everyone knows how to do it.

Lima-lima (*Dioscorea pentaphylla*) is a wild, spiny yam, and the tuber is located far away from the stem of the plant. The tuber of *lima-lima* is round and hairy. There are three kinds of *lima-lima*. One kind is toxic and spiny, the other edible, and the last one has small fruits. The *lima-lima* with strong toxin is called *bubliklit*. One who has eaten *bubliklit* will not be able to get up for two days. One must drink water to flush out the toxin from the body. Unlike *kalot*, the toxin cannot be removed from *bubliklit*.

There is also the wild yam called *lapnit* or *pakit* (possibly *Dioscorea luzonica*). This is found near saltwater and not in the mountains. It is tasty and sweet.

There are other tubers that may be mistaken for *buloy*. The *ubing anitolubing buluhuklanggayan* has shallow tubers and is undesirable. The *banag* (*Smilax* sp.) looks like *buloy*, but it is not *buloy*. It does not have a tuber and cannot be eaten because it is all root. The *kalot-baboy* is eaten by pigs but its tuber is much smaller. The fruits of *kalot-baboy* are similar to those of *buloy*. It also has a toxin like *bubliklit*. The *buloy-usa* never gets cooked. It does not soften. It is hairy and makes a sound when it snaps. It turns into a soup when boiled and does not hold together. *Buloy-usa* is only distinguishable from *buloy* when it is cooked. The plant looks the same both above ground and below ground.

Tugi (*Dioscorea esculenta*) is a cultivated yam with small tubers. It is hairy and spiny. There is also *tuging burot*, which is tasty and shallow in the ground. Another yam is *ubi* (*Dioscorea alata*). *Ubi* is planted in the fields.

There are two kinds of “kamote”. One is *kamoteng kahoy*, literally 'wooden kamote,' (*Manihot esculenta*) which must be cooked right away

because it goes bad within 2-3 days. *Kamoteng baging*, literally 'viny kamote,' (*Ipomoea batatas*) is sunned after harvesting so the sweetness will dry into the tuber. This is tasty and sweet.

Recognized famine foods in the community are *buloy*, *kamoteng kahoy* and *lima-lima*. However, *buloy* is the favorite and most special because it can be harvested anytime during the year. It is not like *tugi* or *lima-lima* that have their own strict harvest seasons.

Buloy came first before rice. *Buloy* naturally grows in the forest. It is eaten while waiting for the rice harvest. It is easier to harvest *buloy* than to plant rice. Rice and *buloy* are both important to the Aytas.

Kamoteng baging, *kamoteng kahoy* and rice are not natural in the forest. They are 'foreigners'. The natural foods in the mountains that Ayta traditionally eat are *buloy*, *ubi*, *gabi*, *kalot* and *lima-lima*.

Buloy was already in Bataan when rice and *kamote* came. The Aytas also arrived first, before rice, and before there was a concept of the country "Philippines."

The harvesting of wild yam elsewhere, unintended domestication processes

The above description detailed the traditional ecological knowledge of the Aytas in the context of finding, harvesting, and the preparation of the wild yam *buloy*—which makes it clear the Ayta have a special and ancient relationship with *buloy*. Many of the Ayta have been converted to Christianity, but *buloy* continues to be respected as sacred because it is an invaluable part of nature. *Buloy* also connects the Aytas with their ancestors and the spirit world. Unfortunately, this relationship is threatened as the youth are losing interest in *buloy*. Thus, the elders are doing their best to encourage the youth to renew their relationship with this yam.

The documented traditional ecological knowledge also shows the intimate connection the Aytas have not just with *buloy* but with the land and nature. They possess knowledge regarding different plants, where they are found, their life histories, regrowth and how they behave across different seasons and in relation to other organisms and the environment. The Ayta also know their topography well. This includes soils, gradients in water availability, slope and the layout of roots and debris in the land. Furthermore, the Ayta know which plants are edible and nutritious, the availability of these food plants, and how these can be harvested sustainably. Such extensive knowledge illustrates the interrelationship of Ayta culture with their

environment. This includes the relationship between the spiritual and the physical realms, as nature is sacred.

Close subsistence relationships between wild yams and people have been observed all over the tropics. According to Maceda (1964), other hunter-gatherer groups such as the Mamanua of Northeast Mindanao, the Aeta of Mt. Pinatubo in Zambales, both in the Philippines, as well as the Semang of Malaysia and the Andamanese also harvest wild yams. The Batak of Palawan also harvest wild yams, but harvesting techniques were not discussed by Eder (1978). Ticsay (1986) mentioned that yams are consumed among the Tasaday, Tiruray, Tagbanua, and Tau't Batu. The Pinatubo Aetas use yams (*Dioscorea filiformis*) as an anti-malaria medicine. The Hanunoo Mangyans of Mindoro Oriental are also reported to harvest *D. divaricata* (common name: *dugian*).

Dounias (2001) described the wild yams of Southern Cameroon which are cherished by the Baka pygmies as food. They have specific tools and harvest techniques for their wild yams. One difference between the Baka pygmies and the Magbukún Aytas, however, is that the Baka pygmies fill their pits back again while the Aytas leave them exposed. Maneenoon *et al.* (2008) also reported that the Sakai of Banthad Range of Peninsular Thailand (in tropical rainforest) harvest wild yams as their main carbohydrate source. The Sakai are hunter-gatherers that range from being nomadic to semi-nomadic. They use a digging stick for deep-rooted tubers. The tubers are harvested when the soil has been removed around it, and this is done with minimal disturbance.

Rituals are also associated with yams in other areas. Coursey (1981) reported that in the Andaman Islands, immature tubers of *Dioscorea glabra* may not be harvested because they are for the exclusive use of goddesses. This is perhaps because immature tubers do not regrow as well as mature ones. Harvest should also be done as socially prescribed. Similar practices are seen in Melanesia, the Philippines, Sri Lanka, India, and West Africa (Coursey 1981). The head of the tuber is also protected, i.e., not disturbed during harvest, so that new tubers could regrow, and yams with withered vines are preferred. In West Africa, there is also a taboo against use of iron digging tools. This suggests that yam harvest is a practice that dates to before the iron age.

Endicott and Bellwood (1991) have reported that the Batek of Malaysia (part of the Semang group in Malaysia) harvest wild yams for consumption and trade. Unlike the Aytas, the Batek prefer the taste of rice to tubers. However, the yams are also seen as food security because of their availability. Some yams are harvested whole, while others only partly to

leave the possibility for regrowth. The Batek use “digging sticks with metal blades” and also enjoy the harvesting activity. Rituals and taboos were not reported.

An interesting aspect is the unintentional domestication of wild yams. Domesticated yams are present in the Magbukún community in *Dioscorea alata* and *Dioscorea esculenta*. However, *buloy* is not cultivated. The community does not have any motivation to do so, as it is accessible in the forest. Perhaps another reason is because the Aytas prefer to harvest on slopes rather than on flat ground (their fields and houses are on flat ground). Furthermore, the wild *buloy* that grow in the fields and secondary forests do not have desirable properties. The growth of *buloy* might be slower in the primary forest as it receives less light. However, domestication may happen without intention, and in a manner not noticed by the domesticator (Sauer 1952, Anderson 1967, Dounias 2001, Zeder *et al.* 2006). The first steps in domestication are to be able to access the wild plant and know its life history (Hildebrand 2003). According to Mignouna and Dansi (2003), domestication of wild plants creates new varieties and usually takes three to fifteen years. A domesticated plant continues being domesticated until desired qualities, which concern ease of growth, harvest, preparation, nutrition, yield, and good taste are achieved .

The re-harvesting of tubers, which stresses the plant and encourages growth of many tubers within one plant, may constitute an unintended domestication process (Tamiru *et al.* 2008). The second tubers have more lignin and therefore are more fibrous; they also produce root buds that can be used for propagation as is also true in the case of *buloy*, where although the second tuber is more fibrous than the first, the second tuber produces buds that become good quality tubers. The second tuber eventually rots, and the new tubers are comparable in fibrosity to the first tuber. Stressing a plant is one way of making it regrow in desirable ways. Yams are generally domesticated to obtain ideal tuber “form, size, and taste” and are reproduced through the tubers rather than through seeds. Taking only part of the tuber without touching the stem stresses it (Scarcelli *et al.* 2006). Yams undergoing domestication also slowly reduce flower production and function (Scarcelli *et al.* 2005, Dumont *et al.* 2006). Domesticated root foods generally have higher starch content and bigger, less fibrous tubers that are easier to process (Zeder *et al.* 2006, Piperno 2006).

Dounias described a process he called *paracultivation*, -which is “a set of technical, social and cultural practices aiming at managing wild resources while keeping them in their natural environment” (2001:135). Paracultivation has been observed among the Baka pygmies of Southern

Cameroon, who, like the Aytas during wild yam harvesting, leave a part of the tuber in the pit to regrow. The pygmies are posited to be “cultivating” in the natural environment because they are nomadic and would therefore prefer to have wild yams in their present distribution in the forest. That way, they would not be concentrated in one area. Paracultivation of wild yams is believed to promote more tuber production, resulting in multiple tubers in one pit.

Coursey (1967, 1981) discussed harvesting yams with minimal disturbance so as to encourage the tubers to regrow. From the regenerated tubers, the most preferred plants and tubers may be selected, and eventually brought into the village for domestication. Coursey described the perfect circumstances for growing yams—“a tropical climate with temperatures around 30°C (86°F), with a sharply demarcated dry season of two to five months, and a total rainfall of some 150 cm (60 inches) evenly distributed throughout the remainder of the year. The soil should be a deep, sandy loam, free from danger of waterlogging.” (1967:72). Parts of the tubers can be left on the ground to regrow, or tubers can be chopped and the pieces planted. Planting root crops is less labor-intensive than planting cereals, because less space and care are needed. Furthermore, trees can remain in the field for the vines to climb on (Coursey 1967).

Conclusion

The traditional ecological knowledge of the Magbukún Aytas of Kanawan regarding *buloy*, or *Dioscorea divaricata* Blanco, has been documented in detail in this paper. Likewise, the relationship that is created between the Aytas and the yam, which they hold sacred, has been examined. The relationship is very intimate. *Buloy* fills a physical need (hunger), while at the same time rituals conducted in relation to *buloy* connect them to the ancestors. Hence *buloy* is a part of Magbukun Ayta identity. The documentation of this information becomes especially valuable today given that the youth of the community are not as knowledgeable about *buloy* and its significance as are their elders.

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APPENDIX: Interview Guide Questions

Language and terms

- What does the word “*buloy*” mean?
 When you say “*buloy*”, what comes to mind? (e.g. the vine, the tree, the root crop [cooked or not?], the flowers?)
 Are there different kinds of *buloy*? Are they all the same? How are they different? How are they recognized? What are the distinguishing features?
 What is your term for “root crop”? Could you please list the plants you consider as root crops?
 Do you have a word for “yam”? (i.e., a common term for “*buloy*”, “*kalot*”, “*ube*”, “*tugi*”, *lapnit*”, etc., which are all from the plant family Dioscoreaceae)
 What are foods that you may liken to *buloy*?
 What are your staple foods? Is *buloy* a staple?
 What are your famine foods? Is *buloy* a famine food?

Recognition

- How is *buloy* recognized?
 What are the features of *buloy*?
 Where is it found?
 Are there indicators for the presence of *buloy*?
 Does *buloy* need certain conditions/presence of plants or animals to be able to live and thrive? Do these help in finding *buloy*?

Harvesting

- Who?
- Who can dig *buloy*? Men or women? Youth or elder? Ayta or Non-Ayta?
 Is permission needed? From whom?
 At what age does a person start digging for *buloy*? Is there an age when one stops, or is it for life?

- What?

What are you digging for?

What are you looking for? Mature or young? Is there a way to find out the age of the *buloy*?

Are there features of a desirable or “perfect” *buloy* (e.g. large weight)?

When confronted with many *buloy* plants, how is the “best” *buloy* chosen?

Are all the *buloy* that are dug up collected, or are there ones that are left behind because they do not measure up to some standard (i.e. rejected)?

- When?

Morning/afternoon/night?

Rainy season/summer? Full moon?

How do you know when you can dig for it?

What are the character states of *buloy* that indicate the timing is right for harvest?

- Where?

How far do you go to get *buloy*?

What are the features of an area where *buloy* is harvested?

What is the preferred habitat of *buloy*?

- How?

How do you prepare for a dig?

Is there a necessary ritual or preparation?

What are taboos in digging and what do they mean?

What do you use to dig?

How hard is it to dig? What are the costs of digging (e.g. time, sweat, etc)?

What are the steps in digging and what is the significance of each step?

- Asking permission (if so, from whom)?

- Looking for *buloy* (what is the topic of conversation while looking for it?)

- Clearing the area around the root crop?

- Starting digging?

- Harvesting the *buloy*?

- Putting back a part of it for regrowth?

- Going home?

- Thanksgiving?

- Why?

Why do you dig?

What is attained/obtained?

What do you feel at every step of digging starting from planning the dig to actually eating it?

Is the *buloy* a symbol of anything? Of what? Does it represent anything?

What is the meaning/significance of digging *buloy* to your culture?

Cooking

Is *buloy* ever eaten raw?
How is *buloy* cooked?
How is the *buloy* prepared before cooking?
How many ingredients are used? What are the ingredients?
Are there any other preparations after cooking that need to be done before eating?

Eating

How is *buloy* eaten?
To whom is it first given?
To whom should it not be given?
Should it all be eaten or can some be thrown away/given to the dogs?
What does it taste like?
How long does it take before cooked *buloy* rots?
What is done with rotting *buloy*?

Storage

Is *buloy* stored? Where, how, why?
How long does it take before *buloy* rots and becomes inedible?
Will anything negative occur if *buloy* is allowed to rot?

Knowledge

How is knowledge regarding *buloy* obtained?
At what age and occasion?
Who teaches?
Do you teach?
Who is allowed to learn?
How long have you been digging?
At what age did you first go along with a dig?
At what age did you start digging under supervision (if at all)?
At what age did you start digging by yourself?

Song

What is the importance of the song? What is the meaning?
How many children know this song?
Who wrote this song?

Status of *buloy* use

How many people in the community dig/cook/eat *buloy*?
How large is the percentage of *buloy* in the diet? How often is it eaten?
What is the nutritional value of *buloy*? How does it contribute to one's health?

How are those that are dug replaced?
 How long does it take before the dug pit fills up with soil again?
 Do you purposely go back to a previous **buloy** that had a big tuber to dig its tuber again?
 How often is digging done?
 Is the frequency different from when you were younger? Why or why not?
 Has there ever been a time when it was very difficult to find *buloy* (or none found at all) e.g. Mt. Pinatubo eruption?
 If you cannot find any more *buloy*, what would you do? Would you plant it? What will you have lost? Will you find a replacement? What are the possible traits of the replacement?
 Is *buloy* sold? How much? Since when? To whom?

Management

Is *buloy* managed? How? Is management done consciously?
 Are there any *buloy* plants that you purposely do not dig? Why?
 What is the effect of harvesting *buloy* tubers on the forest, if any? On the plant itself?
 Does harvesting *buloy* affect the population size? How?
 What is the effect of harvesting *buloy* on its surroundings and the other plants/animals in the area?
 Are the root crops harvested getting smaller or bigger through time? Or is the size more or less the same?
 Has the *buloy* been going deeper or shallower into the soil through the years? Or is it found at more or less the same depth?
 Is it easier to find *buloy* before, now, or is the level of difficulty the same? How long does it take? How deep do you dig?
 What is the effect of natural calamities on *buloy*?
 How large is the demand for *buloy*? How much of the community would want to dig for it?

Reproduction and dispersal

Where did *buloy* come from?
 How does *buloy* reproduce itself? By seed? By cuttings? Through the tuber?
 How are fruits formed?
 Does *buloy* have a smell? Do insects surround it?
 How are seeds dispersed? Where do they go?
 How long do you have to wait for a seedling to grow before it can have a tuber big enough for use? Do you recognize any “male” or “female” *buloy*? Which is more abundant? Which has tubers? What are the differences between male and female plants? Flowers? Features?

When does *buloy* flower/fruit/form leaves/form tubers? How often? How many times in a year? One by one or all at once?
How long do fruits stay on the stem before falling?

Plant-animal interactions

Do animals interact with *buloy*?

Is *buloy* beneficial to animals? Animals to *buloy*?

Are there any traditional stories connecting animals and *buloy*?

Does *buloy* die? How? What is harmful to *buloy*?

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