Ecological Management of a Residual Forest in Negros Occidental, Philippines

The Experience of Marcos Flores in Negros Occidental

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The small mountainside village of Bel-at in the province of Negros Occidental, Philippines is predominated by balding slopes covered with the decaying remains of cut timber and stretches of cogon grass. Residents of the village continually observe the replacement of forest cover with commercial crops, the manufacture of charcoal using residues of slashed and burnt trees, and the construction of new houses along the thinly forested riverbank. Amidst this destruction, however, lies a communal forest and tree nursery dominated by native tree species, many of which are unfamiliar even to the settlers of the area. Mature trees from the communal forest are selected for furniture production, and residents cull trees and plants for their medicinal and botanical uses. Additionally, seedlings from the communal nursery are used in reforestation projects throughout the province. The initiative is maintained by a group of forest dwellers led by a man named Marcos Flores. Their aim is to satisfy both the human and ecosystem needs of the upland by working to restore healthy forests in Bel-at and surrounding communities.

Introduction

Over the last 50 years, the once lush mountain forests in the province of Negros Occidental, Philippines have faced increasing threats from logging companies, charcoal manufacturers, upland farmers and forest encroachers. Today approximately 97% of the original forest cover has been destroyed, replaced by eroding slopes of grass and shrubs. Residents of the upland struggle to carve a living out of the degraded landscape, sometimes contributing to the pervasive erosion through their land clearing and cultivation activities. Additionally, the degradation of the forested watershed has made the upland dwellers vulnerable to drought.

This paper documents the challenges and successes associated with the restoration of the upland forest in the community of Bel-at in Negros Occidental. It highlights the initiatives of Marcos 'Macking' Flores, a local resident who, alongside several local organizations, has propagated not only the native trees in his locality but also the use of a traditional knowledge system used to identify, conserve and manage indigenous tree species.

The setting

The community of Bel-at, located in southern Negros Occidental, is one of 36 *sitios* that comprise the larger *barangay* of Basak. Home to 12 upland dwelling households, Bel-at has a land area of 50.5 ha and is largely characterized by sloping land and residual forest[1].

Background of Marcos Flores

Marcos (Macking) Flores is 55 years old and a father of 12, and considers himself the only remaining Tumandok[2] in the *sitio* of Bel-at. He was born in the town of Calatrava, Negros Occidental from a Cebuano migrant father and a Tumandok mother.

Figure 1. Barefoot, Macking treks the mountain of Bel-at in search of wildfood, seeds and wildlings.

At an early age, Macking helped his family cultivate 2 hectares of a rocky, sloping farm owned by a fellow farmer. When he was 11, his family moved to another *sitio* that was 11 kilometers from the main town. Due both to the distance he lived from the school and the need for help with farm duties, Macking was unable to continue past Grade 2 in elementary school. Instead, his mother taught him basic reading and writing.

As a young man, Macking found employment as a *sacada*, or sugar cane worker, and worked for his uncle as a logger. In the early 1960s, he helped his family tend 3 hectares of land in sitio Bel-at, the first of his two periods of residence there, where he practiced *panga-ingin* (shifting cultivation). During this time he met and married his wife, Gaudicia, and moved to another upland village, which the couple soon departed due to heavy militarization. In their next residence, in the municipality of Hinobaan, Macking engaged in a number of activities to supplement his income from farming, including sawing lumber in collaboration with an illegal *pantat,* or forest guard. For five years, Macking searched for hardwood as far as the most peripheral portions of the mountain ranges.

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[1] Bel-at refers to a body of water from the mountain that flows along the stream of two large rocks. The original settlers saw it like a woman's vagina so they called it *belat.*

[2] The Tumandok are a group of indigenous people in the Philippines. The term is also used to describe plants or animals native to the area.

Later, he secured casual income from gold panning. When gold mining subsided in 1982, Macking returned to timber cutting, which was also declining due to excessive timber extraction. Finally, he shifted to *pananggot tuba* (coconut wine production).

Figure 2. Macking is seen here showing a species of "uway" *(Calamus merrilli)*

In the 1980s, growing tension between the Philippine military and the New People's Army (NPA) put many families in the center of armed conflict. As an active community organizer with the Church-initiated *Kristianong Katilingban* (KK), a group vocal against military abuses in the area, Macking found himself gaining critical awareness on the issues of agrarian land reform, the government, human rights abuses and economic inequalities. However, as the KK was thought to conspire with the NPA, the military put Macking on its watch list and he was forced to be cautious in the public eye.

Eventually, in 1987, military pressure caused Macking and his family to return to Bel-at, where they purchased five hectares of land from Gaudicia's father. Despite increasing tension and encounters in the area between the military groups and rebel forces, Macking and his family stayed put even as other families fled. It was here in Bel-at that Macking developed his interest and skills in forest management. Macking continues to live in Bel-at, caring for a seedling nursery and communal forest, and is dedicated to encouraging the spread of forest restoration projects.

Macking's early influences .

Macking's drive to restore the forest is rooted in his experiences in Bel-at, first in the early 1960s, and later upon his return in 1987. The individual with the most influence in developing Macking's commitment to forest preservation was a Tumandok native and long time resident of Brgy. Basak, Iloy Olay. In 1962, Olay encountered Macking lost in the then-lush forest and helped the younger man home, and the two became

friends. Olay held extensive knowledge about the names and uses of trees and plants, and Macking began to cultivate his own interest, especially about which species could be used to construct houses and furniture. The two men frequently toured the forest together to identify and categorize the use of different trees and plants, and Macking recorded everything that Olay taught him. Macking discovered high quality native trees, such as the large, hard wooded and fine-looking dipterocarp *narra*, known locally as *manggatsapuy (Hopea acuminata)*. Macking also benefited from Olay's wide knowledge of the medicinal and pest management qualities of the diverse species of the forest.

Macking's tutorials with Olay ended after one year with the older man's death. In subsequent years, Macking developed and improved his acquired knowledge of the botanical uses of plants. He made his own concoctions against pest infestation in his upland farm, and was able to teach others, including his father, about the identification of native tree species. He also planted his first Tumandok or native tree species, broadcasting *sangil, lamaraw and miaw* around his farm. Today, Macking still remembers Olay's lessons, and is able to distinguish one tree species amidst thousands of trees by recognizing the size and the color of its leaves or the texture and smell of its bark. *(For an inventory of trees in Macking's agro-forest, see Appendix 1.)*

Facing a denuded landscape

When Macking and his family returned to Bel-at in 1987, they encountered a recently logged, sloping land with rapidly eroding topsoil and extensive patches of cogon grass. The destruction of the forested watershed had reduced stream flow in the rivers, and few species of animals inhabited the area. According to Macking, this ecological decline has resulted from a number of players.

The lumber traders.
Beginning in the early 1950s, the forest of Sitio Bel-at was covered by the operation of the Insular Lumber Company (ILCO). In the late 1970s, the company ceased its operations, leaving a large portion of uncut forest to be subsequently logged by local financiers from the nearby town of Cauayan.

The military factor.
Through the Philippine Constabulary (PC), the military funded commercial extraction of Bel-at's forest, particularly the large hardwood trees, as early as 1962. After forming a contract with a boat-construction company, the military financed the logging of many of Bel-at's trees. Resident loggers were at the mercy of the prices set by the military for

the logged timber, and sometimes received a lower price for the wood than the one initially promised.

The forest dwellers.

In their search for food and employment opportunities**,** migrants to Bel-at cleared the upland for the cultivation of rice, corn and root crops. Unfortunately, the land clearing techniques, including slashing and burning, and the lowland farming technologies used by most migrants did not help to control erosion on the upland slopes and contributed to siltation of the rivers and rapid denudation of forest areas. Further pressure on the residual forest arose from the increasing population and the cutting of trees to build homes for migrant families. These problems still persist today.

This nonsustainable use of the upland farmland strongly contrasts with the traditional actions of the indigenous Tumandok, who subsisted on *banayan* (root crops) from the forest, particularly during the dry season months between February and April. However, succeeding generations have turned to slashing and burning of trees for charcoal making during these months. Massive production of charcoal among these people started in 1987.

The charcoal contractors and forest encroachers.

The mountainous terrain surrounding sitio Bel-at has always been vulnerable to forest encroachers who clear land they do not own and use the remaining trees for charcoal production. Many forest dwellers produce a weekly average of ten sacks, each sack earning P55-60 when sold to a contractor ($1 Canadian= about 33 Pesos). The retail price of a sack in the downtown market reaches as high as P100. As there is no mechanism in Barangay Basak to control or prevent this land clearing, it still continues unchecked.

A Call to Action

Upon his return to Bel-at in 1987, Macking worked to counteract these impacts by spreading seeds and wildlings from the trees he planted in the early 1960s throughout his land. Nonetheless, at this time Macking and his neighbors were facing considerable political turmoil, and as they focused their efforts around combating military abuses and struggling to make a living in the degraded environment, the condition of the forest did not significantly improve.

Organizing the forest dwellers.

In 1989, a local NGO called *Paghida-et sa Kauswagan* Development Group (PDG) was contracted by the Commission on Livelihood (CoL) of

the local church to organize its parish assisted communities popularly known as Kristianong Katilingban (KK), the local version of Basic Christian Communities (BCC). This community organizing was a critical component of CoL's implementation of its Socio-Economic Program for Institution and Community Building (SEPICB). Basak was one of the three barangays piloted for this program. PDG's policy was to provide help to communities only if it was requested, and to encourage communities to identify their own problems and potential solutions. Among other projects, PDG proposed that an agro-forestry initiative would improve the quality of life and the condition of the environment in Barangay Basak.

Macking welcomed the efforts of PDG organizers, especially since he was familiar with the issues they were trying to articulate like security of tenure, improving income levels, and restoration of the logged upland. Many residents were hesitant to accept the intervention of the NGO because they were cautious of PDG's legitimacy. In light of the conflict between the military and rebel groups in the region in the late 1980s, some residents worried that the NGO's agenda was subversive. Macking articulated his desire to listen to the NGO and eventually convinced his neighbors that PDG was well intentioned.

In March 1989, with PDG's organizational and modest financial support, the *Asosasyon sang Magagmay nga Mamumug-on sa Bel-at* (Association of Marginal Upland Farmers in Bel-at or AMUFB) was formed. The group initially held 24 members, including a chairperson, vice chairperson, secretary, public information officer, auditor and treasurer. The original vision of AMUFB was to protect the upland ecosystem through forest restoration and the promotion of sustainable upland agriculture. The first objective continues to occupy the organization, while the second is currently undergoing program and action planning.

In 1991, the AMUFB became one of the pioneer groups to establish PUMOLUYO, now a federation of 34 Peoples' Organizations (POs), including 21 farmers' organizations, 10 forest dwellers' and upland farmers' associations and 3 fisher folk groups. As part of PUMOLUYO's mission for ecological protection, the federation purchased 9.5 hectares of denuded upland in Bel-at and entrusted to AMUFB the task of rehabilitating the logged forests.

The Communal Forest

The purchased 9.5 hectares has become the basis of a communal reforestation project, managed primarily by members of the AMUFB. It was through the Socio-Economic Program for Institution and Community Building that the AMUFP procured trees like mahogany and gmelina to

be planted in the community agro-forest. AMUFP also planted *tumandok* (native) tree species collected by Macking. In the following year, a local NGO called BIND distributed for free approximately 8,000 acacia seedlings with the vision of reforesting the land while creating an income source through harvesting of commercial timber. Several years later, most of the planted acacia trees had died due to their inadaptability to the physical location, poor soil conditions and topography, and competition with the aggressive cogon grass. On the other hand, the native and other commercial trees had a steadfast growth.

It was through this observation that AMUFB and PUMOLUYO agreed that a diversified approach to forest restoration was required on the communal farm, including the planting of indigenous species. Macking supported this decision, arguing that reforestation must stem from the need to rebuild the lost ecological balance, not to produce financial gains. Additionally, he has observed that the profits resulting from commercial tree propagation benefit only a few individuals instead of the broader community. Macking continues to favor the simultaneous planting of commercial and native tree species in the communal forest. He states that after 10 years, the commercial trees will be harvested while the native trees will be preserved to maintain the balance of the forest, providing the community ecological services such as erosion control and water retention.

Today, the communal forest is planted with more than 8,000 commercial tree species, including 3,000 gmelina *(Gmelina arborea)* trees and 4,000 mahogany *(Swietenia macrophylla)* trees, and over 12,000 native tree species. With diversification, Macking has observed an increased diversity of animals in the forest, including the flying lizard and the taklong snail, and has noted improved soil quality.

Macking is committed to propagating as many native tree species as possible, traveling to distant forests in neighboring municipalities to

Figure 3. This old basin is used by Macking to germinate seeds that he collected from the forests.

collect seeds, inspired, in part, by the hope that his children and their offspring will enjoy his native trees. Macking also feels a strong environmental commitment, stating that "*Bahala malasang na da basta mubalik lang ang pispis"* (If my trees make a jungle only to make the birds come back, so be it). He has 3 personal goals for the communal forest:

a. To protect the watershed and preserve the local atmosphere
b. To encourage the return of long lost birds; and
c. To protect the remaining plants and animals in the forest.

At present, Macking is the caretaker of the communal forest, and has planted more than 70% of its trees himself, with the rest planted by the AMUFB. Land owning members of the AMUFB are also encouraged to plant trees on their individual farms. Macking continues to actively restore the forest, and is able to plant over 200 seedlings in 3 days, intercropping indigenous trees with native ones. Macking is also largely responsible for the maintenance of the forest, clearing weeds from around growing seedlings, and selecting mature commercial species for furniture production. Macking attempts to maintain the forest in the most sustainable manner possible. He cuts trees 9-10 inches above the ground at an angle so water does not lag on the surface of the stump, thereby preventing rotting and allowing the tree to form a main branch and regenerate.

As the secretary of AMUFB since 1995, Macking is responsible for the staff at the association's office and attends trainings and seminars related to ecological restoration and sustainable agriculture. Macking claims that the trainings have deepened his environmental consciousness, enabled him to place his local environmental struggles within a global context, and have provided affirmation for his reforestation efforts. In one seminar, Macking cried after realizing that he partly contributed to the degradation of the forest, feeling guilty due to his past experience as an illegal logger. Macking continues to apply lessons from these engagements to his management of the forest.

In 1993, the former Department of Environment (DENR) Secretary, Angel C. Alcala, made a historic visit to barangay Basak where he acknowledged the efforts initiated by Macking and the AMUFB, and encouraged all members of the community to follow their lead in forest resource protection and management.

The Communal Nursery

On behalf of the AMUFB, Macking spearheads a seedbanking project, from which young trees are planted in the communal forest. An average

of 20,000 seedlings are maintained and dispersed to other groups and communities every year. The nursery, adjacent to Macking's house, has a total area of 351 sq. meters and is supplied with water from a nearby stream. Macking collects the majority of the seedlings from his property and the upper portion of neighboring mountains. Some seedlings are also grown from the seeds that he gathers from indigenous trees in distant municipalities. Additionally, Macking exchanges trees in his collection with those of other organizations that have established seedling nurseries. In total, Macking maintains a collection of more than 220 tree species, and records each species' local name, and commercial, botanical and medicinal uses. Many of Macking's propagation techniques have been developed through his observations of natural processes. For example, by noticing that thick skinned seeds germinate faster after passing through the digestive system's of birds, Macking now briefly boils these seeds prior to planting to degrade their hard covering and facilitate the release of the ectoderm.

The PUMOLUYO federation continues to support the communal forest and nursery in a number of ways. In addition to purchasing the land on which the communal forest is planted, PUMOLUYO has also bought the home in which Macking and his family live, ensuring that he can live next to the communal forest and nursery. The federation also has provided some supplies and hard labor for the establishment and upkeep of the project.

Agroforestry initiatives

The communal forest and nursery offer financial opportunities for members of AMUFB and PUMOLUYO through a variety of means. The association is currently framing a policy on the use of the communal forest and the sharing of its benefits, outlining how profits are shared between AMUFB, PUMOLUYO and the individual planter. To date, the following initiatives are undertaken:

Figure 4. Various commercial and non-commercial plants and tree species are found in Macking's nursery.

Tumandok trees used for reforestation projects.

Through the conservation and marketing of 20,000 seedlings annually, trees from the communal nursery have reached as far as Bacolod City, where the provincial government purchased from a total of 5,000 Tumandok seedlings. Also, a local church and the elementary and secondary schools from the neighboring barangays of Basak and from contiguous municipalities are planted with native trees taken from Macking's collections. Additionally, the AMUFB nursery has become the main source of seedlings for communal agro-forestry projects of at least three associations of the PUMULOYO federation. Other nurseries have been created in Basak, using native seedlings collected and propagated by Macking. Normally, the nursery's commercial tree seedlings are sold for 2 to 5 pesos each, generating a modest income for the AMUFB, contributing to nursery expansion, and offsetting expenses related to the collection of seeds and delivery of seedlings.

Income from furniture making.

Using information he gained from Iloy Olay, Macking has become an adept carpenter, culling mature commercial trees from the communal forest for his products. His products include beds, chairs, tables, stools and cabinets. Macking only makes furniture upon request, and is experiencing increasing demand for his products, probably due to the attractive prices that he charges. Although he encourages other members of the AMUFB to make furniture, he currently is the only one who has adopted the practice.

More than commercial benefits.

Macking has taken advantage of the medicinal properties of the trees and plants in the communal forest, saving his family from the high cost of prescribed medicine. His upland crops are also spared from the use of synthetic pesticides since he has been able to use homegrown, natural concoctions from the forest. Macking shares his knowledge of the medicinal and botanical uses of forest resources with other farmers. Some of these uses are listed in the tables below.

Table 1: PLANTS/TREES WITH INSECTICIDAL/PESTICIDAL PROPERTIES

Batangay	worm, rice bug	grind bark, mix with pounced chili and water then spray
Bayanti	worm	grind leaves, mix with water then spray
Huwag	earworm of carabao	hang the vine around the neck of carabao
Manunggal	tungro (virus) caused by green leaf hopper (vector); the virus stops from spreading when the vector is killed	grind leaves, soak in water overnight then spray on rice plants
Pangyawan	tungro (virus) caused by green leaf hopper (vector); the virus stops from spreading when the vector is killed	grind leaves, soak in water overnight then spray on rice plants
Tagbak	rice bug	cut 3 to 4 feet of mature stem of tagbak grass; crush the tip at about 1 foot then stake in the rice field to attract the rice bug to sip the juice of *tagbak*; this pest management technique is done usually during the milking stage of rice
Tigaw	worm	grind leaves, mix with pounced chili and water, then spray
Tubli	rice bug, green leaf hopper, worm, locust	extract some roots, soak in mud for 1 week, squeeze the juice then spray

Table 2: PLANTS/TREES AND OTHER RESOURCES WITH MEDICINAL AND EDIBLE USES

Ahos/Bawang	headache	scrub on the forehead
Apatot	various	fruits, leaves, barks or roots are boiled then drink
Bugnay (bignay)	post natal (as a diuretic)	leaves/roots/barks smoked
Coconut	kidney (as a diuretic)	drink juice or coconut wine (tuba)
Eucalyptus	cough	boil leaves then drink
Paniawan	for carabao having LBM	boil leaves then drink or feed fresh
Alagut-ot	fruit tastes sweet and sour	
Alawihaw	fruit tastes like santol, a sweet and sour fruit popular during rainy season	
Alomangug	fruit tastes and looks like black berry	
Sambulawan	fruit tastes and looks like plum	
Cave bats	guano (dung) used as organic fertilizer	
wild honey	stomach swelling	

Challenges to forest rehabilitation

Although the forest rehabilitation efforts of Macking and the AMUFB have resulted in some successes, the future of Bel-at's forest is still uncertain. Today, the AMUFB faces several obstacles, both internal and external, in striving to meet its goal of forest preservation.

Figure 5. Mature gmelina trees are cut and sawn in various forms and sizes for the manufacture of stools, benches and other furniture.

Conflicting visions

Figure 6: Macking collects dung from cave bats to use as organic fertilizer

Members of the AMUFB hold several visions of the best strategy to improve quality of life and achieve environmental rehabilitation in Bel-at. Some members of the association do not share Macking's opinion that planting both commercial and indigenous trees is the best management strategy for the communal forest, arguing that planting primarily commercial trees is the most effective way to alleviate poverty in the area. Macking continues to believe that the ecological services provided by the establishment of a diversified forest will make the residents of Bel-at less vulnerable to droughts and erosion, thus contributing to poverty alleviation. As well, Macking can make higher quality solid wood products using native trees relative to commercial species. In addition to the forest restoration project, the AMUFB oversees livestock raising and carabao dispersal projects. These projects tend to hold priority over their reforestation initiatives.

Charcoal production for survival.

The El Nino drought of 1997 greatly reduced the yield of crops in the area and prevented some farmers from even attempting to plant in the next rotation, leaving many strapped for cash. Some members of the AMUFB became impatient waiting for the trees to mature, and chose, like many others, to resort to charcoal production, using the mature trees they individually planted.

Macking has little power to prevent these actions as his organization has not yet drafted guidelines on the use of the forest resources. Instead, he presents charcoal producers with his argument that using trees in applications other than charcoal production can lead to longer-term gains. For example, he tells them that using a piece of wood to produce furniture rather than charcoal carries greater benefits as the wood can provide a month of employment in furniture production, in contrast to the one week of employment provided by charcoal production. Macking also encourages others to value the forest for its non-timber resources, including valuable products like medicinal plants and other commercial plants like rattan, abaca and tiger grass.

Continued land clearing with no soil support system.

The persistent demand for food and the lack of employment opportunities in the sugarcane plantations and rice fields around Bel-at continue to drive individual farmers to clear the upland for crop cultivation. Furthermore, many residents continue to utilize conventional lowland farming technologies on their upland farms, seldom taking measures to protect the soil from erosion. Farming techniques currently used to preserve the upland soil are more labor-intensive and time-consuming than lowland systems of cultivation and require some training, and thus are slow to be adopted.

Developing markets

Currently, there is no established marketing center or project through which upland farmers can sell their products. Although the PUMOLUYO federation assists with rice marketing, most farmers from Bel-at grow legumes and root crops, and thus scarcely benefit from this service. In order to provide upland dwellers with an alternative income to charcoal production, a marketing system for these products must be developed.

Upland residents also are lacking a market through which to sell solid wood products such as furniture. Although the demand for such products exists, residents require a formal structure through which to sell their goods to ensure they have consistent and reliable access to consumers. The PUMOLUYO federation might be instrumental in creating such a marketing system.

Inequitable land access.

Inequitable land access is another factor maintaining unsustainable upland activities in Bel-at. The Department of Environment and Natural Resources (DENR) classifies Bel-at as public land, making it vulnerable to different forms of intrusion from shifting cultivators or migrants. Land ownership is established through 'strategic land acquisitions' such as verbal claims or privatization through land tilling, enabling outsiders to acquire many hectares of land through financial or 'sneaky' means. Because of unabated encroachment in the sitio, deforestation has become one mechanism through which to acquire land.

Figure 7. Around 4,000 mahogany (*Swietenia macrophylla*) trees are found in the 9.5-hectare communal forest plantation being managed by Macking Flores.

Inequitable land ownership or occupancy constrains equal access to land resources. The resource-poor upland farmers and migrants have unequal opportunities to benefit from the forest resources. Now that there is literally no large timber available beyond the community forest, there are no commercial opportunities for local lumber contractors, only for those involved in charcoal making.

No protective measures for public land.

Currently, Bel-at does not have a formal protection system in place to guard the forest resources and eliminate illegal logging activity. Additional, since most of Bel-at is enlisted as public land, residents can justify illegal logging and charcoal production by claiming that they are exploiting a common property resource. Macking has considered that linking forest encroachers with the AMUFB instead of excluding them from forest resource use and the outside support his organization has accessed may be the best strategy to protect the resource over the long term.

Measures for residual forest management and sustainable upland conversion

Despite these challenges, various initiatives are underway to continue the forest restoration in Bel-at, and to spread similar initiatives to other communities.

Training engagements.

Macking is committed to educating others about forest restoration, stating that *"kay ang pumoluyo amo ang gobyerno, nagakadapat gid nga kami ang magpanguna sa pagprotekta sang nabilin nga kakahuyan* (because we, the community, are the government, it is right that we should preserve the remaining trees). Since 1991, Macking has been invited to speak at seminars and workshops on the propagation of native trees species, and the skills and insights he has developed through his agro-forestry work. He has lectured for the students of University of Saint La Salle in Bacolod City, the Kabankalan Catholic College in Kabankalan City, and other learning institutions and NGOs that support Macking's forest management systems. In his lectures, Macking highlights his practical and indigenous knowledge systems, spreading an appreciation of the Tumandoks' local ingenuity to protect and conserve local resources.

By sharing his forest management knowledge with his son, Nestor, Macking is also working to ensure that his initiatives will be carried out by succeeding generations.

Linking with other organizations.

Macking has formed links with several organizations and NGOs to further his cause. He has long been a member of the Basak *Barangay Lupon* or Peace and Order Council (POC) a multi-sectoral body headed either by the barangay captain or a councilor. This group sets policy direction and initiates programs for the maintenance of peace and order, including the prevention of possible conflicts that emerge from public land/forest resource use.

Macking is also a member of the Environmental Protection and Rehabilitation Committee of the MAPISAN alliance, the largest network of marginal farmers, forest dwellers and fisherfolks in Southern Negros, providing another avenue to promote forest restoration in other communities. Additionally, the AMUFB is helping to organize groups of upland farmers in nearby communities, with the goal of sparking other forest preservation projects. Macking and two of his sons are currently involved in a considerable amount of organizing.

The DENR's regulations.

The Department of the Environment and Natural Resources has recently begun to issue permits regulating the clearing of land for house construction. The obligation of permit recipients is to plant a minimum of 200 seedlings on previously cleared land. Additionally, the DENR has ruled that a permit is required to cut any indigenous tree. Macking is

hopeful that these regulations will prevent forest encroachment by current residents and upland migrants and help to protect native trees. Still, he stresses that the struggle to restore the balance of the forest requires the continued vigilance of both the local government and the community.

The barangay initiative.

The Peace and Order Council (POC) of the barangay, of which Macking is a member, is responsible for overseeing the implementation of the DENR's regulations. Additionally, the POC is proposing a new project to protect the upland forest. The council hopes to receive funding to establish a 20 hectare communal forest in the barangay, with the goal of preserving the watershed in preparation for future droughts. The POC is proposing that Macking be the caretaker of the project, and would plant indigenous seedlings from his nursery in the forest. The project could be implemented as early as next year, although the barangay council has several projects of greater priority, including a road extension project, the access of a new community water source, and an electrification project.

Considering that political party affiliation seems to dictate the program pursued even by the barangays officials, Macking's reforestation initiative crosses and goes beyond political boundaries. The officials are one in recommending Macking to be the overall facilitator of this reforestation initiative.

Development and spread of sustainable upland farming systems

Some farmers in Bel-at have attended training on sustainable upland agricultural techniques and are beginning to implement some of the practices, such as those outlined by the diversified and integrated farming systems (DIFS) approach, including the agro-forest land technology (SALT) and soil and water conservation management (SWCM) strategies. Common to these projects are the formation of contours and the planting of trees and other hedgerows to maintain soil fertility and prevent soil from covering low-lying areas. Macking is currently creating a farm development plan to integrate some of these concepts on his own farm.

Conclusion

Well aware of the urgent demands of both new and old settlers for food, shelter and employment, Macking and his associated organizations continue to struggle to find the balance between forest resource conservation and use. It may take further community organizing and some time for other people in the area to follow Macking's reforestation initiative, but Macking remains committed to fostering a healthy, resilient upland forest in Bel-at. He is also working to initiate forest restoration projects in other communities. His efforts are anchored in his vision of renewed watersheds that provide a range of forest products to communities, regulate soil erosion and water flow, and are home to a diversity of plants and animals. His vision is a timely one, containing lessons of ecological restoration applicable to all parts of the world.

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APPENDIX I: Incomplete list of plant species collected, conserved and propagated by Macking.

No.	Local name	Scientific name*	Family*
1.	Acacia (raintree)	*Samanea saman* (Jacq.) Merr.	Mimosaceae
2.	Agboy		
3.	Ahislag		
4.	Ahos-ahos		
5.	Alagot-ot		
6.	Alambihod		
7.	Alinsulang		
8.	Almaciga	*Agathis philippinensis* Warb.	Araucariaceae
9.	Alod		
10.	Alom		
11.	Alumangog	*Sphaerodiscus cochichinensis* (Pierre) Nakai	Celastraceae
12.	Alusiman		
13.	Aluwihaw	*Aglaia cumingiana* Turcz.	Meliaceae
14.	Amaga	*Diospyros philosanthera* Blanco var. *tayabensis* (Merr.) Bakh.	Ebenaceae
15.	Ambabalod	*Neonauclea formicaria* (Elmer) Merr.	Rubiaceae
16.	Anahaw	*Livistona rotundifolia* (Lam.) Mart.	Palmae
17.	Aneslag	*Securinega flexuosa* Muell. -Arg.	Euphorbiaceae
18.	Anilaw	*Colona serratifolia* Cav.	Tiliaceae
19.	Anopag	*Euphoria didyma* Blanco	Sapindaceae
20.	Apatot	*Morinda citrifolia* L.	Rubiaceae
21.	Apitong	*Dipterocarpus grandiflorus* Blanco	Dipterocarpaceae
22.	Ata-ata		
23.	Bacan (pula)	*Litsea plateafolia* Elmer	Lauraceae
24.	Bacan (puti)	*Litsea tomentosa* Blume	Lauraceae
25.	Bagalinga	*Melia dubia* Cav.	Meliaceae
26.	Bagarnga	*Hydnocarpus sumatrana* (Miq.) Koord.	Flacourtiaceae
27.	Bagbagan		
28.	Bagopilas		
29.	Bagtikan	*Parashorea malaanonan* (Blanco) Vid	Dipterocarpaceae
30.	Bagulomboy	*Syzygium vidalianum* (Elmer) Merr.	Myrtaceae
31.	Bagunaba		
32.	Bagupilas		
33.	Bahai	*Ormosia calavensis* Azaola	Fabaceae
34.	Bahi-bahi	*Leucosyke buderi* Urn.	Urticaceae
35.	Balakbakan	*Symplocos polyandra* (Blanco) Brand	Symplocaceae
36.	Balangkadios		
37.	Balit		
38.	Balubho	*Diplodiscus paniculatus* Turcz.	Tiliaceae
No.	**Local name**	**Scientific name***	**Family***

39	.	Banaba	*Lagerstroemia speciosa* (L.) Pers.	Lythraceae
40	.	Bangkal	*Nauclea orientalis* (L.) L.	Rubiaceae
41	.	Bangkalawag		
42	.	Bangkono	*Xanthostemon verdugonianus* Naves	Myrtaceae
43	.	Banilad	*Sterculia philippinensis* Merr.	Sterculiaceae
44	.	Banitlong	*Cleistanthus pilosus* C.B. Rob.	Euphorbiaceae
45	.	Bankalawag	*Syzygium rizalense* (Merr.) Merr.	Myrtaceae
46	.	Banuyo	*Wallaceodendron celebicum* Koord.	Mimosaceae
47	.	Baslayan		
48	.	Batikuling	*Litsea leytensis* Merr.	Lauraceae
49	.	Batuan	*Garcinia busuanganensis* Merr.	Guttiferae
50	.	Bay-ang		
51	.	Bayanti	*Homolantus populneus* (Geisel.) Pax	Euphorbiaceae
52	.	Bayog	*Dendrocalamus merrillianus* (Elm.) Elm.	Graminae
53	.	Biga-a	*Colocasia esculentum* (L.) Schott	
54	.	Bilisan	*Heterospathe elmerii* Becc.	Palmae
55	.	Binalukay		
56	.	Bini	*Pongamia pinnata* (L.) Merr.	Fabaceae
57	.	Bino	*Morinda bracteata* Roxb.	Rubiaceae
58	.	Binunga	*Macaranga tanarius* (L.) Muell. -Arg.	Euphorbiaceae
59	.	Bodbod		
60	.	Bogo	*Garuga floribunda* Decne var. *floribunda*	Burseraceae
61	.	Bongloy		
62	.	Bug-as	*Archidendron ellipticum* Nielsen spp. e*llipticum*	Mimosaceae
63	.	Bulog	*Garcinia benthami* Pierre	Guttiferae
64	.	Bulonganon		
65	.	Bulubukado		
66	.	Bulwang		
67	.	Bunlas		
68	.	Caldemon		
69	.	Carambak		
70	.	Dagangan		
71	.	Daha	*Macaranga caudatifolia* Elmer	Euphorbiaceae
72	.	Dalaket		
73	.	Dangula	*Teijsmanniodendron ahernianum* (Merr.) Bakhuzen	
74	.	Dao	*Dracontomelon dao* (Blanco) Merr.	Anacardiaceae
	.	Dapdap	*Erythrina orientalis* (Linn.) Merr.	Leguminosae
76	.	Dayig		
77	.	Dita	*Alstonia scholaris* (L.) R. Br.	Apocynaceae
78	.	Dol-dol ilahas		
79	.	Duca		

80	.	Dugu-an (dilaw)	*Myristica philippinensis* Lam.	Myristicaceae
81	.	Dugu-an (pula)	*Myristica cinnanomea* King	Myristicaceae
82	.	Dungon	*Heritiera sylvatica* Vid.	Sterculiaceae
83	.	Gatasan	*Garcinia venulosa* (Blanco) Choisy	Guttiferae
No.		**Local name**	**Scientific name***	**Family***
84	.	Gisok/Yakal	*Shorea astylosa* Foxw.	Dipterocarpaceae
85	.	Gisok-gisok	*Hopea philippinensis* Dyer	Dipterocarpaceae
86	.	Gmelina	*Gmelina arborea* Roxb.	Verbenaceae
87	.	Hagdan-uwak		
88	.	Haguimit	*Ficus minahassae* (Teijsm & de Vr.) Miq.	Moraceae
89	.	Hamendang	*Macaranga bicolor* Muell. - Arg.	Euphorbiaceae
90	.	Hamugni		
91	.	Hanagdong	*Trema orientalis* (Linn.) Blume	Ulmaceae
92	.	Hanas		
93	.	Hembes-hembes		
94	.	Hublas		
95	.	Hunop		
96	.	Ibo	*Alectryon glaber* (Blume) Radlk.	Sapindaceae
97	.	Inabot		
98	.	Ipil	*Intsia bijuga* (Colebr.) O Ktze.	Caesalpiniaceae
99	.	Itang-itang	*Cananga odorata* (Lamk.) Hook. F. & Thoms.	Annonaceae
100	.	Kaba-uy		
101	.	Kabnol		
102	.	Kagdaowak		
103	.	Kaldemon		
104	.	Kamagong/Mabolo	*Diospyros philippinensis* (Desr.) Gurke	Ebenaceae
105	.	Kamias	*Averrhoa bilimbi* Linn.	Oxalidaceae
106	.	Kanambac		
107	.	Kaningag	*Cinnamomum mercadoi* Vidal	Lauraceae
108	.	Kaningan-kaningag		
109	.	Kanomay	*Diospyros multiflora* Blanco *forma canomoi*	Ebenaceae
110	.	Karambak		
111	.	Kasoy-kasoy		
112	.	Katmon	*Dillenia philippinensis* Rolfe	Dilleniaceae
113	.	Kubi	*Artocarpus nitidus* Trec.	Moraceae
114	.	Kulinos		
115	.	Kulukapayas		
116	.	Kunotingan		
117	.	Lagnob		
118	.	Lagot-ot		
119	.	Lamaraw (pula)		
120	.	Lamaraw (puti)		
121	.	Lambunao		
122	.	Lanete	*Wrightia pubescens* R.Br. ssp. *Laniti*	Apocynaceae
123	.	Lange-lange		
124	.	Lanipga	*Toona ciliata* M. Roem.	Meliaceae
125	.	Lanutan	*Mitrephora lanotan* (Blanco) Merr.	Annonaceae

126	.	Law-at		
127	.	Libas	*Spondias pinnata* (L. f.) Kurz	Anacardiaceae
128	.	Lites		
No.		**Local name**	**Scientific name***	**Family***
129	.	Lomangog	*Terminalia microcarpa* Decne	Combretaceae
130	.	Lomboy	*Syzygium cumini* (Linn.) Skeels	Myrtaceae
131	.	Lubaghobag		
132	.	Lubag-lubag	*Podocarpus pilgeri* Foxw.	Podocarpaceae
133	.	Lumarao (pula)		
134	.	Lunok		
135	.	Magbayabas	*Tristaniopsis decorticata* (Merr.) Wels & Waterh	Myrtaceae
136	.	Magtalisay	*Syzygium gigantifolium* (Merr.) Merr.	Myrtaceae
137	.	Mahogany	*Swietenia macrophylla* King	Meliaceae
138	.	Mahulay		
139	.	Makab-is		
140	.	Makabnol		
141	.	Makadolom		
142	.	Malabaga	*Glochidion album* (Blanco) Boerl.	Euphorbiaceae
143	.	Malabuyo	*Celtis luzonica* Warb.	Ulmaceae
144	.	Malaigang		
145	.	Malapaho/Paho-paho	*Mangifera monandra* Merr.	Anacardiaceae
146	.	Malatuba	*Croton consanguineus* Muell. -Arg.	Euphorbiaceae
147	.	Manaloto		
148	.	Manggachapui	*Hopea acuminata* Merr.	Dipterocarpaceae
149	.	Mangsangab		
150	.	Mansalagon		
151	.	Marabo	*Ficus subcordata* Blume	Moraceae
152	.	Matolug		
153	.	Miyaw	*Aleurites mollucana* (L.) Willd.	Euphorbiaceae
154	.	Mogne		
155	.	Molave/Mulaw-on	*Vitex parviflora* Juss.	Verbenaceae
156	.	Moning		
157	.	Napat-napat		
158	.	Narig	*Vatica mangachapoi* Blanco	Dipterocarpaceae
159	.	Prickly Narra	*Pterocarpus indicus* Willd *forma echinatus*	Fabaceae
160	.	Smooth Narra	*Pterocarpus indicus* Willd *forma indicus*	Fabaceae
161	.	Nato (pula)	*Palaquium luzoniense* (F. Vill.) Vid.	Sapotaceae
162	.	Nato (puti)	*Pouferia macrantha* (Merr.) Baenhi	Sapotaceae
163	.	Ngala-ngala		
164	.	Niño	*Morinda bracteata* Roxb.	Rubiaceae
165	.	Nipot-nipot		
166	.	Obod-obod		
167	.	Odyangan		
168	.	Oway	*Calamus merrillii* Becc.	Palmae
169	.	Paghod/Balayong		
170	.	Pagolingon	*Cratoxylum sumatranum* (Jack) Blume	Guttiferae
171	.	Palagutingan		

172	.	Palomaria	*Calophyllum inophyllum* L.	Guttiferae
No.		**Local name**	**Scientific name***	**Family***
173	.	Palombinan		
174	.	Palosanto	*Triplaris cumingiana* Fisch. & Mey	Polygonaceae
175	.	Panang	*Neotrewia cumingii* (Muell. - Arg.) Pax & K. Hoffm.	Euphorbiaceae
176	.	Panasan	*Ardisia pyramidalis* (Cav.) Pers.	Myrsinaceae
177	.	Pange	*Pangium edule* Reinw.	Flacoutiacea
178	.	Panlubiran		
179	.	Patikan		
180	.	Paihod	*Albizia procera* (Roxb.) Benth	Mimosaceae
181	.	Payong-payong		
182	.	Pili	*Canarium ovatum* Engl.	Burseraceae
183	.	Pipi		
184	.	Pitogo	*Cycas rrumphii* Miq.	Cycadaceae
185	.	Pugahan	*Meiogyne philippinensis* Elm.	Annonaceae
186	.	Puti-an	*Alangium meyeri* Merr.	Alangiaceae
187	.	Red lauan	*Shorea negrosensis* Foxw.	Dipterocarpaceae
188	.	Salong	*Canarium luzonicum* (Blume) A. Gray	Burseraceae
189	.	Salong-salong	*Canarium asperum* Benth.	Burseraceae
190	.	Sambulawan		
191	.	Sampinit		
192	.	Sandana (a)		
193	.	Sandana (b)		
194	.	Sandang	*Anisoptera thurifera* (Blanco) Blume	Dipterocarpaceae
195	.	Sangil red		
196	.	Sangil white		
197	.	Taba	*Tristania littoralis* Merr.	Myrtaceae
198	.	Tabuyog		
199	.	Tacuban		
200	.	Tagabinlod		
201	.	Tagibukbok	*Saurauia leytensis* Merr.	Moraceae
202	.	Tagihoshos		
203	.	Tagobatuan		
204	.	Tagpas (red)		
205	.	Tagpas (white)		
206	.	Taguhangin		
207	.	Tagulisan bayog		
208	.	Tagulisang		
209	.	Tagumata		
210	.	Tal-ot		
211	.	Taloto	*Pterocymbium tinctorium* (Blanco) Merr.	Sterculiaceae
212	.	Tapuyay (pula)		
213	.	Tapuyay (puti)		
214	.	Tara-tara	*Dysoxylum cumingianum* C. DC.	Meliaceae
215	.	Tawa-tawa		
216	.	Tindalo	*Afzelia rhomboidea* (Blanco) Vid.	Caesalpiniaceae
217	.	Tipolo	*Artocarpus blancoi* (Elmer) Merr.	Moraceae
No.		**Local name**	**Scientific name***	**Family***
218	.	Tubog	*Ficus nota* (Blanco) Merr.	Moraceae

219	.	Tugay		
220	.	Tuog	*Petersianthus quadrialatus* Merr.	Lecythidaceae
221	.	Udling	*Astronia cumingiana* Vid.	Melastomatacee
222	.	White lauan	*Shorea contorta* Vid.	Dipterocarpacee
223	.	Wild Avocado	*Persea americana* Mill.	Lauraceae
224	.	Wild lansones	*Lansium domesticum* Corr.	Meliaceae
225	.	Wild mansanas	*Ziziphus mauritiana* (*jujuba*) Lem.	Rhamnaceae

** Due to the unique, local name of some trees, their scientific name is difficult to trace. A taxonomist needs to conduct an actual inventory or must be shown any parts of the trees to establish their scientific name.*