

## TRADITIONAL AGRO-METEOROLOGICAL KNOWLEDGE AMONG THE ABORLAN TAGBANWAS IN PALAWAN, PHILIPPINES

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**ABSTRACT** – The study aims to know the elements of traditional agro-meteorological knowledge (TAK) among the Tagbanwas and the factors that influenced the resilience of TAK. Fieldwork for primary oral data was conducted in sitio Bakahan, Cabigaan in the town of Aborlan, Palawan from September and December 2014 to January 2015. The findings show that TAK is ecological in nature, centering on weather conditions, processes, and their effects on swidden and human life. The resilience of TAK is provisional on the persistence of swidden in contemporary life around the world. It is an effect of the complex interplay of such factors as transmission of TAK in the local language, sense of indigeneity, utility of TAK, and dynamism of TAK.

*Keywords: Tagbanwa, agro-meteorological knowledge, swidden, cash crop*

### INTRODUCTION

Traditional knowledge (TK) is the recent ‘buzz word’ (Morris, 2010) in international development and conservation in territories occupied by indigenous peoples (Spak, 2005; Madegowda, 2009). Interests in it converge on three concerns: the utility of TK; alarm over culture loss (Wilson, 2004); and Intellectual Property Rights (Sahai, 1996). Believers in the utility of TK emphasize not only the use of TK to solve poverty-related problems (Anderson and Niaz, 1999) but also in safeguarding the environment (Ellis, 2005) through state policy and reform (Robbins, 2003). In many parts of the world like Canada, TK is an alternative resource to modern knowledge (Johnson, 1992). It contributes to higher yields through the introduction of new species and technologies in swidden (Dove, 1985). In a rather interesting perspective about poverty, Anderson and Niaz (1999) assert that low productivity among farmers in Pakistan is an effect of the erosion of TK. Some governments recognize the important contribution that TK makes to conservation like among the Tlingit in Alaska (Hunn et al., 2003), the Indians in the Yucatán Peninsula in Mexico (Haenn, 2002), among others, to counter a sense of culture loss among indigenous groups.

TK (Chesterfield and Ruddle, 1979; Anuradha, 1998; Briggs and Sharp, 2004; Tong, 2010) is also known as indigenous knowledge (IK) (Ellen and Harris, 1997; Sillitoe, 1998; Anuradha, 1998; Brodt, 2001; Doxtater, 2004). There are, of course, other concepts that also denote TK and IK, such as local knowledge (Palmer and Wadley, 2007; Morris, 2010), environmental knowledge (Ellen and Harris, 1997; Harris, 1997; Hunn et al., 2003), folk taxonomy (Conklin, 1954, 1957; Berlin et al., 1968), ethno

ecology (Frake, 1962; Eder 1978, 1987, 2003), and so forth. Experts define it differently. In the broadest sense, WIPO (1998-1999) uses TK to refer to “knowledge systems, creations, innovations and cultural expressions which: have generally been transmitted from generation to generation; are generally regarded as pertaining to a particular people or its territory; and, are constantly evolving in response to a changing environment” (p. 25). Abele (1977) defines it as “Knowledge and values which have been acquired through experience, observation, from the land or from spiritual teachings, and handed down from one generation to another” (p. iii). The definition emphasizes the significance that people give to TK, the ‘spiritual’ dimension of some TK, and the orality of TK. Morris (2010) regards TK “the knowledge that ordinary people have of their local environment: environs meaning what is around us” (p. 2).

TK is shared, empirical, practical, informal, dynamic, and may involve a ‘conservation ethic’ or not (Morris, 2010). It relates to a particular environment inhabited by a group (Frake, 1962). Members of the group know and share it (Barth, 1995). It is empirical, based on experience (Sillitoe, 1998). It is practical, utilitarian, and pragmatic (Jacobs, 2005). It is informal, passed on orally, uncodified (Abele, 1977; Barth, 1999), and practiced outside ritual (Morris, 2010). It is dynamic, constantly adapting to a changing environment (Brodt, 2001; Briggs and Sharp, 2004). It is more a phenomenon among swiddeners than among urbanites like those in the UK (Morris, 2010) and Spain (Reyes-Garcia et al., 2014, p. 223) who practice it in home gardens.

Morris (2010) classifies TK into two: ecological and non-ecological (see also, Stevenson, 1996). Weather, agriculture, landraces, commercial or exotic species, and so forth, are ecological (WIPO, 1998-1999); while arts, folklore, rituals, and so forth, are non-ecological (WIPO, 1998-1999). Agro-meteorological knowledge (TAK) is a category of TK about the weather applied on agriculture, particularly swidden (Thomson, 1948; Chevalier, 1980; Dove, 1985; Huber and Pedersen, 1997; Brodt, 2001; Dominguez and Kolm, 2005; Dixon et al. 2010). TAK is a knowledge system “embodied in the technologies farmers now have at their disposal” (Anderson and Niaz, 1999, p. 338).

TAK applies more on swidden than in lowland agriculture around the world, including the Philippines. A few Philippine groups engaged in swidden are subjects of studies by anthropologists: the Hanunuos of Mindoro (Conklin, 1954, 1957); the Subanens of the Zamboanga Peninsula (Frake, 1962); and the Bataks of Palawan (Eder, 1977, 1978, 1987, 2003, 2004; Warren, 1964, 1984). Quite expectedly, small groups like the Tagbanwas are least studied. Tagbanwa (Conant, 1909; Barrows, 1910; Scebold, 2003) refers to three mutually unintelligible, minor languages spoken in Palawan, namely: (1) Calamian Tagbanwa in Culion (Reid, 1971; Fabinyi, 2010); (2) Aborlan Tagbanwa in Aborlan (Reid, 1971); and (3) Central Tagbanwa in the towns of San Vicente, Roxas, and Taytay (Reid, 1971; Scebold, 2003).

Anthropologists (Warren, 1964; Eder, 1977, 1978, 1987) and linguists (Scebold, 2003; Davis, 2003) specializing on the Tagbanwas consider the group a vanishing people. Olofson (2007) regards Tagbanwa an “‘endangered language” (p. 401) for three reasons. First, few Tagbanwa children speak Tagbanwa; second, few adult Tagbanwas speak the language; and, third, Tagbanwa has been “subordinated by in-migrants speaking other languages” (Olofson, 2007, p. 401). The language shift that is happening among the Tagbanwas today is traceable to the influence of in-migration that began in the 1930s and intensified in the 1950s (Perez, 1984; Scebold, 2003; Eder, 2004). The effects of linguistic shift, together with other factors, on the future of TAK remain unexamined. It is against this background that the paper aims to provide answers to two questions: first, what constitutes TAK?; and, second, what factors would explain the resilience of TAK?

## METHODOLOGY

Aborlan is a first class municipality of Palawan located south of Puerto Princesa (Fig. 1). It has 19 barangays, and an estimated population of 32,209 as of May 2010 ([www.nsb.gov.ph](http://www.nsb.gov.ph)). Cabigaan, a barangay of Aborlan, is located in the interior of the town. It has a mixed population composed of Tagbanwas and incomers like the Visayans, Tagalogs, Ilocanos, Cuyunons, Muslims, and other groups (Eder, 2004). Curiously, though, the people of Bakahan are entirely Tagbanwa, who trace their origin to members of the Nangnang family who settled in the place in the 1950s. They are proud of being Tagbanwa, upholding Tagbanwa values and beliefs and practicing swidden, a form of horticulture on the edges of the adjacent forests (Doedens et al. 1995). TAK is alive and robust in Bakahan even as some Tagbanwas also engage in other livelihoods, e.g., employment, *habal-habal* (transporting passengers on motorbike), and trading.

I did fieldwork in Bakahan first in 18-21 September 2014, and next from 18 December 2014 to 5 January 2015, for a paper on TAK. Bakahan is approximately 30 minutes by *habal-habal* from the *poblacion* of Aborlan. The *poblacion* is 43 kilometers from Puerto Princesa and only an hour from the city by bus. I decided to do fieldwork in Bakahan because the population is entirely Tagbanwa, and they still practice TAK in swidden. I interviewed eight informants, all belonging to the Nangnang family. Each informant is a household head, who, together with the rest, represent the core Tagbanwa population of Bakahan. Five are males, namely: Artemio Sakmon (77 years old); Jolito Nangnang (56 years old); Damido Nangnang (48 years old); Nando Nangnang (50 Years old); and Juanito Ngani (87 years old). Three are females, namely: Rosalina Nangnang (86 years old); Flora Apid (83 years old); and Gloria Imag (74 years old). The eighth informant Damido, a son of Rosalinda Nangnang, is my host.

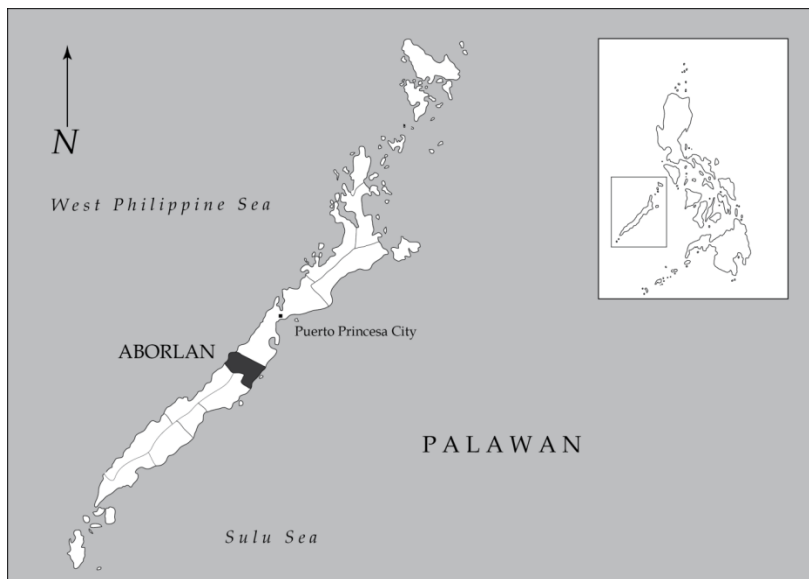


Fig. 1. Map of Study Site

I engaged the informants in talk (Tagalog, *kuwentuhan*; English, conversation), rather than gather data through conventional, formal interview procedures. Talk is an established method of primary oral data gathering in qualitative research. Palmer and Wadley (2007) demonstrate that “talk about the environment is the expression of knowledge about the environment” (p. 749,) articulated in “environmentalist terms” (Mills et al., p. 579). I opted for general questions based on the objectives of the paper to allow the participants to explore and elaborate on their thoughts, instead of using a detailed questionnaire. The informants participated in a talk first in the morning of 19 September 2014, and next in the morning of 21 September 2014. I visited the field of Damido, which was an hour and a half from Bakahan, on 20 September 2014. I followed up the talks from 18 December 2014 to 5 January 2015. I made notes of the talks and presented the preliminary findings of the research to the informants in the afternoon of 5 January 2015, to ensure that my findings reflect their views. Relevant literature supplement the ethnographic data upon which the paper is based. As is the practice in anthropology, the remainder of the paper is written in the ethnographic present.

## FINDINGS

The Tagbanwas of Aborlan are Christians, hence, assimilated into the dominant culture. Most are Catholics and some are members of New Tribe, a born again group that consider traditional Tagbanwa life ways evil, particularly rituals (*pagdiwata*). Members of New Tribe and most Catholic Tagbanwas living in the *poblacion* deny that they are Tagbanwa, with little or no knowledge of Tagbanwa culture anymore. The Tagbanwas of Bakahan are Catholics, and they still know Tagbanwa culture.

### TAK as Traditional Environmental Knowledge

TAK is about the relationship between a group and their environment and the knowledge and practices that evolve from such relationship (Frake, 1962; Morris, 2010). It regards weather “a system of local, qualitative interrelationships of humans and spirit powers” (Huber and Pedersen, 1997, p. 577) that affects crops, farm animals, and humans in multifarious ways.

TAK is a systematic, organized body of knowledge about ecological phenomena, their relationships, and causes and effects (Service et al., 2014). Weather (*tiempo*) is an effect of the elements like the wind (*deres*) and rain (*uran*). When clouds are not very thick, a wet wind (*darikdik*) is likely to blow, which is good to crops. Dry wind (*masaripoot*) presages a humid day and moderate rain. Steady, ‘unmoving’ clouds indicate weak wind (*malubay nga deres*). Strong wind (*makseg nga deres*), which refers to the SW Monsoon (*abagat*), blows from the west, across the mountains, and is indicated by dark (*maitum*), fast moving clouds (*kunom*).

The Tagbanwas stay at home for safety when a strong wind blows. They check on the condition of the crops in the field after a strong wind. The SW Monsoon causes damage on rice in three ways that lead to poor harvest. The rice harvest is chaffy (*mapadek*) when the wind blows at the time that the rice is flowering (shaken, *nauyeg*), the rice falls to the ground, if not break in the wind, or a rice disease called *dugma* causes the leaves to curl. When *dugma* attacks rice, the traditional cures include *patabokan*, which involves burning pepper (*katumbal*) in the field to drive away pests. Another method, *magalsa*, involves burning parts of a poisonous forest plant called *tubli* for the same purpose.

Rain is associated with the monsoons. The rain that the SW monsoon brings is variable – it can be strong or weak (*kasa nga uran*). It is cold and causes pestilence (*peste*) on such farm animals as

chickens and pigs, as well as diseases (*sarot*) in humans, particularly colds, coughs, and asthma. Root crops like sweet potatoes (*camote*) suffer from rot due to worms, the melons are not sweet, and the rice harvest is chaffy (*mapadek*). Pestilence, diseases, and poor harvest indicate bad time (*maaraet i banwa*). The NW Monsoon (*amyan*), which blows from the sea on the east, brings moderate rain that takes longer to cease (*rambang nga uran*).

No strong earthquakes strike Palawan because it is not located on a seismic zone. There are no typhoons and disastrous floods like those in Manila because the island is located away from the typhoon belt (see Fig. 1). The Tagbanwas, though, mention flood, which is of two types. The first is a prelude to flood (*luyod/katalan*) that happens when a plant called *palochina* (Tagbanwa, *tabraw*) is in bloom. When this happens, the Tagbanwas believe that the biggest snake (*tandayag*), a huge python, leaves the forest and lets the floodwaters carry it downriver. The yellow *tabraw* blooms guide the *tandayag* on its way to the sea. Flood (*lenep*) follows *luyod*, causing destruction in communities near rivers, including death to animals and humans in some instances. When a *luyod* happens, the people living in low-lying areas usually evacuate to the school that is located on higher ground for safety.

The environment is a moral space (Huber and Pedersen, 1997). Deities produce the weather, responding to transgressive human activity on the environment by causing bad times. Disaster is due to evil ways, and events like floods are punishments for sins. When destructive floods occur, the Tagbanwas summon a religious functionary, a *bailan* (shaman), for a propitiatory rite. The *bailan* performs a ritual (*magdiwata*) to prevent destruction that a *lenep* may cause. An offering (*magbutang*) is made to deities in the hope that no humans and animals would perish in floods. Chicken is a common offering in a ritual called *padayo*. The chicken that a *bailan* sacrifices and throws to the overflowing river carries the sins of the village down to the sea.

Landslides happen in the forest (*kagebatan*) but they are rare. They take place when the forest soil loosens due to rains and tremors or when an old tree falls. Rocks, gravel, and soil from landslides could destroy an entire swidden (*kaingin*). When these happen, the farmer runs for safety and hopes for harvest from his field no matter how meagre it would be. Like landslides, droughts seldom happen. Nevertheless, they signal bad times (*maaraet i banwa*), particularly hunger due to poor harvest as plants die in the heat of the sun and for lack of water.

TAK, as a knowledge system (Barth, 1995; Anderson and Niaz, 1999; Zegeye and Vambe, 2006), is a resource (Schultz, 1964; Machlup, 1984). It persists because it provides valuable information about swidden (Brodt, 2001). Although they have radios and some have televisions, the Tagbanwas regard mass media a means of entertainment for the youth, not a source of facts on nature regimes (Haenn, 2002). They say that reliance on weather forecasts on radios and televisions inevitably leads to 'culture loss' (Wilson, 2004).

Like the other groups indigenous to Palawan (Eder, 1999; Rigg, 2005; Cramb et al., 2009; Fabinyi, 2010), the Tagbanwas are experiencing an economic shift, a phenomenon that began six years ago. This pertains to the production of ginger as a high value crop in swidden. The new houses, motorbikes, and college education of the children become possible because of income from ginger. Beginning in 2014, they are planting again rice, an intercrop to ginger, for food independence. They have since then desisted from gathering such non-timber forest products as beeswax, honey, *yantok* (rattan, *Calamus caesius*), copal (resin from *Agathis dammara*), and other fossil resins from various tropical trees for trade (Cadelina, 1982; Conelly, 1992), which the government prohibits.

Gathering predates the Spanish period (Fox, 1953; Kress, 1977). It is an intensive practice, which accounts for the depletion of copal in adjacent forests by two Tagbanwa settlements on the coast (Connelly, 1985, 1992). Stricter laws on land classification and use proscribe swidden in primary forests (*geba*) and gathering (Eder, 1987; Novellino, 2011). The shift to ginger production is partly a response to demands for ginger in the market as well as to stricter forestry laws. The Tagbanwas grow ginger and rice at about the same time of the year, which involves the use of same agro-meteorological knowledge and practices.

### **Resilience of TAK**

Experts offer such factors as language, indigeneity, utility, and the dynamism to explain the resilience of TAK. Some assign language a key role (Briggs and Sharp, 2007) in that it facilitates the transmission of TAK across generations. Moreover, since TAK is a local knowledge system, indigenous language is the medium by which groups reproduce TAK. Quite interestingly, the Tagbanwas of Bakahan still speak Tagbanwa in everyday life, and they still practice swidden using TAK in the local idiom. Since children participate in farm work, swiddeners reproduce TAK not only through instruction but also through observation and practice at a young age. Briggs and Sharp (2007) maybe cited here, who state that, “As Agrawal (1995) argues, indigenous knowledge is not simply about language and expression, but about these material conditions through which people must survive” (p. 673).

Indigeneity, the condition of being native to a place, aids the survival of TAK, a practice and process linked to identity. The Tagbanwas of Bakahan emphasize it to differentiate themselves from those outside the sitio like the converts to New Tribe. They consider TAK important in defining and reinforcing ethnicity, Tagbanwa-ness, which is cultural and political at the same time (Johnson, A., 1992). The experience of the natives of the Yukon Peninsula in Canada is relevant in this context. Thus,

“traditional knowledge is closely linked to the inherent rights fundamental to the identity of the Tr’ondëk Hwëch’in people and integral to the cultural, political, economic, and social distinctiveness of the Tr’ondëk Hwëch’in (cited in Roburn and the Tr’ondëk Hwëch’in Heritage Department, 2012, p. 445).”

In their study of the role of IK in bureaucratic management among the Yarrabah in Queensland, Australia, Babidge, et al., (2007) find IK bonded with notions of indigeneity, identity, and change in a dynamic world. Citing Schor, they argue that indigenous groups look at IK “as a force for change and movement, as synonymous with empowering and dynamic identification rather than static and divisive identity” (Babidge et al., 2007, p. 150). They add, saying that, “indigeneity can be conceptualized as an active system of identification, and indigenous knowledge a dynamic contemporary process of management of people and place” (Babidge, et al., 2007, p. 150).

TAK is user-centered. Those who keep it are also the end users because they consider it important in many ways. In Central India, Brodt (2001) observes that only valuable TAK lasts through practice. TAK that is useful in and adaptive to everyday life survives, while those that are not pass into oblivion. It continues to inform the understanding of cause and effect of weather phenomena, and their effects on swidden, plants and animal farms, and human life. It makes possible the production of such cultivars as taro, cassava, a variety of vegetables and root crops, and cereals like rice and corn for food. Regardless of the variety preferred, the same knowledge and practices guide the production of ginger. Improved living conditions, including college education, enhance the value of TAK.

Resilience includes the agency of the individual to accommodate new knowledge into an evolving traditional knowledge system (Brodt, 2001). TAK is dynamic, and its persistence is partly due to its 'changing-ness' (Zegeye and Vambe, 2006). Adaptability to new technology and crops strengthens TAK, which may coexist with modern agricultural knowledge. Johnson (1992) forwards the idea that in Belcher Island in Canada, adaptation to change aids the survival of TAK. The shift to ginger production and the re-introduction of rice as an intercrop attest to the dynamism of TAK. Based on their study in Central India, Briggs and Sharp (2004) say,

“Indigenous knowledges all over the world are malleable, altering in response to Western ideas and practices, but also to an ever-changing array of other ways of knowing and doing. This is due to economic and social change, especially as the result of modernisation. Thus we must not underestimate the significance of material conditions which influence the need for different knowledges. Indigenous knowledge cannot ever be understood in isolation of the critical analysis of economic, social, cultural and political conditions (p. 673).”

## DISCUSSION

TAK embodies understanding of the environment, the processes therein, and the effects of these processes on swidden and society. The individual organizes his observations of how such elements as temperature, wind, rain, and so forth, combine to produce nature regimes (Haenn, 2002) that affect swidden and human life. He frames his observations by using words that are familiar to others to signify the individual and social nature of knowledge (Ferrater-Mora and Cohn, 1970; Goffman, 1986; Yamane, 2000). It is like any cultural process critical to group survival, whose creation, expression, and reproduction language mediates (Perry, 2003) from the early stages of life to adulthood. Because the family is the unit of labor in swidden (Frake, 1960; Wiber, 1985), children joining their parents in swidden, learning TAK from instruction, through observation, and by imitation, is part of the process. The transmission of TAK is intergenerational whereby children learn from their parents, who transmit crystalized knowledge that is important to group survival (Robertson, 1996). Like language, indigeneity is a cultural and political process. It is an embodiment, marker, and practice of Tagbanwa-ness. It is a daily experience, which involves, to borrow from Fishman (1996), a sense of “being” Tagbanwa and “knowing” and “doing” (pp. 63-69) as such.

Chester and Ruddle (1979) assert that the resilience of TAK remains entangled with swidden. Resilience is a problem solving process that entails, according to Brodt (2001), overcoming “unfavorable sociopolitical and economic forces, which exists quite apart the knowledge, must be overcome first” (p. 118). Reflecting on the prospects of swidden in Southeast Asia, critics underscore the forces that work against the practice (Fox, 2000; Condominas, 2009). Condominas (2009) says that, “shifting cultivation or burned and followed land” creates “the need to large areas of land to nomadify, if I may call it that, their cropping and their dwellings” because “the need for space in which to shift the swiddens is a major handicap for swidden agriculture” (pp. 265, 267). The ban on swidden and gathering highlights these forces and their effects not only on the Tagbanwas but also on other swiddeners in Palawan.

Notwithstanding the issue of land, Smidt-Vogt, et al. (2009) identify three trends that are happening in swidden around the world today. First, other forms of agriculture and livelihoods increasingly replace swidden; second, follow periods are shorter; and, third, despite shorter follow periods, the swidden remains. Swidden in China, Laos, Thailand, Indonesia, and Malaysia is transitioning into other forms of land use due to forest conservation, shift to settled agriculture,

resettlement, privatization, industrial agriculture, and the expansion of market (Fox, 2009; Sturgeon, 2007). Except for the promotion of industrial agriculture, these factors also occur in Palawan and affect all swiddeners the same way (Eder, 1977, 1987; Cadelina, 1982; Novellino, 2011).

The thought that swidden adapts to change and at the same time remains a resilient system needs attention (Smidt-Vogt et al., 2009). Fox (2000) claims that swidden is a rational economic choice for many upland cultivators in the world. Nevertheless, swidden in Southeast Asia (Dove, 1985; Cramb et al., 2009; Fox et al., 2009), Africa, Latin America (Chesterfield and Ruddle, 1979; Chevalier, 1980; Metz et al., 2009), and the Indian sub-continent (Anuradha, 1998) is in flux. Experts, though, cannot agree on the factors of change, the processes involved, and their effects. Generalists like Briggs and Sharp (2004) attribute change to modernization, while Brodt (2001) points up to globalization. Particularists give emphasis to such specific factors as the introduction of new species (Fujisaka 1986), migration (Fujisaka, 1986; Gray, 2009), weather change (Fujisaka, 1986; Huber and Pedersen, 1997), land conversion (Goethals, 1975), laws on forestland (Novellino, 2011), and commercial farming (Goethals, 1975; Fujisaka, 1986; Eder, 1987). These factors, both general and specific, affect TAK.

\ Understanding what is happening in swidden since the 1950s is important. Based on his fieldwork in Java, Geertz (1963) describes the failure of swidden to stabilize or transform itself into another form of agriculture as ‘involution.’ Swidden among the Tagbanwas is undergoing involution. In Southeast Asia, the strategies include ‘dis-intensification’ and intensification of swidden, the introduction of cash crops, the reorganization of family-based labor, and resort to livelihoods in the cities (Cramb, et al., 2009). The Tagbanwas try to overcome the obstacles that the ban on activity in primary forests cause (Conelly, 1985, 1992; Novellino, 2011) by resorting to permanent swidden and polyculture. Permanent swidden is an exercise in disintensification, while intensification through polyculture increases yield per hectare (Beckerman, 1983). Labor deployment strategies involve school-age children helping in weeding the swidden and in harvesting the crops. Damido, who once left Bakahan for Manila for work, is back in the sitio as a swiddener.

The adaptability of TAK to change also accounts for its resilience. Swiddeners are rational, dynamic, creative individuals, constantly making decisions, and ‘inventing’ strategies as they try to grapple with the fluid ecological and social conditions in which they find themselves. Johnson (1972) speculates that individuality and experimentation are common in swidden, which revises views of traditional agriculture as conservative. Permanent swidden and polyculture are not only logical choices; they are also inventive, suggesting trial and error methods and distinctive practices. Citing the African experience, Zegeye and Vambe (2006) state that, “changing-ness” is a characteristic of indigenous knowledge as one observes in the arts and in “some structured cultural institutions that proliferate in Africa” (p. 356).

Permanent swidden and polyculture do not demand additional labor inputs to increase income. Ginger is resistant to weeds and pests and gives greater income to tillers (Conelly, 1992). It makes likely the shift from mobile swidden to “permanently -cropped fields”, called *sawah* in Borneo (Padoch, et al., 1998, p. 7), and the transformation of shifting swiddeners into “fixed field farmers” (Padoch, et al., 1998, p. 6). Re-using swidden is sustainable because of income from high value crops. In a way, it aims “to conserve environmental resources and to make agricultural systems ecologically ‘sustainable’ over the longer term” (Olofson, 1997, p. 84).



Some critics, however, raise questions about the resilience of permanent swidden and polyculture (Russell, 1988; Condominas, 2009). Uncontrolled swidden leads to the appearance of tropical savannahs composed of *cogon* (*Imperata cylindrica*). Tillers abandon swiddens two to three years after the first harvest for lack of practices that aim to restore lost fertility and the absence of technology to combat *cogon* (Conklin, 1957; Frake 1962). Swidden then needs ‘inexhaustible’ land (Condominas, 2009), which, in recent years, the government proscribes to protect the remaining forests of Palawan (Novellino, 2011). Scaff (1948), in his study of swidden in Bukidnon, and Rigg (2005), in Southeast Asia, illustrate that swidden prevents the accumulation of landed property and wealth, which explains the ‘poverty’ of swiddeners. Indeed, ten years ago, the Tagbanwas hunted wild pigs for meat in the diet, while they collected rattan and copal for cash to supplement income from swidden (Connelly, 1985, 1992). Today, however, improved living conditions because of income from ginger paint a different picture of Tagbanwa life in Bakahan. Cash cropping, though, has its own disadvantages. It leads to increase income, but complete dependence on it increases vulnerability (Cramb, et al., 2009). Nonetheless, swidden provides a safety net by reintroducing rice as an intercrop to ginger toward greater food security.

## CONCLUSION

TAK is ecological in nature (Conklin, 1954, 1957; Frake, 1962; Johnson, 1992; Morris, 2010), mirroring group knowledge of weather conditions and their influence on swidden and human life. The resilience of TAK is contingent on the survival of swidden (Chesterfield and Ruddle, 1979), suggesting an elaborate process that implicates transmission of TAK in the indigenous language (Briggs and Sharp, 2007), a deep sense of indigeneity (Babidge et al., 2007), utility (Anderson and Niaz, 1999; Brodt, 2001), and dynamism (Brodt, 2001; Reyes-Garcia et al. 2014). The last attests to an attitude for change (Olofson, 1997; Condominas, 2005), such as the shift to permanent swidden (Olofson, 1980, 1981, 1996, 1997; Doedens et al., 1995; Padoch et al., 1998; Metz et al., 2009), polyculture (Beckerman, 1983; Weinstock, 1984), and resort to other survival strategies (Chevalier, 1980; Cramb et al, 2009). It witnesses to swidden as a rational choice and adaptive system and swiddeners as creative agents of change (Johnson, 1972). It is in response to various forces that challenge swidden as a viable, sustainable form of agriculture on the edges of forests (Doedens et al., 1985) around the world (Brodt, 2001; Fox et al., 2009; Condominas, 2009).

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## LITERATURE CITED

- Abele, F. (1997). Traditional knowledge in practice. *Arctic*, 50(4), iii-iv.
- Anderson, J. and Niaz, S. (1999). Institutional reforms for getting an agricultural knowledge system to play its role in economic growth [with Comments]. *The Pakistan Development Review*, 38(4), 333-354.
- Anuradha, R.V. (1998). Mainstreaming indigenous knowledge: Developing ‘jeevani.’ *Economic and Political Weekly*, 33(26), 1615-1619.

- Babidge, S., Greer, S., Henry, R., and Pam, C. (2007). Management speak: Indigenous knowledge and bureaucratic engagement. *Social Analysis: The International Journal of Social and Cultural Practice*, 51(3), 148-164.
- Barrows, D. (1910). The Negrito and allied types in the Philippines. *American Anthropologist*, 12(3), 358-3.
- Barth, F. (1995). Other knowledge and other ways of knowing. *J. Anthropol. Res.*, 51, 65-8.
- Beckerman, S. (1983). Does the swidden ape the jungle? *Human Ecology*, 11(1), 1-12.
- Berlin, B., Breedlove, D., and Raven, P. (1968). Covert categories and folk taxonomies. *American Anthropologist*, 70(2), 290-299.
- Briggs, J. and Sharp, J. (2004). Indigenous knowledges and development: A postcolonial caution. *Third World Quarterly*, 25(4), 661-676.
- Brodth, S. (2001). A systems perspective on the conservation and erosion of indigenous agricultural knowledge in central India. *Human Ecology*, 29(1), 99-120.
- Cadeliña, R. (1982). Batak interhousehold food sharing: A systematic analysis of food management of marginal agriculturalists in the Philippines. Ph.D. Dissertation, University of Hawaii. Manoa, Hawaii.
- Chesterfield, R. and Ruddle, K. (1979). Traditional agricultural skill training among peasant farmers in Venezuela. *Anthropos*, 74 (3/4), 549-565.
- Chevalier, J. (1980). Slash-and-burn agriculture and dual economy theories: A Peruvian case-study. *NS, North South*, 5(9), 67-95.
- Conant, C. (1909). The names of Philippine languages. *Anthropos*, 4(4), 1069-1074.
- Condominas, G. (2009). Anthropological reflections on swidden change in Southeast Asia. *Human Ecology*, 37(3), 265-267.
- Connelly, W. (1985). Copal and rattan collecting in the Philippines. *Economic Botany*, 39(1), 39-46.
- Connelly, W. (1992). Agricultural intensification in a Philippine frontier community: Impact on labor efficiency and farm diversity. *Human Ecology*, 20(2), 203-223.
- Conklin, H. (1954). The relation of Hanunuo culture to the plant world. Ph.D. Dissertation, Yale University, New Haven, Connecticut.
- Conklin, H. (1957). *Hanunuo Agriculture: A Report on an Integral System of Shifting Cultivation in the Philippines*. Rome, Food and Agricultural Organization of the United Nations.
- Cramb, R. et al. (2009). Swidden transformations and rural livelihoods in Southeast Asia. *Human Ecology*, 37, 323-346.
- Cramb, R., Colfer, C., Dressler, W., Laungaramsri, P., Trang Le, Q., et al (2009). Swidden transformations and rural livelihoods in Southeast Asia. *Human Ecology*, 37(3), 323-346.
- Davis, P. (2007). Review: Tagbanwa: A Philippine Language on the Brink of Extinction by Robert A. Scebald. *Language*, 83(4), 922-923.

- Dixon, B., Schaefer, R. and McCurdy, T. (2010). Traditional Chamorro farming innovations during the Spanish and Philippine contact period on Northern Guam. *Philippine Quarterly of Culture and Society*, 38(4), 291-321.
- Doedens, A., Persoon, G., and Wedda, A. (1995). The relevance of ethnicity in the depletion and management of forest resources in northeast Luzon, Philippines. *Sojourn: Journal of Social Issues in Southeast Asia*, 10(2), 259- 279.
- Dominguez, S. and Kolm, K. (2005). Beyond water harvesting: A soil hydrology perspective on traditional southwestern agricultural technology. *American Antiquity*, 70(4), 732-765.
- Dove, M. (1985). The agroecological mythology of the Javanese and the political economy of Indonesia. *Indonesia*, 39, 1-36.
- Doxtater, M. (2004). Indigenous knowledge in the decolonial era. *American Indian Quarterly*, 28(3/4), 618-633.
- Eder, J. (1977). Portrait of a dying society: Contemporary conditions among the Batak of Palawan. *Philippine Quarterly of Culture and Society*, 5(1-2), 12-20.
- Eder, J. (1978). The caloric returns to food collecting: Disruption and change among the Batak of the Philippine tropical forest. *Human Ecology*, 6, 55-69.
- Eder, J. (1987). *On the Road to Tribal Extinction*. Berkeley: University of California Press.
- Eder, J. (2003). Of fishers and farmers: Ethnicity and resource use in coastal Palawan. *Philippine Quarterly of Culture and Society*, 31, 207-225.
- Eder, J. (2004). Who are the Cuyonon? Ethnic identity in the modern Philippines. *The Journal of Asian Studies*, 63(3), 625-647.
- Ellen, R., and Harris, H. (1997). Concepts of indigenous environmental knowledge in scientific and development studies literature: A critical Assessment. APTF Working Paper 2, APTF, University of Kent, Canterbury, UK.
- Ellis, S. (2005). Meaningful consideration? A review of traditional knowledge in environmental decision making. *Arctic*, 58(1), 66-77.
- Fabinyi, Michael. (2010). The intensification of fishing and the rise of tourism: Competing coastal livelihoods in the Calamianes Islands, Philippines. *Ecology*, 38(3), 415-427.
- Ferrater-Mora, J. and Cohn, P. (1970). The language of religious experience. *International Journal of Philosophy and Religion*, 1, 22-33.
- Fishman, J. (1996). Ethnicity as being, doing, and knowing. In: Hutchison, J. and Smith, A. (eds.). *Ethnicity*, pp. 63-69. Oxford: Oxford University Press.
- Fox, J. (2000). How blaming “slash and burn” farmers is deforesting mainland Southeast Asia. *Asia Pacific Issues*, 47, 1-8.
- Fox, J., Fujita, Y., Ngidang, D., Peluso, N., Potter, L. Sakuntaladewi, L. et al. (2009). Policies, political-economy, and swidden in Southeast Asia. *Human Ecology*, 37(3), 305-322.

- Fox, R. (1953). *The Pinatubo Negritos: Their Useful Plants and Material Culture*. Manila: Bureau of Printing.
- Frake, C. (1960). Family and kinship among the eastern Subanun. In: G. P. Murdock (ed.). *Social Structure in Southeast Asia*. New York: Viking Fund Publications in Anthropology No. 29.
- Frake, C. (1962). Cultural ecology and ethnography. *American Anthropologist*, 64(1), Part 1, 53-59.
- Geertz, C. (1963). *Agricultural Involution*. Berkeley, University of California Press.
- Goethals, P. (1975). *Rarak: The annual swidden cycle*. *Indonesia*, 20, 112-154.
- Goffman, E. (1986). *Frame Analysis: An Essay on the Organization of Experience*. Boston: Northwestern University Press.
- Gray, C. (2009). Rural out-migration and smallholder agriculture in the southern Ecuadorian Andes. *Population and Environment*, 30(4-5), 193-217.
- Haenn, N. (2002). Nature regimes in southern Mexico: A history of power and environment. *Ethnology*, 41(1), 1-26.
- Hunn, E., Johnson, D., Russell, P., and Thornton, T. (2003). Huna Tlingit traditional environmental knowledge, conservation, and the management of a "wilderness" park. *Current Anthropology*, 44(55), S79-S103.
- Jacobs, N. (2005). Lived environmental knowledge. *Environmental History*, 10(4), 710-711.
- Johnson, A. (1972). Individuality and experimentation in traditional agriculture. *Human Ecology*, 1(2), 149-159.
- Johnson, M. (ed.) (1992). *Capturing Traditional Environmental Knowledge*. Ottawa: International Development Research Centre and the Dene Cultural Institute.
- Kress, J. (1977). Contemporary and prehistory subsistence patterns in Palawan. In: W. Wood (ed.). *Cultural Ecological Perspective in Southeast Asia*. Ohio, Univ. Center, Int'l Studies, Southeast Asia Series, No. 4.
- Machlup, F. (1984). *Knowledge: It's Creation, Distribution and Economic Significance, 3. The Economics of Information and Human Capital*. Princeton: Princeton University Press.
- Madegowda, C. (2009). Traditional knowledge and conservation. *Economic and Political Weekly*, 44(21), 65-69.
- Metz, O., Padoch, C., Fox, J., Cramb, S., Leisz, S., Thanh Lam, N. and Duc Vien, T. (2009). Swidden change in Southeast Asia: Understanding causes and consequences. *Human Ecology*, 37(3), 259-264.
- Mills, M., Huber, T. and Pedersen, P. (1998). Ecological knowledge in Tibet. *The Journal of the Royal Anthropological Institute*, 4(4), 783-786.
- Morris, B. (2010). Indigenous knowledge. *The Society of Malawi Journal*, 63(1), 1-9.

- Novellino, D. (2011). Cycles of politics and cycles of nature: Permanent crisis in the uplands of Palawan. In: Roy Ellen (ed.). *Modern Crises and Traditional Strategies: Local Ecological Knowledge in Southeast Asia*, pp. 185-219. Oxford: Berghann Books.
- Olofson, H. (1980). Swidden and *kaingin* among the Tagalog: A problem in Philippine upland ethnography. *Philippine Quarterly of Culture and Society*, 8(2/3), 168-180.
- Olofson, H. (1981). Mang Ruben and Mang Jeremias: Permanent hillside farmers of Laguna. *Philippine Quarterly of Culture and Society*, 9(2), 111-134.
- Olofson, H. (1996). Taboo and environment, Cebuano and Tagbanuwa: Two cases of indigenous management of natural resources in the Philippines and their relation to religion. *Philippine Quarterly of Culture and Society*, 23 (1), 20-34.
- Olofson, H. (1997). Context is sovereign: Thoughts on indigenous agricultural knowledge in upland Cebu. *Philippine Quarterly of Culture and Society*, 25(1/2), 83-93.
- Padoch, C., Harwell, E., and Susanto, A. (1998). Swidden, *sawah*, and in-between: agricultural transformation in Borneo. *Human Ecology*, 26(1), 3-20.
- Perez, A. (1984). Rural settlement, community satisfaction and migration: A case study of the NARRA Settlement Project. Thesis, University of the Philippines. Quezon City.
- Perry, R. (2003). *Five Key Concepts in Anthropological Thinking*. Upper Saddle River, N.J.: Prentice Hall.
- Reid, L. (1971). Philippine minor languages: Word lists and phonologies. *Oceanic Linguistics Special Publications*, 8, i, iii-xii, 1-169, 171-239, 241.
- Reyes-Garcia, V., Aceituno-Mata, L., Calvet-Mir, L., Garnatje, T., Gomez-Baggenhun, E., Lastra, J. et al. (2014). Resilience of traditional knowledge systems: The case of agricultural knowledge in home gardens of the Iberian Peninsula. [\*Global Environmental Change\*](#), 24, 223-231.
- Rigg, J. (2005). Poverty and livelihoods after full-time farming: A South-East Asian view. *Asia Pacific Viewpoint*, 46(2), 173-184.
- Robertson, A. (1996). The development of meaning: Ontogeny and culture. *The Journal of the Royal Anthropological Institute*, 2(4), 591-610.
- Robbins, P. (2003). Beyond ground truth: GIS and the environmental knowledge of herders, professional foresters, and other traditional communities. *Human Ecology*, 31(2), 233-253.
- Roburn, S. and the Tr'ondëk Hwëch'in Heritage Department (2012). Weathering changes: Cultivating local and traditional knowledge of environmental change in Tr'ondëk Hwëch'in traditional territory. *Arctic*, 65(4), 439-455.
- Russell, W. (1988). Population, swidden farming and the tropical environment. *Population and Environment*, 10(2), 77-94.

- Sahai, S. (1996). Importance of indigenous knowledge in IPR System. *Economic and Political Weekly*, 31(47), 3043-3045.
- Palawan. www.nsb.gov.ph.
- Scaff, A. (1948). Cultural factors in ecological change on Mindanao in the Philippines. *Social Forces*, 27(2), 119-123.
- Scebold, R. (2003). *Central Tagbanwa: A Philippine Language on the Brink of Extinction*. Manila: Linguistic Society of the Philippines.
- Schmidt-Vogt, D., Leisz, S.J., Mertz, O., Heinemann, A. Thiha, T., Messerli, P. et al. (2009). An assessment of trends in the extent of swidden in Southeast Asia. *Human Ecology*, 37(3), 269-280.
- Schultz, T. W. (1964). *Transforming Traditional Agriculture*. New Haven: Yale University Press.
- Service, C., Adams, M., Artelle, K., Paquet, P. Grant, L., and Darimont, C. (2014). Indigenous knowledge and science unite to reveal spatial and temporal dimensions of distributional shift in wildlife of conservation concern. *PLOS ONE*, 9(7), 1-9.
- Sillitoe, P. (1998). The development of indigenous knowledge: A new applied anthropology. *Current Anthropology*, 39(2), 223-252.
- Spak, S. (2005). The position of indigenous knowledge in Canadian co-management organizations. *Anthropologica*, 47(2), 233-246.
- Stevenson, M. (1996). Indigenous knowledge in environmental assessment. *Arctic*, 49(3), pp. 278-291.
- Sturgeon, J. (2007). Pathways of “indigenous knowledge” in Yunnan, China. *Alternatives: Global, Local, Political*, 32(1), 129-153.
- Thomson, A. (1948). The growth of meteorological knowledge of the Canadian. *Arctic*, 1(1), 34-43.
- Tong, L. (2010). Protecting traditional knowledge – Does secrecy offer a solution? *PER/PELJ*, 13(4), 162-180.
- Warren, C. (1964). *The Batak of Palawan: A Culture in Transition*. Philippine Studies Program Research Series No. 3. Chicago: University of Chicago.
- Warren, C. (1984). Agricultural development of the Batak of Palawan, Philippines. *Crossroads*, 2, 1-11.
- Weinstock, J. (1984). Monoculture or Polyculture in a swidden system. *Human Ecology*, 12 (4), 481-482.
- Wiber, N. (1985). Dynamics of the peasant household economy: Labor recruitment and allocation in an upland Philippine community. *Journal of Anthropological Research*, 41(4), 427-441.
- Wilson, W. (2004). Introduction: Indigenous knowledge recovery is indigenous empowerment. *American Indian Quarterly*, 28(3/4), 359-372.
- WIPO (1998-1999). Intellectual Property Needs and Expectation of Traditional Knowledge Holders. WIPO Report on Fact Finding Missions on Intellectual Property and Traditional Knowledge. Geneva, Switzerland.

Yamane, D. (2000). Narrative and religious experience. *Sociology of Religion*, 61, 171-189.

Yengoyan, A. (1966). Ecological analysis and traditional agriculture. *Comparative Studies in Society and History*, 9(1), 105-117.

Zegeye, A. and Vambe, M. (2006). African indigenous knowledge systems. *Review (Fernand Braudel Center)*, 29(4), 329-358.



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