The forest school

Indigenous knowledge and formal education amongst the Agta of San Mariano, The Philippines

Master thesis

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List of acronyms

4Ps	*Pantawid Pamilyang Pilipino Program*
DENR	Department of Environment and Natural Resources
DSWD	Department of Social Welfare and Development
IK	Indigenous knowledge
IP	Indigenous people
IPRA	Indigenous Peoples' Rights Act
LGU	Local Government Unit
NCIP	National Committee on Indigenous Peoples
NGO	Non-governmental organisation
NIPAS	National Integrated Protected Areas System
NSMNP	Northern Sierra Madre Natural Park
NPA	New People's Army

1. Indigenous peoples, knowledge systems and environmental change

> "It is through knowledge transmission and socialization that worldviews are constructed, social institutions are perpetuated, customary practices established, and social roles defined. In this manner, local knowledge and its transmission, shape society and culture, and culture and society shape knowledge." (Ruddle 2000:277)

Indigenous peoples have over time developed a detailed body of knowledge about their environment, because they are often dependent on natural resources for survival. Indigenous knowledge is created through interaction with the natural environment of a specific area and is continually adjusted in response to changes in this environment (Ellen and Harris 2000).

Little is known about how knowledge is transmitted amongst indigenous people and what factors influence transmission. Understanding these processes can contribute towards preserving this knowledge. For my studies as a master student in Cultural Anthropology and Developmental Sociology at Universiteit Leiden, I have conducted research on the transmission of indigenous knowledge amongst Agta in the northeast Philippines in relation to a recent development in the area; the introduction of formal education. The main research question for this study was: What domains of indigenous knowledge are culturally valued and how is this knowledge transmitted amongst the Agta of San Mariano?

To answer this question, I will discuss the transmission of indigenous knowledge (IK) amongst the Agta in relation to the theoretical debates surrounding characteristics of knowledge transmission, stages of learning and factors that cause change in indigenous knowledge. Through interviewing, participant observation and the gathering of quantitative data about differences in knowledge between generations, I looked at which domains of knowledge are valued amongst the Agta, who the actors in knowledge transmission are, how the learning process works and in what way social and environmental changes have affected this transmission.

In the following paragraphs I will discuss indigenous knowledge, terminology surrounding the topic and the importance of indigenous knowledge, after which I will provide information about the studied group and the region they live in.

1.1. What is indigenous knowledge?

Ellen and Harris (2000) give a clear and complete definition of indigenous knowledge: IK is local and inextricably linked to a particular place, differing from Western science in that IK is cannot be de-contextualised. It has a non-literate, oral character and is based on trial and error experimentation and empirical knowledge. New knowledge is added constantly and whilst repetition leads to the traditionalised aspect of IK, it is never static. The knowledge is usually widely distributed amongst a people, but can be restricted to a certain age-group, gender or ritual authority. The distribution is however always fragmented and does not exist in a single person; different people have knowledge on different domains, but also have different knowledge about the same domains. IK is therefore always dependent on practices and interaction. IK is always functional; it is created to lead to practical use and performance, and holistic and integrative.

The topic of this thesis has been referred to under various names, such as indigenous knowledge, traditional ecological knowledge, ethno-ecology, tribal knowledge or local knowledge. Which term is used depends on the direction from which knowledge is approached, but in many cases terms can be used interchangeably (Ellen and Harris 2000). However, terms as traditional and tribal can be interpreted as something of the past or may have connotations of primitiveness, whereas terms like ethno-ecology or local knowledge do not fully cover the different dimensions of the concept. In this study, I will therefore stay with the term 'indigenous knowledge' (IK). Indigeneity is a controversial term that has been under discussion due to its legal and political implications, and using the word 'indigenous' can therefore sometimes be problematic. The Agta however, have been recognised as indigenous under the Indigenous Peoples Rights Act (IPRA) in 1997 (Persoon 2004:61), which is why using the term indigenous knowledge in their case would be undisputed.

Using the term 'indigenous' should however not lead to the exclusion of knowledge that was learned through other, non-indigenous, ethnic groups. The term indigenous knowledge in this study refers to knowledge used by the Agta, regardless of its origin.

1.2. The value of indigenous knowledge

Indigenous knowledge is pressured by acculturation and changes within bodies of knowledge, but it is valuable for many reasons. The two most important of these are described below.

Firstly, the development of a body of knowledge over generations has fundamental socio-cultural value to a community. IK plays a crucial role in the identity of communities and has an intrinsic value as part of global heritage. Whilst IK is often unequally distributed and affects power relations within a community, it may contribute towards self-determination and empowerment of local communities (Ruddle 2000:291).

Secondly, indigenous knowledge has long been seen as inferior to western science (Ruddle 2000; Briggs, 2005). However, from the early 1990s onwards, IK has been recognised as a valuable source of knowledge and has been explored as a different perspective to western science. Increasingly, the notion that it is unhelpful to test one against the other, has led to the recognition of western science and indigenous knowledge as complementary (Sillitoe 1998:226).

A shift in paradigm, from a top-down theory of modernization and transfer-of-technology to a bottom-up, grassroots approach to development, was accompanied by a new interest in IK. Two aspects may be distinguished: academic value and value in development. The academic focus on IK lies mostly in ethno-science and human ecology, while the developmental approach focuses on farming systems and participatory development (Sillitoe 1998:225).

Although romanticising IK as an "untainted, pristine knowledge system" (Briggs 2005:18) is unhelpful, its value as for practical use in areas where conventionally used data are scarce should be underlined (Ruddle 2000). However, the recognition of IK as an ever-changing concept depending on specific locality is crucial to the success of its practical use (Briggs 2005; van Eijck and Roth 2007).

One of the fields in which IK may have practical value is biodiversity conservation. Accumulating evidence suggests that indigenous knowledge is important for its potential as a contributing factor to biodiversity conservation (Gadgil et al. 1993; Berkes et al. 2000). Gadgil and colleagues (1993) argue that indigenous societies recognise the value of biodiversity, because they are dependent on it for survival. They show how some indigenous groups have helped restore biodiversity and underline the value of their knowledge in conservation of biodiversity. For instance, Posey (1985) shows that the Kayapó Indians in the Amazon increase heterogeneity in landscape by creating forest islands in the savannah-like cerrado. Another example is the rotation of grazing lands by pastoral nomads that protects biodiversity in the Sahel (Gadgil et al 1993:153).

However, the role of IK in biodiversity conservation is still under discussion. Ruddle (2000) argues only few explicit examples can be found in which a 'traditional conservation ethic' of local

communities is apparent, and Li (2002) warns for the misinterpretation of pragmatic behaviour of indigenous groups that does not have conservation as its primary goal.

Although Sillitoe (1998) and Briggs (2005) warn against the use of indigenous knowledge outside its local context, various scholars argue that IK can play a crucial role in development and poverty alleviation.

> "Indigenous knowledge is used at the local level by communities as the basis for making decisions pertaining to food security, human and animal health, education, natural resource management and other vital activities. IK is a key element of the social capital of the poor and constitutes their main asset in their efforts to achieve control of their own lives. For these reasons, the potential contribution of indigenous knowledge to locally managed, sustainable and cost-effective survival strategies should be promoted in the development process." Gorjestani (2004:265)

The intrinsic value and potential practical use of indigenous knowledge has led to a call for finding ways to preserve indigenous knowledge (Brodt 2001; Wilson 2004; Nfah-Abbenyi 2011).

1.3. Indigenous peoples and protected areas

Protected areas (PA's) in which human access is limited to conserve biodiversity have been set up all around the world, covering over 12% of all land on earth. However, cultural and biological diversity often coincide and early American models of conservation sought to create uninhabited parks in order to preserve pristine nature, free from human interference. This led to the eviction of local communities. (Moore et al. 2002:1645; Dowie 2009:*xx-xxiii*).

"Fortress conservation" (Brockinton 2002) was highly criticised by anthropologists advocating indigenous peoples' rights to live on their ancestral lands and use its resources (Orlove and Brush 1996:333-4; Colchester 2004:147). In addition, the possible value of indigenous knowledge for biodiversity conservation (discussed in chapter 1.2) has been used as an argument for the participation of indigenous peoples (IPs) in conservation through natural resource management.

A more pragmatic argument against the exclusion of indigenous peoples from protected areas states that conservation cannot be successful without community involvement. The

effectiveness of park management depends on support from local communities (Orlove and Brush, 1996:336-9).

Policy on indigenous peoples and natural resource management

As shown by Persoon and colleagues (2004:3) "an increasing awareness of and commitment to indigenous peoples' concerns has become visible within the international policy arena as well as amongst donor organisations." The various policy guidelines such as those of the International Labour Organisation and the UN Declaration on the Rights of Indigenous Peoples recognise the importance of the relationship of IPs with their territories and their right to use natural resources. They oppose resettlement and advocate the participation of IPs in decision-making regarding development programs. However, policies by biodiversity conservationist organisation are often regarded as eco-centric, because they only recognise IP's rights when communities are seen capable of sustainably managing natural resources (Persoon et al. 2004:13).

"The Philippines is among the world's leading countries regarding indigenous peoples' legistation" (Persoon et al. 2004:64), with the enactment of the Indigenous Peoples' Rights Act (IPRA) and the instalment of the National Committee on Indigenous Peoples (NCIP) in 1997. In the National Integrated Protected Area System (NIPAS) Act (DENR 1992) recognises the rights of IPs in protected areas within the framework of park legislations. However, the NCIP and the implementation of the IPRA are criticised for being slow (Persoon et al. 2004:61-70). The situation of the Agta regarding resource and land rights will be discussed in the following subchapters.

1.4. The study area

The Cagayan Valley

The studied group of Agta lives in the northeast of the Philippine island Luzon in the province Isabela, a sparsely populated area with a high population growth rate. On Northeast Luzon the Cagayan River flows from south to north, with the Sierra Madre Mountain Range in the east, the Caraballo Mountains in the south and the Cordillera Mountains in the west. The area has a high diversity in habitats, with vegetation types ranging from mangrove forest, beach forest, lowland dipterocarp rain forest, limestone forest, forest over ultrabasic rocks to montane forest and grassland (van Weerd et al. 2009:46-50). The Cagayan Valley has a tropical climate that is affected

by the northeast monsoon from November to April and southwest monsoon from May to October, which create up to 20 tropical storms throughout the year. Temperatures range from around 19° C in January to 36° C in May (van Weerd et al. 2009:42).

Peoples of the Cagayan Valley

The area has a large cultural diversity, of which a short overview will be given here. More than 3,2 million people were counted in the valley in 2010, with a population growth rate of 1,36 between 2000 and 2010 (NSO 2010). The cultural composition is rapidly changing due to migration, intermarriage and assimilation (van der Ploeg et al. 2009a).

The first colonizers of the area were the Australoid peoples from whom the Agta descent. About 5,000 are estimated to live in the Cagayan Valley and they are amongst the poorest of the region. Detailed information about the Agta can be found in chapter 1.5. The Paranan are a group that migrated to the area some 250 years ago and of which around 15,000 people reside between Palanan en Dinapigue. They cultivate upland rice and white corn as staples. Around 255,000 Ibanag and 150,000 Itawis live in the Valley and these ethnic groups are culturally and linguistically tied. Their main livelihood activities comprise of rice, corn, sugarcane and tobacco agriculture. Smaller ethnic groups in the Cagayan Valley are the Kalinga, Yogad and Gaddang (van der Ploeg et al. 2009a:57).

An estimated 60,000 Bugkalot find their ancestral land in the Valley. They are sometimes referred to by the term Ilongot, which they consider as derogatory and related to the old practice of headhunting (only completely abandoned in the 1970s). The Bugkalot too are rapidly abandoning their traditional practices, due to the in-migration of other peoples (van der Ploeg et al. 2009a:58; Aquino and Persoon 2009:58-9).

From the 1700s, Ilocano moved to the lowlands of the Valley, driven by labour opportunities in tobacco cultivation and later the logging industry. At this moment, they form a majority in the Cagayan Valley and are influential as traders and politicians. The Isneg, Corderilla Kalinga, Ifugao and Ikalahan are ethnic groups origination from the Corderilla Mountains, who now migrate to the Cagayan Valley due to overpopulation of the Corderillas (van der Ploeg et al. 2009a:60).

Biodiversity in the region

The Sierra Madre Mountain Range comprises about 40% of the remaining primary forest of the Philippines (see map 1.1.). It is considered to be a biodiversity hotspot because of its “exceptional

concentration of species with exceptional levels of endemism [...] that face exceptional degrees of threat" (Myers 1988:187). It is home to more than 3,500 plant species of which 106 are threatened and many are endemic to the region. Faunal diversity is still partly undocumented, but already 97 endemic species (of which 21 are threatened) have been found (Antolin 2003:2). Threatened species include amongst others the Philippine crocodile, flying foxes and a number of birds.

An important factor to the damaging of forestlands in the Sierra Madre is large-scale logging and mining concessions. Only few logging and mining companies hold rights to concessions in the area today and local communities continually resist the approval of more permits, but still these forms of resource extraction are extremely destructive to the forest and its biodiversity (Antolin 2003:8; van der Ploeg et al. 2009b:85). Illegal logging also plays a large role in nature degradation and happens on a scale comparable to commercial logging (van der Ploeg et al. 2011). Examples of trees that have been heavily logged in the area and that are identified as vulnerable by IUCN are the to the Philippines endemic red lauan (*Shorea negrosensis*), the almaciga (*Agathis dammara*) and the Philippines' national tree narra (*Pterocarpus Indicus*) (Ashton 1998; Farjon 2013; World Conservation Monitoring Centre 1998).

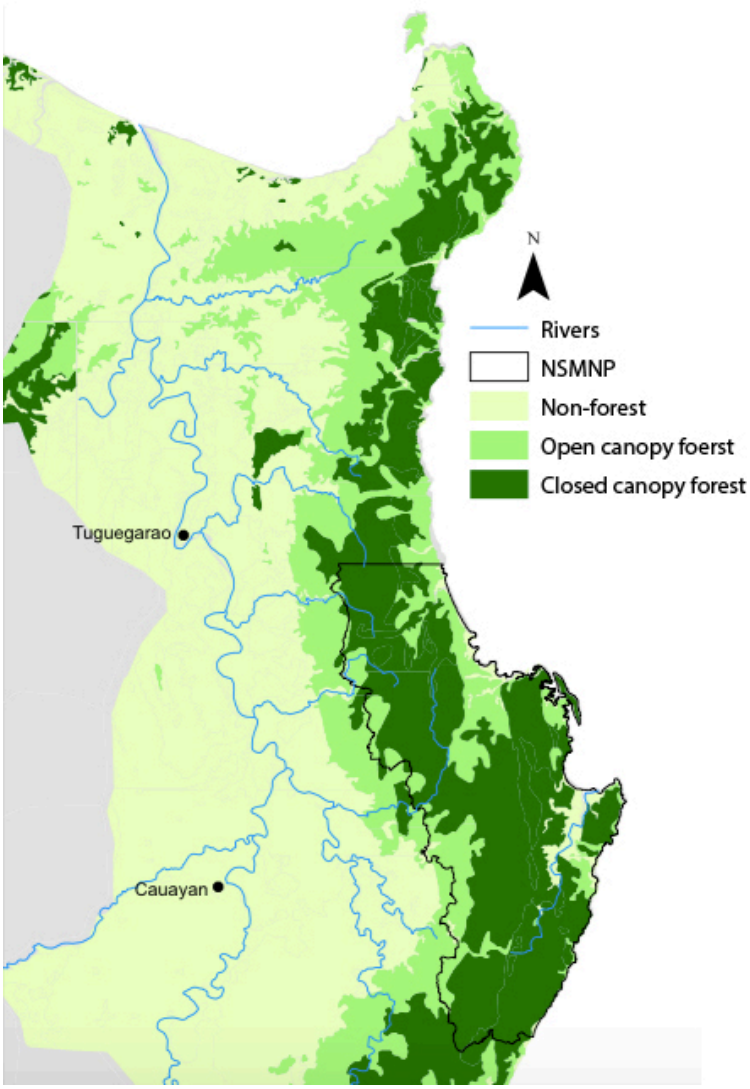
Small-scale agriculture includes shifting cultivation and the creation of rice terraces and cornfields and was made possible in the forest due to logging operations that provided access into the deeper forest areas. Farming is a threat to the area because it results in soil degradation and erosion and more loss of forest cover and biodiversity (Masipiqueña 2003:103-5; Bareng and Balderama 2009:16).

Small-scale marine fishing of some 31,000 fishermen affects the coastal areas and often, destructive fishing methods such as dynamite fishing and cyanide poisoning are used (Antolin 2003:7-8).

Population growth not only threatens the biodiversity in the way discussed above, but also through the increased pressure on natural resources. The overuse of traps to catch Philippine warty pigs (*Sus philippinensis*) and Philippine brown deer (*Cervus mariannus*) and more destructive methods to catch these species have resulted in a decreased number of hunted animals in the forest (Minter 2010:127-8).

To protect the biodiversity of this region and in line with the National Integrated Protected Areas System (NIPAS) Act, the Northern Sierra Madre Natural Park (NSMNP) was created (Minter et al.

2014). With 359,486 ha of terrestrial and coastal lands the NSMNP is the largest protected area of the Philippines (Antolin 2003:5) (see map 1.1). About 1,800 Agta and 21,000 people from other ethnic groups live in the NSMNP and the park is divided into separate zones with corresponding legislation on biodiversity protection and resource use (Minter 2010:1,29).



Map 1.1. Forest cover in northeast Luzon and boundaries of the Northern Sierra Madre Natural Park (van Weerd et al. 2009:41)

However, the NSMNP can be seen as a paper park (Minter et al. 2014): laws to protect biodiversity are often not implemented due to policy interventions that are based on flawed assumptions on the scale and organisation of illegal activities, understaffing of the NSMNP management, insufficient funding and corruption (van der Ploeg et al. 2011). This issue is further illustrated by Minter, who

shows that many Agta are unaware of the park's existence and the rules that follow from it (Minter 2010:254-5; Minter et al. 2014). At this moment, the forests are protected mainly through their inaccessibility: the area east of the mountain ridge can only be reached through a small airstrip on the coast or a six-day walk through the mountains or by boat in the dry season (van der Ploeg et al. 2011).

Also, the government continues to plan development projects of roads and economic zones that increase pressure on natural resources in the region; which will most likely lead to further population growth through immigration and the dislocation of local populations, including farmers and Agta, who will move further into the forests (Antolin 2003:9).

1.5. The Agta

The Agta are descendants from Australoid peoples who arrived in the Philippines over 35,000 years ago, colonizing the areas in which they were joined later by many different ethnicities (van der Ploeg et al. 2009a) (see chapter 1.4). The Agta are part of a group that has been referred to as 'Negritos' by the Spanish colonialists and later the American colonial government and the Philippine government. I follow linguists and anthropologists who choose not to use this term due to its racist and derogatory connotations (Brosius 1990:xxi-xxii; Griffin 2002:42, in Minter 2010:3). I will use the term non-Agta to address other ethnic groups living in the studied area or use the names of individual ethnic groups.

Livelihood

The Agta are considered as primary hunter-gatherers who, despite having been in close contact with farming communities throughout their history, possess a continuous cultural history of foraging (Layton 2001:314-5, in Minter 2010:5). Many of their livelihood activities are closely related to indigenous knowledge about the natural environment and are therefore important in the current research. I will explain the livelihood activities that are most relevant to the research here in short; these will be discussed thoroughly in chapters 5 through 7.

The Agta hunt mainly for wild pigs and deer and on a smaller scale macaques, water monitor lizards and several bird species, usually within their own or spouses' watershed. Tools used in hunting are

bow and arrow, traps and more recently shotguns and pig bombs (Minter 2010:102-119). The catch is shared between the households of the residential group and part of the catch is sold.

An example of the extensive knowledge Agta have about animal species is provided by van der Ploeg and van Weerd (2010). During bird-watching trips with six experienced Agta hunters, they listed 110 Agta names for different bird species, including species that are not directly economically used. This study shows that "indigenous knowledge of birds is not limited to edible or pest species, as is popularly assumed" (van der Ploeg and van Weerd 2010:130).

Although not all Agta hunt, hunting plays an important role in Agta identity. Minter (2010:112) shows that Agta women prefer to marry a skilled hunter and that hunters proudly display their skills by the use of trophies. However, she also states that time spent on hunting has plummeted since 1980, which according to Agta is due to wildlife scarcity. Also other changes, such as smaller hunting parties, the use of more traps and less hunting dogs and bow and arrow are noted. The decrease of wildlife is caused by loss of habitat through logging, harvesting of fruit trees and also hunting by loggers (Minter 2010:125-8).

Both river- and coast-dwelling Agta spend much time fishing for consumption and trade, usually with spears and along the coast with nets. Shellfish, shrimps and crabs are collected by hand. River-dwelling Agta use nearby creeks and rivers as their primary fishing grounds, with small fish and shell species and sometimes eel as usual catches. Coast-dwelling Agta catch a much larger variety of species in reef pools, sea-grass beds and coves. Non-fishing grounds are determined by taboos (Minter 2010: 129-34).

In recent years, destructive and illegal methods such as dynamite, poison and electro-fishing are occasionally used but frowned upon by some. In most studied Agta groups, time spent on fishing decreased since the 1980s and returns have dropped due to environmental degradation such as water pollution, erosion and destructive methods used mostly by non-Agta (Minter 2010:144-6).

Agta collect many plant species for their own use, with different purposes such as food, herbal medicine, fuel, household material, ritual and in trade (Garcia and Acay 2003). The most often-collected food items consist of fern shoots, wild tubers and yams, fruits and sporadically honey. The Agta have been described as 'commercial hunter gatherers' (Headland 1986, in Minter 2010:5), referring to the trading contacts the Agta have historically had with neighbouring farmers. Today the Agta trade various forest products with non-Agta populations, such as wildlife meat, honey, freshwater eel, live lobster, rattan, timber, swiftlet nests, in exchange for luxury goods like rice,

coffee, tobacco and sugar. This trading takes place on a small scale and is both supply and demand driven. Rattan is one of the most collected resources for commercial purposes and is obtained by both men and women of all ages, but also is the source of much worry because of low incomes and related debts to buyers. Anecdotal evidence suggests that rattan is less and less found in the NSMNP. Since the last fifteen years, collecting swiftlet nests from caves provides an opportunity for income, a difficult task only performed by men (Minter 2009:208-9; 2010:101,150-61).

Small swiddens or *uma* are held by most Agta households. Examples of crops that are often cultivated are upland rice, white corn, sweet potato, taro, cassava, *pechai*, *mung* beans, pepper and banana. Of these, upland rice, white corn and root crops are most consistently planted. Of most other vegetables only few plants are cultivated (Minter 2010:201-2).

There is a clear gender-based division of labour, with women spending more time on domestic activities and childcare, weaving and digging of root crops, and men responsible for hunting, honey gathering, lobster fishing and logging. Activities like fishing, collecting non-timber forest products and agriculture are done by members of both sexes (Minter 2010:66). In the 1980s, Agta women were reported to participate in hunting activities, an example that was at the time used to counter the widely accepted image of men as hunters and women as gatherers (Estioko-Griffin and Griffin 1981). Minter (2010:66,112-3) however found that women were not involved in hunting at the time of her research. This change will be discussed in chapter 5.

Belief system

Previous scholars have discussed the belief system of the Agta, with some arguing that the Agta belief is primarily monotheistic, some recognising only an animistic belief in spirits and others stating that Agta belief focuses on one god in addition to many spirits. Minter (2010:72-83) found only evidence for an animistic belief amongst the Agta and closely describes two kinds of spirits (*anito*) that are central in Agta religion.

On the one hand, the spirits of deceased ancestors are believed to haunt the forest and death is linked with several taboos and rituals. The dead are buried or occasionally left to decay on a bamboo bed and the name of the deceased is pronounced only when seeking contact with the spirit. The burial site becomes a taboo area called *gaygay* or *banteng*. The dwelling where the person died is burnt, personal belongings are left at the grave and several measures are taken to prevent the

spirit to come back to the settlement. Some days after the death, the settlement is abandoned in fear of the *anito*, but also for emotional reasons.

On the other hand, nature spirits play a role in the Agta belief system. Minter distinguished malignant spirits that can be kept off by noises, offerings or the help of a spirit medium (*bunogen*) and guardian spirits who protect animals and sometimes oppose hunting and fishing. Upsetting these guardians can be avoided by not damaging the mandibles of the catch (in which an animal's soul is believed to reside), not wasting catches and not joking about animals.

Social organisation

Agta communities are considered to have egalitarian constructions that are based on bilateral kinship relations. Griffin (1996:196-9) describes how collective ownership of land is linked to descent from a common ancestor. Individuals belong to several cognatic descent groups, which are based on descent from the mother's or father's side, or both. Households are linked to an extended family group, which lives in a particular river valley or coastal area (Minter 2010:59-60). Agta regularly shift camps, with mobility varying according to the season. The distance between settlement sites is on average 5 kilometres (Rai 1990:58-9). Moving can be the result of economic, social or religious reasons, and is restricted to places where Agta have kinship connections. Other kinship networks are regarded with mistrust, which is related to a fear of inter-group raids (Minter 2010:83-4).

A household dwelling can range from a *pinanahang*, a windshield supported by poles during summer, to a more elaborate structure with a lifted floor or a basic wooden house (Minter 2010:63).

Agta families are mostly based on monogamist marriages and usually take place between Agta of neighbouring areas. They can be pre-arranged or chosen by spouses themselves, who after a small wedding ceremony and the exchange of gifts can live with either side of the family (Minter 2010:60). Most Agta marry around the age of 18 and women are an average of 20.4 years old when they have their first child (Early and Headland 1998:92). An average of seven children are born per household, but this number should be seen within context of high child mortality (see 1.6) (Minter 2010:66, Early and Headland 1998:97).

Demography

With an average annual income of $574 per capita, Isabela province is one of the poorest regions in the Philippines (NSO 2007). Poverty is most widespread in the mountain areas and is related to little access to drinking water, medical services and education (Minter 2010:25-6). Several poverty

alleviation programs specifically targeted at Agta are active in the NSMNP and focus on providing basic services and livelihood (Minter 2010:237), but the "[…] Agta of the Northern Sierra Madre Natural Park find themselves in a highly disadvantaged position in terms of their health condition and educational background." (Minter 2010:241)

Early and Headland (1998:101-102) show that during their period of research (1950-1994) the life expectancy of a new-born Agta was 25 years (compared to an average of 71 years in the whole of the Philippines, Minter 2010: 24). This low life expectancy is mostly due to high child mortality; only one third of all live births live long enough to reach puberty (Minter 2010:53).

As Colfer and colleagues (2006) argue, the benefits of forest environments should not be romanticized, as malnutrition and viruses are common for forest-dwelling peoples. Early and Headland, (1998:103-6) found that amongst Agta of the San Ildefonso peninsula, Aurora Province, 85.7% of deaths are the result of infectious disease, such as measles, diarrhoea, pneumonia, malaria and tuberculosis. Other important causes are maternal deaths (4.4%), nutritional disease such as vitamin B_1 deficiency or illness related to alcohol-abuse (4.1%), homicides mostly through intergroup violence (3.0%) and accidents (2.7%). Minter (2010:54) found similar results amongst Agta of the NSMNP, although alcohol- and violence-related deaths were less recorded.

Where Early and Headland (1998:121) found marriage as the reason for 67% of all out-migration, this is less the case amongst Agta of the NSMNP, of whom only 4% married non-Agta. Also, Minter (2009; 2010:58-9,227) questions earlier conclusions that inter-ethnic marriage leads to population decline, by suggesting that they can also result in beneficial Agta-farmers relations that can strengthen the Agta population.

The Agta population has shown a negligible growth rate, with 1,644 Agta in 1980 (Rai 1990:176) and 1,777 counted between 2002 and 2005 (Minter and Ranay 2005, in Minter 2010:53). This however should be contrasted to the higher population growth of non-Agta groups in the region due to natural growth and in-migration.

Resource rights in the NSMNP

Due to their status of indigeneity and through the Indigenous Peoples' Rights Act (IPRA), the Agta are granted settlement and resource use rights to their ancestral lands. This means they are allowed to use traditional methods for resource utilization (DENR 2001:73), but the concept of 'traditional' methods is not clearly defined here. It refers ambiguously to 'historically customary techniques of

production', prohibiting the use of power-machinery. In spite of resource use rights, prohibitions of hunting threatened species apply to all people inside the park, including the Agta.

Another reason for extensive resource rights for the Agta, is that policy implementers often regard them as 'stewards of the forest'. Minter however argues that whilst Agta have valuable knowledge about their environment, their practices should not be misinterpreted as a conservationist ethic (see the paragraph on practical usefulness of IK in chapter 1.2). She gives the example of the *gaygay* that are sometimes seen as a helpful in protecting natural resources, whilst this is essentially a practice related to spiritual beliefs that can be overcome by paying fines (Minter 2010:286). Also, Minter and colleagues (2014) show that many political, socio-cultural, financial and practical barriers inhibit active Agta participation in decision-making.

2. Problem definition and theoretical foundation

In this chapter I will describe the theoretical concepts that are important in studying indigenous knowledge transmission and give an overview of what different scholars have written about this topic. Also, more information about the factors contributing to changes in knowledge will be provided. Lastly, I will state again the research question and the sub-questions around which research was built up.

2.1. Theory on knowledge transmission

Practical and theoretical knowledge

In researching indigenous knowledge, scholars make a distinction between practical and theoretical dimensions. Whilst theoretical knowledge refers to the ability to name species or their uses, practical knowledge is the ability to put this knowledge into use (Godoy et al. 2005). Studies have shown that most learning of theoretical knowledge occurs during childhood and remains unchanged after the beginning of adolescence (Zarger 2002; Zarger and Stepp 2004). More practical knowledge and complex skills are learned throughout adolescence and adulthood (Ohmagari and Berkes 1997; Gurven et al. 2006).

The dimension of gender should also be taken into account, when discussing indigenous knowledge. IK can in many ways vary between genders; men and women often have knowledge about different things and can have different knowledge about the same topic. Also, men and women differ in the way they organise, preserve and transmit knowledge (Norem et al. 1989).

Characteristics of knowledge transmission

Ruddle and Chesterfield (1977) studied the transmission of knowledge on the Guara Island in the Orinoco Delta of Venezuela and summarized the process and characteristics of transmission of knowledge. These have proven remarkably suitable for generalization into different cultures (Ruddle 1993; Ohmagari and Berkes 1997, Pearce et al. 2011).

The characteristics of knowledge transmission are described as follows:

1. There exist specific age divisions for task training in economic activities.
2. Different tasks are taught by adults in a similar and systematic manner.

3. Within a particular task complex (for example, gill-netting in fisheries) individual tasks are taught in a sequence ranging from simple to complex.
4. Tasks are gender and age specific, and are taught by members of the appropriate sex.
5. Tasks are site specific, and are taught in the types of locations where they are to be performed.
6. Fixed periods are specifically set aside for teaching.
7. Tasks are taught by particular kinsfolk, usually one of the learner's parents.
8. A form of reward or punishment is associated with certain tasks or task complexes.

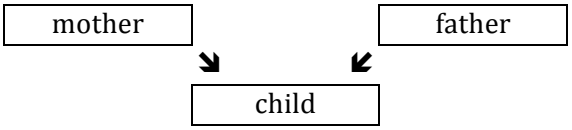
(direct quote from Ruddle and Chesterfield 1977:6-7)

Vertical, horizontal and oblique transmission

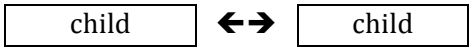
Reyes-García and colleagues (2009) make a distinction between different pathways in which knowledge is transmitted. They mention vertical, horizontal and oblique transmission. Vertical transmission (A) is the teaching of parents to their offspring. This is often considered the most common form of knowledge transmission (Lancy 1999; Lozada et al. 2006). The acquisition of knowledge through peer groups and siblings is called horizontal transmission (B). This type of transmission often takes place in the form of play and also becomes more important when the learners reach adolescence (Lancy 1999; Zarger 2002). Oblique transmission refers to transmission from an older adult other than a parent to a student (C) or from one adult to multiple students (D). Often, combinations of the different forms occur, such as in children among the Indian Jenu Kuruba, who learn honey-collecting skills mostly through vertical, but also through oblique transmission (Demps et al. 2012).

Fig. 2.1. Pathways of knowledge transmission

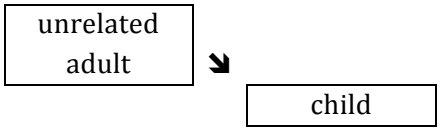
A. Vertical transmission



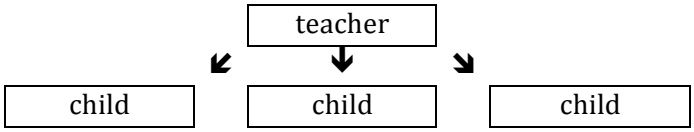
B. Horizontal transmission



C. Oblique transmission



D. Oblique transmission



Stages of learning indigenous knowledge

In Ruddle and Chesterfield's (1977) identification of eight stages of the learning process of IK, a student firsts needs to be familiarized with the skill to be learned. Then he will observe the teacher performing the skill. In a third step he will help with simple tasks and later string all small steps together to help with the entire skill complex. In the fifth step he will perform the new skill as an apprentice after which he becomes an assistant to the teacher. He will then perform the skill independently and eventually become an equal partner to the teacher (see fig. 2.2).

Play as a means of learning

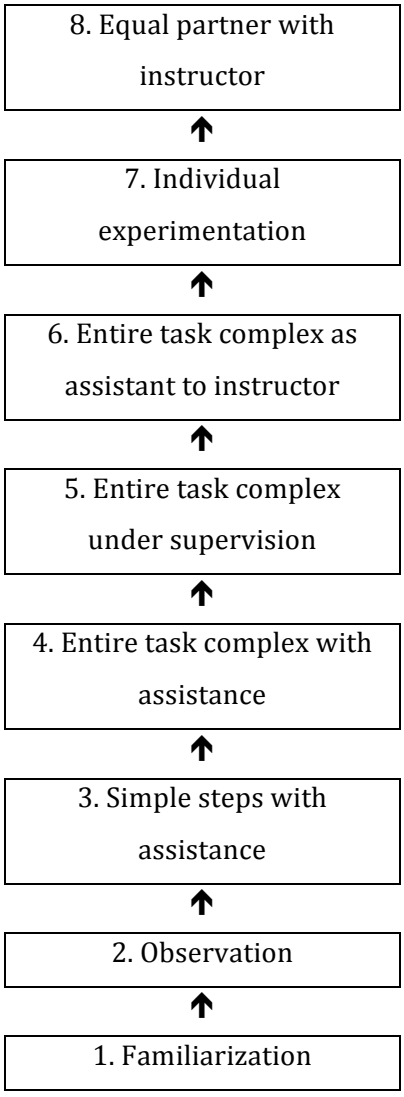
Gray (2009:476), who included data about the Agta in his research, calls play "a foundation for hunter-gatherer social existence". He points out that hunting and gathering parties resemble playgroups in many ways: both are based on voluntary participation and individual autonomy, take into account all individual needs and involve shared materials and consensual decision making. This prevents hierarchical relations and dominance from arising (2009:487-90).

Play can also be seen as the foundation of education amongst hunter-gatherers; children are treated with much freedom and indulgence; they are allowed play for most of the day and are rarely expected to contribute towards their subsistence. However, children learn by incorporating adult activities such as digging root crops, building houses, hunting or making tools into play and games (Gray 2009:505-14).

In many hunter-gatherer groups, birth rates are low and one settlement does not include many children of the same age-group. As a result of this, children of mixed age and gender play together. Gray (2009:512-4; 2011:516) describes mixed-age play as often non-competitive and characterized by older children helping younger ones. This form of play can benefit children of all age-groups

involved: older children can develop their skills in nurturing when helping younger children, whilst learning more themselves through teaching others. Younger children are introduced to activities that are within their proximal zone of development; these are too difficult or dangerous for them to carry out alone, but can be learned through collaborating with older children (Vigotsky 1978 in Gray 2011:504). Also, older siblings and other playmates often form role models for children, enthusing the latter to learn what others can already do.

Fig. 2.2. Eight stages of learning (after Ruddle and Chesterfield 1977:116)



2.2. Loss or change?

A number of studies have recently underlined a trend of decline in indigenous knowledge. Among the Inuit of Northwest Canada certain aspects, like knowledge and skills in regard to hunting and camping, are still being transmitted to younger generations, whereas knowledge about traveling on ice and navigation are unknown in younger generations, due to changing social conditions and the introduction of new technology, but also because legislation is prohibiting hunting of certain species (Pearce et al. 2011). Ladio and Lozada (2004) show a loss of knowledge on edible forest plants amongst the Mapuche of northwest Patagonia. In recent studies, examples of the loss in medicinal knowledge can be found (Begossi et al. 2002; Srithi et al. 2009). A study of Indian farming communities describes how indigenous agricultural knowledge suffers from the influence of large-scale farming (Brodt 2001). McCarter and Gavin (2013) show the local perception of loss of indigenous knowledge through a case study on Malekula Island in Vanuatu. Local communities reported external processes, such as formal education and missionary missions, and internal processes like social change and population growth that cause "erosion" and "decline" (McCarter and Gavin 2013:288) in indigenous knowledge.

However, recently the view of IK as a concept that is prone to loss has been contested with the argument that it is unhelpful to analyse indigenous knowledge in terms of loss. As shown by Ellen and Harris (2000) IK is constantly changing, adapting to changes in the social and natural environment. This means that some knowledge is always lost (for example because it has become irrelevant in a changed situation) and new knowledge is constantly added. Gómez-Baggethun and Reyes-García (2013) argue that the current focus on loss of IK should be diverted towards change and adaptation, to avoid obscuring a society's capacity to adapt to socio-economic and environmental change.

2.3. Contributing factors to change in indigenous knowledge

Some of the most frequently reported factors contributing to changes in indigenous knowledge are summarized here.

Migration

In-migration (such as colonisation) and population decline (for example through out-migration) cause loss of knowledge, but population growth can lead to the use of new technologies to answer a larger demand (Ruddle 1994:13; Drahos 2014:59). Alexiades (2009) provides several examples of how migration of Amazonian communities contributes to change in IK: whilst (forced) relocation of indigenous groups can result in loss of indigenous knowledge through the loss of lands, in the case of the Kaiabi of the Brazilian Amazone this has resulted in a revitalisation of knowledge on traditional basket weaving.

Market integration

The influence of market integration has often been noted as an important factor in loss of indigenous knowledge (e.g. Ruddle 1994). One explanation is that markets offer alternatives for self-collected natural resources. Godoy and colleagues (2005:132) suggest "if markets erode [indigenous] knowledge by enabling people to access substitutes for natural products, then we would expect markets to affect practical knowledge before affecting theoretical knowledge." A study by Byg and colleagues (2007) concludes that physical distance to roads (and therefore markets), not plant availability, is the best predictor for use of palm trees by the indigenous Shuar of Ecuador. In a quantitative approach to knowledge loss amongst Amazonian Tsimane', losses of practical indigenous knowledge between 1 and 3% were found, relating to proximity to markets (Reyes-García et al. 2013).

Some however argue that market integration does not only affect indigenous knowledge negatively. Godoy and colleagues (1998) state that integration into the market can lead to both erosion and retention of indigenous knowledge: indigenous knowledge on botany and wildlife is inhibited through the sale of crops or through wage labour, but can grow due to market integration through the sale of non-timber forest products. Guest (2002) had similar findings, concluding that acquisition of indigenous knowledge could be accelerated when a community participated in a market through natural resource-based activities.

Government policy

Throughout history, colonial governments have purposely oppressed indigenous cultures and knowledge systems through assimilation policies (Battiste 2002:4-5). Also today national governments often promote assimilation into the mainstream national culture, by imposing the dominant language, law, dress or religion on ethnic minorities on ethnic minorities. With examples

of local fisheries, Toloa and colleagues (1991, in Ruddle 1994:12) show how centralisation of authority by a national government can result in change in methods of marine resource management. For example, on Tokelae, traditional authorities were salaried by the central government. This made it possible for local fishermen to avoid traditional fishing regulations by paying a small fine.

Development programs are regarded by some as forms of neo-colonialism that aim to assimilate or westernise local cultures without leaving room for indigenous knowledge systems (Abidogun 2015:712-3).

However, Ruddle (1994:7-10) argues that government policy can also be an important factor in the preservation of indigenous knowledge through the support of tradition, traditional authority and traditional law.

Education

Education has often been used by colonisers and national governments as a means to assimilate indigenous communities through eradicating IK systems. Even today, indigenous knowledge is in some cases still portrayed as backward and is systematically left out of education programs (Adams 2008; Battiste 2002; Wilson 2004).

Several factors of education that inhibit IK have been listed by Ruddle (2000:297-299): practices in education are often lagging behind on recent developments in the academic debate and the recognition of IK as a valuable source of knowledge; IK is often still seen as unscientific and education is therefore biased towards Western science. Many institutions still hold a top-down vision of focus on empirical methodology in laboratory settings and transfer-of-technology, a stance that is aided by the private sector (Ruddle 1994:16).

Examples of the role that formal education plays on the loss of indigenous knowledge are shown amongst local communities in Northern Thailand and Kalimantan, where higher levels of education are related to less knowledge on botanics and medicinal plant use (Srithi et al. 2009; Sheil and Salim 2012).

For the first time in history, Agta children of San Mariano have the possibility of receiving formal education close to home. Where they could previously only attend school when they moved to the municipal centre, a new school in Diwagden has led to the consistent school attendance of Agta children in the area. The effects of schooling on Agta life and knowledge transmission have not previously been studied and will be a central theme in this thesis.

2.4. Research question

The current study explores the following research question: What domains of indigenous knowledge are culturally valued and how is this knowledge transmitted amongst the Agta of San Mariano? Because knowledge often refers to specific skills, the two are linked and should not be seen separately.

To answer this main question I will use several sub-questions, which I will elaborate on in the next chapter. They are:

1. What domains of knowledge are valued amongst Agta?
2. What actors are involved in the transmission of knowledge and what is their relationship?
3. How does the learning process of indigenous knowledge work and how is indigenous knowledge distributed amongst the group??
4. How have indigenous knowledge and its transmission changed under the influence of formal education and other locally relevant developments?

3. Research amongst the Agta

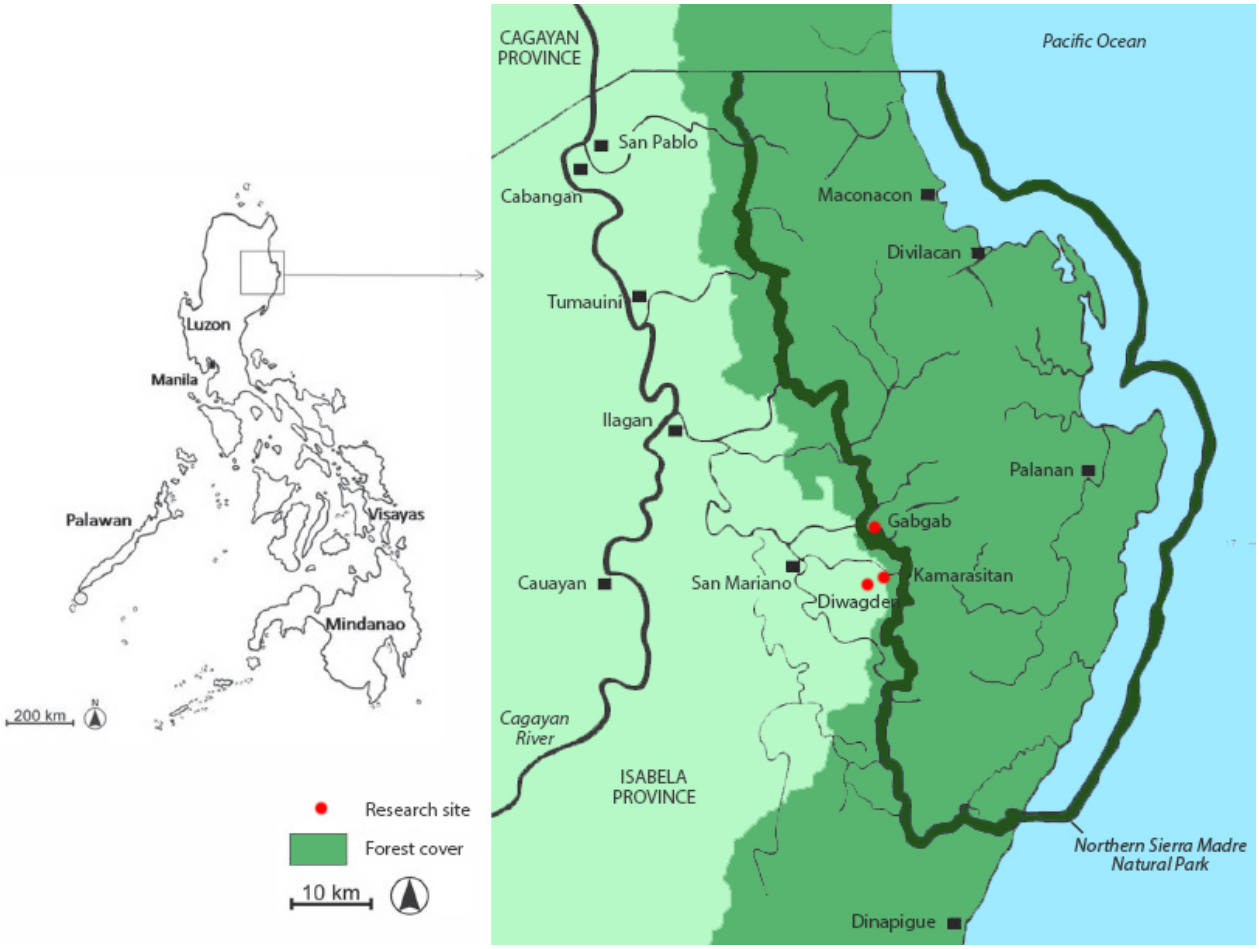
This chapter will discuss the research population and the details of conducting fieldwork. The different research methods and techniques used to answer each sub-question are listed, including their strengths and their limitations. Also, I will give insight in the ethical considerations surrounding this study.

3.1. The studied group

The current study focused on three Agta settlements living in the municipality of San Mariano in Isabela Province. The choice of the studied group resulted from practical considerations such as reachability and cost-efficiency. A census by Minter (2010:50) counted 222 Agta living in San Mariano between 2000 and 2005. These Agta comprise 0.5% of total population in the municipality.

The research population consisted of three Agta settlements in the municipality of San Mariano: lower Diwagden, Kamarasitan and Gabgab (see map 3.1). Another Agta group, living in upper Diwagden, was not included in the study. Reasons for this included mutual distrust between this groups and the group in lower Diwagden (from now on referred to as Diwagden) and the unwillingness of the former group to take part in research.

At the time of research, there were a total of 68 Agta living in the studied settlements (see table 3.1). Diwagden and Kamarasitan are located on 30 minutes walk from each other and the Agta of both settlements belong to the same watershed group. At the start of the research there were five households in Diwagden and three in Kamarasitan, with one household moving from the first to the latter in March. First, only these two settlements were focused on, but during the second month of research Gabgab (six households) was added. The main reason for this was because in contrast to the children of Diwagden and Kamarasitan; children in Gabgab do not receive formal education at this moment (although few of them went to school before). This difference provided an opportunity to compare the transmission of indigenous knowledge between school-going and non-school-going Agta.



Map 3.1. Location of the studied settlements (after van der Ploeg et al. 2011:204)

Table 3.1. Demography of the settlements

	Diwagden	**Kamarasitan**	**Gabgab**
Number of inhabitants (number of households)	24 (5)	19 (3)	25 (6)
Percentage male	62.5	52.6	52.0

3.2. Access to the field

In order to enter the field of study, we had to acquire permission from the LGU of San Mariano, the municipality of which the studied settlements are part. Before starting a next fieldtrip, we thus requested a permit, which was granted each fieldtrip. In addition, we coordinated our whereabouts and research goals with the local police and army.

At the beginning of the fieldwork, I asked the Agta community to conduct a meeting in which I conveyed the nature and aims of my study and asked for their informed consent. The following text was translated into Ilocano to explain the purpose of the research:

> "I am a student from the Netherlands and I am very interested in knowledge that the Agta have about the forest. I would like to learn about what an Agta needs to know nowadays? This can include things like hunting, fishing or knowledge about plants. But maybe there are other things that you [Agta] think are important, and I would like to learn about them too. Also, I am interested in how Agta learn these things and why they are important to know.
>
> I would like to study these things for three months and live in a tent near your settlement. If this is okay, I will talk to you, ask you questions and look at how Agta teach knowledge and skills. Also I would like to film you and take pictures, to look more closely at this topic. These images will not be sold. After I go back home, I would like to write about what I learn from you and show this to my teachers at the university.
>
> I hope that you would like to help me with this."

The text was read to the informants, who after they consented signed with a thumb-mark. A copy of this document can be found in appendix 1. In addition to this written consent, I explained the nature and aims of the study to any new informants and asked for their consent before conducting interviews. Both the permits and the FCIP were brought to every fieldtrip, although we were never asked to show them.

3.3. Conducting fieldwork

Research took place over a period of three months (January through March 2015). During this time, we made five fieldtrips to the Agta settlements, all of which ranged between 7 and 15 days. In total, we spent 40 days in the field. During most of this time, we stayed in tents in the studied settlement and were usually offered a vacant dwelling to use as our kitchen. Although we often shared meals with informants, we always had our own hearth, to avoid committing ourselves and thus limiting the research too much to one household.

Between fieldtrips I stayed in the International Student House of Isabela State University. The research was carried out in close contact with the Mabuwaya Foundation, a local NGO that provided logistical support and the College of Forestry and Environmental Management (CFEM) of Isabela State University in Cabagan.

Because I did not achieve a sufficient level of speech in Palanan-Divilacan Agta, the primary language spoken by the studied group, I hired Melody Capal, a former graduate student of Isabela State University, as a research assistant who also functioned as a translator. She conversed with our informants in Ilocano, which is the most used language in the region. Almost all Agta were proficient in speaking Ilocano; the children learn it in school and Agta use this language to communicate with non-Agta. In addition to being a translator, the research assistant came to be one of my key informants in explaining differences between Agta and Ilocano culture. Because of her important role in my research amongst the Agta, I have decided to write this thesis in the first person plural. However, all data analyses and writing were done by me.

Where available, the spelling of emic vocabulary used in this thesis was derived from the Dumagat (Casiguran) – English dictionary (Headland and Headland 1974) or compared to earlier spelling by Minter (2010) and Rai (1990). In the cases where Agta terms could not be found in existing literature, I have spelled words phonetically and asked my research assistant for advice. I am aware of the restrictions that follow from these choices and spelling used in this thesis might not be completely accurate.

3.4. Research methods and sampling

In addition to the methods listed below, most questions were also addressed in informal and unstructured interviews, a method that provided valuable information and explore new domains by letting Agta themselves explain what they viewed as important information. Especially with children and adolescents, who were often very shy, unstructured interviews without an interview sheet were much less intimidating. Where possible we used filming as a method to capture teaching processes, although this was practically difficult because of weather conditions, and because some informants were shy to be filmed.

Sub-question 1: What domains of knowledge are valued socially amongst Agta?

- *Pebble Distribution Method*. By the example of Atran and colleagues (2002) and Godoy and colleagues (2009) we tried to use freelisting as a method to identify knowledge systems that are important to Agta. We started by asking Agta about the top 5 of most important things they want their children to learn, a top 5 of what someone should know to be Agta and a top 5 of the knowledge the informant uses the most. However, most informants found it difficult to think of more than one or two examples, so in addition to freelisting we used the Pebble Distribution Method (Colfer et al. 1999:38-41). In this method, we showed informants pictures of possible activities (such as fishing, trapping, collecting honey, etc.) and asked them to distribute 50 buttons (the "pebbles") between these pictures according to the following questions: which activities do you do the most during (1) the rainy season, (2) the dry season, (3) which activities contribute the most to daily meals and (4) with which activities do you make the most money (photo 3.1). The examples of activities were chosen in accordance with Minter (2010) and informants were always asked whether any activities were missing from the available pictures before the buttons were divided.
- *Seasonal calendar*. By letting the Agta create a calendar of domains of knowledge, we learned what different knowledge is important in which season. Whilst we focused primarily on domains of knowledge that were used during the period of my fieldwork, this allowed me to take into account knowledge that is more important in other seasons. Where first we tried to let informants draw activities on a circular calendar, we ended up asking about the seasonal calendar through unstructured interviews, because many informants were not used to drawing and felt uncomfortable using pencils.
- *Semi-structured interviewing* (see appendix 2A). Through this method, we gained insight in why certain knowledge (based on methods above) is important, what it means to know (or not to know) certain things. This included asking what young Agta men and women look for in a marriage partner and why.

Sub-question 2: What actors are involved in the transmission of knowledge and what is their relationship?

- *Genealogy*. Upon arrival in the field we created a genealogy of the studied watershed group, which allowed me to get an overview of all inhabitants, introduce ourselves to informants and gain insight in kinship relations.

- *Expert pooling*. With structured interviewing we systematically gathered peer recommendations to find the experts of different knowledge domains (Davis and Wagner 2003). Questions included letting informants list the people they learned the most from (who are the teachers) and the people they would ask for information about a certain topic (who are the experts). This way we aimed to discover pathways of knowledge transmission (Atran et al. 2002). Whereas informants quickly named teachers, the naming of experts proved to be less helpful in gaining insight in pathways of knowledge, since most informants claimed that all adults had equal skills (see chapter 4.3).
- *Semi-structured interviewing* (see appendix 2B). Through this method we asked more specific questions such as why Agta consider some people to be experts or teachers, what knowledge they learned from who and whether they taught anyone else.
- *Observation*. Where semi-structured interviewing told us through which actors transmission should go, observing told us more about things always work this way and uncovered exceptions.

Sub-question 3: How does the learning process of indigenous knowledge work and how is indigenous knowledge distributed amongst the group?

- *Semi-structured interviewing* (see appendix 2B). By asking informants how they learn/teach, we aimed to gain basic insight of teaching techniques, although theoretical. For more information about practices, we also needed observation as a method.
- *Structured interviewing* (see appendix 2C). To find out which informants have learned which skills and knowledge, we asked the informants themselves about their competencies (or parents about their children's). Following Ohmagari and Berkes (1997), we did not ask about all eight stages of learning, but summarized them into three points for operationalization in the field: (1) learned by hands-on experience; (2) learned by observing only; and (3) not learned.
- *Observation and participant observation*. These methods helped us discover in what way things are being taught, by looking at how children learn and also participating and trying to learn with them. In this method all eight stages of learning could be addressed.
- *Systematic observation*. Through techniques such as noting down the composition of hunting and fishing groups and the types of meat/fish children contribute, qualitative information was supplemented with quantitative data.

- *Animal identification test.* By asking Agta of different ages to identify pictures of animals, we aimed to study how indigenous knowledge of the forest environment is dispersed amongst different age-groups and whether it has changed through generations. Informants were individually shown pictures of 7 mammal and 24 bird species living in the NSMNP, chosen on the basis of articles by van der Ploeg and van Weerd (2010) and Thijs (2005), the former of which also listed Agta names of bird species (photo 3.2).

  The number of correctly identified species was used to calculate informants' 'test score'. Names could be listed in the Agta language, Ilocano or Tagalog and correct answers were chosen using van der Ploeg and van Weerd (2010) as a directory, but also through informant consensus (Trotter and Logan 1986, see chapter 9.6): by looking at which answers were given most frequently. For example, in the case of the great egret (*Ardea alba*), the Agta name *uduk* and the Ilocano *kanaway* were known to be correct. However, because many informants identified the animal as *kabulo* (40.5%) or *dalugog* (23.8%), we noted these as correct answers in addition to the known terms. In three cases, we weighed answers given by 'experts' more heavily to find the right answers, a method based on the cultural consensus model by Romney and colleagues (1986, see chapter 9.6). With the lack of experts named by the community itself, we assumed experienced hunters to have the most knowledge about taxonomy. Using this method several answers were approved as correct. The English, scientific and local names can be found in appendix 3.
- *Transect walk.* In a similar way, a comparison of ethno-botanical knowledge between different age-groups was made on the basis of a transect walk, in which we accompanied Agta of different genders and age-groups on a short walk through the forest, asking them to identify the name and use of any medicinal plant we came across. The walk started right next to one of the houses of the Kamarasitan settlement and brought us approximately 100 meter into the forest, following a small stream. Testing one informant took between 4 and 35 minutes, depending on how many plants he/she could point out.

  Although the method was derived from Zent (2001) and Zarger and Stepp (2004), results were interpreted differently. Without knowledge of the medicinal use of the species, we tried to find the 'correct' local name and use of plants by looking for experts of medicinal knowledge. However, opinions about names and uses of plants differed between experts. This led us to divert the focus from finding the correct answer

to identifying which differences and similarities in answers exist between families (unlike Zent (2001), who identified correct answers based predominantly on majority consensus, and Zarger and Stepp (2004), who examine change in ethno-botanical knowledge over time). To calculate the 'score' of informants on the test, the number of species they could identify were added up as follows: one point was awarded if a person could give only a name or a use, and two points were given if both a name and a use were provided, regardless of the answers' correctness.

Limitations of methodology for testing indigenous knowledge are presented in subchapter 9.6 of the discussion.

Sub-question 4: How have indigenous knowledge and its transmission changed under the influence of formal education and other locally relevant developments?

- *Semi-structured interviewing* (see appendix 2D and 2E). We asked Agta how they think different social and environmental changes influence their knowledge and its transmission. This way, we looked to get a better understanding of the Agta viewpoint of the topic, as well as their future expectations.
- *Unstructured interviewing*. Interviewing teachers and local government officials (of the Department of Social Welfare and Development) helped us understand the practicalities and regulations regarding formal education from a different perspective.
- *Observation*. We regularly visited the school buildings to obtain an impression of how schooling in Diwagden works in practice.
- *Systematic observation*. By tracking school attendance of Agta children we noted how much time Agta children spend in school in practice.
- *Analysing*. The other sub-questions will help to gain insight in the answer to this analytical question.

Age estimation

Because most Agta do not know their exact age, we categorised informants into age-groups based on appearance and age comparison between members of the settlements. As a consequence, all ages noted in this thesis should be seen as estimation.

Photo 3.1. The Pebble Distribution Method, Kamarasitan, January 2015

Photo 3.2. Doing the animal identification test with Buridik, Gabgab, March 2015

Sampling

Samples for interviews were chosen on convenience and willingness to participate, although care was taken to include informants from different age-groups and gender where possible. No monetary or other rewards were given in exchange for participating in the study. We found that in most cases, informants were happy to take time in answering our questions, or otherwise schedule an appointment on another time. Only in Gabgab informants were less eager to participate; one of the reasons why we spent less time in this settlement than in the other two.

Table 3.2 shows the number of interviews and tests conducted. Although sample sizes may seem small, they form a good representation of the community as a whole, since the research group only consisted of 68 informants. The interview on identifying domains included 6 to 8 informants from each settlement. One informant could participate several times in the interview about pathways of knowledge, to discuss various domains of knowledge. For the structured interview and tests, we aimed to include as many informants as possible. Parents sometimes helped answering questions for their children. Only elderly informants were asked about their perception on social and environmental change, because we looked for developments concerning these topics over a longer period of time.

Table 3.2. Frequency of interviews and tests

Topic	**Method**	**Frequency**
Identifying domains of knowledge	Semi-structured interview	20
Pathways of knowledge transmission	Semi-structured interview	37
Reported knowledge and skills	Structured interview	58
Perception of social changes	Semi-structured interview	7
Perception of environmental changes	Semi-structured interview	9
Animal identification	Test	42
Transect walk	Test	17

3.5. Analysing data

During observation and after participant observation (e.g. in the cases of joining with fishing, or harvesting and helping with household activities) written field notes were taken during the day and expanded on in the evenings. This resulted in three separate notebooks, which I manually encoded

into the categories of different domains of knowledge and themes such as upbringing, environment, schooling and social change. Informants' responses in interviews were recorded in a similar way, writing up quick notes during the interviews and elaborating and coding them after the interview was finished. In between field trips I wrote more elaborate field reports to preliminarily analyse data and evaluate on the process of the research and the used methods. Recoding and extensive analysis of the results took place after the end of the fieldwork.

The quantitative data found through the testing of knowledge was analysed using IBM SPSS Statistics 21. I used (multiple) linear regression to relate independent variables age, sex, family and settlement to the dependent variables of scores on knowledge tests. This method has been shown useful in different cultures (Reyes-García et al. 2004) and is successful in showing variance between generations and variance caused by life-stages (Godoy et al. 2009). In addition, data from the transect walk was analysed using Pearson's chi-square tests.

I used the data obtained through systematic observation in frequency tables and analysed them further by comparing variables such as age and gender.

3.6. Ethical concerns

The American Anthropological Association has provided ethical guidelines that should be taken into account when conducting anthropological fieldwork. In this paragraph, I will discuss the seven principles of their statement on ethics (AAA 2012) in relation to the current research.

In line with the first principle of the AAA, the current research did not cause any direct harm to the dignity and bodily or material well being of individuals or the Agta population as a whole. I hope to have contributed towards the dignity and pride Agta take in their culture, by showing an interest in their knowledge. I do not foresee direct or indirect negative consequences of this research to the studied group. The ownership rights of indigenous knowledge and intellectual property should be taken into account and therefore, some aspects of indigenous knowledge will not be discussed in detail to avoid bio-piracy (Persoon and Minter 2011).

In the second principle, the importance of openness and honesty to informants and others is stressed. These concepts were always central to the research and we were always honest about my position and goals as a student. This is closely related to the principle of informed consent. As was described in chapter 3.2, we asked written and verbal informed consent from our informants at the

start of fieldwork and took care to explain the nature and aims of the study to any new informants, asking for their consent before conducting interviews.

In regard to the AAA principle of ethical obligations, we explained to the informants our limited influence towards improving their situation or changing government policies, to avoid unrealistic expectations. However, in order for the research to be beneficial to the studied group, we let the Agta participate in the direction of the research by looking at what knowledge domains are important from an emic perspective and listening to other issues arising during conversations, including them in the research where possible. An example of this is the larger emphasis on problems surrounding schooling than was originally aimed at.

In order to make my research accessible to the informants (principle 5 of the AAA), we tried to report our findings back to the community at the end of the fieldwork period. Although a short presentation was aimed for, we ended up discussing the results informally with anyone who wanted to join during the last fieldtrip. This was also a useful opportunity to ask informants whether they agree with my findings.

Furthermore, I protect and preserve my records by ensuring that only my research assistant, my supervisor and myself handle data. In this thesis, personal names will be used when quoting Agta, because informants took pride in participating in the research and did not want to be anonymized.

In regard with the last principle of the AAA, I tried to maintain a respectful and ethical professional relationship with all people that are involved in the study. This included having an open relation with my research assistant and give her and others appropriate credit for their contributions to the research.

4. Growing up as an Agta

The Agta recognise various life stages, throughout which different domains of knowledge and skills are learned. This chapter draws up an image of these different life stages and provides a description of childrearing, early learning and growing up amongst the Agta. In subsequent chapters, the learning processes of hunting, fishing and subsistence gathering will be discussed in detail.

4.1. From *anak* to *amay*: life stages

In the first stage, a child is called *anak*, a term that is used for both boys and girls. The term for adolescent boys is *ulito* (the Ilocano term *binata* is also often used) and girls are called *madiket*. The start of both these stages seems to be related to the offset of puberty, but is not clearly demarcated. No ritual or rite of passage is related to entering these new stages. A boy becomes an *ulito* around the age of 14, whereas becoming *madiket* is related to the start of menstruation; although the first menstruation is not something that is stressed on or that is publicly known.

The terms *ulito* and *madiket* are used until marriage; for unmarried men or women who have surpassed adolescence, the terms also indicate their single status. During the stage of *ulito*, young men who have hunted their first *alingo* undergo a small ritual that is discussed in paragraph 4.5. Married men are referred to as *amay* and married women as *bakés*.

4.2. Childrearing and growing up

Most remarkable about childrearing amongst Agta is the freedom in which children grow up, also described by Minter (2010:69). Mostly, they can choose for themselves what they do during the day. Children are not often punished. We never observed any physical or severe verbal abuse, although parents occasionally scolded their children, mostly for being too noisy.

Young *anak* are allowed to play around the settlement without many obligations, although we found that some tasks are learned at the age of 3 (see paragraph 4.4). Games and play often involve livelihood activities, like when children pretend to hunt or look for fruits in the forest. Toys that were observed are wooden guns and slingshots, which are mostly used by boys but occasionally

also by girls. Interestingly, although in hunting the bow and arrow have been replaced with the *diposporo* (see chapter 5), play with the *eblog*, a small bow made from bamboo, was also observed in all settlements (photo 4.1).

Another entertaining pastime is building and checking bird traps or *akwat*, which are set up around the settlement and used to catch small birds (see below). During the hot summer months the children can be seen swimming and playing in streams in rivers for much time of the day.

Playgroups are often of mixed aged and gender, with siblings and other *anak* of the settlement playing together. Games and play include livelihood activities such as building houses, fishing, hunting and making tools. Games and play are not competitive; whilst one could easily imagine games associated with livelihood activities that children are introduced to ('who catches the most fish'), comparisons between performers' abilities are not made.

From a young age, children are introduced and familiarised with different livelihood activities (particularly hunting and fishing) through storytelling. Nestor Alieyo (Gabgab): "After we come back from the hunt, we tell anyone who wants to hear about what happened. We tell them about successful hunting trips, but also when we just missed an animal." Two such stories can be found in appendix 4. These stories can be educational by providing examples of different situations that can come up during hunting and fishing trips. Often, advice is given on how to deal with these situations.

During adolescence, much of the activities that are learned in the *anak*-stage are continued. Girls become responsible for certain household tasks, such as laundering and childrearing of younger brothers and sisters or even of collecting materials needed for betel chewing. Also, they learn to gather root crops, which is discussed in chapter 7. Boys are more often away from home, joining in hunting and fishing trips (see chapters 5 and 6).

In the evenings, the adults of a settlement discuss the activities that should be done the following day. They decide what the adolescents will do and assign them tasks like fishing, collecting root crops, or going to the market. Decisions are based on the needs in the settlement as well as skills and preferences of the youngsters, and although these assignments are usually followed, the *ulito* or *madiket* is free to refuse and decide on their own activities.

Children can decide for themselves whether they want to attend school, with the result that all but one of the children in Diwagden and Kamarasitan went to school every day at the time of research. More information on formal schooling will be given in chapter 8.

4.3. Ideas about learning and expertise

Interestingly, when asked about how they learned or taught various skills and environmental knowledge, Agta almost without exception answer in the same way:

> "When I was young, my parents told me that it is important that I learn how to hunt so that when they are no longer here, I can provide for my family. So that is when I learned." Marshal Impiel, Gabgab.

> "Parents tell their children it is time they go catch *bungsilan*, because they should be able to provide food. Then they learn to fish." Nestor Alieyo, Gabgab.

> "At some point my mother said to me: you have to learn to dig for *ilos*, so that you can take care of yourself after I am gone. So then I started collecting *ilos*." Rosanna Lingan, Kamarasitan.

> "One day, my father told me I should be able to provide for my family, so I should learn to hunt *alingo*. This was the time I went hunting for the first time." Romel Chavez, Diwagden.

> "I told my children: when me and your mother are gone, we will visit you [as *anito*] and ask for something. So you need to know how to make a *wari*." Nestor Alieyo, Gabgab.

It seems that the way in which skills and knowledge are taught and learned is not something that is actively thought about. Learning is regarded as an integral part of growing up and, as shown in the following chapters, consists more of observation and imitation than of systematic verbal or physical instruction.

Experts

Another interesting finding was that no distinctions between good and bad hunters, gatherers or fishers were made. When asked to name experts of different knowledge domains, informants of all settlements stated that all adults had the same level of skill. For example, although we noticed that

some women were visibly better at weaving *abak* then others and some men seemed to return to the camp with catch more often then others, this was never emphasized. In line with this, Minter (2010:123) wrote that hunters never boast about a successful hunt. It seems that equality is set above skill.

One possible exception to this observation can be found in the placing of *alingo* jaws in houses. Minter describes that because an animals' spirit is believed to reside in its mandibles, placing the jaws of a caught *alingo* in the roof or above the fireplace is regarded as an act of respect, as well as a way "to display the hunter's success" (2010:124). Pokis Layugan and Roger Lingan (both from Kamarasitan) denied that they hang the jaws out of respect for the animals and argued that the jaws (and sometimes skulls of *ugsa* and *sunggo*) are hung for display only. Whilst this can be seen as a form of decoration, it is also a way for hunters to show their skill through the number of animals they have caught.

4.4. Learning in early childhood

This paragraph will give an outline of the different tasks and skills that an Agta learns as *anak*. Figure 4.1 shows a selection of different tasks and skills and an indication of when they are learned during the stages of *anak* and *ulito/madiket*.

Swimming

Swimming is a crucial step towards learning to fish, an important livelihood activity that is the topic of chapter 6, and is needed to cross rivers when traveling. *Anak* learn to swim at an early age. Similar as to what Ruddle and Chesterfield (1977:35) describe in how children in the Orinoco delta learn to swim, Agta children are encouraged to play in the water during laundering and bathing sessions. When they are old enough to walk, their parents let them stand in the river during washing; first with a parent standing right next to them, later with less close supervision (photo 4.2). This way, the *anak* start feeling comfortable in the water and observe others swimming. Children under the age of 6 are usually allowed only in shallow areas of the river that are naturally enclosed by rocks or beach areas with slow flowing water. Dog paddle is the first stroke that is used by inexperienced swimmers. Later, most Agta use the breaststroke, which is learned through play and observation. Children learn to swim individually; no demonstration or physical assistance is used, although observation of others is crucial.

Fig. 4.1. The order of learning different tasks[1]

Task	Sex		Anak	Olito / Madikid
	M	F		
Household tasks:				
Collecting water	x	x		
Collecting firewood	x	x		
Cleaning around the house		x		
Laundering		x		
Swimming	x	x		
Cultivation:				
Cleaning	x	x		
Weeding	x	x		
Removing larger plants	x	x		
Planting	x	x		
Placing seeds	x	x		
Covering	x	x		
Use of digging stick	x	x		
Harvesting	x	x		
Gathering:				
Fruits	x	x		
Root crops		x		
Digging		x		
Knowledge		x		
Honey	x			
Umok (swiftlet nests)	x			
Botanical knowledge				
Names	x	x		
Uses	x	x		
Fishing:				
Species	x	x		
Pisepis	x	x		
Bungsilan/burokos	x	x		
Dalag	x	x		
Tilapia	x	x		
Igat	x			
Nightfishing	x	x		
Constructing fishing gear				
Hunting:				
Shooting				
Iblok (toy bow)	x	x		
Pana (bow and arrow)[2]				
Debomba (airgun)				
Diposporo (matchgun)				
Trapping				
Sakwat (birds)	x	x		
Silo (alingo)	x			
Magaliduk (diposporo)	x			
Recognising tracks	x			
Magahob (smelling)	x			
Paglakad	x			
Constructing diposporo	x			
Magahagkos	x			

Gabgab

Kamarasitan and Diwagden

[1] Information was based on structured interviewing and observation. However, as not all domains were observed, this should be seen as an indication of the order in which activities are learned.

[2] *Pana* (bow and arrow) was not used in the studied settlements and informants indicated that young Agta do not learn to use this method any longer.

Photo 4.1. Children play with an *eblog*, Gabgab, February 2015

Photo 4.2. Aulelia watches over her granddaughter who is learning to swim, Gabgab, March 2015

Familiarization with the forest

Girls and boys from the age of 7 and upwards often accompany their parents and older siblings into the forest, either when visiting relatives in other settlements or on shorter trips to check the silo or to collect fruits, vegetables and other plants. By following their guardians, they learn to find their way in the forest and recognise different plants and to a lesser extent animals.

Often, *anak* under the age of 12 are quite scared of the forest. When we asked children in Kamarasitan why they were scared, three stated that they fear the *anito* (spirits) inside the forest (see below), whilst four were more scared of other people they could encounter. Therefore, most children below the age of 7 stay close to the camp, and few older children go into the forest unaccompanied. Nestor Alieyo (Gabgab) told us "*anak* learn to fish before they go hunting, because when they are young they are too scared to go in the forest."

Akwat, small *silo* to catch birds, are a means through which children familiarize with animals and at the same time teaches them how to set traps. Examples of bird species that are caught are *patet (Hypsipetus Philippenis*, Philippine bulbul), *amak (Turnix ocellatus*, spotted buttonquail), *pagekpak (Pycnonotus goiavier*, yellow-vented bulbul), *toklin* (*Rallina eurizonoides*, slaty-legged crake) and different dove species such as the *batu-batu* (*Chalcophaps indica*, emerald dove) and *laguiden* (*Phapitreron leucotis*, white-eared brown dove). Boys were seen setting up *akwat* more often, although some girls also built them and equally enjoyed checking them. Older brothers show their younger siblings how to set up an *akwat* and help them build their own. Catching animals is encouraged by parents, who claim that "it's a first step towards learning to build an *alingo silo*" (Pokis Layugan, Kamarasitan). Playing with the catch provides an opportunity for very young children to interact with animals and learn about animal behaviour.

Animal identification

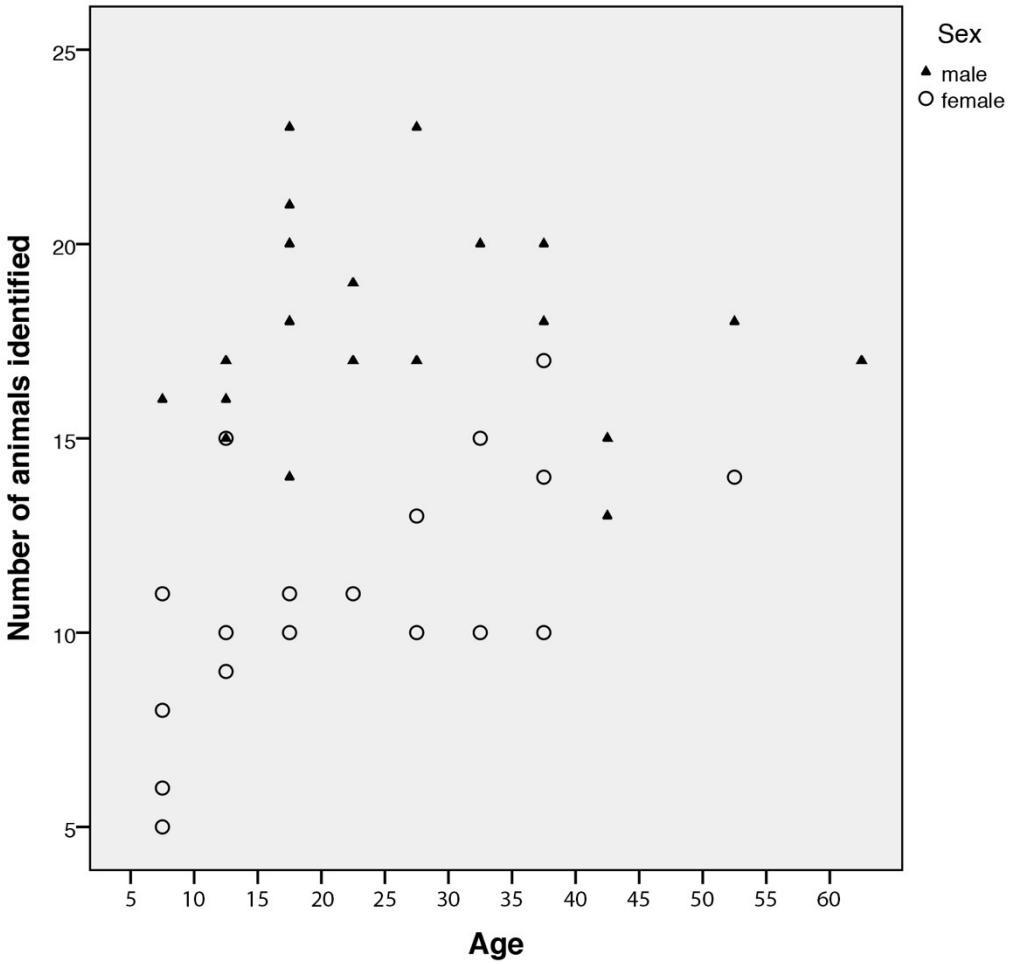
Indigenous knowledge about the forest environment consists of numerous aspects, such as survival and navigation skills and knowledge about animal and plant species. In an attempt to quantify part of this knowledge, we studied informants' ability to identify different animal species. We showed informants pictures of 31 mammals and birds that live in and around the NSMNP. A test score was created by counting the number of correctly identified species (see chapter 3.4 for a description of this method and chapter 9.6 for a discussion of limitations to measuring indigenous knowledge).

The animal identification test included 42 informants, of whom 22 were male (52.4%). Two informants were excluded from analysis because their insufficient eyesight hindered them from

identifying the pictures. The mean age of informants was 25.2, and genders did not significantly differ in age. In the score, four pictures were excluded from the score because they caused confusion because they were taken at an unusual angle (Philippine crocodile, *Crocodylus mindorensis)*, did not sufficiently show the animal's distinctive features (oriental honey-buzzard, *Pernis ptilorhynchus* and elegant tit, *parus elegans*) or because no informants recognised the species (Isabela Oriole, *Oriolus isabellae*). The limitations of quantifying indigenous knowledge are presented in the discussion.

Results showed that men could more easily identify species than women, with an average of respectively 18 against 11 correct answers (with a maximum score of 27). Also, adjusted for gender, age positively corresponded with test score ($F = 30.525$ with $p < 0.00$, see fig. 4.2), showing that the ability to identify animals increases with age.

Fig 4.2. Scores on the animal identification test



Learning about animal taxonomy seems to start at an early age: the test only included children from age 7 and up, and test scores of the youngest age-group (6-10) varied from 5 to 16 correct answers. Highest scores (20 or more correct answers) were given by males between the ages of 16 and 40. This corresponds with this group's frequent trips to the forest through participation in hunting and fishing trips. Too few elderly informants took part in the test to conclude at what age the learning process slows, although results suggest that for men, most knowledge is acquired before the age of 25. Women could identify less animals and their learning process seems to expand over a longer period of time. This might be explained by the fact that women less often to go deep into the forest and because unlike hunting, their primary livelihood activity of subsistence gathering does not focus on animal species.

Household tasks

Anak of both sexes are treated equally in many ways, although girls are expected to help with household chores more often. Among the first chores that children help out with are collecting water and firewood. Both boys and girls from the age of 3 where observed carrying small water containers (of about 2 litres) or collecting small twigs as firewood. The youngest ones often followed and imitated older siblings in these tasks. No physical assistance or detailed instructions were observed. Later, bigger jerry cans and larger pieces of wood are collected and at this time a slight division of gender appears; although both tasks can be performed by both genders, collecting water is done more often by women, firewood is more often collected by men.

In several families chores are rotated between all children; for example, the first one to wake up in the morning makes the fire, the second collects water and the third cleans the dishes after breakfast. Some chores however, seem to be more gender-specific; washing clothes and weaving are typical women's activities. Girls accompany their mothers when laundering from as early as their third year, observing and later assisting their mother. From the age of 10, girls are expected to do the laundry alone.

Weaving abak

Many types of baskets are used around the house to hold rice, clothes or other items. These baskets, collectively called *abak*, are woven from the palm-like leaves of *bidiyo* (*Pandanus sp*.) and other plant species. Girls start to learn how to weave *abak* from around the age of 6. Knowledge transmission appears to be mostly vertical; from mother to daughter. It is likely that knowledge about weaving is also transmitted between siblings, however, this was never observed.

First, the girl is familiarized with the baskets, by seeing them around the house and observing her mother weave. Then, she imitates her mother in the easier steps of weaving the centre part of the basket; the corners and edges are harder and are learned later. When a error is made, the mother simply takes over to correct it. Banana leaves are often used as practice material, since they are easier to fold and abundant around the settlement. When the learner can faultlessly weave the centre, the banana leaves are replaced by *bidiyo* and the entire task complex is practiced with help of the mother. She can become an equal to her teachers through experimentation, trying out different patterns and decorations (step 7). It can take several years before the learner is experienced enough to make faultless baskets that are good for sale, the youngest experienced weaver we met was around the age of 18.

Cultivation

Swiddens or *uma* are usually in close proximity to the settlement and children can play in and around them during the day. They are often taken into the fields while parents, grandparents or older siblings work the land. This enables caregivers to combine child rearing with cultivation and enables children to observe this activity. Transmission about knowledge of cultivation is oblique, although most knowledge transmission occurs within the same household. Plant cultivation is learned along with the season; first children help cleaning the land with their own small machete, then they are given their own seeds to plant and cover in pre-made holes and later they help harvest 'easy' crops like pepper, *pechai* and tomato. This introduction to cultivation all happens around the age of 5, after which the learner continues to learn for some years, cutting bigger plants, creating planting holes themselves and harvesting also root crops, corn and rice.

Whether a child can perform all tasks of cultivation depends on his experience but also on physical strength. The different tasks are performed by both sexes, but because of their strength, boys seem to help with cleaning the *uma* more often, whereas girls are more active in planting and harvesting.

Spiritual knowledge

Spiritual knowledge is learned in a long process. During childhood children are already told about the presence of spirits (*anito*) in the forest and learn how they should behave towards the forest by observing their parents. Nestor Alieyo from Gabgab tells us about how boys learn to make a *wari* (offering) when they enter the forest to hunt: "They will do it when they hunt alone, because they have seen me do it many times and know it's important. I don't need to tell them."

On two occasions, we observed the making of a *wari* to the *anito*. In both cases, offerings of glutinous rice, coffee and tobacco were made to ask an *anito* to cure an ill family member. The rituals were performed by the sick individuals and although at both occasions their adolescent children were asked to help prepare the glutinous rice (with boys husking the rice and girls helping with the cooking), nothing was explained to them.

When asked, adults and adolescents told us that they learned about rituals only by observing their parents and other adults. In the case of making a *wari*, children are sometimes allowed to join their parents to the place where the ritual is performed (in these cases this was an *uma* close by the settlement). However, as children and adolescents in many cases are scared of *anito* and the rituals surrounding these spirits, they rarely do so. Loyda Magas from Gabgab (age 13): "My parents never explained to me how you should make a *wari*. I only know what to say because I've heard my father talk during the *wari*: he yells to the *anito* really loudly!"

4.5. Iteptep

We encountered a ritual that has not been described in the literature before, but is closely related to the coming of age of boys. This ritual, called *iteptep* or *teptep*, is performed when a boy catches his first *alingo*.

A boy's first *alingo* catch is followed by a small ritual in which the boy is softly tapped on the shoulder with a pig leg. The performer of the ritual usually is an older man and an experienced hunter; often the father, but it can also be any other man who has gone through the *iteptep* himself. *Iteptep* can take place in the forest when the *alingo* was caught during a multiple-day hunting trip, or inside the house after the boy has carried his catch home. It is however a private ritual, which only involves the tapper and the young hunter and does not serve a wider audience. *Iteptep* is traditionally performed when a bow and arrow are used for the hunt, but nowadays the ritual also takes place if the *alingo* is killed with a *diposporo* (matchgun). However, catching an *alingo* with a *silo* (snaretrap) does not result in *iteptep*, because catching animals by trapping is seen as a group effort. "Even if it is my *silo* that caught an *alingo*, other people helped catching the animal because we all check each others' traps." (Romel Chavez, Diwagden)

Some people believe *iteptep* brings luck (*suwerte*) to the young hunter. As Marshal Impiel from Gabgab puts it: "We believe that if we do this, the boy will shoot an *alingo* every time he goes to

hunt." However, others say it is merely a way to encourage the boy to go hunting more often, by rewarding him after his first catch. One boy who had just received *iteptep* told us the ritual made him proud and made him want to hunt again.

The extent to which *iteptep* is performed throughout different Agta watershed groups is unclear. All families in Kamarasitan and Diwagden confirmed its performance, whereas in Gabgab only one hunter told us that the ritual is still in use.

Iteptep is strictly speaking not a coming of age ritual, in the sense that the hunter does not enter a new life stage. But although after *iteptep* the hunter is not yet regarded as fully skilled, having been part of the ritual is a condition before being allowed to marry: one step closer to the next stage in life (see also chapter 5).

We found no similar rituals or other coming of age rituals for girls, although a girl must be proficient in digging up root crops before she is ready for marriage. However, there seems to be no precise moment in which this proficiency is reached.

5. Hunting

5.1. Mangaliduk

Hunting takes up a central place in Agta life and culture. Hunting trips can last up to 5 days, during which the hunters make camp in the forest. The most hunted mammal is the *alingo* (*Sus philippinensis,* Philippine warty pig). Other game animals include the *ugsa* (*Cervus mariannus,* Philippine brown deer), *sunggo* (*Macaca fascicularis,* long-tailed macaque) and to a lesser extent the more rare *bitatawa* (*Varanus bitatawa*, Northern Sierra Madre forest monitor), *mutid* (*Paradoxurus hermaphroditus,* common palm civet) and *musang* (*Viverra tangalunga,* Malay civet). However, Agta state that due to wildlife scarcity hunting is decreasingly productive, as was earlier shown by Griffin and Griffin (2000:334) and Minter (2010:127).

Traditionally, Agta hunt using a bow (*busog*) and arrow (*pana*), commonly referred to as just *pana*. However, since the early 1990s Agta have started using the *diposporo*, a fire weapon they make themselves, using matches as gunpowder. Table 5.1 shows the use of hunting tools in the research group compared to tools observed by Minter (2010). During the research, we witnessed only two families in the studied group who owned a *busog* and *pana*. Although three informants (17.6% of 17 hunting men) claim they still occasionally use the *pana* for hunting, we never witnessed this. In chapter 5.2 the current-day use of the *pana* and the transition to the *diposporo* will be discussed in more detail. Informants from the current research group denied using pig blasts, stating that this tool is only used by hunters from other ethnic groups.

Agta refer to hunting with *diposporo* or *pana* with the term *mangaliduk*. Catching *alingo* with *silo* (snaretraps) also occurs on a large scale. In this case Agta lay out a large number of traps (numbers of up to 300 traps were reported, although this data should be handled with care because it seems to be overestimated) made from various types of wooden twigs and rope throughout the forest. Although hunting with *silo* is very common, it seems to take up a less prominent role in Agta culture. This chapter will focus on the practice of *mangaliduk* only.

Table 5.1. Hunting tools in past and present

Name of tool[1]	Type of game[1]	Used from 2002-2007[1]	Currently used in research group
Bow (*busog*) and arrow (*pana*)			
Unbarbed arrow (*pana*)	Small and large game	Yes	No
Barbed (*garaygay*)	Large game	Yes	No
One component (*eblog*, *bigiw*, *bahe*) (Rai 1982; Reed 1904)	Macaques and other small game	No	No
One component (*pana*) (Reed 1904)	Birds and bats	No	No
Gun			
Match-gun (*diposporo*)	Small and large game	Yes	Yes
Air-gun	Small and large game	Yes	Yes
Trap			
Snare trap (*silo*)	Wild pig and deer	Yes	Yes
Snare trap (*pangate*)	Jungle fowl	Yes	Yes
Spear traps (*bilatik*, *takdik*, *kalawat*) (Rai 1982; Reed 1904).	Small and large game	No	No
Rattan loop trap (*bélaybay*), cage trap (*salakumba*), lasso-type ropes (*biklog*) (Rai 1982)	Python, jungle fowl and other unspecified birds	No	No
Sticky latex (Rai 1982)	Perching birds	No	No
Dogs	Locating, cornering and driving large game	Yes	Yes
Rubber slingshot	Small and large game	Yes	Yes
Blast	Wild pig raiding swiddens	Yes	No

[1] Based on Minter 2010:119.

5.2. The cultural value of hunting

The importance of hunting and its cultural value can be seen on several levels. First of all, hunted animals are a source of protein and fat. *Alingo*, *ugsa* or other hunted animals do not form a regular part of daily meals, but once an animal is caught by one of the group members, every household in the settlement receives a share. As also described in Minter (2010:125), the rest of the catch is sold or bartered in neighbouring villages, providing much needed monetary income or rice. Hunting is an important part of a boys life from a young age, as will be described more in the paragraph on learning patterns.

The cultural value of hunting can also be deduced from various rituals and beliefs that surround the practice *mangaliduk* (but not hunting with silo), such as the *iteptep* ritual described in chapter 4. Other rituals surrounding hunting involve removing bad luck that can obstruct successful hunting. Bad luck can be achieved in many ways. When part of the hunting group fails to join a hunt, or when a hunter touches the wrong plant such as *salagu* (unidentified species) the hunters have to be purged from bad luck. This can be done by placing twigs on the forest floor, making symbols that avert bad luck.

Minter (2010:114-115) already described the perceived influence of forest spirits on hunting success. The importance of propitiating these *anito* were confirmed by many hunters that we spoke: it was often stressed that a hunter's chances of catching depend as much on skill as on luck and help from *anito*. Hunters must therefore perform several rituals, such as offering small bits of rice or other foods upon entering the hunting grounds and asking the *anito* to "allow us to catch today, so that we can provide for our family". Informants from all studied settlements confirmed to perform such offerings and this small prayer to please the *anito*.

Later in life, being a skilled hunter is a valued asset of a man. Women say that for a marriage partner, they prefer a man who is a good hunter. A man is expected not to marry before he can hunt, so that he can provide meat for his family. Also, when an Agta man wants to marry, it is considered tradition that he brings the girl's parents an *alingo* as a wedding gift. This way, he can show his parents that he will be able to provide for his family. In addition, the man is supposed to prepare the meat for the wedding ceremony.

Box 1. No marriage before you can hunt!

Palanan Impiel is the father of three sons and two daughters. His two oldest sons are of marrying age, and Boyog, the second son, is in love with a girl from a neighbouring village and wants to marry her. Palanan however, does not allow him to marry yet: "Boyog cannot get married yet. Rodel [the oldest son who is considered to be a skilled hunter] is a better hunter than him and he is not even married yet! Rodel is really the breadwinner of the family and catches often. Boyog is good, but often comes back empty handed."

Box 2. The marriage proposal of Pokis and Estilita.

Pokis Layugan, who currently lives in Kamarasitan, had fallen in love with Estilita the moment he met her. He always loved to visit her in her home settlement Kamalaklakan whenever he had the chance, but could not openly court her, since his parents did not like Estilita. She was not aware of his feelings, and rumours were spread that Estilita was in love with someone else. Heartbroken, he left his home to join the New People's Army[1] (NPA). After several years of service, Pokis found out that Estilita still had not married yet, and he decided to take his chances. He left the NPA and went to Kamalaklakan to court her. When he learned that she returned his feelings, Pokis went into the forest and hunted down a large *alingo*. This he gave to her parents as a gift and to show them he could take good care of their daughter. They told the parents of their love for each other and got engaged that night.

For the wedding, it was Pokis' job to provide the meat. At least two *alingo*, several *igat* and other fish were needed to serve all guests, so together with his brother, Pokis hunted and fished until they had enough food. Estilita collected as much *ilos* as she could find to serve with the meat.

Men and women in all settlements agreed that a man should learn to hunt before he can get married. In Gabgab, we encountered one couple that had married before the husband caught his first *alingo*. In this case the parents of both partners did not oppose the marriage, but said that it would have been better if the man had learned to hunt before marrying, so he could provide for his family. The married woman said that she did not mind, as her husband was still learning and would be a skilled hunter soon.

Pana or diposporo?

Hunting with a *pana* is seen as one of the key features of Agta culture. However, different reactions to the question whether their children should learn to use the *pana* were heard. Out of 16 informants, some say it is important for their sons to learn to use the *pana*, because of its cultural importance (12.5%) or because they see the *pana* as a backup for when the *diposporo* cannot be used (18.8%). Those in favour of still teaching the *pana* to children where all male. Marshal Impiel, Gabgab: " It is still important for our children to learn to use the *pana*, because this is the method we used before. It is important for Agta culture". Roger Lingan, Kamarasitan: "What if you are out of

[1] The NSMNP is known to be a hiding place for militants of the New People's Army, a communist party who fought the national government. Many Agta (either voluntarily or forcibly) joined the NPA at the height of the conflict, between the 1970's and 1990's (Minter 2010:41).

bullets, or you cannot afford to buy new matches? Then you should be able to shoot using a *pana*, to provide for your family." However, most informants (68.8%) see no need for boys to learn to use the *pana* anymore. The *diposporo* is preferred above the *pana* because it is more powerful and because where arrows sometimes get stuck in foliage, bullets pierce through bushes more easily. Still, four of these informants explicitly stated that whether their children will learn to use it depends on their own interest; the father will teach them only if they want to.

In the case of the importance of hunting for marriage, hunting with a *pana* or with a *diposporo* is valued equally. Women do not expect their future husbands to hunt with a *pana*, because they are aware that this is extremely difficult. As Unos Lingan from Kamarasitan puts it: "The taste will be the same."

We observed no Agta under the age of 30 that had learned to hunt with the *pana*. Already fallen out of use, it can therefore be expected that this technique will disappear from the studied group.

5.3. Actors and pathways of knowledge

Almost all men participate in hunting, with the exception of young children, school-going children and old men, and at this time and in the current research group hunting is an activity only performed by men. Estioko-Griffin and Griffin (1981) reported Agta women being active hunters, but their participation was already less frequent in 1985 (Griffin and Griffin 2000:334). Minter (2010:113) found no women involved in hunting in the 2000's. We met two older women who claimed to have hunted when they were younger, but at the time of research no women participated in hunting and no women under the age of 45 ever had.[2] Reasons found by Minter, such as wildlife scarcity and unavailability of hunting dogs, were confirmed in the current research group, but do not fully explain why only women (and not men) have stopped hunting.

Some Agta stated that logging has led to the change of vegetation in the forest and the increase of spikey plants, making it physically strenuous to navigate to the forest. Women are claimed not to be strong enough. A last reason proposed lies in a social change in the area. We were told that after incidents of rape by loggers, army soldiers and other men, women are scared to encounter men who could pose a threat, and therefore do not go deep into the forest alone. This

[2] One woman (age-group 21-25) stated she joined hunting trips when she was around the age of 15; she did not carry a weapon but followed the dogs and called the men when they had found an *alingo*.

could be an additional factor that withholds them from hunting. The frequency of which these arguments were used is shown in table 5.2. However, the possibility should be taken into account that because of its sensitive nature, the last argument (fear of rape) was underreported.

Another possible explanation is that women's lack of participation in hunting is an example of a more general change in gender roles that might have occurred amongst the Agta.

Table 5.2. Why women do not hunt anymore[1]

Argument	**Frequency**	**Percentage**
Wildlife scarcity	3	18.8
Unavailability of hunting dogs	3	18.8
Change in vegetation	5	31.3
Fear of rape	1	6.3
Explanation unknown	4	25.0
Total	16	100.0%

[1] Data was obtained from a total of 13 unstructured interviews, in which several respondents named more than one argument.

Both vertical and oblique learning pathways can be found in hunting. Fathers are the primary teachers; usually they accompany their son on his first hunting trip. However, a boy can choose to join any hunting trip with any men from the settlement, and can therefore choose with whom he goes. Also, since hunting parties often consist of a larger group, the boy can learn from multiple teachers at once. Teaching is however said to occur mostly from the older to a younger generation, and not so much between peers.

5.4. The learning process

Hunting is considered to be the most difficult activity in Agta life. The learning process consists of learning various different steps and years of practice. Young boys are encouraged to play with hunting weapons from a young age, playing with slingshots, small bows called *eblog*, bamboo guns and toy guns made from wood. In Gabgab, boys around the age of 10 that are interested in learning to hunt can go into the forest with a hunting party (at this stage not carrying a weapon). First, he only joins as far as the hunting-camp waits and guards the camp. Inexperienced hunters often get

assigned tasks, such as keeping the fire going or building a *pinanahang*. Around this time he also practices shooting targets with a *debomba* (airgun). Targets can be stationary objects; banana shoots are often used, but also small birds around the camp.

Below is explained how the tracking method of hunting, seemingly the most used method amongst this group, is learned.[3] Information about the tracking method was achieved from unstructured interviewing of four experienced hunters and semi-structured interviewing of nine individuals. We were not able to observe the hunters further into the forest than the hunting camp, because this would result in hindering or even completely obstructing the hunt.

After a few months, the learner can follow the party further into the forest. There are many tasks that need to be learned. Learning where the *alingo* and other hunted animals can be found and recognising tracks are essential in finding the prey. The former can be learned from storytelling and explanation from a teacher, whereas the latter is shown during the hunt. Footprints and tracks are smelled to find out whether they are old or new; this is called *magahob*. Fresh tracks smell like newly ploughed soil, something the learner is already told before, but he experiences for the first time when the older hunters show him the tracks. When fresh tracks are spotted, the hunters will start to walk slowly and quietly: *paglakad*. This step is learned soon after the learner joins the hunt for the first time. When the *alingo* is spotted the experienced hunters crawl very slowly towards their target, making sure not to break any twigs: *magahogkos*. At this stage of the hunt, the youngest hunters stay behind, because they are not able to move quietly enough. This is however an opportunity to observe the hunt from close by. After this is observed several times, the boy tries to get closer to the game each time.

He can only learn to perform the entire task complex after building his own *diposporo*. Generally, although this rule can be bent when necessary, hunters use their own weapons that they built themselves. Learners from around the age of 16 can be seen spending hours carving wood and forging metal to create their *diposporo* in their homes. It takes weeks before the weapon is finished, but the boy is rewarded with a next step in the learning pattern: the shooting. Romel Lingan, Kamarasitan: "I taught myself how to build a *diposporo*; I made mine by myself by just trying it out and also looking at other men's weapons. It took a few weeks to finish it, but I'm proud that I made it." From the moment he has his own gun, the young hunter forms part of the hunting team and performs the entire complex. The person who is the closest to the animal is the one that shoots,

[3] Other hunting methods include ambushing and stalking (Minter 2010:121).

which means that once the learner has sufficient skill in *magahogkos*, he can occasionally try to kill the prey.

At the same time, individual experimentation plays an equally important role in learning to hunt; learners are encouraged by their fathers and other teachers to go into the forest alone after they own a *diposporo*. This allows him to practice finding tracks, *magahob*, *paglakad* and *magahogkos* alone and to develop personal style.

From iteptep to proficient hunter

As explained before, the hunter is rewarded with the *iteptep* ritual when he catches his first *alingo*. But after receiving the *iteptep*, he is not directly seen as an equal to the older hunters. The experienced hunter Roger Lingan of Kamarasitan makes a comparison with an army battalion: "He [the learner who has received *iteptep*] is not a trainee anymore, he is a soldier. But I am the commander, he still has to listen to me and follow my orders when we hunt in a group." Only after several more years of practice and after coming home with a catch regularly, the hunter is said to be regarded as an equal partner to the instructor. However, older hunters are still hierarchically above younger hunters within the same hunting group. The elders will choose the hunting grounds, give orders to the youngest in the group and make decisions regarding camp locations, where to hunt and when to go back.

Hunting and going to school

As for boys in Gabgab, boys from Kamarasitan and Diwagden go on their first trip into the forest around the age of 10 as well, but from then on the learning process slows dramatically compared to Gabgab. Those who go to school during the day only sporadically join hunting trips. For example, Noel Layugan from Kamarasitan (age 14) had not joined a hunting party further than the camp in the forest yet. School-going Itoroy Impiel (age 15) only rarely went hunting, whereas his one year older brother Boyog, who does not go to school, had built his own *diposporo*, joined the hunt regularly and already shot some small game (photo 5.1).

Photo 5.1. Young hunters Boyog, Rodel and Romel pose with their *diposporo*, Kamarasitan, February 2015

6. Fishing

6.1. Magbattek

Fishing or *magbattek* is done mostly during the summer months, because during the rainy season the water is often too cold for humans as well as fish species, which are said to hide under rocks when the water temperature is low. The tool that is used most for fishing is the *bakal*, a small metal spear with a rubber firing system, together with goggles (*anti-para*), which are sometimes homemade from wood and glass shards. The *bakal* is used for catching various different species (see table 6.1.), whilst shellfish are collected by hand. To a much lesser extent, other tools are used. In Gabgab a speargun (also called *bakal*) was observed; this weapon is only used by adult men. The *battik* consists of a metal barbed point tip attached to a wooden pole and is used only for hunting *igat* (*Anguilla marmorata*, giant mottled eel). Only once we observed the use of roasted fish as bait for catching *igat*, a technique that Rai (1990:54) refers to as *magmalik*.

Fishing can take place close to home, as most Agta settlements are situated close to a large stream or river. When the weather is good, children go in and out of the water whenever they please, combining fishing with play. Also, groups can go on one- or multiple-day fishing trips, which take place further from the camp, usually upstream and deeper into the forest. Whilst fishing close to the camp often results in only a few small fish, these bigger trips are aimed at larger catches.

6.2. The cultural value of fishing

Fishing is a livelihood activity that is very frequently performed. In summer, fishing is done on a day-to-day basis, sometimes several times a day. At this time, children can be found in and around the water for most part of the day, and fishing also takes place after nightfall. In Gabgab, fish catches also generated some income through selling (part of the) catch in nearby villages.

Unlike hunting, Agta informants claim fishing is not difficult and can be done by anyone. We observed the use of the *bakal* not only by Agta, but also by fishermen from other ethnicities. However, non-Agta fishermen in the studied area use nets more often, where Agta rely mostly on the *bakal*. Also, non-Agta neighbours consider the Agta to be the most skilled at using this tool.

6.3. Actors and pathways of knowledge

Fishing is an activity done by both sexes and Agta from different age-groups, although women seem to participate less often when they are of marrying age and when they have children. A fishing party normally consists of a few *amay* and *ulito*, sometimes *madiket* join as well. Fishing can take place individually or by working in teams, depending on the fisher's preference and the type of fish that is aimed for.

When asked, most Agta say they learned fishing from their parents. Parents were indeed occasionally observed to fish with their children, but much more often, children seemed to learn from older siblings (horizontal transmission): fishing parties close to the settlement often consist of younger and older children going together. These groups can be of mixed gender, although during fishing the boys and girls usually separate to different parts of the river (photo 6.1).

In Gabgab, older boys (from age 14 and up) and to a lesser extent girls also join fishing trips with adult men, learning from them. The members of a fishing party are not necessarily of one family, but can consist of people from different households, sometimes even from other settlements. Also, fishing parties' compositions change constantly. This suggests that pathways of knowledge about fishing can be oblique in addition to horizontal. However, as is explained below, learning how to fish is much more an individual process that also occurs when learners fish alone.

6.4. The learning process

Anak are familiarized with fishing at a very young age; because fishing is often done close to the house, they can easily observe others doing it.

Whilst children do learn a lot from imitating peers and siblings, fishing seems to be learned mostly by doing and by first catching easier species, and slowly moving to fishes that are harder to catch. The first species that they catch are *pisepis* (*Melanoides maculate*, shellfish), which are easily grabbed from the shallow parts of the river by hand and do not require swimming. Also before they can swim well, they start using the *bakal* to catch *pellang* (*Rhinogobius spp*.) and later *bungsilan (Rhinogobius spp.)*; species that stay at shallow parts and move slowly. More difficult fishes to catch are tilapia (*Oreochromis mossambicus*) and *bangkok* (*Clarias batrachus*, walking catfish), and the most difficult also most valued catch and is said to be the *igat* (*Anguilla marmorata*, giant mottled eel). Being able to catch these species depends on swimming technique and strength. Learners

should be able to shoot whilst swimming with their legs and swim against the current. Also courage is needed to swim in the deep and darker parts of the river, so these species are caught at a later age. The use of the *bakal* is never really explained to learners and solely learned by observation, imitation and trial and error (photo 6.2).

Photo 6.1. Children of a mixed age and gender fishing party show their catch, Gabgab, March 2015

From pisepis to igat

Tables 6.1 and 6.2 illustrate the order in which children learn to catch species, but also show that differences between genders exist.[4] In childhood and early adolescence, children of both genders

[4] Data was collected through structured interviewing, in which we asked informants at what age children learn to catch certain fishes and which children of had already caught these species. In addition, we systematically recorded the composition and catches of 17 fishing trips in February and March 2015, during which 32 fishermen participated.

catch the same species. The easy-to-catch *pellang* is not highly valued and therefore disregarded by older fishermen.[5] During adolescence, men specialise in catching more difficult species, whereas women continue to catch *burokos* and *bungsilan*. *Igat* is exclusively caught by adult men. After marriage, women participate in fishing less often and focus on easy fish species and *pisepis*.

Fishing after school time

Children in Gabgab had more time to practice fishing during the day than those in the other studied settlements, who fished only on school-free days or in the late afternoon. During observation, school-going children seemed to catch more easy species than children in Gabgab, but since fishing did not occur on the same river, it is unclear whether this is due to their skills in fishing or to differing conditions of the two rivers. [6]

Table 6.1. Age at which fish species are first caught

Agta name	**Scientific name[1]**	**English name[1]**	**Approximate age first caught**
Pisepis	*Melanoides maculata*		4
Pellang	*Rhinogobius spp.*		5
Bungsilan	*Rhinogobius spp.*		6
Burokos	*Glossogobius celebius*	celebes goby	6
Dalag	*Channa striata*	mudfish	8
Bangkok	*Clarias batrachus*	walking catfish	8
Tilapia	*Oreochromis mossambicus*	tilapia	10
Igat	*Anguilla marmorata*	giant mottled eel	13

[1] Scientific and English names based on Doornbos (2008:67)

[5] In this thesis, the term fisherman is used to describe both male and female individuals that participate in fishing.

[6] Kamarasitan and Diwagden are located in the Disulap river watershed, whilst informants from Gabgab had settled on the banks of the Catalangan river.

Table 6.2. Fish species caught in February and March 2015

Age-group	Species caught by both genders	exclusively by men	exclusively by women
1 – 5	*pisepis*	-	-
6 – 10	*pisepis, pellang, bungsilan, burokos, dalag, bangkok*	-	-
11 – 15	*pellang, bungsilan, burokos, dalag, bangkok, tilapia*	-	-
16 – 20	*dalag, bangkok, tilapia*	*igat*	*bungsilan, burokos*
21 – 25	*dalag, bangkok, tilapia*	*igat*	*bungsilan, burokos,*
26 – 30	*dalag, bangkok,*	*tilapia, igat*	*pisepis*
over 30	*dalag, bangkok,*	*tilapia, igat*	*pisepis*

Photo 6.2. Dominique watches his older brother Arthur as he straightens his *bakal*, Kamarasitan, March 2015

7. Subsistence gathering

7.1. Magpuron

A study by Garcia and Acay (2003) on plant-use of the Agta showed that they collect many plant species for their own use, with numerous purposes such as herbal medicine, food, fuel, household material, ritual and in trade. The most often-collected food items consist of fern shoots, wild tubers and yams, fruits and sporadically honey (Minter 2010:150-3). Of collected food types, this chapter will focus mostly on the gathering of root crops, because this was observed on several occasions. However, information on other products collected for subsistence will also be given where available. Table 7.1 shows the root crops that were collected during our time in the field.

Table 7.1. Root crops collected from January through April 2015

Agta name	**Scientific name**[1]
Ilos	*Dioscorea filiformis*
Segday	*Stenomeris dioscoraeafolius*
Sigig	*Dioscorea cf. esculenta*
Bukiang	*Dioscorea cf. hispida*
Balo	*Rubus fraxinefolius*

[1] Based on Minter (2010:151).

Garcia and Acay (2003:78-81) have identified 144 different plant species used for medicine by Agta, for example for numerous illnesses, wounds, bone fractures and other health issues. We found that our informants used plant stems, leaves, roots, flowers and in many cases extracts of plants in herbal medicine. Plants needed for medicinal purposes are collected when needed. Some could be found close to the studied settlements, whereas for others, informants would go deep into the forest.

Transect walk

To test the distribution of medicinal knowledge amongst the research group, we walked a transect through the forest and asked informants to point out plant species that are used in medicine or for consumption and state their name and use. Test scores were calculated by awarding one point for stating either a name or a use, and two points for giving both a name and use of a plant (see chapter

3). The limitations of this method will be examined in the discussion. All participants were from Kamarasitan and Diwagden and out of the 17 informants from different age-groups, 9 were male (52.9%). Together they pointed out 44 different plant species.

An important finding is the large variance in knowledge that exists within the research group. Of those plant species that were pointed out by more than one informant (n=34), many are ascribed two or more different names and uses, which is illustrated in table 7.2. Further results of the transect walk will be discussed in paragraph 7.3.

Table 7.2. Variety of names and uses of medicinal plants reported (in percentages)

	One name	**2 or more names**	**Total (n = 34)**
1 use	14.7	17.6	32.4
2 or more uses	23.5	44.1	67.6
Total	38.2	61.8	100.0%

7.2. The cultural value of gathering

Minter (2010:148) found that not much time is invested to gathering for subsistence (with numbers from less than 1% to 4% of time investment measured in 2004-2005) and that gathering for barter and trade is increasingly important. However, in the way hunting plays an important role in the lives of boys and men, the subsistence gathering, and specifically the gathering of root crops, seems to be of high cultural value for Agta women. Collecting root crops was often named first when women were asked which activities they do most often and which activities are important to learn for girls. Similar to the fact that men should learn to hunt before they wed, women are expected to marry only after they have achieved sufficient skill in collecting root crops. Estilita Layugan from Kamarasitan told us that in the way men are expected to catch *alingo* for the wedding feast, women should gather enough *ilos* and other root crops for the guests. *Ilos* seems to be the most valued root crop, since 71.4% of the women named it first when asked which wild root crops they collect (n=14).

During our time in the field, root crops seemed to be gathered less often in Kamarasitan and Diwagden than in Gabgab, although no cause for this could be found; men and women in all settlements seemed to value them equally.

Commercial gathering was, with the exception of rattan gathering in Gabgab, not an activity that was done on a large scale during our time of research. Four out of five families in Diwagden participated in the collection of swiftlet nests and in summer, informants reported that honey collection is a helpful addition to monetary income when sold in nearby villages.

Medicinal plants are used for many illnesses, sometimes on their own and sometimes in combination with medicine received from midwives or doctors. Informants stated that for most ailments, medicinal plants work just as well as treatments prescribed by doctors. Their choice for one or the other was a matter of personal preference and availability. Herbal medicine seemed the preferred choice in preventing diseases such as *subisubi* (beriberi, vitamin B1-deficiency), cold body[7], child illnesses like measles and other skin problems. It is also used in maternal care. For example, we were shown plants that help the women lose her placenta or that stop heavy bleeding after giving birth. Both newborn babies and breastfeeding mothers are given drinks that contain plant extracts (sometimes mixed with gin or breast milk) to ensure the baby grows strong and healthy. Also, medicinal plants are often used to disinfect wounds and treat infections.

7.3. Actors and pathways of knowledge

Fruit and other non-timber forest products are gathered more often in between other tasks, such as on the way back from hunting, fishing or root crop gathering trips, or after coming back from neighbouring villages. These are collected by men, women and children, although women seem to be the main providers.

Girls usually learn from their mothers and older sisters or cousins, who will go out on collecting trips together. Also, girls (often relatives) of the same age-group were seen helping each other in digging up roots; the knowledge pathway of collecting root crops is both vertical and horizontal.

Medicinal knowledge

Medicinal plants are collected by both men and women. Unlike in other livelihood activities, Agta were quite open in naming individuals who are more knowledgeable in herbal medicine. To find the

[7] Informants named many plant species that cure 'cold body', a sickness during which the patient experiences a cold feeling in the stomach, often accompanied by bowel problems, such as diarrhoea or constipation.

distribution of medicinal knowledge between genders, we asked married couples whether the husband or the wife had the most knowledge about medicinal plants. Table 7.3 shows the frequencies in which husbands or the wives were reported to have the most knowledge.

Table 7.3. Reported experts of medicinal knowledge in married couples

Dominating gender	**Frequency**	**Percentage**
Husband	3	23.1
Wife	8	61.5
Equal knowledge	2	15.4
Total	13	100.0

During the transect, men pointed out an average of 13.0 plants and women an average of 10.3 plants. Knowledge about the uses of plants differed per gender. Of the 34 plants that were pointed out by more than one informant, 11.4% was only known by men, whereas 5.9% were only named by women. However, it is likely that these results are biased due to the higher mean age of male (26.8) over female informants (21.6). In further analyses, the data concerning these 34 species were used to compare knowledge of individuals.

What the results from the transect show, is that the knowledge about plant-uses is in some cases gender specific. Only female informants pointed out *sapined* (unidentified species), a remedy for irregular menstruation, whilst only men told us about the *salagu* (known to some Agta as *agmata*, unidentified species), a plant which is used to treat wounds but also brings bad luck when touched during a hunt.

Informants of the same household were in 20.6% of the cases (n=34) significantly more likely to state the same use of a species than members of different households. This suggests vertical and horizontal transmission between members of the same family and fits the expectation that pathways of knowledge occur mostly form parents to their own offspring rather than to other children. Married informants stated that they share much information about medicinal plants with their husbands and wives, and that this transmission of knowledge goes in both directions.

No such correlation was found between age-group and use, although this could also be due to the low number of informants.

7.4. The learning process

Gathering root crops

In Diwagden and Kamarasitan, no *anak* or *madiket* were observed gathering wild root crops. The oldest *madiket* was around 14 years of age, followed by girls around the age of 8, and their mothers stated that they had some experience gathering. However, none of these girls joined trips during our research period. It is unclear why these children did not participate in gathering root crops whilst their peers in Gabgab did; this could be because gathering was performed less often in these Diwagden and Kamarasitan.

Because we did not observe any girls gathering in these settlements, the following information is based on findings from Gabgab.

Children are often asked to collect from the *uma* whatever vegetables are needed, including cultivated root crops such as *kamote* (*Ipomea batatas,* sweet potato) and *gabi* (*Colocasia esculenta*, yam). This task introduces them to food procurement of root crops in a familiar setting close to home (photo 7.1).

A mother is usually the first to take her daughter into the forest to collect root crops. From the age of 8, the learner observes the mother and is given simple tasks, such as helping to carry crops back to the settlement. Further steps include taking over the digging for crops already found by the mother.

Being proficient as a collector of root crops depends on several things. First, the collector should have sufficient knowledge about how to locate plants, and also how the root grows. The only moment in which we observed a teacher to verbally instruct a learning girl was when showing how to distinguish plants that have edible roots from similarly looking plants. Recognising the plants above ground seems the most difficult step in learning how to collect root crops. When a girl has sufficiently mastered this step, she can join older sisters or cousins into the forest. Then, she must have enough strength to dig them up, since many edible roots are hidden far below the surface. In some cases, holes of more than 1 meter deep must be made to find them. Girls who are still learning often miss one of these assets and can often only collect small roots or parts of larger ones. Only *madiket* and *bakés* above the age of 20 were observed to possess the knowledge and strength to collect large roots. The observation in box 3 illustrates how these collecting trips can take place.

Box 3. Three young women gathering *ilos*

Magdelena Impiel (age-group 21-25) took her younger sister Loyda (13) and her cousin Annalyn (15) to collect *ilos*. After walking some 20 minutes, the group arrived at the collection site; a patch of forest situated between a cornfield and a stream. Here, the group split up, with everyone starting to look for the plant in separate locations about 30 meters apart. There was little communication during the gathering of the plants; occasionally the younger girls called out to notify the others when they had found a root, but Magdalena gathered in silence. Annalyn was already physically quite strong and was able to dig out large crops, she occasionally walked over to help Loyda, who had more trouble. Annalyn helped mostly in physical assistance; there was no talking apart from some complaints about how deep the root grew. Magdalena was only asked for help when Annalyn had found an exceptionally large root that seemed to be stuck between other plants. The three girls dug it out together without substantial communication. Magdalena went back home after approximately 1 hour of digging, whereas Loyda stated: "I don't want to go home if I don't have enough *ilos*, so we have to keep looking." She and Annalyn continued to look for root crops and returned after 1 hour and 45 minutes with a large *sigig* (*Dioscorea cf. esculenta*, photo 7.2). On the way back, they picked leaves to chew betel with and collected leaves of *mahabanuang* (*Clerodendron intermedium*), which Loyda's mother had asked the girls to do. The girls did not know what the plant could be used for, but could recognise the species.

This example also shows that the collection of medicinal plants is often combined with other activities, such as foraging, but also hunting or visiting another settlement.

Medicinal knowledge

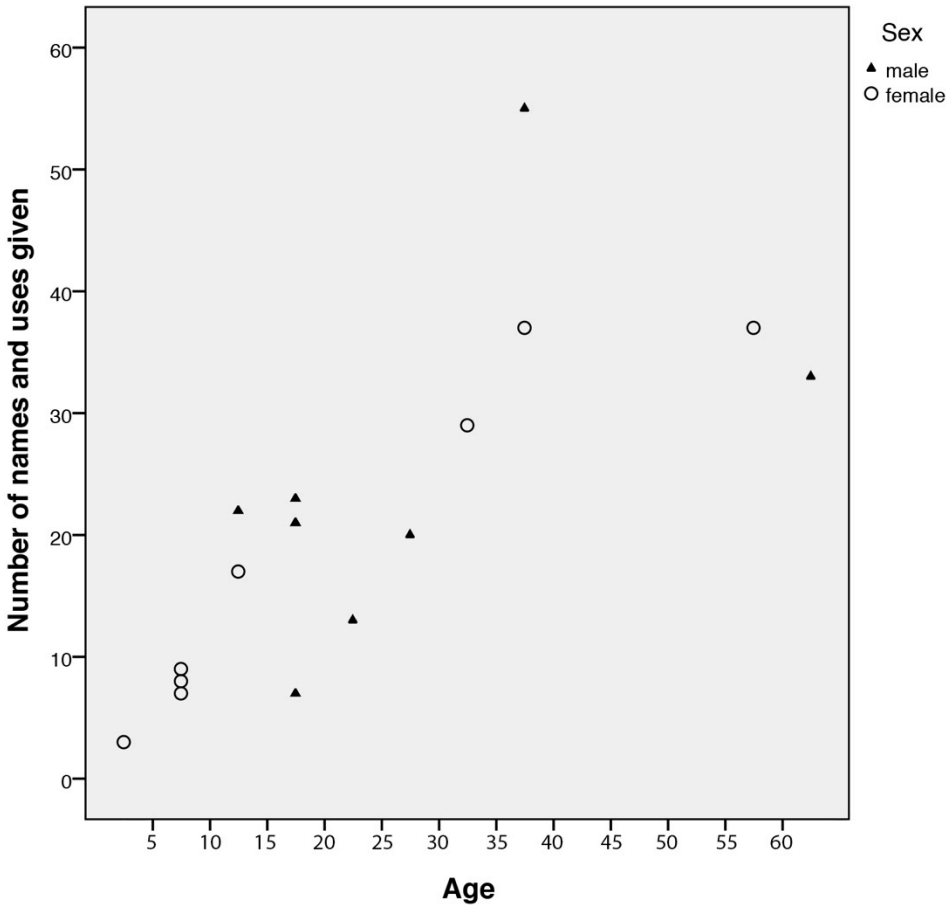
Results from the transect walk show that knowledge regarding medicinal plants has a long learning process that starts when *anak* are around five years of age. The number of plants pointed out steadily increased with age and a linear regression (see fig. 7.1) showed a strong positive correlation between informants' test scores (number of names and uses were given) and age-group ($F=21.495$ with $p<0.00$).

Parents show children plants whilst walking through the forest, but most knowledge is acquired at the time a certain plant is needed: when a person is sick, the parents/mother will show a child what medicine can be used. Older children can be asked to pick medicinal plants when needed. In line with this, some medicinal knowledge appears to be linked to related life-stages. Children often knew

only the function of a plant and not the name. Although knowing what possible uses a plant has does not equal knowing how to use them, this suggests that practical knowledge is learned before theoretical knowledge (about plant names).

In the transect, only parents and children with significantly younger siblings knew the function of *mahabanuang* (*Clerodendron intermedium*) as a cure for infants' bowel problems. Several plants that are given to women after delivery, such as *tikal* (unidentified species) and *kalantas* or *runo* (*Schizostachyum lima*), were only named by men and women already married.

Fig. 7.1. Amount of names and uses given on transect walk.



Most likely the learning processes slows after the age of 35, when individuals are exposed to fewer new experiences. One possible exception in this is knowledge surrounding witchcraft. Only the two male informants above the age of 35 designated the use as protection against witchcraft to certain plants. It is unclear whether this result is due to the small sample size or is caused by gender or age-specificity of knowledge regarding witchcraft. Another possibility is that some informants did not include these uses against witchcraft, because they did not categorise these as medicinal.

Photo 7.1. Janet (age 8) proudly displays the *kamote* she has collected from the *uma*, Kamarasitan, January 2015

Photo 7.2. Annalyn (age 15) shows a large *sigig* the she has dug up, Gabgab, March 2015

8. The influence of schooling on knowledge transmission

8.1. The introduction of formal schooling in Diwagden

One of the biggest social changes that affect Agta life in San Mariano is the introduction of formal schooling closer to their settlements. Although Agta children have been sporadically receiving schooling for several decades, now is the first time that children in San Mariano province receive regular schooling (photos 8.1 and 8.2). In Diwagden, day-care and kindergarten teaching started in 2009, with lessons being given in a local church building. Since 2013, a separate building for day-care and kindergarten was constructed and since this time, grade 1 and 2 are taught in the church. The San Mariano LGU has announced that grade 3 and 4 will be added from next year.

The Agta families in Diwagden and Kamarasitan currently send their children to the school in Diwagden. At the time of research, 16 children regularly attended day-care of which 6 Agta, the others being children of Ilocano, Ifugao and Kalinga descent. The kindergarten class consisted of 15 children, of which 9 Agta (see table 8.1). However, two of Agta in day-care and three in kindergarten had moved with their families and no longer attended class. Gabgab however, is not close to any primary school. Whilst some of the children currently living there received one or two year of schooling when they lived near the barrio San Isidro and others in Del Pilar, none of them went to school during the time of research. Melvin Magas from Gabgab (age 11): "We go to the forest school!"

Table 8.1. School-going Agta of three settlements in San Mariano.

	Number of under 18's	**Number of school-going children during research period**
Diwagden (barangay San Jose)	11	8
Kamarasitan (barangay San Jose)	10	7
Gabgab (barangay Disulap)	15	0

8.2. Social Welfare programs

The Philippine government's Department of Social Welfare and Development (DSWD) implemented several programs to increase education-levels and reduce poverty in disadvantaged families. The

Pantawid Pamilyang Pilipino Program, or 4Ps, is a strategy that works towards these goals through conditional cash transfer.

When participating in the program, a family receives PhP500 for health and nutrition and PhP300 per school-going child per month (with a maximum of PhP1400). The money is received by the "most responsible adult person in the household"; in the observed cases this was always the mother. In order to receive benefits, certain conditions must be followed. One of these is that children between 3 and 14 years of age attend day-care, kindergarten or school for at least 85% of the school days (DSWD 2009:3-4).

In addition to the existing 4Ps-program, the Modified Conditional Cash Transfer (MCCT) for Homeless Street Families (HSF) and Indigenous Peoples (IP), known as the IP-program amongst the studied group, is aimed at families that were excluded from the 4Ps program (DSWD 2014), as will become clear below.

The 4Ps and IP-program in practice

In the studied group, only 42.8% of all families with children in Diwagden were part of the 4Ps-program (n=7). Another 28.5% of the mothers in these families indicated they were under the IP-program. However, at the time of research, the IP-program was just starting up and no families had received payment yet. No families in Gabgab were part of either of the programs.

For the 4Ps program, mothers were chosen as the most responsible adult who received the money. They would go to San Mariano once every two months to collect the benefits, the amount of which according to them depended mostly on whether they had been present at meetings and health check-ups. The teachers noted children's school attendance, but in practice all enrolled children received the full amount. The participating Agta families were satisfied with the 4Ps-program, although they said it was difficult to meet the requirement of attending all meetings. We noted collecting the money was also a task with much hassle. The mother would have to travel back and forth to San Mariano, a journey that cannot be done within one day. On arrival there, the LGU-officials would often tell them that the money would arrive later that week, causing the women to go home empty handed (but with travel costs) and having them try again a few days later.

Many Agta complained that it was unfair that some families did and others did not take part in the program. They claimed that the unfortunate families were not present when a government official came to Diwagden to make an inventory of the eligible families, and were therefore excluded from the program.

Photo 8.1. The combined class of kindergarten and day-care, Diwagden, January 2015

Photo 8.2. Agta children make their homework, Kamarasitan, March 2015

8.3. Schooling for a better life?

When asked for reasons why Agta parents send their children to school, different answers came up. All parents hope for a better life for their children and future generations, although different expectations of the future are held, some of which seem more realistic than others. Many parents believe that sending their children to school will benefit the whole family, because their sons and daughters are thought to have a good job prospect (with examples of possible jobs varying from teaching to becoming a doctor, pilot or even a pop star).

Perhaps more realistic arguments can be found in the parents who claim that their children will be less discriminated against when they can read and write. Palanan Impiel (Kamarasitan) explained that he sends his youngest son (the first of the family to attend school) to the market, because this is the only one of the family who can calculate how much money he should receive back when buying goods. Here, it seems that families believe that education will reduce inequality and discrimination against Agta.

In Gabgab reasons for not sending children to school included having insufficient funds. Sitang Alieyo, a mother of four who had previously sent her children to school in Del Pilar, said she could not afford school supplies. She claimed she would send her children to school "if they received benefits." However, practical reasons also played a large role: the father of the same family (Nestor Alieyo, Gabgab) argued that the family had to move to the area in which they live now in order to guard previously claimed land for cultivation. The school was simply too far to walk to every day.

Most Agta children in Kamarasitan and Diwagden enjoy going to school and are eager to learn to read and write. They were excited when leaving for class in the morning and seemed enthusiastic to make their homework, or to show us how well they could write.

The children in Gabgab were divided in their opinions on going to school. Whilst 3 out of the 7 children of school-going age (42.8%) eagerly wanted to learn to read and write and felt deprived when they had to move away from the school, the others were less sad about not receiving education. They claimed to be uninterested in formal education. Many of the previously school-going children in Gabgab had experienced bullying when they attended school in San Isidro or Del Pilar and therefore did not want to go back.[8]

[8] Bullying also occurred in Diwagden, although Agta children there seemed less affected by this and stated they found support from each other.

Cancelation of classes

Although officially school was planned for every working day of the week, classes were only given on 48.3% of the school days (n=31, excluding national holidays). In each case the reason for cancellation of classes was absence of the teacher. Possible reasons for her absence were meetings in other villages, arguments between teachers and the school board, or the fact that it was a holiday the next day. Also, because the teacher walks to the school from another village each morning, she is often delayed, with classes starting one or two hours after the planned time. This is a well-known problem throughout rural Isabela Province.

8.4. The impact of schooling on indigenous knowledge

From mobile to sedentary lifestyles

As described before, traditionally Agta have a mobile lifestyle. Settlements are located on the border of the forest and directly next to a river or stream, close to the areas in which livelihood activities take place. In the rainy season, they stay mostly in one place, living in small houses, whereas during summer time, they move with their *pinanahang* along the rivers (Minter 2010:83-4). The Agta families in Diwagden are less mobile and have lived in the same area for some time. Here, forest has made place for small-scale agriculture; the Agta dwellings in Diwagden are surrounded by corn- and rice-fields and are in close proximity of the village and its school. Walking to the forest border takes more than 20 minutes, and hunting areas are located a half-day's walk from the settlement. Whilst various factors play a role in this choice for a more sedentary lifestyle, living close to the school is one of the arguments Agta parents use in explaining their choice for remaining at the current location. However, the Agta families living in Gabgab at the time of research were still mobile when their children went to school in Del Pilar and San Isidro. This illustrates that mobility does not have to obstruct school attendance.

Schooling and indigenous knowledge

The impact of formal schooling on different indigenous knowledge domains appears to be connected with time investment. When asked about learning skills such as hunting, fishing and gathering, most parents argue that schooling does not affect how their children learn to fish and gather, since these are activities that can be done after school and in the weekends. This seems to be

true for activities such as subsistence gathering and fishing, which can take place fairly close to the settlement and do not necessarily take up much time.

However, the school-going children in Diwagden and Kamarasitan spend a lot less time on fishing and gathering then the children in Gabgab. In the latter settlement, boys and girls above the age of 10 are expected to help with livelihood activities, whereas the contribution to food procurement from the children of the former is mostly limited to fishing after school. This could be a consequence of both school attendance and living further away from the forest. Because the gathering of wild root crops was less common in Diwagden and Kamarasitan, no conclusions can be drawn about the effect of school-attendance on the learning of this knowledge domain.

In the case of hunting, parents are less sure about the effect of schooling on their children's learning. In Gabgab boys from the age of 12 and upward would regularly join hunting trips and start to learn about hunting. Parents in Diwagden explained that this could not be the case for their children, because they were going to school and did not have time to go hunting. Even though classes are often cancelled, this does not enable school-going children to join hunting trips, because it is rarely announced in advance. Hunting trips often take several days and because the cancelation of class is rarely announced, longer trips cannot be planned; children are never sure whether the teacher will be there the following day.

Of the interviewed parents and guardians in Diwagden and Kamarasitan, 27.2% (n=11) argue that their children will not have to depend on hunting anymore, because their education will enable them to provide for their families by other means. Also, 18.2% fear that the rapid reduction of forest cover will make hunting no longer feasible.

A majority of the parents (54.5%) stated that it is still important for their children to learn to hunt, although they were unsure about how this can be combined with formal education. Whilst everyone agreed that their children could learn to hunt if they were interested, we found no examples of school-going boys who were learning to hunt at the time of research. One father planned to teach his son during the summer holiday. However, besides the fact that the summer holiday (April to June) is not the best hunting season, observation and informant's descriptions of the learning pattern of hunting show that it takes around eight years to become a proficient hunter. Although it is too soon after the move of these families to make definite claims about the effect of this new sedentary lifestyle on knowledge about the forest environment and livelihood skills, it can be expected that as long as Agta regularly attend school, they will spend less time in the forest environment.

9. Discussion

In this chapter, I will summarize the findings from the current study on the Agta of San Mariano and compare these to earlier literature on indigenous knowledge transmission. Then, the influence of formal education on the transmission of indigenous knowledge amongst the Agta is summarized. Furthermore, I will reflect on the methodological difficulties that were met when measuring indigenous knowledge.

9.1. Indigenous knowledge and the Agta

Indigenous peoples have over time developed a vast body of knowledge about their surroundings. This indigenous knowledge (IK) is defined by Ellen and Harris (2000) as knowledge that is inextricably linked to a specific time and place, orally transmitted and based on empirical knowledge. An important aspect of IK is that it is constantly changing in relation to changes in the environment. IK has intrinsic value as part of cultural identity, can contribute towards the empowerment of indigenous peoples and is in some cases practically useful, for example in biodiversity conservation or poverty alleviation.

Whilst IK is often looked at in terms of loss, Gómez-Baggethun and Reyes-García (2013) argue that it is more useful to look at it in terms of change. Factors that can contribute to changes in IK are migration, government policy, education and market integration.

This study looked into the transmission of IK amongst the Agta, a hunter-gatherer people living in the Sierra Madre Mountain Range of Northeast Luzon (the Philippines). This is a region with a tropical climate and a very high cultural diversity. Also, the Northern Sierra Madre Mountain range is the largest remaining primary forest of the Philippines and holds a large range of endemic and also threatened plant and animal species. The biodiversity of the area is however under threat from logging, agriculture, marine fishing and development projects (Antolin 2003; Masipiqueña 2003).

The Agta are depended on the natural resources of the forest and have an extensive body of knowledge on this environment. About 1,800 Agta live in the Northern Sierra Madre Natural Park (NSMNP), in which they hold settlement and resource use rights due to their status as indigenous peoples. Despite these rights, Agta participation in the park's management is very limited (Minter et

al. 2014). Furthermore, the NSMNP is primarily a park on paper and its rules are hardly implemented in practice.

River-dwelling Agta live in small settlements on the border of the forest. Many of their livelihood activities, such as hunting wild pigs, fishing and gathering fruits, vegetables and root crops, are based on the application of indigenous knowledge. Whilst these livelihood activities remain important in Agta culture (and for Agta identity), new techniques are introduced as well. Some activities, such as hunting, are less profitable due to environmental change, whilst other activities such as the gathering of swiflet nests are increasingly lucrative (Minter 2010).

Not much was previously known about knowledge transmission amongst the Agta. This study addresses the question of what domains of indigenous knowledge are valued amongst the Agta of San Mariano and how this knowledge is transmitted. Research was done from January through March 2015 in in three settlements in the municipality of San Mariano: Diwagden, Kamarasitan and Gabgab (see map 3.1). Formal education has been recently introduced in the Diwagden.

Data was collected using qualitative and quantitative methods. Qualitative methods included semi-structured, structured and unstructured interviewing, observation and a seasonal calendar. This data was encoded during and after fieldwork and evaluated in field reports. Quantitative data from systematic observation, the pebble distribution method, a transect walk and an animal identification test were analysed using (multiple) linear regression, Pearson's chi-square tests and frequency tables.

During this study I have taken great care in following the ethical guidelines provided by the AAA (2012). I was honest and open about the nature and aims of the study and asked for the informed consent of anyone participating in the study.

9.2. Life stages and development through play

Different life stages are recognised amongst the Agta, starting with *anak* (childhood). From around the age of 14 until marriage the terms *ulito* for boys and *madiket* for girls are used, after which a man becomes *amay* and a woman *bakés*.

Although *anak* start helping with household tasks and livelihood activities (such as cultivation) at a young age, they enjoy much freedom and are rarely punished. Gray (2009:505, 510-

4) describes how play as a means of education in hunter-gatherer societies. This seems very applicable to early learning amongst the Agta; livelihood activities such as fishing and gathering are incorporated into play. Playgroups are of mixed age and gender and allow children to learn and develop skills within their proximal zone of development (Vigotsky 1978 in Gray 2011:504).

In addition to the important role he ascribes to play in learning, Gray (2009) compares hunter-gatherer societies to playgroups. He argues that competitiveness is avoided amongst hunter-gatherers, something that is illustrated by two examples from the Agta: naming experts of knowledge domains is avoided (with the exception of experts on medicinal knowledge) and successful skill is not something that Agta boast about. Also in line with Gray's theory (2009:487-8), hunting, fishing and gathering parties are based on voluntary participation and autonomy. Even youngsters can decide upon their activities; adolescents are presented tasks like collecting crops, cultivating the *uma* or joining a fishing or hunting trip, but tasks are taken up voluntarily. These behaviours can contribute to maintaining equality within the group.

However, hunting and fishing parties differ from play groups, since relations in these parties are in fact hierarchical. For example, younger Agta are expected to follow orders from elders during the hunt. Here, the social structure depends on seniority and experience of the group-members, whereas Gray (2009:498-90) names equality and consensual decision-making as characteristics of play groups and hunter-gatherer parties.

9.3. Valued domains of knowledge

Of the many different livelihood activities that Agta pursue, this thesis focussed mainly on hunting, fishing and subsistence gathering, because these were highly valued amongst the research group and were visible at the time of research.

Hunting or mangaliduk

Commonly hunted animals include amongst others the *alingo* (Philippine warty pig, *Sus philippinensis*) and *ugsa* (Philippine brown deer, *Cervus mariannus*). Hunting is regarded as the most difficult livelihood activity that Agta perform and is surrounded by rituals and traditions that mark its cultural value, such as *iteptep* and several spiritual beliefs regarding the chances of success in a

hunt. Also, hunting is part of growing up in the sense that a man should marry only after he is proficient enough to provide for his family.

Although the *diposporo* (matchgun) has largely replaced the *pana* (bow and arrow) as primary hunting tool in the research group, reasons for still teaching boys to use a *pana* are both practical (the *pana* can be used as a backup) and cultural (the *pana* is regarded as part of Agta identity).

Although Agta women participated in hunting until at least the 1980's (Estioko-Griffin and Griffin 1981), hunting is now exclusively performed by men. The exact reasons for why women have stopped hunting are still unclear, but informants suggested several environmental changes that could be related, such as the decrease in wildlife numbers and change in vegetation. Also, the argument that women are scared to go deep into the forest alone might play a role.

Fathers and other male relatives are the ones to teach adolescent boys to hunt. Hunting is learned through cumulatively practicing smaller tasks. A learner then builds his own weapon and practices with a hunting party as well as alone. Even after the shooting his first prey, years of practice are required for a young hunter to peer with his teachers.

At the time of research, school-going boys in Kamarasitan and Diwagden only rarely joined hunting trips compared to their peers in Gabgab, who go through the learning process at a much faster pace due to more practice.

Fishing or magbattek

Fishing or *magbattek* is done mostly with the use of small spears (*bakal*). Men and women of all ages participate in fishing and mixed age and gender fishing parties can fish close to the settlement or deeper into the forest. Fishing is learned horizontally when children go out to fish with siblings and other peers, but individual experimentation seems crucial in developing fishing skills. Children start with catching easy species and by trial and error and slowly shift to fishes that swim faster, deeper or are more difficult to find.

Where during the summer months Agta children from Gabgab participated in fishing many times a day, *anak* in Diwagden and Kamarasitan fished less often, only after school-time or on free days.

Subsistence gathering or magpuron

Of the various products the Agta collect for subsistence, gathering root crops such as *ilos* is a valued women's activity. Girls learn through vertical and horizontal transmission (from their mothers and

older sisters and cousins). Much is learned through observation and imitation. Skill depends on knowledge about where plants grow, how they can be recognised and how the root itself grows, but also on strength that is needed to dig out the root. Proficiency is reached in late adolescence or early adulthood.

Observations of young women gathering root crops were limited to Gabgab; in the other settlements we only observed gathering by married women. It is unclear whether this difference in participation was due to a low sample size or to social or environmental differences between the settlements.

Agta use many different medicinal plants for a range of diseases and ailments. Whilst women are most often named as experts on medicinal plants[9], medicinal knowledge also appears to be gender-specific. For example, female Agta know which plants that can be used for curing irregular menstruation, whereas men have more knowledge on plants related to curing wounds. Also, more knowledge was shared between members of the same family than between households, which suggests transmission occurs mostly between close relatives.

Knowledge about medicinal plants is gained throughout the years and learned when needed. Some uses of plants are therefore only known to people that have surpassed a certain life stage and the learning process regarding medicinal knowledge seems to slow after the age of 35.

9.4. Processes of knowledge transmission

The way in which indigenous knowledge is transmitted amongst the Agta varies per knowledge domain. Several, but not all characteristics of knowledge transmission as described by Ruddle and Chesterfield (1977:6-7, see chapter 2.1) can be recognised amongst the Agta.

Knowledge and skills are indeed gender and age specific. Examples of this are women's specialisation in collecting root crops and men's expertise in hunting, but gender differences also occur within a certain knowledge domain, such as in medicinal knowledge.

Skills are taught by members of the appropriate sex, at the site on which they are performed. Certain kinfolk, such as parents, are primary instructors in all studied knowledge domains, although extended family members are also involved in teaching.

[9] Medicinal knowledge was the only studied knowledge domain in which Agta acknowledged different levels of expertise between individuals (see chapter 7.3).

Unlike Ruddle and Chesterfield (1977) suggest, there are no punishments as result of inadequately performing a task; nor are rewards used as part of the learning process. Only the *iteptep* ritual was sometimes described as a 'reward' for the first successful hunt.

A very visible similarity to Ruddle and Chesterfield's theory is that knowledge and skills were in all domains acquired through learning and cumulatively practicing a sequence of steps that together form the complete task. This is particularly apparent in the learning process of hunting: after familiarisation through storytelling, boys learn to recognise tracks, stalk the animal and build their own weapon. Only then can they practice the whole activity of hunting. In subsistence gathering girls start with helping to carry the crops, then follow by helping with digging. Only later they learn to recognise the plants. Similarly, tasks such as cultivation and weaving are already introduced in early childhood and include stepwise learning. Development in terms of strength and also courage largely determine the speed in which children learn.

Structure and autodidactics in acquiring indigenous knowledge

The most striking difference between learning amongst the Agta and the discussed theory is the structure Ruddle and Chesterfield (1977) recognise as characteristic of indigenous knowledge transmission. They state that tasks are learned systematically and that fixed periods are set aside for teaching (characteristics 2 and 6, see chapter 2.1). However, Agta regard knowledge transmission and teaching as an integral part of growing up, they do not think in terms of teaching methods. No fixed periods are set aside for teaching, since children learn by joining and helping in livelihood activities all the time. Although learning is stepwise, the distinction Ruddle and Chesterfield's stages of learning make between performing the entire task complex with assistance, under supervision or as an assistant to the instructor is not visible in knowledge transmission amongst the Agta, which again illustrates that learning processes are less structured than suggested.

These findings are closely related to the importance of observation and imitation in knowledge transmission. From learning to swim to hunting *alingo*, observation and imitation are the most common learning techniques; verbal instruction is seldom used in any of the studied knowledge domains. Particularly when it comes to spiritual knowledge these techniques seem the main means through which knowledge is transmitted, but also swimming, collecting water and weaving *abak* are learned primarily through observation and imitation. Primary knowledge about the forest

environment and its biodiversity is learned through accompanying parents on short trips into the forest.

Pathways of knowledge

All pathways of knowledge transmission described by Reyes-García and colleagues (2009) are found amongst the Agta. However, individual experimentation is a crucial method in learning about any knowledge domain. Young Agta are encouraged to practice activities by themselves at any stage in their learning process. This is most visible in fishing, where pathways of knowledge transmission are largely horizontal between peers, but learning depends mostly on individual experimentation through practice and play. *Anak* teach themselves by starting to catch slower species that swim in shallow parts of the river and then shifting to fish that are more difficult to catch. In hunting, fathers are primary teachers and also uncles and other male adults are involved, making the teaching process vertical as well as oblique. But learners are also sent into the forest on their own, to develop their tracking and stalking techniques and create a personal style.

9.5. The influence of formal education on indigenous knowledge

The studied Agta have the opportunity to attend school regularly only since the introduction of formal education in Diwagden in 2009. The Philippine's government's *Pantawid Pamilyang Pilipino Program* and the Modified Conditional Cash Transfer for Homeless Street Families and Indigenous Peoples (known as 4Ps and IP-program), are aimed at increasing education levels through conditional cash transfer, with school attendance of children as one of the conditions. This has resulted in 15 Agta children going to school.

Parents and children's expectations of what schooling will bring them are sometimes unrealistically high, with some thinking that schooling will lead to a job as doctor or pilot. However, valuable skills such as reading, writing and simple maths might help decrease discrimination. Reasons for not sending children to school are practical: lack of funds and big distance to the schools are the most important arguments heard in Gabgab, where none of the children attend school.

Amongst other social factors, education may consolidate parents' decisions to follow a sedentary lifestyle close to the school, whilst their distance to the forest border increases as a result of

deforestation through small-scale agriculture. Living further away from the forest means children interact less with the forest environment, which is likely to result in a decrease in knowledge about the forest environment.

This study shows that schooling has an impact on the learning of indigenous knowledge, although not equally strong for each domain, because school-going children have less time to engage in livelihood activities. Fishing and gathering seem less affected by school attendance, because these activities can take place after school time or in the weekends. However, observations indicate that knowledge surrounding hunting is affected by school attendance because of the time-investment needed for this difficult learning process. Most Agta parents still want their sons to learn to hunt despite going to school, although it is not clear how this will take form. At the time of research no school-going boys were actively involved in hunting, unlike their non-school-going peers who joined hunting trips frequently.

As described by Abidogun (2015), governments often use education as a means to assimilate ethnic minorities into their country's national culture and although well intentioned, the 4Ps and IP program could be regarded as a repetition of assimilation policies.

Whilst it is too soon to draw final conclusions on the impact of formal education on indigenous knowledge amongst the Agta, the current findings suggest that formal education will lead to erosion of knowledge surrounding hunting. Together with other social processes, schooling may contribute towards the assimilation of Agta into the larger Philippine culture (although this itself is very much heterogeneous).

9.6. Measuring indigenous knowledge

After comparing the main findings concerning the transmission of indigenous knowledge to the literature, I will now reflect on methodological issues met during fieldwork. The current research includes two methods to quantify indigenous knowledge. In the animal identification test we asked informants to identify animals from pictures and during a transect walk some 100 meters into the forest informants pointed out all medicinal or edible plants that they could recognise along the way. Whilst many studies have used similar tests to quantify indigenous knowledge (Reyes-García et al.

2007), this research amongst the Agta exposed difficulties that arise from such methods, which led me to explore the various limitations that narrow the possible interpretations of measuring IK here.

What is measured?

Knowledge about animal taxonomy and botany are only two examples of the different aspects of environmental knowledge and the generalizability of these aspects of IK to all knowledge about the forest environment is therefore limited. Environmental knowledge includes countless different aspects, like navigation and survival skills (such as finding food, water and shelter, or anticipating extreme weather) as well as knowledge about flora and fauna.

Whilst in the frame of the current research animal identification through pictures was the most feasible method to measure informants' knowledge about animal taxonomy, its ability to measure this aspect of environmental knowledge was limited.

A first limitation can be found in language; Agta from different watersheds in some cases use different names for the same species. Although we tried to adjust for this, it is possible that some answers that were analysed as incorrect actually followed from linguistic differences rather than wrong identification.

Secondly, a gender bias may have resulted from this tests' focus on animal identification: interaction with animals is more likely to follow from animal-focused but male-dominated livelihood activities such as hunting and fishing than from the typically female activity of gathering. Using hunters' knowledge to find correct answers may have also led to a male bias, since the informants we worked with were all male.

Thirdly, pictures can be difficult to interpret for people who are not used to printed materials (Ng'weno 2010). Using this method might lead to a measurement of how well informants can interpret two-dimensional images rather than their ability to identify animals by appearance.

A last, more general limitation of the used method is that ethno-zoology and ethno-ornithology are not confined to taxonomy based on visual appearance. They also include knowledge about animal behaviour, habitats, calls, migration and seasonality (Ng'weno 2010; van der Ploeg and van Weerd 2010:127). The absence of these features in the test may have affected the content of and variance between answers. The experience described in box 4 clearly shows the difference between asking about environmental knowledge on-site or outside the forest environment, illustrating the importance of different features used in identification (in this case location and habitat). Most likely the same issues influence testing animal taxonomy by the use of photos.

Box 4. On- and off-site botanical knowledge

On one occasion, we joined several *madiket* on a gathering trip into the forest and asked them to point out medicinal plants that we encountered on the way. In the forest, they happily identified different species and told us about possible uses of these plants. Once back in the settlement, we showed the same girls samples of the plants we had encountered earlier that afternoon in the forest and asked again for their names and uses. Now, the girls could only recall a fraction of the information they gave before. Most likely, this is because information of the surroundings in which the plants were found was missing.

Ng'weno (2010) pleads for inclusion of all aspects that are used in taxonomy when studying ethno-ornithology. I would like to argue the same for testing ethno-botanical and ethno-zoological knowledge amongst the Agta, but also amongst hunter-gatherer societies in general. Although it may be difficult to achieve systematic and replicable methods that use on-site knowledge recall, these are preferred over more indirect methods that use pictures or questionnaires.

Interpreting the results: choosing the 'correct' answers

The transect walk accounted for the importance of location and habitat in ethno-botanics by letting informants point out plants on-site. This method however revealed difficulties in interpreting results from IK-tests, especially when asking the question of what information is culturally 'true' or 'correct'. Several methods of finding the correct information on ethno-botanics are used in previous studies.

D'Andrade (1981, in Romney et al. 1986:314) sees culture as a shared and learned information pool, of which knowledge is distributed and shared between members of a community. The informant consensus model by Trotten and Logan (1986) chooses correct information on the basis of the frequency in which answers are given. The cultural consensus model "is an attempt to make objective the criteria by which we might measure our confidence in inferring correct answers to cultural questions" (Romney et al. 1986:313). In this model, 'correctness' of any culture-related information is also based on the agreement between informants, but here informants who agree on

plant names and uses more often, are regarded as experts. Their answers are weighed more heavily in the analysis.

I have made use of both these methods in interpreting answers to the animal identification test.[10] However, in the case of medicinal plants amongst the Agta, different names of plants can be the result of linguistic differences. Also, whilst the cultural consensus model and the informant consensus model are based on the assumption of one common truth that is the same for all informants, one plant could hold more than one function. In addition to this, it is likely that people from different generations, genders, etc. hold different (but equally 'true') information about the same plant. Although Agta pointed out informants that were knowledgeable about medicinal plants, different experts often knew different names or uses for plants. Therefore, choosing one plant name or use over other given responses seemed not appropriate for this knowledge domain and comparing the amount of names and uses provided seemed more suitable. One limitation of this method is that we had no means of recognising genuine errors, for example in the case that an informant mistook one plant for a different species.

In testing animal identification it did seem appropriate to distinguish between right and wrong answers, because 82% (n = 119) of the answers that we expected to be incorrect could be traced back as names of different species. The remaining 18% were each named by only one or two informants who were not considered experts (such as young children or other informants that were inconsistent in their answers).

These observations and reflections have led me to conclude that, although quantifying IK can be valuable for comparing differences between informants, great care must be taken in choosing methods and interpreting data from knowledge tests.

[10] With the lack of experts named by the community itself, we thoroughly discussed the animal pictures with experienced hunters and weighed their answers more heavily.

10. Conclusions

In relation to these findings, the discussed literature on indigenous knowledge transmission seem to suggest a more strongly structured and organised learning pattern than is applicable to Agta learning. Furthermore, the autodidactic aspect of learning indigenous knowledge amongst the Agta is undervalued. I pose that for Agta and possibly for hunter-gatherer peoples in general, learning indigenous knowledge depends to a very large extent on autodidactic processes.

On one hand, observation and imitation are forms of informal and unstructured learning through vertical, horizontal and oblique pathways. Like Gray (2011) already showed, young children learn through observing and imitating livelihood activities in play and these learning techniques remain important throughout the complete processes of learning indigenous knowledge and skills.

On the other hand, individual experimentation is a form of knowledge acquisition that occurs next to vertical, horizontal and oblique transmission. In some domains of knowledge it is even crucial to learning.

The extent to which the autodidactic processes of observation, imitation and individual experimentation merely *supplement* verbal and physical instruction by a teacher, or *dominate* over these more structured methods can differ between knowledge domains. This is visible in learning patterns of hunting and fishing. In hunting, most learning takes place through vertical and oblique transmission, but in addition to this learners also go into the forest to practice their skills alone. Fishing however, primarily depends on learning by doing through individual experimentation and trial and error.

No final conclusions can be drawn on the effect of formal education on the learning of livelihood activities now, since at this time no Agta children have yet graduated and reached the age at which they are expected to be proficient in these skills. One could argue that after Agta boys finish the schooling that is provided in Diwagden, they are still young enough to start the learning process surrounding hunting, although somewhat delayed. However, whether education is an obstruction or a mere interruption of indigenous knowledge learning processes should be seen in the context of Agta's future aspirations and expectations. Schooling is from an emic perspective a means through which Agta will no longer have to solely depend on traditional livelihood activities such as hunting.

With reluctance I predict that because of the time-investment needed, in the future formal schooling will obstruct learning to hunt, unless a more culturally sensitive curriculum is designed.

10.1. Loss or change?

Should the described process be seen as a form of loss or change in indigenous knowledge? Since indigenous knowledge is by definition never static, Gómez-Baggethun and Reyes-García (2013) argue that IK should be analysed in terms of change rather than loss. In my opinion, this question should be seen in relation to the different values one can attribute to indigenous knowledge. The erosion of knowledge regarding hunting can be seen in relation with (or as a consequence of) the increased pressure on natural resources and the rapid disappearance of the forest environment it depends on. Minter (2010:127) already showed that time spent on hunting has decreased as a result from wildlife scarcity. From the perspective of practical usefulness, and assuming that the Agta's indigenous knowledge can not contribute to countering the rapid deforestation in the Northern Sierra Madre, the process can be explained as a form of adaptation and change.

However, with regard to the intrinsic value of indigenous knowledge to a cultural identity, I would like to argue that when new generations of Agta never learn to hunt, this domain of indigenous knowledge is in fact 'lost'. This way, education amongst other social processes that lead to the assimilation of Agta into the mainstream Philippine culture can contribute to the erosion of indigenous knowledge and identity.

It must be noted that this conclusion should be seen outside the discussion whether or not formal education will be helpful in improving the lives of Agta and alleviating poverty. Minter (2010) has shown that the Agta use diversification of livelihood activities as a way to adapt to social and environmental change, and education and literacy can be seen as a means through which other livelihood activities can be pursued. Population growth, deforestation and increased pressure on natural resources are very real threats to the Agta's current way of life, to which they must adjust. Also, literacy might prove to be a way out of the marginalised position of Agta in the area. But whilst poverty alleviation and loss of knowledge often go hand in hand, IK can also be valuable as a means for development and poverty reduction (Gorjestani 2004). In the light of its intrinsic value and its possible potential for poverty alleviation, biodiversity conservation and other practical uses, the preservation of indigenous knowledge of the Agta should be promoted.

10.2. Limitations of the study

Besides the discussed issues that arise from quantifying indigenous knowledge, the current research was limited in several ways.

Since only a small group of Agta living in one municipality were included, results of the current research cannot simply be generalised to all Agta in the Northern Sierra Madre, but should be seen in its local context. Because the research group only consisted of 70 individuals, the sample from which qualitative and quantitative data was collected was too small to make conclusive statements regarding pathways and distribution of knowledge. Although most of the quantitative data includes all inhabitants of the studied settlements, the number of informants and thus the power of statistical analyses were low. Whilst no hard conclusions about Agta in general can be drawn from quantitative data, these do describe the current situation in the research group.

An availability bias may have also played a role in the findings and whilst a seasonal bias was avoided where possible by drawing up a seasonal calendar of knowledge and skill domains that are important in different seasons, research in different times of the year might give new insights in knowledge transmission. For example, a study during the school holidays from April to June would determine to what extent learning of IK takes place during summer holidays.

10.3. Suggestions for future research

After this research has shown the significance of autodidactic learning techniques amongst the Agta of San Mariano, more research should be undertaken to explore whether individual experimentation, observation and imitation are equally important in learning indigenous knowledge amongst other hunter-gatherer societies. Also, no definite claims on the impact of schooling on the Agta of this area or elsewhere could be made yet, since formal education has only recently been introduced in San Mariano. Further research on long-term developments of schooling in indigenous communities is needed, to draw conclusions on the effects on transmission of indigenous knowledge.

Programs to promote the use of IK in education have sprung up in different locations; most notably in countries where western majorities and indigenous minorities coexist, such as in New Zealand, Canada, the United States and Australia (Battiste 2002; van Eijck and Roth 2007). UNESCO's

program on Local and Indigenous Knowledge Systems (LINKS) looks to ensure the role of indigenous knowledge in education and has successfully collected IK in books and online databases (UNESCO 2012).

In the Philippines, the Philippines' Response to Indigenous Peoples and Muslim Education (PRIME), was implemented from 2011 through 2014 to improve access and quality of basic education for Muslim and indigenous communities. This program includes the involvement of indigenous elders and traditional leaders in teaching. Three schools in the municipalities Maconacon, Divilacan and Palanan, which hold high Agta populations, were constructed under the PRIME-program (Australian Department of Foreign Affairs and Trade 2014).

Introducing indigenous knowledge in the curriculum of primary education and designing culturally sensitive learning materials could benefit the Agta of San Mariano by allowing them to maintain their traditional knowledge whilst increasing literacy amongst their people. Also, allowing students to miss class can facilitate the transmission of indigenous knowledge, especially when it comes to learning time-consuming, and culturally important skills such as hunting.

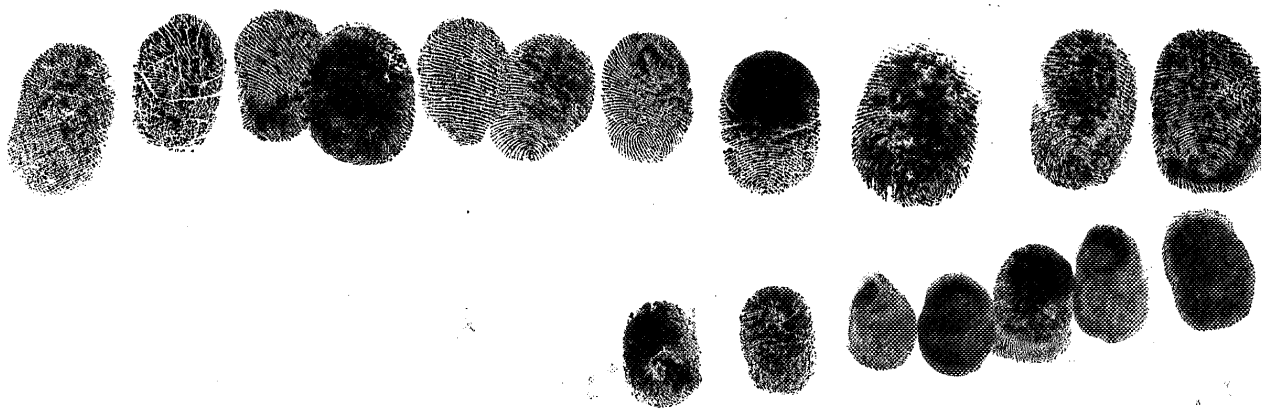
Appendixes

Appendix 1. FPIC

Umvna te amin siyak ne Renee Hagen may saak nga studiyante nga naggapo te nutherlands siyak ket interisado nga maamwan te kasasaad dagite agta ditoy kabanbantayan kayat ko nga maamwan dagite kasapulan yo tatta nang-rura te hunting, panag kalap te lamis ken dagite mulmula ken dagite daddurna nga ganit te agta nga importante kayat ko nga maamwan ~~dagite~~ dagitoy nga banbanag te tallo nga bulan ken agganak ite tent asiding te balay go no oks lang kangaygo. malisarita nak kangaygo ket ibagaygo no anya te salwdsud yo ken kayat ko nga malita no kasano dagite agta ken nagurwan te ammuda nang-rura te expert da kayat ko met nga na video ken na picture te asiding daytoy nga picture ket usanek sak bay nga agawid nak isurat ko dagitoy naamwak ket pakital to ~~dagitoy~~ daytoy te teacher ko ite University.

amok nga matulungan dak ditoy.

agyaman nak kada kayo



Appendix 2 A. Interview: Identifying domains of knowledge

1. What are the most important things that you learned and use a lot in daily life?
   (OR: What are the activities you do the most during the day?)

2. What do you think are the most important things an Agta should know (to be Agta)?
   (OR: What activities are most important for Agta culture?)

If informant is married and/or has children ask question A, otherwise ask B

3 A What are the 5 most important things you want your children to know?

B What skills/knowledge do you think is important when you look for a husband/wife?

For Agta above age of 30 ask question A, for younger Agta ask B

4. A. Are there examples of skills information that you learned, but that you never use anymore or that are not important anymore?

Do young people today still learn these skills?

Why do you think this is not important anymore?

B. Do you know about skills that your parents or grandparents know, but that you have not learned?

Are there others of your age that do know these skills?

Why do you think younger people do not learn this anymore?

Are there things you've learnt, but older people haven't?

For Agta above age of 30 ask question A, for younger Agta ask B

5. A. Are there things young people learn now, but that you never learned?

B. Are there things you've learnt, but older people haven't?

Why did people not do this before?

From who did Agta learn this new thing?

Appendix 2 B. Interview: Pathways of knowledge transmission

Ask all questions about three different domains. First about how the learning process normally goes, then specific for the informant.

1. Do you know how to/Do you know a lot about [skill/domain of knowledge]?

2. How do Agta usually learn this skill?

3. Who usually teaches this skill to a person?

4. Can you tell us more about how you learned this? (step-by-step)

   A not learned

   B learned through observation only

   C learned through hands-on experience

5. Who taught you the most about [domain of knowledge]?

6. Who would you ask if you wanted to know more about [domain of knowledge]?

   (OR: Who of the Agta knows the most about [domain]?)

   Why?

7. Have you taught [domain of knowledge] to other people?

   To whom? *(For age, compare to other children)*

Appendix 2 C. Interview: Reported knowledge and skills

A = not learned B = observation only C = hands-on experience					
	hunting	C1= no catch yet C2= caught small animal C3= iteptep			
	collecting	C1= misses strength C2= misses knowledge C3= proficient			
	weaving	C1= not proficient C2= knows all patterns			
Name informant					
Hunting					
èblok					
pana					
bird silo					
silo					
debomba					
diposporo					
dogs only					
Fishing					
swimming					
collecting pisepis					
dalag					
tilapia					
igat					
Collecting					
umok					
ilos					
agal/anibung					
fruits					
Kaingin					
cleaning					
planting					
harvesting					
Weaving (abak)					
Housetasks					
collect firewood					
collect water					
laundry					
School					
until year					
location					
writing					
reading					
maths					

Appendix 2 D. Interview: Perception of social changes

First ask a very open question, to see if the informant already names certain aspects, then probing of more specific indicators. Make clear that the questions focus on change since the informant was young.

Since you were young,

About migration

1. Do you think more people live in the area close to you?
   What kind of people have moved to the area since you were young?
2. What is your relationship to the people that have moved to the area? Bayanihan?
   Conflicts? Friends?
3. Have you noticed any changes in the relations between Agta and other people in the area?

About formal education

4. Did you go to school when you were young?
   Did any Agta go to school when you were young?
5. Are you in the 4P/IP program?
   Have you received money yet?
6. For what reasons do or don't you send your child to school?
7. What do you expect they will achieve by going to school?
   What kind of job?
   Change in relationships?
8. What do children learn in school?
9. Are there problems or difficulties about the schools?
   How is the relationship with other ethnic groups?
   Are there enough teachers/books/school supplies?
   How is the quality of teaching?
10. How do you think will going to school affect learning other things, like fishing/hunting/abak etc.?

About market integration:

11. Do you go to a market?
    Which markets?

Do you also go to other markets?

What do you buy/sell?

How often do you go?

12. Do Agta go to the markets more often than before?
13. Have the products Agta trade on the market changed?

In what way? Other products? More/less?

What do you trade before and what do they trade now?

Other:

14. Are there any other changes that we have not talked about yet?

Appendix 2 E. Interview: Perception of environmental changes

First ask a very open question, to see if the informant already names certain aspects, then direct questions more to specific indicators.

Since you were young,

1. Have you noticed any big changes in the nature of the area that you live in?

About the abundance and distribution of wildlife:

2. Has the amount of wildlife changed in your area since you were young?

   Ask for detailed information and about different species:

   wild pig (alingo), wild deer (ugsa), monkeys (sunggo), moniter lizards (bitatawa) , birds (which species?), fish (species?)

3. Do animals live in the same places as where they used to live when you where young?
4. Why do you think this has changed?

   Probes: illegal and commercial logging, agriculture, population growth, more people using the forest

5. How has this affected you personally and the Agta in general?

   Compared to the past, is it now more or less difficult to hunt?

6. Do Agta now hunt differently? Different methods or not at all?

   Specify for different species (also fish!)

   Do Agta now learn different things because of these changes?

About forest cover and composition:

7. How has the forest changed since you were young?

   forest cover, composition (types of plants)

   What do you think is the cause for this? *Specify logging*

8. How has this affected you personally and the Agta in general?
9. How has this affected gathering forest products?

   S*pecify for plants for food, construction and medicinal plants*

10. Do Agta now learn different things because of these changes?

About water quality:

11. Has the cleanliness of the water changed since you were young?

12. Are there rivers that have dried up?
13. How has this affected you personally and the Agta in general?

    Probe: look for clean water in different places?
14. Is there a change in amount/types of fish? And fishing methods?

About nature conservation policies:

15. What have you noticed of changes in rules regarding the forest? (*probe: NSMNP)*

    How do these rules affect you personally?

    How do these rules affect the Agta?
16. Are there any activities you did in the forest that are not allowed anymore?
17. Are there methods of hunting or fishing that are not allowed anymore?
18. Are there forest products that you are not allowed to collect anymore? (probe: timber, certain plant species)
19. Do Agta now learn different things because of these changes?

Other:

20. Are there any other changes in the nature of the area you live in, that we have not talked about yet?

Appendix 3. List of animal species used in animal identification test

	English name	Scientific name[1]	Local names
1	Gold-crowned flying fox	*Acerodon jubatus*	*Payag, paniki*
2	Monitor lizard	*Varanus sp.*	*Bitikao, bitatawa*
3	Philippine crocodile[2]	*Crocodylus mindorensis*	*Bukahod, bukarod, buwaya*
4	Northern giant cloud rat	*Phloeomys pallidus*	*Daluyan*
5	Malay civet	*Viverra tangalunga*	*Mosang, musang*
6	Common Palm civet	*Paradoxurus hermaphroditis*	*Mutid, ales*
7	Philippine deer	*Rusa Marianna*	*Ugsa*
8	Great egret	*Ardea alba*	*Kabulo, kanaway, uduk[1], dalugog*
9	Philippine eagle owl	*Bubo philippensis*	*Bulayo[1], bukao*
10	Rufous Hornbill	*Buceros hydrocorax*	*Kalao[1]*
11	Oriental honey-buzzard[2]	*Pernis ptilorhynchus*	*Kali[1]*
12	Philippine eagle	*Pithecophaga jefferyi*	*Aguila[1]*
13	Philippine Bulbul	*Hypsipetus philippenis*	*Patet[1]*
14	Black-naped oriole	*Oriolus chinensis*	*Patodilao[1]*
15	Isabela oriole[2]	*Oriolus isabellae*	-
16	Yellowish white-eye	*Zosterops nigrorum*	*Bubonsalag[1]*
17	Whiskered pitta	*Pitta kochi*	*Kongkong[1]*
18	Slaty-legged crake	*Rallina eurizonoides*	*Tokling, tangiok[1]*
19	Elegant tit[2]	*Parus elegans*	*Amalaplosan[1]*
20	Black-naped Monarch	*Hypothymis azurea*	*Bouseswet[1]*
21	Indigo-banded kingfisher	*Alcedo cyanopectus*	*Darwen[1]*
22	White-throated kingfisher	*Malcyon smyrnensis*	*Salaksak[1]*
23	Philippine dwarf kingfisher	*Ceyx melanurus*	*Darwen[1]*
24	Stork-billed kingfisher	*Pelargopsis capensis*	*Batao[1]*
25	Large-billed crow	*Corvus macrorhynchos*	*Wak-wak[1], uwak*
26	Green racquet-tail	*Prioniturus luconensis*	*Mambag[1]*
27	Green-faced Parrotfinch	*Erythrura viridifacies*	*Tragui[1], dignas*
28	Luzon Water-Redstart	*Phyacornis bicolor*	*Sesenlit*
29	Yellow-vented bulbul	*Pycnonotus goiavier*	*Pagekpak[1], periperuka*
30	Cream-bellied fruit dove	*Ptilinopus merrilli*	*Bihole[1]*
31	Red-crested malkoha	*Phaenicophaeus superciliosus*	*Sekat[1]*

[1] Based on van der Ploeg and van Weerd 2010.
[2] Excluded from analysis.

Story 1. "How we killed an *alingo* with a knife"

When Nestor Alieyo (around 40 years old), Buridik Impiel (20), Giovanni Impiel (23), Bongbong Magas (18), Ariel Magas (23) and Karod Alieyo (16) came back from a fishing trip upstream, the people from Gabgab were surprised to see that they were carrying an *alingo*. Everyone gathered around to see the catch and once all had sat down with some coffee, we listened to Nestor's story: "It had just turned dark and we were sitting around the fire, waiting for the moon to come so we could fish. We were talking and making quite some noise, but suddenly Bongbong heard a sound. I told him to get a flashlight and he looked for animals, but didn't find anything. It was probably a *carabao* [*Bubalus bubalis*, domestic water buffalo]. When we heard another sound, more people got up to look, but we kept thinking it was nothing. Then suddenly we saw the *alingo*, but it quickly ran away. Everyone sat down again, only Bongbong kept looking. His flashlight was almost dead, but then he suddenly the animal made a sound again and it was really close! Everyone heard it so they ran towards the sound, carrying only knives since they didn't bring a *diposporo* on a fishing trip. Bongbong and I got really close and the *alingo* attacked him and got away again! Luckily Karod was right behind us and he hit the *alingo* with a big stone in his hand. It ran towards Giovanni who stabbed it with a knife, Ariel stabbed it again and then it fell to the ground. So that is how we caught an *alingo* on a fishing trip. You have to improvise and be fast!"

Story 2. "Too much bad luck"

At night when some elders and children were relaxing around the fire, Marshal Impiel from Gabgab (45 years old) recalled the following story: "I was alone checking some *silo* upstream, and I found a wild chicken in one of the traps. I tied it to my backpack and left it, so I could check some more *silo*. But when I came back, the chicken was gone. I decided to go fishing for *igat* in stead, but now my flashlight stopped working! It was too much bad luck so I decided it was better to go home. That turned out to be a good choice, because the next day I went back and found a big *alingo*. So you see that when you're unlucky, you have to give up and try another time."

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