



A Socio-economic Assessment of
THE HUON COAST
Leatherback Turtle
Nesting Beach Project

(LABU TALE, BUSAMA, LABABIA, AND PAIAWA),
MOROBE PROVINCE, PAPUA NEW GUINEA

BY JEFF KINCH JULY 2006



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ACRONYMS

ADB	Asian Development Bank	KTCGH	Kamiali Training Centre and Guest House
BCRMP	Biodiversity Conservation and Resource Management Program	KWMA	Kamiali Wildlife Management Area
BoD	Board of Directors	KWMC	Kamiali Wildlife Management Committee
BSSE	Bismarck Solomon Seas Eco-region	LILTCP	Lasanga Island-Lake Trist Conservation Project
CBO	Community-based Organization	LLG	Local Level Government
CFMDP	Coastal Fisheries Management and Development Program	MFMA	Morobe Fisheries Management Authority
CI	Conservation International	MOMASE	Morobe-Madang-Sepik
CITES	Convention on the International Trade in Endangered Species	MOU	Memorandum of Understanding
CNA	Conservation Needs Assessment	MTSG	Marine Turtle Specialist Group
DEC	Department of Environment and Conservation	NFA	National Fisheries Authority
EEZ	Economic Exclusion Zone	NGO	Non-government Organization
EU	European Union	NOAA	National Oceanic and Atmospheric Administration
GDS	German Development Service	PIT	Passive Integrated Transponder
GEF	Global Environment Facility	PMV	Public Motor Vehicle
HCLTN	Huon Coast Leatherback Turtle Network	PNG	Papua New Guinea
HEO	Health Extension Officers	RCFDP	Rural Coastal Fisheries Development Program
ICAD	Integrated Conservation and Development	SPREP	South Pacific Regional Environment Program
ICCO	Interchurch Organization for Development Co-operation	TNC	The Nature Conservancy
ISOEA	Indian Ocean and South East Asia Memorandum on Turtles	TOR	Terms of Reference
IUCN	World Conservation Union	UNDP	United Nations Development Program
K	Kina	USA	United States of America
KCPC	Kamiali Conservation Project Committee	VDT	Village Development Trust
KICDG	Kamiali Integrated Conservation and Development Group	VHF	Very High Frequency
KICDT	Kamiali Integrated Conservation and Development Trust	WMA	Wildlife Management Areas
		WMC	Wildlife Management Committee
		WPRFMC	Western Pacific Regional Fisheries Management Council
		WWF	World Wide Fund for Nature

EXECUTIVE SUMMARY

The Western Pacific Regional Fisheries Management Council¹ (WPRFMC) currently funds several leatherback turtle recovery projects in the Western Pacific, whereby participating communities are paid to monitor beaches as opposed to harvesting eggs or turtles. As the leatherback turtle recovery projects actually involve the management of human induced threats and anthropogenic impacts, the WPRFMC contracted the author to assist in understanding the social and economic impacts of the leatherback turtle recovery projects in the participating communities of Labu Tale, Busama, Lababia and Paiawa, which reside along the Huon Coast of the Morobe Province in Papua New Guinea (PNG). The Huon Coast has the largest nesting leatherback population in PNG, and amongst the largest in the Western Pacific.

With the exception of Paiawa, all participating communities along the Huon Coast have experienced an increase in population growth. The decline in population at Paiawa can be attributed to the lack of rural services. All communities have varying difficulties in realizing income opportunities and no regular transport to markets. Cash income is small, irregular, widely variable, and often related to their sub-clan membership. In general, monetary needs fluctuate throughout the year as seasonality of garden productivity, fishing effort, labor requirements and customary needs shift. Results from a socio-economic survey conducted in January 2006 show the range of household incomes to be very high, partly because of variation in household size, with estimates of annual household income ranging between Kina (K) 120-2,580/year².

Leatherback turtles are not normally eaten along the Huon Coast. Where leatherback turtles are killed, eaten and/or traded, this is mostly attributed to communities that once lived in the hinterland but now reside on the coast. At Paiawa, people regularly killed and smoked leatherback turtles and traded the flesh and eggs with mountain peoples residing in the interior for pig meat. Egg harvesting was/is widely practiced. At present, reliance on harvesting leatherback turtle eggs has mostly shifted to the wages generated from the WPRFMC funded leatherback turtle recovery projects.

Historically, there was not a strong need to regulate resource use along the Huon Coast on the basis to avoid over-exploitation, with people having little pragmatic concern for the environment. Resource management practices where they existed were rather directed primarily towards issues of resource distribution and social reproduction, or what could be termed 'cultural' sustainability, rather than towards issues of 'ecological' sustainability, as they were embedded in a larger set of customary practices, which regulates clan membership, inheritance rights, and a host of other social rights and obligations. Thus concepts of conservation, as understood by WPRFMC and NOAA project scientists, conservationists and managers, cannot be demonstrated among the people of the Huon Coast.

Villagers in the participating communities are interested in improving their quality of life and see modern (Western) consumer goods, services and lifestyles as adding to that quality; their particular social context qualifies the way in which they go about exploiting economic opportunities.

Even though monies generated by the leatherback turtle recovery projects are filtering out to the wider kin groups, sub-clans and the general community, the possession of money is still a frequent source of jealousy and conflict, and there are equity issues on the rise.

For the continuation of future activities, the WPRFMC needs to ensure that its position is made clear, particularly since there is a sense amongst participating communities that some members view the WPRFMC as the 'new' pathway to development. This may not be the message, which the WPRFMC has sought to promote, but it is a logical outcome, particularly at Lababia with its previous interaction with the Village Development Trust (VDT) and the Kamiali Integrated Conservation and Development Group (KICDG).

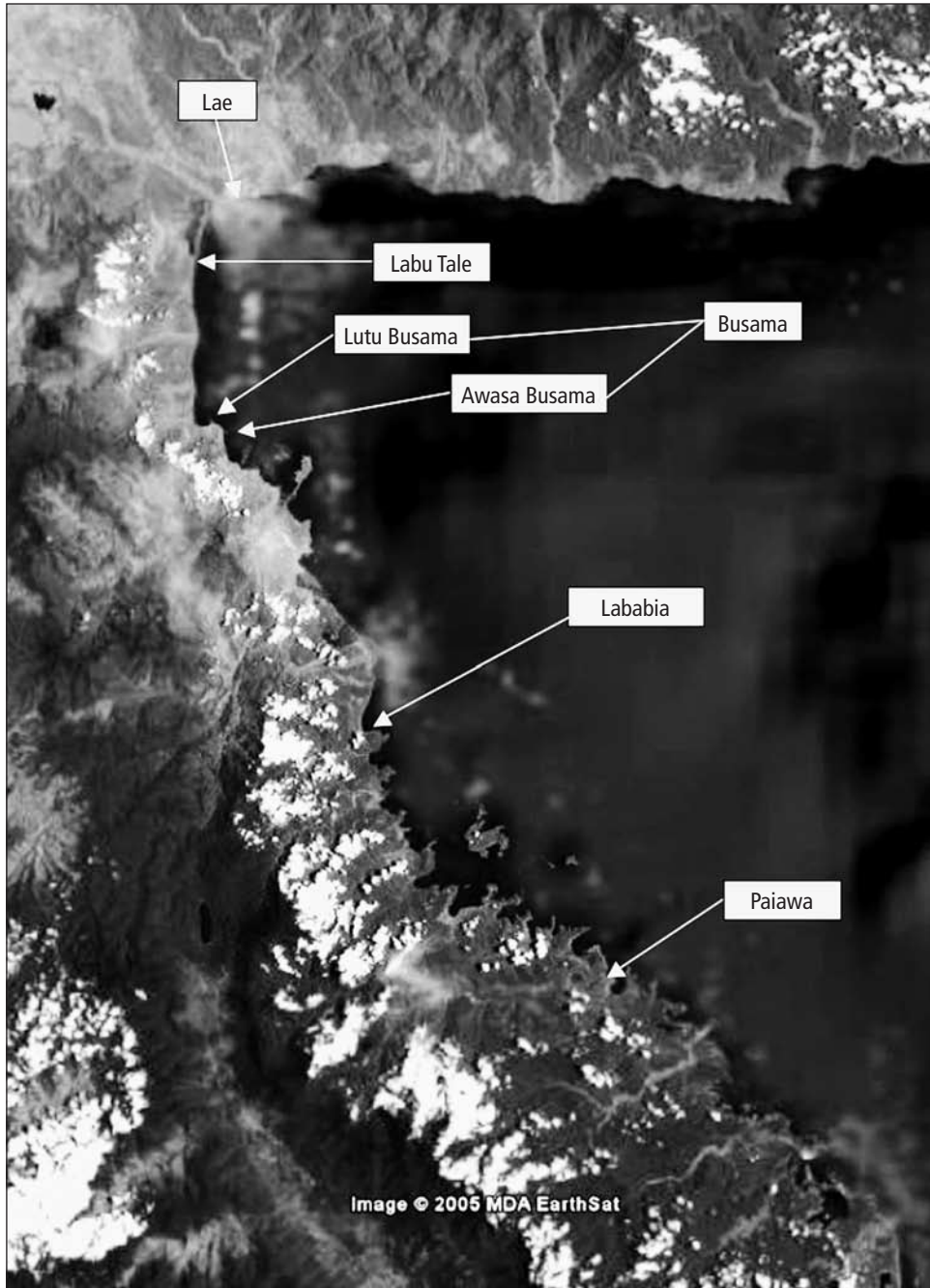
The current dependence of participating communities relying on the WPRFMC for cash income also brings into question the financial sustainability of the leatherback turtle recovery projects along the Huon Coast as nesting beach protection depends on long-term support and agreements with local communities.

Subsequently, the WPRFMC will need to find long-term funding or provide input into the development of a trust fund to ensure the leatherback turtle recovery projects along the Huon Coast continue, because there is a real risk that when the funding for the leatherback turtle recovery projects run out or if the WPRFMC focus changes, so will the participation from the communities.

¹ The WPRFMC is one of eight fishery councils in the US (and one of three in the Pacific), established by the Magnuson Fishery Conservation and Management Act of 1976 to oversee the nation's fisheries in the 200 mile US EEZ, comprising Hawaii, American Samoa, Guam, the Commonwealth of the Northern Marianas, Johnston Atoll, Wake, Palmyra, Jarvis, Midway Atoll, Howland and Baker Islands.

² Approximately 1 Kina = \$3.30 USD

HUON COAST



LOCATION OF PROJECT COMMUNITIES

Source: earthgoogle.com

OBJECTIVES AND METHODOLOGY

The original Terms of Reference (TOR) focused on the Busama (Buang-Buassi) and Lababia (Kamiali) communities. Because of the incorporation of Labu Tale and Paiawa during the course of the 2005-2006 nesting season, the author broadened the TOR to encompass all project communities along the Huon Coast.

Specific duties included:

- A literature review of relevant information for the Huon Coast region to foster an understanding of the conservation history and natural resource use in the region, and how previous policy decisions have helped shape conservation ethics in the region;
- An evaluation of how conservation efforts relate to the international conservation arena, which recommend non-consumptive use of turtles;
- Documentation of relevant kinship, socio-economic affiliations and other cultural factors between villages and among villagers that affect conservation efforts

including community impacts due to donor incentives, the extent of knowledge of and attitudes toward the current conservation efforts among villagers including the cultural importance of the leatherback turtle to the people, and conservation compliance;

- Characterization of the relationship between all relevant Non-government Organizations (NGOs), Community-based Organizations (CBOs), government agencies and other stakeholders;
- Acting as a liaison and contact person for the local communities to help them acquire any relevant project assistance from the University of Papua New Guinea or other donor agencies; and
- Generation of recommendations for the WPRFMC's Turtle Advisory Committee for future actions and needs to promote long-term longevity of the leatherback turtle recovery projects and the development of a sustainable management plan for leatherback turtles in the Huon Coast region.

Visits to participating communities were undertaken in September, October and December 2005, and January and March 2006 (see Appendix A).

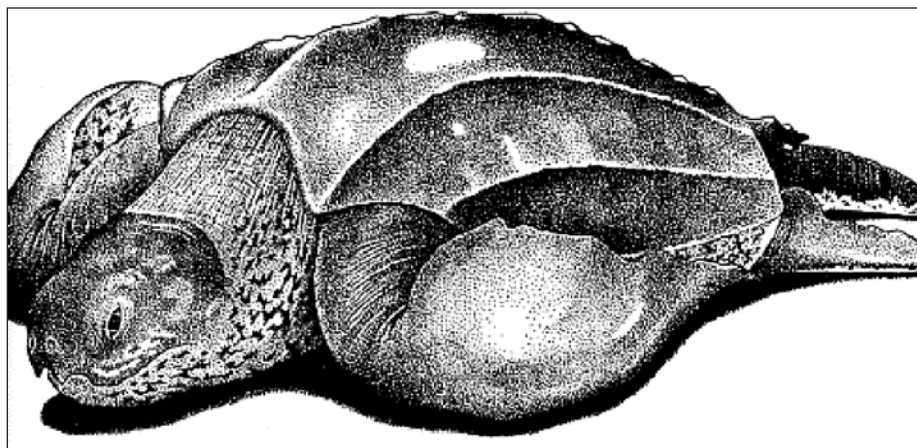
During the January 2006 trip, the author walked the beach from Labu Tale to Busama, surveying all leatherback turtle nests (Kinch, 2006a) and conducted a socio-economic survey in all project communities. Every household was visited, and occupancy and educational information was recorded. Households were also randomly selected at regular intervals for more in-depth interviews (see Appendix B). Twenty-five households were surveyed at Labu Tale (equating to 21% of all households), 30 at Busama (9%), 15 at Lababia (15%) and 10 at Paiawa (22%).

A final visit to project communities was conducted at the end of March 2006 coinciding with the closure of the nesting beach monitoring season.

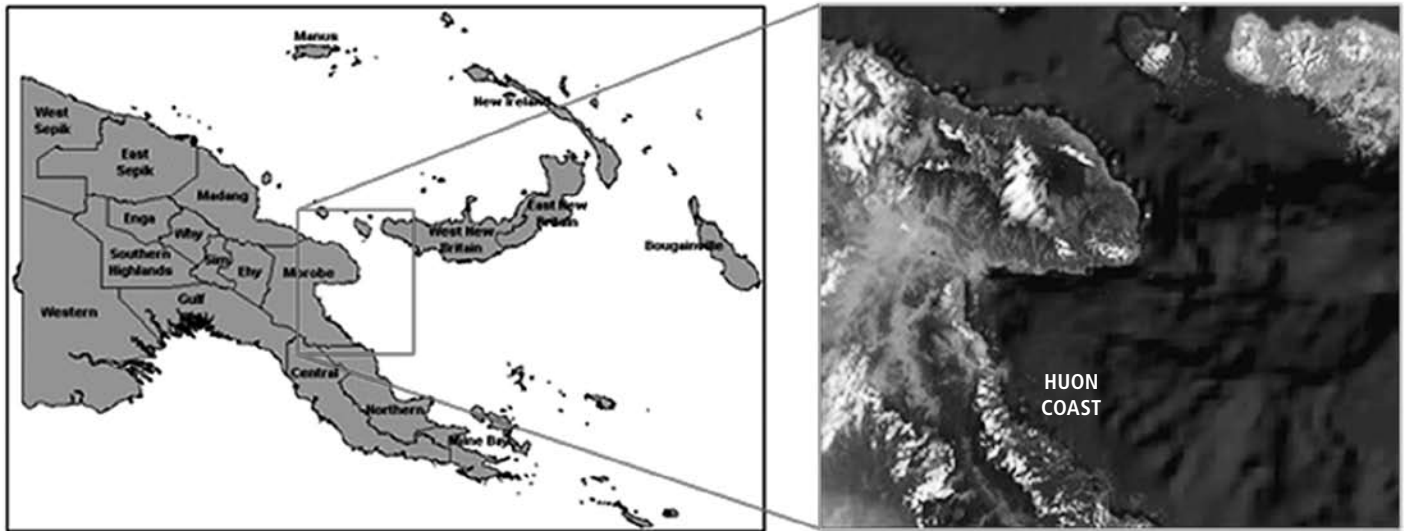
LANGUAGE TERMS FOR LEATHERBACK TURTLES

PLACE (AND LANGUAGE)	NAME
Labu Tale (Vehes – Austronesian)	<i>Hana</i>
Busama (Bugawac – Austronesian)	<i>Hum</i>
Lababia (Kela – Austronesian)	<i>Kareon</i>
Paiawa (Guhu-samane – Trans-New Guinea)	<i>Nangobu</i>

Source: Kinch, 2006 – Unpublished field data.



Leatherback turtles



MAP 1: MOROBE PROVINCE, SHOWING COASTAL AREAS

Source: earthgoogle.com

1.0 INTRODUCTION

The Huon Coast in the Morobe Province of PNG has the largest nesting leatherback population in PNG³, and amongst the largest in the Western Pacific⁴. Recent interventions in PNG by the WPRFMC⁵ are part of a wider strategy that addresses anthropogenic and environmental threats to leatherback turtles in various phases of their life history. These interventions that support leatherback turtle recovery in the Western Pacific have been driven in part by an attempt to off-set impacts of the Hawaii-based longline fishery⁶. The WPRFMC currently supports four projects along the Huon Coast on nesting beaches that

fall under the socio-cultural jurisdiction of the villagers who live at Lababia⁷, Busama⁸, Paiawa⁹ and Labu Tale¹⁰. Villagers from these communities are employed as field coordinators, team leaders and beach monitors. Monitoring teams patrol the beaches periodically each night, during which they Passive Integrated Transponder (PIT) tag¹¹ each turtle and record carapace length and width, distance of the nests from the sea and to the foreshore vegetation, number of eggs, time of day/night that nesting occurred, weather conditions, tide level and nesting behavior. They are also involved in egg and hatchling protection by placing bamboo grids over nests.

There is an increasing awareness by the WPRFMC that these leatherback turtle recovery projects may have possible social, cultural and economic impacts on the participating communities. Subsequently, as part of its on-going commitment to leatherback turtle recovery in the Western Pacific, the WPRFMC is trying to understand the socio-economic conditions and cultural ecology of participating communities as their co-operation and support is important to achieving success. Such understanding is important as it helps determine the attitudes, aspirations and expectations of the participating communities, the identities and characteristics of its sub-groups, and their cultural and social predilections.

³ Other nesting sites in PNG include the Lou, Aua and Wuvulu Islands and Tingos, Tulu and Timonai villages on Manus Island, Manus Province; Garu in Kimbe Bay, Ganoi villages and Pilapila Beach on New Britain Island; along the southeast coast of New Ireland; on Long Island and parts of the mainland coast of the Madang Province, along the coast from Boiken to Turubu in the East Sepik Province; around Aitape in the West Sepik Province; and on Normanby, Misima, Kiriwina, Simsimla, Woodlark Islands in the Milne Bay Province (Limpus, 1997; Spring, 1982a; Kinch, 2002; Quinn and Kojis, 1985; Hirth *et al*, 1993; Pritchard, 1979; Lockhart, 1989).

⁴ Other leatherback nesting sites in the Pacific also include Australia and Fiji (Hirth *et al*, 1993). There are no known nesting grounds for leatherbacks in the U.S. Pacific Territories (SPC, 2001).

⁵ The WPRFMC believes that by empowering local communities to manage their resources, the foundation will be laid for long-term conservation (and recovery) initiatives (Kinan, 2005).

⁶ In response to litigation by certain NGOs in 1999 the WPRFMC implemented significant changes to the management of the Hawaii-based longline fishery to reduce sea turtle interactions (WPRFMC, 2003, 2004; Dalzell, 2000, 2001; Kinan and Dalzell, 2005). The fishery is now a deep-set fishery with mandatory gear modifications, spatial and temporal closures and observer coverage.

⁷ Lababia is the name given to the current village area by the Australian colonial administration. Kamiali (or Kamu Yali) is the name that the villagers use to identify their village. In this report I will be using Lababia.

⁸ Busama (or Busamang) is the name that encompasses two villages, Lutu Busama and Awasa Busama.

⁹ The traditional name for Paiawa is Weta.

¹⁰ Labu Tale is the most southern village of three villages that make up the Labu area. The other two villages are called Labu Miti and Labu Butu.

¹¹ Most nesting population studies have relied on metal flipper tags for identification, which has been shown to be unreliable for leatherback turtles (McDonald and Dutton, 1996; Rivalan *et al*, in press) and has led to the widespread assumption that survival of adult nesting females is low since tagged animals are rarely seen more than once (Boulon *et al*, 1996; Hughes, 1996; Dutton *et al*, 2001). High tag loss has prompted the use of PIT tags. The change to PIT tags was also in part due to the concern that metal tagging may contribute to incidences of fibropapilloma (Mrosovsky, 2000b).

1.1 THE HUON COAST

The Huon Coast lies along the southern section of the Huon District of the Morobe Province. The Morobe Province is located on the north-eastern coast of PNG (Map 1) and shares Provincial borders with the West New Britain, Madang, Eastern Highland, Gulf, Central and Oro Provinces. Total land area for the Huon District¹² is 7,400 km², with approximately 26% of this area having human occupation, mostly along the coastal plains, which cover 24% of the Huon District land area, and consist of flat coastal plains, alluvial flood plains and swamps (Hanson *et al*, 2001).

Climate along the Huon Coast is tropical equatorial characterized by a wet season from May to August, with heaviest rainfall during the months of June to August, and a drier season from September to April (Bein *et al*, 1998; Hanson *et al*, 2001). This high rainfall is drained from the upland regions by several rivers, which pour from the interior, cutting deep channels through forested ridges, and are evident on the coast by large silty river mouths. Temperatures range between 22-28°C (McAlpine *et al*, 1975).

1.2 HISTORY

Trans-New Guinean speaking people during earlier waves of migration originally occupied the Huon Coast. Austronesian speaking people¹³ moved into the area between 4,000 and 5,000 years ago displacing some of these earlier Trans-New Guinean speaking groups (McElhanon, 1984).

In 1886, the German colonial government established the Morobe Headquarters south of Paiawa, with the German Evangelical Lutheran Church¹⁴ arriving soon after. These missionaries later established the Malalo Circuit in 1905 and opened the Malalo Station near Busama in 1907. From this base, mission work along the Huon Coast began in earnest. The missionaries actively discouraged the use of all manner of rituals and associated beliefs, and male initiation rites and associated men's *haus* began to disappear¹⁵. The truth-value and offers of salvation were not the driving factor for communities along the Huon Coast to adopt Christianity, but rather its association with material power and wealth¹⁶ (see Wagner, 2002).

German control moved to Australian hands in 1914 with the start of World War I. The area stayed under Australian administration until 1942, when the occupation by Japanese armed forces in World War II forced the withdrawal of the Australians. For about 14 months the Japanese occupied and patrolled the coastal area around Lababia until Australian and United States of America (USA) armed forces recaptured the area in 1943. The Busama people assisted Australian soldiers within the Lega, Kalesta and Wagao areas¹⁷.

1.2.1 Settlement History

The people of Labu Tale are said to be originally from Wang at the head of the Buso River, and later migrated to their present location via Sapaia. In 1910, people were also removed from Buwen Island and settled at Labu Tale, to be followed later by people

from the Wampar group and in more recent times by a variety of others due its proximity to the capital of Lae.

The majority of current inhabitants at Busama¹⁸ are originally from Wampar, Awasa and Ahi groups who all lived in the Bukaua area on the Huon Peninsula at Gabanzi. These groups later moved to Loc'ampon. At Loc'ampon, a fight broke out between the groups due to differences in marriage and language. Half of the Ahi crossed the Markam River with the Wampar group to the current location of Lae while the other half followed the Awasa group to Busang. At Busang, a fight again broke out within this group. On hearing of this battle, the Wampar-Ahi group routed the Awasa-Ahi, who fled to Locsaung, which lies between Locsinang and the Buang River.

In Locsaung, the Awasa-Ahi were safe until they went down to the beach to fetch salt water. On their return, they forgot to remove a bridge, which isolated them from outsiders. The Wampar group who had not given up pursuing them found the bridge still in place, entered the village and attacked. After the fight, the Wampar group captured two Awasa-Ahi, one of which was a male child. The Wampar leader gave this boy to his wife to take care of together with his own son. These two boys grew up together and later became future leaders and consolidated two new villages at Nasawapum and Munung.

As a result of this battle, three different groups were formed. These groups were the Awasa, Ahi and Gaiwec or Walong.

¹² Total land mass area for the Morobe Province covers 33,525 km², with an additional 719 km² consisting of Provincial waters. The mainland coastline length is approximately 402 km long.

¹³ The Morobe Province has a total of 107 languages in 27 language families. All villages along the Huon Coast are Austronesian speaking villages except Paiawa, which is Trans-New Guinea speaking.

¹⁴ Villagers in participating communities could be described as staunch Lutherans though some smaller groups at Labu Tale and Busama have succumbed to the recent waves of charismatic evangelical movements such as Baptist factions, the PNG Bible Church and the Church of Christ. The church (regardless of denomination) is the focus for village activities, communal gatherings, ceremonial life, religious values, and community cohesion. It is also a provider of utilities and services, and a rural development agency. Church services are also an important venue for village announcements.

¹⁵ The men's *haus* was an institution that enabled the male members of a sub-clan to discuss all manner of social and economic issues, and to plan, and implement group activities, notably the festivities or ceremonies related to marriage, burial and initiation. Today, informal men's *haus* still exist as places where young males, either married or unmarried sleep, termed a *hausboi*. Descent groups still continue to carry out some functions of the men's *haus* because they provide a useful way of stabilising group obligations and responsibilities. Other functions, such as the education of younger boys by older sub-clan members, and the segregation of married men with small children from their wives (which acted as a limit on population growth), have either been replaced by other practices or else abandoned completely. Another reason attributed to the decline of the men's *haus* is the high costs of maintenance.

¹⁶ The leatherback turtle recovery projects are also seen as cloaked in material power, and more so by offers of conservation incentives from the KICDG and the WPRFMC.

¹⁷ Men from Lababia and other communities remained on 'active' service with the Australian and US military during 1944 and early 1945, accounting for 46% of all able-bodied men absent from the villages (Downes, 1946). Many village 'maidens' could not marry at this time due to the absence of prospective husbands (Kyndon, 1945).

¹⁸ Busama's history was taken from village records that had been recorded by Anzet Samuel and Kamsel Buasi.

¹⁹ Hogbin (1951) proposes that these movements of people occurred between 1750 and 1775.

The majority of the Gaiwec-Walong group later crossed the Buang River, with some remaining with the Awasa group. The people that crossed the Buang River became further divided into the Balumsieng Aeasa-Koc, Awasa-Bigampin, Awasa-Mblacwatim, and Gaiwec clans. These clans later settled at Balumsieng, before moving up to Kectu, Gelengtec-Gohacya and Gwalum. Another group, called the Ahi-Buangam also crossed the river and settled at Busilimand-Mtockwa.

Three of the newly formed Awasa clans and others from the Gaiwec clan left Gwalum, climbed over the mountain and came down to the Buassi River. After crossing the Buassi River, they met up with some neighbouring clans, the Gaiwako, Bolingalop, Awasa-Bocgatic and Mblacnun. All these clans joined forces at Mt Awalu and later triumphed over the Wampar group. After this battle they dispersed, with some clans settling at Lutu Point on the Salamaua Peninsular, while others remained in the mountains.

Some years later at Lutu Point, a group of Bukaua speaking peoples calling themselves Ngacblan-awa settled at Apoepu-Buhoesung and Iliyotu. Around this same time, the Awasa groups that had been living in the mountains came down to Anamki-Asalacmki and then onto Mola'och whereby they called themselves Busamang after a nearby small river¹⁹. Busamang is the present day area of Lutu Busama and Awasa Busama. As a consequence of trade and church contact, other peoples from Tamigedu, Bukaua and Tami Island have also settled at Busama (Tumonde and Wagner, 1992b).

It is thought that most people from present day Lababia trace their ancestral domain to Mundiado or Lambe in the mountainous interior (Wagner, 2002). At this time, they were friends with the Biangi people, a neighboring mountain group that shared farming land in the Bitoi Delta, and which the Kela speakers were allied with against the neighboring Kaiwa speakers, a group that inhabited the hinterland area north

of the Bitoi Delta at that time. For some reason, now lost in time, the alliance broke down and the Kela speaking people moved towards the coast (Bayer, 1955; Wagner, 2002). At this time, they split into smaller groups with their own men's houses; two major clan divisions emerged, with *Gara* congregated in the north and the *Areme* in the south. The first gathering of these Kela speaking people occurred at Lababia Point, and shortly afterwards on Lababia Island. The village then dispersed as a result of a series of epidemics (mostly whooping cough and dysentery), with some families settling at the present village site, while others moving permanently to the villages of Buso and Kui. After the World War II hostilities finished in 1943, Lababia was officially established at its current location, which is actually called '*Kamu Yali*' (Wagner, 2002).

1.2.2 Clan Identity

First habitation, ancestral gardening, or victory in warfare, traditionally legitimated ownership of areas of land and sea in the participating villages²⁰. While villagers in the participating communities possess strong individual rights to the land, use rights actually exist simultaneously at many levels, beginning with the individual and progressing to the family, sub-clan, clan, and community as a whole²¹. These rights are distributed differentially throughout the community, depending partly on their geographical location, age, gender, genealogy, and social history. Access and management rules are therefore embedded in a complex set of customary practices that serve not only to regulate resource use, but also to regulate the social and economic life of the participating communities²².

All participating communities are divided into various sub-clans or major clans (Tables 1 and 2). There appears to be no major clans at Labu Tale, with all clans spread through the four hamlets, Kili-Kilingki, Gupa, Piguwa and Wange. As noted above, Busama is actually two large villages, Lutu Busama and Awasa Busama. These villages are further divided into 'streets', of which there are six. In Lutu Busama these are Kapong, Wharf

TABLE 1: MAJOR CLANS

LABU TALE	BUSAMA	LABABIA	PAIAWA
No major clans identified	No major clans identified	Gara	Uliwa
		Areme	Yakabula
			Wapo

Source: Kinch, 2006 – Unpublished field data.

TABLE 2: PREDOMINANT SUB-CLANS

LABU TALE	BUSAMA	LABABIA	PAIAWA
Kakala	Bringalop	Lumi Amboli (G)	Abula
Lunda	Gaiwe	Lumi Duwe (G)	Moa
Ealolalu	Gaiwaku	Lumi Barekatu (G)	Awehau
	Blanung	Lumi Yuwa (G)	Aewa
	Koc	Lumi Tali (G)	Pagevia
	Bungampin	Lumi Due (G)	Katoa
	Ngablanwa	Lumi Areme (A)	Povio
	Bwangum	Lumi Yame (A)	
	Lutung	Lumi Talon (A)	
Lumi Ane (A)			
Lumi Baling (A)			
	Lumi Mamba (A)		

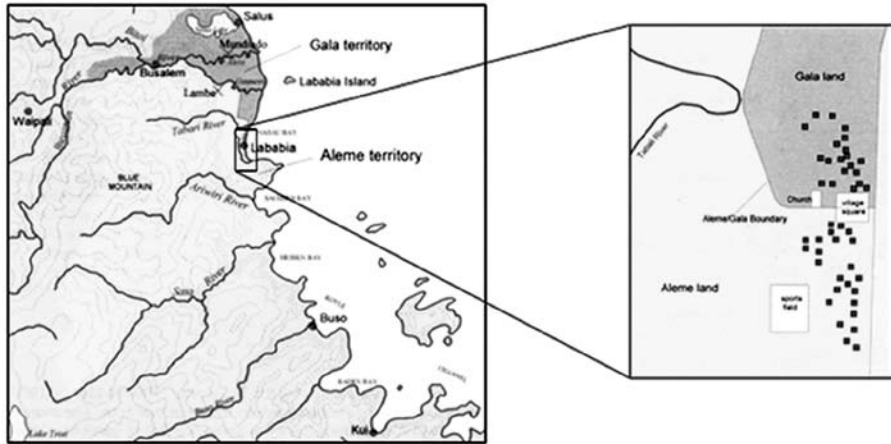
Source: Kinch, 2006 – Unpublished field data.

Note: Clans for Lababia from Martin (1998), those with a (G) are Gara, those with an (A) are Areme.

²⁰ Once an individual gardens a particular portion of land, it becomes the property of his family line, unless loaned to another line, and is transmitted in accordance with local customs of inheritance. Individuals can secure new gardening land by clearing virgin forest at the margins of established clan territories.

²¹ For example, the majority of land claimed by the people of Lababia is covered by virgin forest. This land, along with the resources it contains, is not the property of clans, sub-clans or individuals, but rather it is held in common by all the Lababia people, and decisions concerning it are made by adult village members as a whole, or by representatives of all the sub-clans. Individuals may use any part of this forest for their subsistence needs, but may not do so for commercial gain without the agreement of the village community (Martin, 1998, in press).

²² The historical consciousness of the community is also shaped by these customary practices, which have evolved over a period of centuries as villagers have adapted to changing social and ecological circumstances (see Wagner, 2002).



MAP 2: CLAN BOUNDARIES AT LABABIA

Source: Martin, 1998.

and Hobaga Streets. In Awasa Busama these are Yellow, Mango and Tenth Streets. These streets are again further divided into smaller hamlets and residential areas (see Appendix C). Clans are spread throughout the streets, though some areas have larger groupings of a single sub-clan. Lababia is now a reasonably sized village spread out over a wide area of Nassau Bay and various hamlets are referred to by different place names such as Mongo, Bitoi, Lababia Island, Mission Street, Sele, Kulindi and Uemba. As noted above also, the clans at Lababia are divided into two major clans and several

sub-clans, which will be dealt with in some detail below. At Paiawa there are three main clans and several sub-clans. Paiawa is divided into two settlement areas, the main area adjacent to and at the mouth of the Weta River and the other on a sand spit a short walk away.

Villagers at Lababia represent themselves as being divided between two major clans, the *Gara* and the *Areme*²³. These two major clans are composed of a number of smaller sub-clans, which are determined by a combination of residence and descent²⁴.

Even though there is a clear division between residential and garden areas (Map 2), there is a high level of cooperation between these two clans in village affairs, and community work tasks are generally organised on this basis. In a sense, the two major clans at Lababia operate similar to a moiety system, whereby community life is dominated by both a distinct and complementary role.

In theory all of the sub-clans at Lababia operate as corporate landowning groups, though this appears to have been stronger in the past when each clan had its own men's *haus*, feasts and ceremonies²⁵ (Wagner, 2002). For the *Gara* major clan, land rights operate on a number of levels. The *Areme* major clan also claims to be a landholding group, and not merely an umbrella under which the other clan's gather, as the clans of *Gara* do. This appears to have come about as a consequence of the dominant position occupied by *Lumi Areme*, the most senior and largest of the sub-clans. This dominant position emerged due to the perceived opportunity to access money, firstly, when compensation for mining exploration was presented and secondly, when the Village Development Trust (VDT) first tried to develop the Kamiali Training Centre and Guest House (KTCGH) in 1997 at Kulindi²⁶.

²³ The *Areme* are also referred to as the *Tabali*, in recognition of their association with and control over the Tabali River area. This term was applied to them by the *Gara* clan and means 'people who always go to the sea'. The *Gara*, traditionally concentrated on growing taro in the Bitoi River and simply means 'up there', referring to the fact that the Bitoi Delta is located northwards from the area historically occupied by the *Areme* (Wagner, 2002). In the Bitoi Delta, most of the main agricultural area is considered public land, though the sub-clans of the *Lumi Ambo* and the *Lumi Barakatu* of the *Gara* major clan hold more primary rights to the areas along the Aleta tributary which is the northern arm of the Bitoi River, and the *Lumi Duwe* dominate along the Daunewa tributary, which is the southern arm of the river. All other land in this area is considered public (Wagner, 2002).

²⁴ Martin (1998) described the people of Lababia to be the same as Busama, meaning that they were traditionally matrilineal (considered to have the greater political authority), though it appears nowadays that there is an increasing emphasis on the principle of patrilineal descent due to economic factors. Later investigations by Wagner (2002) suggests that individuals within sub-clans at Lababia can and do claim land on the basis of both matrilineal and patrilineal connections. People at Lababia also often have names in both their mother's sub-clan as well as their fathers, and these can be invoked if they wish to switch their primary affiliation from one parent's sub-clan to the other.

²⁵ In the past, the *Areme* and *Gara* major clans controlled different areas including areas to fish. Today, restricted access zones formerly maintained by separate clans have been abandoned and are now amalgamated into a single marine territory over which villagers as a whole exercise exclusive rights to harvest fish and other marine resources. The *Lumi Areme*, however, do lay claim over the Tabali River and the *Lumi Duwe* claim ownership over Dauwena River. Also in the past, there was specialisation by differing sub-clans over resource access and use. For example, the *Lumi Ambo* were in charge of collective pig hunts and the special nets used; the *Lumi Areme* had specialized knowledge concerning the capture of dugongs and turtles by nets; and both the *Lumi Areme* and the *Lumi Barakatu* had special nets for catching tuna. The *Gara* major clan was specialized in growing taro (Wagner, 2002).

²⁶ Villagers at Lababia initially agreed to the construction of the KTCGH and the VDT went about surveying the land and obtaining a lease from the *Areme* major clan. Because the lease involved a yearly rental payment, the area of the KTCGH soon became the focus of a major dispute within the Lababia community, as the *Areme* major clan, through its biggest sub-clan *Lumi Areme*, claim large blocks of land within the village and on both sides of the Tabali River, and to most of the sago swamp area. The *Lumi Yame*, however, also laid claim to some of the same areas (Wagner, 2002). When the case was argued before a land mediator, the *Areme* major clan spokesmen did not argue on the basis of whose ancestors had prior rights, but that the *Lumi Yame* was a sub-clan of the *Areme* major clan and thus only had secondary rights. This argument was based on a previous court case, which arose because of the prospect of mining chromium in the 1970s wherein villages had to determine whose should receive the compensation monies that were to be paid during the exploration process, as well as any future royalties. In this case, the *Lumi Ane*, a small sub-clan at Lababia, but a major clan at neighboring Buso did not have any consolidated landholdings in the village or in garden areas, but do have special claims at the south end of Lababia's territory, at the mouth of the Saia River, where the mining and prospecting would have taken place. It was therefore necessary for the people at Lababia to downplay the rights of the *Lumi Ane* and promote the *Areme* major clan overall. In the end the court awarded Buso the land on the south side of the Saia River and the north side to the *Areme* major clan, thus resulting in the legal status of the *Areme* major clan being seen as a landowning group in the Lababia community (Wagner, 2002). In the case of Kulindi, *Lumi Yame* won.

1.2.3 Recent Territorial Issues

The hinterland to the northwest of Lababia is the home of the Kaiwa speaking people. These mountain-dwelling people have a long history of conflict with the Kela speakers of Lababia and were shifted to the coast by the Australian colonial administration in 1916. Conflict since this time continued up until the 1970s²⁷ and again more recently with Salus villagers killing the famous *Labaks*²⁸ leatherback turtle in January this year (Gabana, 2006). A group of young men from Lababia attempted to claim compensation of K 1,500 from the people of Salus and bring the perpetrators to justice. The Salus people chased this delegation away. Around this same time, a group from Salus was caught harvesting corals from Langui near Salamaua Point for the production of lime²⁹. There has been police intervention, but tensions between the people of Lababia and Salus and Salus and Langui continue.

As there is continual tension between Lababia and Salus, there are also continual

grievances between Labu Tale and Busama. These also have a historical footing, beginning around 1960 when the Lutheran Mission brought a saw to cut timber in the Buang River area. This activity resulted in several fights between the people of Busama and the Labu area resulting in several men jailed. In 1979, people from Busama and the Labu area fought at Mtockwa, and the Buang-Buassi area. This fight resulted in a court case in 1980, and after an appeal by the Busama villagers over an earlier judgment, the court decided that the Buang River be set as the boundary between these two groups.

During this year's monitoring season, conflict again arose over this area, partly induced by the monetary gains of the leatherback turtle recovery project that people at Busama were receiving from the WPRFMC. People at Labu Tale were naturally upset as all previous leatherback turtle monitoring work, dating back to the late-1970s had been done in their territorial area (see below). The issue began to flare up when people from Labu Tale read in the local newspaper about the leatherback turtle recovery projects in the Buang-Buassi area³⁰ from press releases

during the Pacific Islands Forum held in Port Moresby. The Labu Tale then began claiming that the beach where the leatherback turtle recovery project was being conducted was in their area. Several meetings were held with VDT and the Department of Environment and Conservation (DEC) to resolve the matter, but tensions continued. The issue was finally resolved when the WPRFMC Turtle Project Coordinator (the 'donor') arrived in December 2005 and declared that Labu Tale would also be incorporated, with its own staffing regime and its own beach monitoring station.

1.3 POPULATION AND DEMOGRAPHY

Each of the current participating communities belongs to the Huon District, but come under different Local Level Governments³¹ (Table 3). Labu Tale is in the Wampar Local Level Government (LLG) area, Lababia and Busama both fall under the Salamaua³² LLG, and Paiawa is located on the northern end of the Morobe LLG.

TABLE 3: PARTICIPATING COMMUNITIES AND GOVERNMENT ADMINISTRATIVE HIERARCHY

PLACE	WARD	LOCAL LEVEL GOVERNMENT	DISTRICT
Labu Tale	6	Wampar	Huon
Lutu Busama	15	Salamaua	Huon
Awasa Busama	16	Salamaua	Huon
Lababia	7	Salamaua	Huon
Paiawa	2	Morobe	Huon

Source: PNG 2000 Census.

²⁷ Around this period, the people of Lababia and Salus came to an understanding over the use of land and gardens around the north arm of the Bitoi River, and the people of Salus have been given permission to fish in the Salus Lake, the Bitoi River and the open sea provided they follow the rules set down by the Lababia community (Martin, 1998, in press; Tumonde and Wagner, 1992b).

²⁸ This was apparently the largest leatherback turtle recorded along the Huon Coast, and had been previously fitted with a satellite transmitter at Lababia. *Labaks* is a PNG 'slang' modification for Lababia.

²⁹ People at Salus previously made an income from making lime from the freshwater snail *Faunus ater* that they gathered from Lake Bitoi, but abundance of this species has now declined.

³⁰ The focus on the Buang-Buassi area was a result of the 2004 aerial survey funded by the National Oceanic and Atmospheric Agency (NOAA).

³¹ Under German colonial control, all villages had an appointed *luluai* or headman and a *tultul*, or village policeman. This was continued under Australian control. In 1940 the Australian administration encouraged the establishment of councils, and finally in 1954, native local government councils were formed. These evolved into Local Level Governments after Independence.

³² Salamaua is now a district centre and is located on a narrow peninsula just south of Busama. Historically, it was the administrative center for the Morobe Province due to its harbor and closeness to the Wau goldfields. After World War II, administrative functions were transferred to Lae because land was available to build an airstrip.

With the exception of Paiawa, all other participating communities have experienced an increase in population growth (Table 4). The decline in population at Paiawa can be attributed to the lack of rural services. It has no Community or Primary school, aid-post or other facilities. They also have very limited income opportunities and no regular transport to markets. Subsequently a proportion of the population has out-migrated to settle in other villages, which do have better services.

Life expectancy for villagers in participating communities is around 52 years. There has been no real improvement in the mortality conditions affecting infants, and malnutrition rates for children under five years are fair. The Total Fertility Rate (the average number of children per women aged 15-49) is between 4-5³⁴. All the participating communities have a youthful population with 36.5% of the population under 15 years of age and only 4.4% aged 65 and over (Table 5)

(see Appendix D for full demographic details).

The average population density across all participating communities is around 10 people per km², which is considerably lower than the Morobe Provincial average of 16 people per km². In general, the Huon Coast has low to moderate population densities.

TABLE 4: POPULATION DETAILS – 2000-2006

PLACE	NO. OF HOUSEHOLDS (2000)	NO. OF HOUSEHOLDS (2006)	DIFFERENCE (%)	AVERAGE HOUSEHOLD SIZE (2000)	AVERAGE HOUSEHOLD SIZE (2006)	DIFFERENCE (+/-)	TOTAL POPULATION (2000)	TOTAL POPULATION (2006)	DIFFERENCE (%)
Labu Tale ³³	89	117	23.9	6.0	5.4	-0.6	532	637	16.5
Lutu Busama	145	208	30.2	5.4	4.7	-0.7	784	968	19.0
Awasa Busama	105	128	18.0	4.8	4.7	-0.1	501	607	17.5
Lababia	85	101	15.8	6.8	6.1	-0.7	582	612	4.9
Paiawa	56	46	-21.7	5.7	6.9	1.2	320	316	-1.2
Total	480	600					2,719	3,140	

Sources: PNG 2000 Census; Kinch, 2006 – Unpublished field data.

TABLE 5: AGE CHARACTERISTICS

PLACE	% AGED LESS THAN 15 YRS	% AGED 65 YEARS +	MEDIAN AGE (YEARS)
Labu Tale	36.1	3.9	22.7
Lutu Busama	35.3	5.7	23.7
Awasa Busama	32.9	5.6	23.9
Lababia	40.9	3.6	19.2
Paiawa	37.2	3.1	19.2
Average	36.5	4.4	21.7

Source: PNG 2000 Census.

TABLE 6: EDUCATION STATUS

ACTIVITY	LABU TALE	LUTU BUSAMA	AWASA BUSAMA	LABABIA	PAIAWA	AVERAGE
% aged 5-29 years attending school	33.6	30.9	24.7	28.0	32.6	30.0
% Proportion aged 10 years + who have completed Grade 6	71.5	80.8	76.6	77.7	91.2	79.6
% Proportion aged 10 years + who have completed Grade 10	70.7	11.7	11.5	8.5	72.0	34.9
% Proportion aged 15 years + with other education qualifications	7.3	3.9	3.8	2.3	4.3	4.3
% Proportion aged 10 years + and literate	78.3	83.9	62.1	93.8	98.3	83.3

Source: PNG 2000 Census.

³³ Labu Tale also includes the community of Maus Buang.

³⁴ The population growth rate for the Morobe Province is 2.8% per annum.

1.4 EDUCATION

The literacy rate of around 83% for participating communities is high by rural PNG standards, and is considerably higher than the Morobe Provincial average of 64%. The majority of people in participating communities can read and write in *Tok pidgin*. All children between the ages of nine and fifteen have reasonable comprehension of English since this is the language used in the schools³⁵, with competency varying amongst the adult population³⁶. Some older men have an understanding of English, particularly those that had served alongside Australian and USA armed forces during World War II. An understanding of English is a little more unusual among older women.

Amongst the participating communities, approximately 80% of the population has achieved Grade 6, with a further 35% achieving Grade 10 (Table 6). Rates of attrition at the primary school level are reasonably high and transition rates at post Grade 6 and Grade 10 levels are low. Reasons for this are due in part to an irrelevant curriculum, weak management and administration, and declining resource allocations to schools by National

and Provincial authorities. The other contributing factor is the payment of school fees, as the present earning power of many households is insufficient to cover the cost of educating their children beyond Grade 6. From the recent socio-economic survey, approximately 38% of respondents suggested that they had difficulties in paying school fees.

All of the participating communities have either Primary or Communities Schools with the exception of Paiawa, which has an irregularly running Elementary School. These schools provide education for their own village children, but also service villages farther away. For example, the schools at Lababia and Busama also enrolls pupils from Buso, Siboma and Paiawa.

During this leatherback turtle-monitoring season, the WPRFMC proposed paying students' school fees or assisting schools in materials or renovations³⁷ as a means of providing a community incentive³⁸. Subsequently, the author was requested to conduct an education census to determine the level of school attendance³⁹ and relative costs associated with school fees (Tables 7 and 8).

TABLE 7: 2005 SCHOOL ENROLLMENTS

GRADE	LABU TALE	BUSAMA	LABABIA
EP	-	50	0
EP 1	?	22	0
EP 2	?	34	0
Grade 3	0	48	23
Grade 4	?	36	33
Grade 5	?	70	28
Grade 6	0	33	37
Grade 7	-	44	2
Grade 8	-	30	23
Total	135*	367	144

* School master, when interviewed, did not have the school enrollment book, but knew the total student population. '0' denotes classes not taught that year (hence no students), '?' denotes students were enrolled but exact number unknown.

Source: Kinch, 2006–Unpublished field data.

TABLE 8: EDUCATION DETAILS AND ESTIMATED COSTS OF SCHOOL FEES

PLACE	NO. OF TERTIARY STUDENTS	NO. OF HIGH SCHOOL STUDENTS	NO. OF PRIMARY SCHOOL CHILDREN	NO. OF COMMUNITY SCHOOL CHILDREN	NO. OF ELEMENTARY SCHOOL CHILDREN	TOTAL NO. OF CHILDREN SSCHOOLING	ESTIMATED SCHOOL FEE COSTS (K) (TERTIARY EXCLUDED)
Labu Tale	0	22	9	63	35	129	37,090.00
Lutu Busama	8	39	156	0	63	266	69,930.00
Awasa Busama	8	18	69	0	62	157	34,145.00
Lababia	1	2	84	0	36	123	16,900.00
Paiawa	0	4	17	2	14	37	8,135.00
Total	17	85	335	65	210	712	166,200.00

Source: Kinch, 2006–Unpublished field data.

³⁵ Previous estimates of an understanding of English at Busama range from 50-75% for younger people (Tumonde and Wagner, 1992b).

³⁶ Previous estimates at Lababia suggest that 15% of adult men have some competency with the English language (Martin, 1998).

³⁷ All schools in the participating communities do indeed require renovations. Water tanks are also needed. For example, school children attending Labu Tale Community School must walk 2 km to a well for fresh water. Government inspectors carried out a needs assessment of all schools along the Huon Coast about three years ago, but as yet, nothing has happened.

³⁸ The community at Lababia is provided an incentive payment of K 8,000/year for not harvesting leatherback turtle eggs; the community actually sees it as a form of rental fee for using their beach during the leatherback turtle-monitoring season.

³⁹ Main aspects affecting enrolment involve the aforementioned inability to pay school fees, and problems with transport and accommodation.

The Community School at Labu Tale currently offers grades up to Grade 6. In 2005, Labu Tale Community School provided teaching for Grades 1, 2, 4 and 5, and had 135 students. This year they will teach Grades 2, 3, 5 and 6. As Paiawa has no school, all children above the age of 6-7 years, have to stay either in boarding schools or with relatives or friends of their parents at neighbouring villages. Children from Paiawa may attend school at Kum, Kui, Lababia, Laukano and Busama. Most children going to High School attend Salamaua High, with a smaller majority attending High Schools in Lae. There is a current move at Busama to establish a training vocational centre at nearby Bula⁴⁰.

A community incentive based on education would have been rather costly for the WPRFMC, as the estimated costs of school fees alone are approximately US \$ 52,000/year. The concept actually did not win favor amongst participating communities, particularly at Lababia where an incentive is paid, and the idea was subsequently shelved⁴¹.

1.5 INFRASTRUCTURE

Rural health services in the participating communities are minimal at present, with the aid-posts at Labu Tale, Busama and Lababia closed for a variety of reasons⁴². Paiawa does not have an aid-post. People that are sick either travel to Buakap, the Salamaua Health Centre at Kela, a private clinic at Laukanu or to Lae for treatment (common ailments include malaria, pneumonia, diarrhea, sores and coughs, and injuries).

TABLE 9: TRADE STORES

PLACE	TRADE STORES
Labu Tale	5
Lutu Busama	5
Awasa Busama	5
Lababia	3
Paiawa	0

Source: Kinch, 2006–Unpublished field data.

Water supply is not an issue for the participating communities, though the people at Paiawa drink straight from the Weta River⁴³. Labu Tale and Busama have a number of streams draining from the mountain range that provides adequate and potable water. There are also scattered tap stands throughout the villages. The Rotary Club in Lae originally constructed a small pipe system for the Community School at Lababia (Tumonde and Wagner, 1992a), and this was later expanded under a VDT water supply project in mid-1996 (Kisokau, no date).

All participating villages have Very High Frequency (VHF) radios but these are not functioning due to problems of upkeep and licensing payments for use of transmitting band-widths. There is definitely a need for this system to be rehabilitated or upgraded⁴⁴ as it would undoubtedly improve logistical activities, reduce costs for travel, and improve coordination amongst the participating communities, as well as provide the ability to seek help in times of emergencies.

Other village services include several trade stores, again with the exception of Paiawa, due in part to a lack of transport (Table 9) (see Appendix E for trade store prices). There are also several informal fuel sellers at Labu Tale and Busama.

During the recent socio-economic survey, transport was identified as the major limiting factor to development along the Huon Coast. Because of the low population densities and the terrain, no roads have

TABLE 10: HOUSING TYPE

HOUSE TYPE	LABU TALE	BUSAMA	LABABIA	PAIAWA
Bush Material	85%	63%	100%	70%
Semi-Permanent	10%	23%		10%
Permanent	5%	13%		20%

Source: Kinch, 2006–Unpublished field data.

been built, and the volume of goods produced at the village level has been too modest to encourage the development of a cost-effective system of water transport.

Previously Busama, Lababia and Paiawa had workboats, but these have now ceased running as they either fell into community disputes or lacked maintenance. The *MV Mbame* was originally acquired by the Lababia community in 1976 and was run as a village cooperative, playing an important role for mobility and marketing prior to the arrival of dinghies in the village. This co-operative, mired in continual controversy over management and the misappropriation of money, eventually collapsed (Wagner, 2002). Busama also had their own community vessel, the *MV Bubuwe* and later, the *MV Bubuwe II* (Tumonde and Wagner, 1992b). The *MV Weta* serviced Paiawa up until the mid-1990s. After these vessels ceased operation, many households also ceased marketing operations because the transport fees by dinghies became cost prohibitive.

1.6 HOUSING

The majority of houses in the participating communities (Table 10) are built from bush materials, with walls of platted bamboo or sago, and roofs made from sago thatch. More permanent and semi-permanent housing can be observed at Busama and Labu Tale due to their proximity to Lae, which allows for easier access to shops and hardware outlets, but also opportunities to earn cash to buy materials. Several

⁴⁰ During the 1950-1960s the Lutheran Mission operated a girl's Vocational School near Bula.

⁴¹ The WPRFMC was acting on notions of 'equity' and felt the school fee incentive would assist a broader membership of the community. While equity values strongly pervade the 'western' perspectives of the WPRFMC, they can also be found in the perspectives of Lababia community, the former concentrated on the community, while the community was more concerned with ensuring that some individuals and kin groups do not achieve an economic advantage over themselves or others. The community decided that the incentive payment was better equitably distributed by supporting numerous committees and other groups in the village as some people do not have children attending school and thus would not benefit at all (though some people will still miss out with the way the payment was distributed, it was still thought that these committees and groups provided wider benefits across the community, either materially or spiritually as in the case of Church groups).

⁴² Reasons for closure include no Health Extension Officers (HEOs), lack of suitable or incomplete housing for the HEOs, and no medicines.

⁴³ The Huon Coast Member of Parliament, Sasa Zibe has funded a scheme where water will be drained from a dam to a village water holding tank.

⁴⁴ The author had previously attempted to get a communications system funded through Seacology.

permanent houses at Paiawa are from the relocation of abandoned houses and sheds left behind when a logging camp departed in the early 1990s. All housing is of the European style. Pit toilets are evident at Busama, though in general toileting facilities are scarce, with most people utilizing the beach and bush.

1.7 ECONOMY

The major social and economic unit in the participating communities is the nuclear family, though there are also examples of extended families, and also some examples of two related families sharing the one residence while accumulating the resources to build another house. In some cases, the houses of a group of families related by a common ancestor will be built close together. As mentioned above, these family groups or 'sub-clans' represent a 'corporate' kin group who in the past would collaborate in social and cultural activities, co-operate in economic activities⁴⁵, and determine access and use rights to gardening land and, to a certain degree, fishing areas.

Villagers at Lababia have been described as subsistence affluent but cash poor⁴⁶ (Wagner, 2002), and this could be said to be true for all participating communities. Against people living in town or expatriates, people in participating communities now judge themselves impoverished in material

terms⁴⁷. This drives their aspirations of development⁴⁸ and the various strategies they pursue within their economic lives and influences their participation with the wider world, and in the case of Lababia, with VDT and KICDG, and with all participating communities, now with the WPRFMC and other partners in the leatherback turtle recovery arena.

During the recent socio-economic survey, it was determined that cash incomes for villagers in the participating communities are small, irregular, widely variable, and often related to their sub-clan membership. Obtaining detailed income-and expenditure information was difficult for a variety of reasons, mostly to do with problems of recall, and the seasonality of certain cash-making endeavors. Also, villagers find it difficult to fix previous income earning events to a calendar date, thus making estimates of annual per capita income difficult to make. A final contributing factor is the high occupational flexibility associated with both subsistence activities and economic opportunities, with monetary needs fluctuating throughout the year as seasonality of garden productivity, fishing effort, labor requirements and customary needs shift⁴⁹.

All households obtain cash income from a variety of subsistence and commercial activities. The degree that households depend on any of these activities as noted

above is dependent on the availability of related resources, but also on acquired skills, felt needs and prevailing consumption patterns. Besides schoolteachers there is no paid employment in the participating communities. Several individuals reported to receive pensions or monthly funds from superannuation schemes⁵⁰. Many men have experienced labor opportunities earning cash as employees at some time of their life and for varying lengths of time, and many men from the participating communities have worked for logging companies in the past (Martin, 1998).

People at Lababia previously earned money via wages generated by the Kamiali Integrated Conservation and Development⁵¹ (ICAD) activities, and more recently, all participating communities have had a tremendous boost in income from the wages given out under the WPRFMC's leatherback turtle recovery projects. Cash now has an important part to play in the images the villagers display in the seeking of prestige, with cash energetically sought and any suspected new opportunities to obtain it competed for.

Results from the socio-economic survey show the range of household incomes to be very high, partly because of variation in household size, with estimates of annual household income ranging between K 120-2,580/year⁵². Income levels are generally insufficient to facilitate the establishment

⁴⁵ Because of the intrusion of the market economy, this level of cooperation has weakened as cash income is now more often than not, pursued at the nuclear family level, with subsequent increase in social and economic differentiation between families and sub-clans (Martin, in press). Today, each household tends to look after its own affairs independently.

⁴⁶ Poverty in PNG refers generally to the lack of accessibility to basic services, opportunities to sustain lives and a lack of income earning opportunities.

⁴⁷ The growing articulation of PNG with the world economy combined with the images of affluence from the outside world has produced new economic visions for the people.

⁴⁸ Aspirations include a desire for more consumer goods, for permanent rather than bush material housing, better health care and education, sports facilities and opportunities to travel.

⁴⁹ Ceremonial life has been affected to some degree due to the lack of cash. Modest exchanges do still occur between the immediate families, but few families have the resources required to stage what others would consider to be a feast sufficient for ceremonial occasions, such as a marriage, particularly as trade store goods have now become an increasing part of the prestige system.

⁵⁰ Most people that obtain higher education and gain employment or self-employment in towns remain there for their productive life-cycle, returning to the village only when they lose jobs or retire.

⁵¹ The ICAD model fostered the incorporation of development initiatives for communities with high biodiversity areas and conservation activities by NGOs. This model gained increasing focus in PNG following the Rio Summit in 1992, and the subsequent establishment of the Convention on Biological Diversity. In response to the Conservation Needs Assessment (CNA), the PNG Biodiversity Conservation and Resource Management Program (BCRMP) was established within DEC in 1993, with funding by the Global Environment Facility (GEF). An ICAD was set up immediately at Lak in the New Ireland Province and failed (McCallum and Sekhran, 1997), and in 1995 a second project was set up in the Bismark-Ramu area (van Helden, 1998), with NGOs also establishing ICADs across PNG. The CNA had designated the Kamiali area as an area of very high priority biodiversity conservation area, due to it being virtually unsurveyed (Alcorn, 1993). Subsequently, when an opportunity arose, an ICAD was established at Lababia, known as the Kamiali ICAD.

⁵² The average household income at Lababia was estimated to range between K 250/year in 1996 (Martin, 1998, in press) to K 1,250/year in 1998 (Wagner, 2002). In 1996 the Real Domestic Factor Income per capita for the Morobe Province was estimated at K 1,240. It should be noted that this indicator is an aggregate figure and needs to be interpreted carefully as this figure will be skewed due to the higher number of wealthier people living in Lae at a level far higher than the majority of rural households.

of small-scale village businesses, such as the growing of cash crops⁵³ or the raising of livestock⁵⁴, though vanilla holdings have been planted at Labu Tale and Busama in the last 2-3 years, with many households waiting for plants to reach maturity before selling. Unfortunately the market price for this commodity has slumped dramatically since the first waves of enthusiasm in the early 2000s.

During the socio-economic survey, the vast majority of respondents reported that fishing is their prominent source of income generation⁵⁵, followed by the sale of betel nut⁵⁶ (*Areca catechu*), garden food in local village markets or in Lae, construction (of canoes and houses), and the sale of coral lime⁵⁷. Villagers at Lababia and Paiawa also receive income from the occasional sale of handicrafts, particularly trochus (*Trochus niloticus*) armbands.

Average income from fishing was K 60/ market trip or village sale and K 95/market trip for garden produce. Remittances averaged K 60/month for those households that received them, with most remittances coming from adult children that were working in major urban centers, on mine sites or in logging camps. Other instances

of monetary assistance reported during the socio-economic survey include money to pay for boat fares to return to the village, to buy food or support general living costs, to pay debts, to pay medical costs (usually associated with new births), to buy soccer boots, to assist with Christmas festivities and to pay school fees.

One of the biggest problems facing villagers in the participating communities is the prohibitively high transportation cost if they want to sell produce in Lae. As noted above, larger and more economical diesel-powered boats have operated in the past; none are now doing so. Dinghy fares from Labu Tale are K 8-10, Busama K 20-25, Lababia K 40-50, and Paiawa K 70-80 one-way. Additional costs are also incurred besides the dinghy fare when marketing, including freight (charged at a per parcel rate, e.g.: bunch of bananas, bilum⁵⁸ of sago bundles, or coconuts), Public Motor Vehicle (PMV) fare to transport produce from the Eye-grease market (the landing point for villagers along the Huon Coast), market fee, wheelbarrow charge and victuals. On average, households at Labu Tale and Busama will make the trip to Lae to market at least once a month⁵⁹, with households at Lababia less regular and Paiawa hardly ever.

Internal redistribution of cash usually takes place through the operation of a number of small trade stores and weekly markets, like the one at Busama, which operates daily. During the recent survey, produce that was being sold at the Busama market included betel nut, mustard, tomatoes, oranges, bananas, scones and donuts, fresh and smoked fish (mostly flying fish (*Cypselurus* spp), garfish (Family Hemiramphidae), scads (*Sela* spp), trevally (*Carangoides* and *Caranx* spp.), longtoms (Family Belonidae), snapper (*Lutjanus* spp.) and squids), peanuts, fresh and cooked sweet potato, corn, pineapple, watermelon, pitpit, greens, sago and cucumber. One observable result of the benefit of the leatherback turtle recovery project for Busama has been the increase in marketing, greater use of canteens and trade stores in the village, and 'street' markets.

The most common expenditure for households is food and household items, with approximately 60% going toward rural necessities such as bush-knives, fish lines and hooks, rice, sugar, salt, soap and kerosene for lighting. Social contributions⁶⁰, custom needs⁶¹, Church tithes⁶², clothing, school fees and outward remittances or monetary assistance consumes the rest.

⁵³ Formal plantation activity first began in the 1930s with the establishment of sawmills, cocoa plantations and cattle stations. Under the plantation ordinance of the 1920s many plantations were established across PNG, which was later expanded between 1956-1961 by the Copra Cooperative. Along the Huon Coast, several more plantations were established under this scheme between 1951-1954. People from Busama had a large coconut plantation at Mtocke, and a coffee and coconut plantation was established near the Bitoi River at Lababia and was run as a village cooperative. The co-operative societies never became a major force in smallholder marketing. Reasons for the decline of this initiative include the capital poured into expansion, the method of payment to smallholders and the usual claims of mismanagement and corruption. Plantations that were established failed in a short period of time, particularly the one at Lababia (see Wagner, 2002).

⁵⁴ During the 1930s, a cattle farm was established at Buang-Abongbalelon near Busama but was later relocated to Mumeng.

⁵⁵ Village fishers also expressed a significant amount of local knowledge in regards to the best locations and times to fish, recognizing the effects of weather patterns, seasonal change, and other factors on fish habits.

⁵⁶ The consumption of betel nut in a combination of mustard (*Piper* spp.) and lime (either from coral or shells) is widespread in Melanesia, Micronesia, and parts of South and Southeast Asia.

⁵⁷ The burning and heating of coral releases carbon dioxide to create calcium oxide, or lime. Common species used are the staghorn *Acropora* species, particularly *Acropora nobilis*, *A. millepora*, *A. formosa* and *A. grandis*. Some *Fungia* spp. and *Porites* spp. are also used. Lime is also made from the shell of the freshwater snail *Faunus ater*.

⁵⁸ A bilum is a woven string bag.

⁵⁹ From discussions with several women and information collected during the recent survey, a marketing example is provided for Busama. The average market produce for a woman at Busama will consist of at least 20 bundles of sago which retail for K 5/bundle (price is between K 4-6), a bunch of bananas which will retail for K 6 (range is K 3-10), coconuts sold for K 0.60/each and a carton of smoked fish (sold for about K 50/carton). For all this, she will earn K 172. Her costs include K 40 boat fare (return), K 30 in freight; the PMV fare will be K 4 (return), the market fee of K 6, and a wheelbarrow charge of K 1. If she has not brought food with her she will consume food purchased at the market, which maybe another K 5. These costs have now consumed K 86 of her K 172 leaving K 76 to buy village 'essentials' and cover any other needs.

⁶⁰ Previous estimates at Lababia, suggest that approximately 20% of a typical household's annual cash income circulated back and forth within the community's gift economy (Wagner, 2002).

⁶¹ Custom needs refer to activities such funerary, bride-price and feasting exchange contributions.

⁶² Church tithes are collected at three levels: Circuit, District, and Parish, with annual payments of K 11 required per person.

TABLE 11: MAJOR ASSETS

ITEM	LABU TALE	BUSAMA	LABABIA	PAIAWA
Radio	40%	40%	53%	40%
Camera	20%	7%	7%	0%
Coleman Lantern	60%	77%	60%	80%
Sewing Machine	40%	20%	0	20%
Television	15%	7%	0	0
Generator	25%	10%	27%	0
Solar Panel	10%	3%	7%	0

Source: Kinch, 2006–Unpublished field data.

1.7.1 Assets

Material possessions common to most households across the participating communities include one or more bush-knives, axes and hoes, aluminum cookware, plastic buckets, washtubs, fuel containers, small kerosene hurricane lamps, plastic/enamel/porcelain crockery, cutlery, Bibles, prayer and hymn books, school textbooks, exercise pads, pencils and pens. Other major assets include a radio, Coleman lanterns and sewing machines (Table 11).

1.8 FISHING

The fisheries sector began in the 1960s along the Huon Coast, when Australian middlemen came purchasing fish to sell in Lae, and fishing became the mainstay of the cash economy for this area. Fishing in all participating communities intensified during the German Development Service (GDS) sponsored Morobe-Madang-Sepik (MOMASE) fisheries project. This project was headquartered in Lae at Voco Point and ran from 1987 to 1999. It created a steady market, a cheap supply of ice, and advice to village fishers on cost-effectiveness in running a fishing business. When it was first initiated, Lababia was the most productive

community, and a community fishing co-operative called *Mbame* was established with assistance from VDT and World Wide Fund for Nature (WWF).

Due to socio-cultural fabric of the Lababia community, a further 18 fisher groups were established⁶³ shortly after showing that some individuals and sub-clans were not committed to supporting the community fishing co-operative, and within six months of its inception in January 1996, the co-operative fishing project collapsed. The VDT blamed the Kamiali Conservation Project Committee (KCPC) for the failure and suspected they had misappropriated funds (Wagner, 2002; Martin, 1998). The dinghy and equipment was later sold to a local entrepreneur, Peter Ben, who continues to this day to buy and catch fish for sale. The supply of fish from Lababia and elsewhere later became erratic and it appeared that participation in the fishery by village fishers was based on short-term needs (Drewes and Jarchau, 1991).

More recent fisheries related interventions in the participating communities include the establishment of the European Union's (EU) Rural Coastal Fisheries Development Program (RCFDP) in 2004⁶⁴. The Buagong fisher group is based at Busama and is the

recipient of a 28 ft fiberglass dory powered by an inboard diesel engine under a loan agreement. This fisher group has been traveling down the Huon Coast to purchase fish from village fishers at Paiawa. In 2005, the Asian Development Bank (ADB) funded National Fisheries Authority (NFA) Coastal Fisheries Management and Development Program⁶⁵ (CFMDP) also started in the Morobe Province⁶⁶ and has conducted community-based fisheries management awareness programs along the Huon Coast, including Lababia, Busama and Labu Tale. They are currently assisting the village of Buakap to the south of Busama to develop a fisheries management plan for their territorial waters. The WPRFMC has also been collaborating with the CFMDP over the production of a comic book about the need for the protection of leatherback turtle nests. Recently, the Waimala Fishing Association of Labu-Tale received a Philippine-style pump-boat from Frabelle Frecosmar, a new tuna fishing and canning company based in Lae.

The most common forms of fishing for participating communities is handlining, followed by vertical longlining, trolling, spear fishing and netting (Table 12). Trap fishing, the use of derris root (*Derris trifoliata*) and dynamite fishing⁶⁷ are also occasionally

⁶³ Many of these groups would supply fish for a few months and then cease due to a lack of working capital, or other subsistence activities would cause the group to split up (Martin, 1998).

⁶⁴ As part of its project of poverty alleviation by increasing rural incomes, the RCFDP has been trying to develop the deep-water snapper fishery in PNG as part of its overall purpose of sustainable commercial production and improved marketing of marine products.

⁶⁵ The author has provided technical assistance to the RCFDP and the CFMDP. The CFMDP in particular has provided significant logistical support, such as housing and other arrangements to the author in his role as the WPRFMC Project Anthropologist and recently with the Project Leader contracted through the Marine Research Foundation.

⁶⁶ One of the goals of the CFMDP is to explore arrangements through which provinces, LLGs and communities might participate more fully in fisheries development and management in the province, in order to ensure that the benefits derived from marine resources are sustainable and economically beneficial over the long term. Another objective of the CFMDP is infrastructure development. At Voco Point, a planned wharf development will focus on an area that is important for fisheries activities where longliners, dinghies, village boats, yachts, and Lutheran shipping vessels congregate. This improvement is expected to create spin-off economic opportunities and social benefits for coastal communities in the Morobe Province.

⁶⁷ Bombs for dynamite fishing were made from old World War II ordnance. People using this technique would place the explosive material extracted from the old ordnance in a glass jar and a blasting cap then inserted.

TABLE 12: FISHING GEARS

ITEM	LABU TALE	BUSAMA	LABABIA	PAIAWA
Fishing spears	60%	83%	100%	90%
Spear gun	30%	17%	7%	50%
Fishing lines	90%	80%	93%	100%
Fishing net	45%	13%	40%	10%
Prawn net	30%	67%	0	0
Underwater torch	5%	13%	13%	0
Ice-box/Esky	10%	30%	20%	10%
Canoe	65%	63%	93%	90%
Dinghy	30%	13%	7%	10%
Outboard engine	20%	7%	13%	0

Source: Kinch, 2006–Unpublished field data.

TABLE 13: AVERAGE BUYING PRICES FOR FISH BUYERS (KINA/KG.)

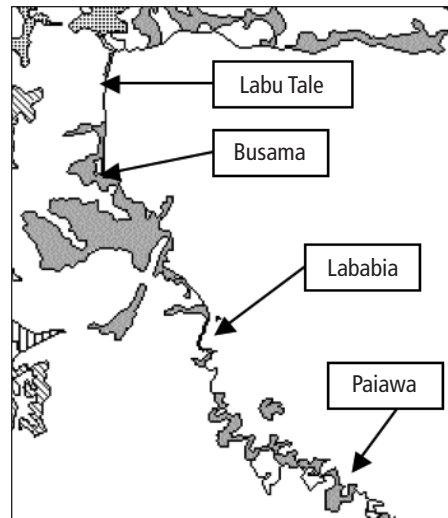
SPECIES	BUSAMA	LABABIA	PAIAWA	LAE
Mackerel		3.70	3.50	6.50
Reef fish and Snappers	3.00	3.70	3.00	6.50
Red Emperor	5.00	3.80	3.00	5.50
Pelagics ⁶⁹ and Trevally	2.00	2.50	2.50	4.00
Batfish		2.20		5.50
Squid		0.50		0.80
Lobster		6.00		16.00

Source: Kinch, 2006–Unpublished field data.

TABLE 14: CATCHES AT LABABIA

PRODUCT	KG	KINA
Reef fish	70.3%	71.2%
Red Emperor	18.0%	16.7%
Batfish	10.1%	8.6%
Squid	0.5%	0.6%
Lobster	1.2%	2.9%

Source: Kinch, 2006–Unpublished field data.



MAP 3: AGRICULTURAL LAND ALONG THE HUON COAST Source: Bourke et al, 1997.

used⁶⁸. For Lababia and Paiawa, beche-de-mer and trochus harvesting contribute to overall fishing activities on occasions because they have suitable reefs and islands within their territorial waters. Women will also reef glean for shells (*Tridacna* spp., *Lambis* spp., *Neritodryas conea*, *Neritina pulligera*, Family Donacidae and others), beche-de-mer and octopus in these two communities.

At both Busama and Lababia there are three village fish buyers. At Busama, one of these buyers is the aforementioned RCFDP recipient. At Lababia, the three fish buyers are Peter Ben, David Naru and Jim Kinasi. In discussions with these fish buyers it was strongly evident that it was very difficult to run a village-based fishing enterprise due to high fuel prices, difficulties in accessing ice, and lower than anticipated fish purchase prices (Table 13) (also see Kinch, 2006b for an analysis of the RCFDP fisher groups for the Morobe Province). Additional costs incurred include the purchasing of food, tackle, stimulants (tobacco and betel nut) and crew wages.

A review of sales receipts held by village buyers at Lababia showed that reef fish consistently provided around 70% of weight and cash value for all fish purchased (Table 14) (see Appendix F for species details).

1.9 GARDENING AND FOREST USE

Nearly every family in the participating communities engages in subsistence gardening (Table 15) and gardening land is extensive along the Huon Coast (Map 3). In general there is low land use intensity, with new gardens made each year in a new area. Each family has several gardens in production and at various stages of growth at any one time (Table 16). Gardens at Labu Tale and Busama are located in the flat terrain close to either side of the Buang River or in hills located behind the main village centre. At Lababia, most gardening occurs in the Bitoi River flood plain, which is 5-10 km distance from the main village. The Bitoi

⁶⁸ There have been reports of groups using insecticides in fresh-water ponds and streams and at Sapaia, people were said to be using charged car batteries to electrocute fish.

⁶⁹ The tuna season along the Huon Coast is from November-February.

TABLE 15: GARDEN ACTIVITY

ACTIVITY	LABU TALE	LUTU BUSAMA	AWASA BUSAMA	LABABIA	PAIAWA
Households engaged in any form of agricultural activity	100.0%	94.5%	97.1%	98.8%	100.0%

Source: PNG 2000 Census.

River area accounts for 70% of all gardens (Wagner, 2002). Regular flooding of the river provides nutrients to the area, and allows a very short fallow period of 3-4 years, compared to the period of 5-15 years⁷⁰, which is more typical⁷¹. This year, gardens at Lababia were inundated by high tides. Behind the main village of Lababia, along both sides of the Tabali River, is an extensive swamp where villagers go to harvest sago palm. Gardens can also be found on Lababia, Lasanga and Jawani Islands. Unlike the other participating communities, no hillsides have been cleared for gardening, though a small amount of gardening takes place close to and behind the main village households, back towards the Tabali River. At Paiawa, the practice is to start a garden from the bottom of the slope (actually on the shoreline) and work their way up to the ridge-line. These gardens are continuous and some have been in use for 8-10 years as they creep up the slope year by year. Gardening practices do not involve any soil and water management techniques such as soil mounding, composting, or drainage and irrigation ditches.

In general there are four types of gardens produced. These are taro (*Colocasia esculenta*) gardens; mixed gardens, which are dominated by sweet potatoes (*Ipomoea batatas*), but may also include any of the following: pawpaw (*Carica papaya*), yams (*Dioscorea alata*), sugar cane, Chinese Taro

(*Xanthosoma sagittifolium*), sago (*Metroxylon sago*), aibika (*Ablemoschus manihot*), Amaranthus spp, snake bean (*Vigna unguiculata*), pineapple (*Ananas comosus*), sugar cane (*Saccharum officinarum*), corn (*Zea mays*), cucumber (*Cucumis sativus*), Chinese cabbage, choko, shallots, egg plant, water melon and pitpit (*Saccharum edule*); cassava (*Manihot esculenta*) gardens⁷²; and banana (*Musa cvs*) gardens. In old garden sites, kunai grass (*Imperata cylindrica*) is prevalent, and *Piper aduncum* is an important fallow tree.

The relative importance of sweet potato and taro varies between locations⁷³, dependent on the occurrence of taro beetle⁷⁴ (*Papuan* spp.). Despite an increase in the importance of sweet potato, taro continues to be an important crop, though at Busama sweet potato has now become the staple⁷⁵. Soil fertility is also a factor restricting the planting of taro.

Fruit trees that may be planted around the village or in family and sub-clan 'orchards' include mango, Malay apple, Marita pandanus and guava. Food gathered from the forests consists mostly of fruits, galip and okari nuts, and breadfruit.

From a 24-hour food recall survey, plantains are the predominant staple at Labu Tale, sweet potato at Busama and Lababia, and taro at Paiawa (see Appendix G for further details).

TABLE 16: AVERAGE NUMBER OF GARDENS FOR EACH VILLAGE

PLACE	OLD	NEW
Labu Tale	2.0	2.2
Busama	1.6	1.9
Lababia	1.8	1.7
Paiawa	1.0	1.2

Source: Kinch, 2006–Unpublished field data.

1.10 ANIMAL USE

Very few pigs (*Sus scrofa*) are kept in the participating communities⁷⁶. Pigs required for customary rites or 'parties' are bought from Lae or neighboring villages for K 200-600 each. Occasionally captured wild piglets will be raised back in the village, essentially forming the domesticated stock observed in some villages. Some households keep chickens and one cassowary was being husbanded at Lababia.

One of the most significant features of the local economy is people's minimal use of the forest for hunting. Male respondents during the recent survey stated that hunting was more common in their grandfathers' time, and villagers generally regard themselves now as fishers and gardeners, not as hunters (see also Martin, 1998). The main target species when hunting include pigs, cassowary, tree kangaroos, cuscus, echidna, bandicoots and bush fowl. Martin (in press) states for Lababia that the hunting trips carried out nowadays are best described as recreation.

⁷⁰ In 1944, Hogbin (1951) estimated that fallows at Busama were between 7-14 years long.

⁷¹ Shorter fallow periods are also the result of individual families seeking to limit the distance they have to walk to their gardens.

⁷² These are planted in sandy soils immediately behind the village, and close to the shoreline at other locations.

⁷³ In the past, Busama people would trade taro south to Sipoma village for pots (Hogbin, 1947).

⁷⁴ In 1944, Hogbin (1951) noted that taro beetle was not a problem at Busama, but had practically wiped out the crops of neighbouring villages. Infestations of taro beetle were found by Issacson and King (1987) to be of high concern amongst village gardeners in the Morobe Province.

⁷⁵ A study at Busama in 1946 found sweet potato an unimportant crop; furthermore, the crop was considered undesirable because it attracted wild pigs into the taro gardens (Hogbin, 1951). A later study in 1991 observed the same (Bourke *et al*, 1997).

⁷⁶ Pig raising was a major activity at Busama in 1950 with an estimated 600 pigs kept in the village at that time (Hogbin, 1951).

2.0 LEATHERBACK TURTLE ECOLOGY

The leatherback turtle is the largest sea turtle and is the sole member of the taxonomic family Dermochelyidae⁷⁷, which exhibits significant morphological and physiological differences⁷⁸ from the other family of sea turtles, the Cheloniidae (Pritchard, 1971, 1997; NFMS and USWFS, 1998; Rhodin *et al*, 1981; Gaffney, 1975; Bickham and Carr, 1983; Pritchard and Trebbau, 1984; Eckert, 1995). They are the most widely distributed sea turtle, typically associated with continental shelf habitats and pelagic environments, ranging through all oceans from 71° N to 47° S (SPC, 2001; Pritchard and Trebbau, 1984).

It is speculated that leatherback turtles are short-lived, reaching only 30-45 years of age (Boulon *et al*, 1996), with age estimates for sexual maturity ranging from 2-14 years (Pritchard and Trebbau, 1984; Rhodin, 1985; SPC, 2001), but commonly thought to be between 9-15 years (Zug and Parham, 1996). Even though their large body size, insulating layer of sub-epidermal fat, ability to control blood flow and counter-current heat exchangers in the flippers (Mrosovsky and Pritchard, 1971; Frair *et al*, 1972; Greer *et al*, 1973; Goff and Stenson, 1988; Paladino *et al*, 1990; Morreale *et al*, 1996) allows for

greater thermal tolerances⁷⁹, nesting activity is restricted to tropical and sub-tropical regions between 30°N and 20°S (Thompson *et al*, 2001).

Leatherback turtles roam the oceans searching for jellyfish (*Cyanea capillata*, *Rhizostoma cuvieri*, *R. cuvieri*, *R. pulmo*, *Stomolophus melaegrus*, *Catostylus mosaicus* and *Physalia utriculus*), ctenophores, scyphomedusae, cnidarians (medusae, siphonophores), tunicates (salps, pyrosomas), gelatinous zooplankton and other soft-bodied invertebrates (Leary, 1957; Fritts *et al*, 1983; Collard, 1990; Grant *et al*, 1996; Boulon *et al*, 1988; Morreale *et al*, 1996; SPC, 2001; Eckert *et al*, 1989; Den Hartog 1980, Den Hartog and van Nierop, 1984; Paladino and Spotila, 1992). The high intrinsic growth rates of this macroplanktonic prey coupled with their extreme sensitivity to fluctuations in the marine environment renders their abundance and distribution sporadic⁸⁰ (Saba *et al*, 2006), forcing leatherback turtles to migrate to foraging grounds over great distances⁸¹.

Leatherback turtles nesting along the Huon Coast have been reported to cross the Pacific Ocean to forage in the neritic waters off the west coast of North America⁸² (Benson *et al*, 2006; Dutton, 2006; Harvey *et al*, 2006). It has also been recorded that the nesting period

for leatherback turtles along the Huon Coast corresponds with the presence of large populations of *Catostylus* spp. (Quinn and Kojis, 1982; Quinn *et al*, 1983), which may offer sustenance during inter-nesting intervals⁸³.

2.1 CURRENT STATUS

In the Pacific Rim region there are two genetically distinct populations of leatherback turtles (Dutton *et al*, 1999). There is a western population nesting in Indonesia (West Papua⁸⁴), Malaysia⁸⁵, PNG, the Solomon Islands, and China (NMFS and USFWS, 1998) and an eastern population with nesting beaches in Costa Rica (Spotila *et al*, 1996; Steyermark *et al*, 1996) and the Mexican states of Guerrero, Oaxaca, and Michoacán⁸⁶ (Sarti *et al*, 1996). The Bellagio Blueprint for Action calls for the protection of these leatherback turtle nesting sites (WFC, 2004).

All sea turtles are currently listed on the World Conservation Union (IUCN) Red List (<http://www.redlist.org>) and in Appendix I of the Convention on the International Trade in Endangered Species (CITES). Leatherback turtles were moved from Endangered to Critically Endangered on the Red List in 2000⁸⁷, following increased concern

⁷⁷ Blainville introduced the generic name *Dermochelys* in 1816, whilst the species name *coriacea* was first introduced by Vandelli in 1761 and adopted by Linnaeus in 1766 (Rhodin and Smith, 1982) and refers to the leatherback's distinctive scale-less skin which is black with varying degrees of pale spotting and has a rubber-like texture.

⁷⁸ Adult leatherback turtles have a carapace that is constituted of tough, oil-saturated connective tissue raised into seven prominent ridges and tapered to a blunt point posteriorly (Wood *et al*, 1996). Hatchlings are likewise predominately black, but differ in being covered with tiny polygonal or bead-like scales.

⁷⁹ Juvenile leatherback turtles have been observed from 57° N to 34° S, although turtles less than 100 cm curved carapace length may be limited to regions with water temperatures above 26° C (Eckert, 1995).

⁸⁰ Given the low calorific content of gelatinous organisms, it is thought that mature female leatherback turtles most likely seek large aggregations of prey or areas that favour larger prey, areas that are characterised by phytoplankton blooms and elevated sea surface temperatures to build their energy reserves required for nesting (Harvey *et al*, 2006).

⁸¹ Leatherback turtles are often associated with foraging areas located in eddies and convergence zones, and whilst feeding they may drift with surface currents for long periods, with most of their activity focusing on foraging movements within the water column (Lombardi *et al*, 2006).

⁸² Haplotypes taken from leatherback turtles that have been stranded on North American beaches or were caught incidentally in fishing operations in the eastern side of the North Pacific Ocean suggest that PNG leatherback turtles migrate to the Northern Hemisphere to forage after nesting (Dutton *et al*, 2000).

⁸³ Anecdotal statements by Busama and Labu Tale villagers suggest that jellyfish populations have declined in recent years.

⁸⁴ The largest nesting population of leatherback turtles is the rookery at Jamursba-Medi on the north Vogelkop coast in West Papua, Indonesia, where approximately 500-1500 females are estimated to nest annually (Hitipeuw *et al*, 2006). Other leatherback turtle nesting sites in West Papua have been reported by Tomascik *et al* (1997), Petocz (1987), Bhaskar (1987), Maturbongs (2000) and Suganuma *et al* (2005).

⁸⁵ Populations in Malaysia are reported to be extirpated (Chan and Liew, 1996).

⁸⁶ Populations in Mexico and Costa Rica have decreased exponentially since the 1990s (Eckert, 1997; Spotila *et al*, 2000).

⁸⁷ This change in status was based on estimates from Pritchard (1982) and Spotila *et al* (1996), which suggested a 70% decline in one generation (Mrosovsky, 2003). Pritchard (1971) first estimated the worldwide leatherback turtle population to be between 29,000-40,000 nesting females, but later refined his estimate to approximately 115,000 a decade later (Pritchard 1982b). Around the same time, Ross's (1982) made a more conservative estimate of 14,325 nesting females. Fourteen years later, Spotila *et al* (1996) estimated a global population with a mean of 34,529. The 70% decline comes from the difference of 80,471 between Pritchard's (1982b) and Spotila *et al*'s (1996) estimates. Mrosovsky (2003) believes that this listing is likely to result in erroneous impressions of the rate of changes in leatherback turtle numbers as Pritchard's (1982b) was based on his work conducted in Mexico, but still relied heavily on his earlier interpretations in 1971. Taking 1982 as the start date for measuring decline, Mrosovsky argues that this gives the impression that the changes in numbers have been more rapid than is in fact was the case.

about population decline in the Pacific Rim region⁸⁸ (Godley and Broderick, 2001). Leatherback turtles have been listed as endangered in the USA, Mexico, and Costa Rica. In PNG, the leatherback turtle is the only sea turtle on the protected species list⁸⁹ (Kula and George, 1996). Malaysia banned the sale of all leatherback turtle products in 1988 and enacted bans in 1985 and 1991 on fishing gears that entangle leatherback turtles (Chan and Liew, 1996). Indonesia began protecting leatherback turtles in 1978 (Sumertha Nuitja and Lazell, 1982).

2.2 LEATHERBACK TURTLE USE

Human activities that threaten leatherback turtles populations directly or indirectly in the Western Pacific include human and animal take of eggs and/or turtles, destruction and modification of nesting habitats (e.g.: logging, mining, village and urban expansion), incidental mortality from fishing gears (longlines, coastal gillnets⁹⁰ and trawls), pollution (e.g. ingestion of plastics and other synthetic material and toxins), disease, and insensitive tourism.

In PNG, leatherback turtles have been consumed in different areas of Madang, Morobe, Manus, East Sepik, East New Britain, Milne Bay and Central Provinces (Pritchard, 1979; Spring, 1982a,b; Lockhart, 1989). In some areas, they were part of the subsistence diet or were utilized in extending social relationships through trade, but in general it appears the consumption of leatherback turtles was not widely practiced because their oily flesh is considered unpalatable (Quinn *et al*, 1985; Pritchard, 1979). The only utilitarian use of leatherback turtles recorded in PNG is a mention that their oil was used in lamps in Manus (Pritchard, 1979).

Leatherback turtles are not normally eaten along the Huon Coast⁹¹. Where leatherback turtles are killed, eaten and/or traded, this is mostly attributed to communities that once lived in the hinterland but now reside on the coast. These communities include Buasing, Salus and Kobo⁹². At Paiawa, people regularly killed and smoked leatherback turtles and traded the flesh and eggs with mountain peoples residing in the interior for pig meat⁹³.

Egg harvesting was/is however widely practiced, partly because the beaches along the Huon Coast are used as pathways for local people that go to and from their gardens, or to visit neighboring residential areas, and because local fishers use the beaches at night to catch fish. Previously all eggs laid along sections of the Huon Coast were taken soon after laying (Quinn *et al*, 1983; Work, 2002).

At Labu Tale, leatherback turtles nest on beaches that affront the village and during the nesting period, the beach is partitioned by residence and people harvest from those areas. During the recent socio-economic survey, 40% of all respondent households said that they had consumed leatherback turtle eggs in the last year. During the 2006 beach walk conducted by the author, eleven nests had been dug up along the beach from the Buassi River to the Budu River⁹⁴ (see Kinch, 2006a). Reasons given for this harvesting despite the leatherback turtle recovery project was that the people that harvested eggs were not benefiting financially from the WPRFMC funded projects presence. At Busama, inland people from Bumatu who come down to Busama to trade and for market and sometimes camp on the beach near the mouth of the Buang River to have a change in diet were also blamed for egg harvesting.

It appears that at Lababia at least, there is stronger compliance with no egg harvesting. In the past, egg harvesting was a highly organized activity centered on a sub-clan rotational system with family groups or a portion of the sub-clan working together and sharing whatever eggs were found (Wagner, 2002). Once one 'corporate' group had found a nest or a series of nest, the 'right' to harvest was then given to another group, until all groups had their chance and then the rotation would begin again⁹⁵. The process has now stopped, as egg harvesting has been abandoned under the leatherback turtle recovery project, though the system of sub-clan rotation has been modified to accommodate the beach monitoring work, with the 'corporate' group now rotating as beach monitors and team leaders. The neighboring Salus people are known to harvest eggs from the Bitoi River area. Paiawa people did not consume any eggs this season.

In pre-historical and historical periods, egg exploitation along the Huon Coast would have had little impact on the leatherback turtle populations, as the villages were small and scattered. After World War II, egg exploitation increased, with leatherback turtle eggs changing from a protein supplement to a commercialized commodity. At present, reliance on harvesting leatherback turtle eggs has mostly shifted to the wages generated from the leatherback turtle-monitoring project. To get a grasp of possible income from egg harvesting, the author has attempted to get an approximate value of income that could be generated from egg harvesting, using Lababia has an example, as it has the highest egg volume laid during the nesting season and the longest time-series for nesting data.

⁸⁸ Though leatherback turtle populations in the Pacific are declining, other leatherback turtle populations in the US Virgin Islands (Dutton *et al*, 1992; Boulon *et al*, 1996), South Africa (Hughes, 1996) and Equatorial Guinea (Rader *et al*, 2006; Tomas *et al*, 1999) have shown apparent increases in abundances.

⁸⁹ Previous studies indicate that the numbers of leatherback turtles are decreasing in many areas of PNG (Pritchard, 1982; Spring, 1982a, b).

⁹⁰ During the recent socio-economic survey only one incident of catching a leatherback with a gill net was encountered at Busama and it was released unharmed.

⁹¹ Reasons given for this prohibition at Lababia appear to have been more to do with the difficulty of killing the turtles due to their size and the amount of effort needed to break open their thick shells than with any notions of conservation (Wagner, 2002).

⁹² In 2003, three leatherback turtles were reported killed at Kobo.

⁹³ There is still a large turtle net in the village called *poresemun*, though it is now not maintained. These nets were made from tulip and *magus* fibres, and were deployed from canoes to capture sea turtles.

⁹⁴ On the 24th January 2006, a large meeting (122 men, 37 women and plenty of children) was held at Busama to discuss closure from the Buassi to Budu Rivers. Issues raised at this meeting were if they did close the beach to egg harvesting, would this ban be permanent.

⁹⁵ This practice was abandoned at one point in the recent past, but led to a free-for-all with some groups missing out and was subsequently re-introduced (Wagner, 2002; Work, 2002).

Taking data from the 2005–2006 nesting season, 157 nests were laid along the 10 km beach at Lababia. During this same season, leatherback turtles were averaging 94 eggs/nest⁹⁶. From this, it can be extrapolated that the total potential income from the sale of eggs would be K 5,903.20 for that season (if all eggs were sold at K 0.40/egg⁹⁷). Even when using the averages from the last seven years of nesting data, it would appear that egg harvesting would only earn between K 6,500/year (using Kisokau, 2004, 2005 data) and K 7,500/year (using Pilcher, 2006 data).

From discussions with community members it appears that egg harvesting only ever contributed a small proportion of income for several reasons. The first being that most eggs were consumed immediately or distributed through clan and kin networks upon harvesting, second, the community has lacked access to suitable and cheap transport for a number of years to get produce to markets in Lae⁹⁸ and lastly, a high number of the nests were destroyed by erosion or inundation during high tides. As a comparison, it is estimated that the WPRFMC provides approximately K 43,760/season⁹⁹. Thus, the Lababia community is in actual fact being compensated just over seven times the amount that could ever be potentially made from egg harvesting.

Unfortunately for the WPRFMC, it would appear that paying communities for monitoring and protection will need to continue as the interest and commitment to monitor leatherback turtle nesting events and promote hatchling success is dependent on this income rather than concern about the recovery of leatherback turtle populations.

2.2.1 'Traditional' Aspects

Pritchard (1979) records a ritual on Manus Island related to leatherback turtle nesting, whereby a 'magic' man would chant over a concoction of coconut oil, dogs' teeth and sago to divine nesting time and location of leatherback turtles. Leatherback turtles that did come were then guided to a killing and processing area by holding a lamp close to its head. Upon reaching the processing area the leatherback turtle was clubbed over the head, butchered and the meat distributed.

From discussions with villagers in the participating communities, there appears to be nothing as ritualistic as Pritchard's anecdote above, though there are several stories and associated beliefs. Hirth *et al* (1993) records one local tradition that was told to him by leatherback turtle egg collectors in the Busama area. According to this story it was custom to place the small, yolkless eggs back into the egg chamber after excavation and then to cover them with sand, in the belief that the leatherback turtle would return to nest there again. Another, less common custom was to throw one yolkless egg in the direction that the turtle would come back to re-nest. This direction was always towards the village so next time the walk from the village to the nesting area would be less.

On the recent socio-economic survey, the author collected further stories and practices. At Labu Tale it was stated by some informants that if you say the name of the leatherback turtle as you are digging the eggs up, you would find that all the eggs would not contain yolks. One informant at Busama suggested that when the nesting season is due to finish, leatherback turtles shift further south along the beach to nest between the Buassi and Budu Rivers. The most common

story told at Busama was that 'traditionally' only middle-aged and elderly people were allowed to dig for eggs. If a young person harvested eggs, it was said that they would age quickly. At Busama, it was also noted that a call of a certain bird would signal the arrival of a nesting leatherback turtle. This type of story is common for other species, particularly tuna (see Wagner, 2002).

2.3 NOTIONS OF CONSERVATION?

Historically, there was not a strong need to regulate resource use along the Huon Coast on the basis to avoid over-exploitation, with people having little pragmatic concern for the environment. Resource management practices where they existed were rather directed primarily towards issues of resource distribution and social reproduction, or what could be termed 'cultural' sustainability, rather than towards issues of 'ecological' sustainability (Wagner, 2002).

Practices did exist however that could be construed as having a conservation outcome, both in relation to marine resources and the need to propitiate forest spirits¹⁰⁰. Belief in spirits of various kinds also restricted movement within village territories, limiting the number of families, which were likely to exploit resources at any given location. Tuna fishing practices were traditionally subject to stricter control in earlier times. At Lababia, young men were not allowed to fish for tuna until they had been properly initiated, and even afterwards, they were obliged to follow a strictly enforced set of ritual practices. These practices are now losing value because of the adoption of Christian religion¹⁰¹ and new methods of exploiting resources.

⁹⁶ Previous monitoring programs in the early-1980s at Labu Tale record the mean number of leatherback turtles eggs laid per nest to 99.3 (Quinn *et al*, 1983).

⁹⁷ In the 1970s, leatherback turtle eggs were sold in the Lae markets for 2 toea/egg, where 100 toea = 1 K. By the early 1980s, the price had risen to 10 toea/egg (Quinn *et al*, 1983). In late 1989, the price was increased again to 20 toea/egg, which was the same price for one chicken egg (Hirth *et al*, 1993). Until recently, leatherback turtle eggs could be found being sold in the Lae markets for 40 toea/egg.

⁹⁸ A recent review by the author of market survey data conducted by the CFMDP show no incidences of sale of leatherback turtle eggs in any of the Lae markets monitored under their project.

⁹⁹ This figure includes wages to field coordinators, team leaders and beach monitors, as well as the K 8,000/year incentive payment for non-egg harvest/beach rent.

¹⁰⁰ Examples include leaving certain species of tree standing when clearing forest for new garden sites, as these trees provide homes for birds, which are valued for several reasons. Some people also understand that trees left standing along the river bank provide shade, which is important to fish living in the river.

¹⁰¹ Conversion to Christianity entailed the abandonment of a large body of indigenous religious practices, many of which had previously structured villagers' interactions with their physical environment.

People in the participating communities are aware of human action as a source of disruption, but not to entire ecosystems, only to people's current or future access to a particular resource, and not to any consideration of their ecological functions and inter-relationship with other parts of the ecosystem (see Wagner, 2002). Even though the use of fish poison and dynamite is listed in the Kamiali Wildlife Management Area (KWMA) rules as a prohibited activity, the Lababia community has not taken action against any offenders, enforced any of the KMWA management rules, or imposed fines. During the MOMASE fisheries project, staff suggested to Lababian fisheries that small fish should be returned to the sea and that some temporary closures be instituted to help rebuild fish stocks. Most people at Lababia rejected the idea (Wagner, 2002).

Before the leatherback turtle project and the associated economic rewards there was little interest in conserving leatherback turtles at Lababia. Wagner (2002) writes that when villagers at Lababia were told about leatherback turtle populations declining, they responded that it was not their problem. Their concern was to sustain their own egg supply, and they were reluctant to reduce that supply in order to solve what they considered to be a problem created elsewhere¹⁰².

In the absence of a conservation ethic¹⁰³, there is a risk to the leatherback turtle recovery projects that when a future opportunity arises that is perceived to offer

a materially better income, such as mining or logging¹⁰⁴, it may be taken up. This also raises some questions about the efficacy of awareness conducted by the VDT, KICDG and the Huon Coast Leatherback Turtle Network (HCLTN) so far.

2.4 NATURAL PREDATION

Crocodiles (*Crocodilus porosus*) on the Huon Coast occasionally kill leatherback turtles as they come up to nest (Rei *et al*, 2003; Hirth *et al*, 1993; Quinn *et al*, 1983), and this was indeed a problem for this year's monitoring season at Busama. Sharks have also been reported as a potential threat to both nesting adults and hatchlings (Hirth *et al*, 1993; Quinn *et al*, 1983).

Predators of leatherback turtle eggs along the Huon Coast include monitor lizards (*Varanus indicus*), local dogs (*Canis familiaris*) and ghost crabs. As mentioned above, very few people keep pigs in the participating communities and subsequently pose little or no problem to eggs or to hatchlings. In the 2004-2005 nesting season at Lababia, heavy predation by village dogs was reported in the two to three days after initial hatching, and not after oviposition or during incubation (Kisokau, 2005; Pilcher, 2005). During the 2005-2006 nesting season, 1.5 m x 1.5 m bamboo grids with a 10-15 cm gap between the weaves¹⁰⁵ were used whereby the space in between the grids would allow hatchlings to emerge but not allow dogs to dig through.

2.4.1 Other Impacts

In the Busama and Labu Tale areas, expansion of the villages has affected nesting. In the 1970s houses the village of Busama stopped at the Buha Creek, but has now extended right up to the Buassi River.

2.5 NESTING

When nesting, leatherback turtles prefer deep, unobstructed underwater access and a relatively steep beach profile. The beaches that are part of the territorial zones of the participating communities offer these characteristics and consist of black grayish colored sand and have a linear shoreline with a moderate slope. The sand is relatively fine-grained and the supra-littoral vegetation is composed of beach creepers¹⁰⁶ and further inland, coastal forests. Many beaches are intersected by rivers, creeks or form swamps and lakes.

The beach at Lababia is the main leatherback turtle-nesting beach, accounting for approximately 70% of all nesting events along the Huon Coast (Benson, 2005; Benson *et al*, in press; Rei, 2005) and is characterized by a narrow beach¹⁰⁷ causing leatherback turtles to sometimes nest in and under vegetation at the upper margin. Other project site beaches are broader, and nests are generally located away from the vegetation line¹⁰⁸. There is the potential that these beaches

¹⁰² On Lihir, environment officers from the Lihir gold mine worked with DEC to develop an educational campaign to discourage people from killing leatherback turtles and collecting their eggs, resulting in meetings in villages and schools, the distribution of posters and information pamphlets in *Tok pidgin* and Lihirian all explaining the concept of an 'endangered species' and reasons why people should no longer eat leatherback turtles or their eggs. This had no effect, and each year the mining company employs young boys to guard the nesting ground from predation for the duration of the nesting season (McIntyre and Foale, 2004).

¹⁰³ Martin (1998) suggests that the people of the Huon Coast have no significant emotional, religious or philosophical linkages to the natural ecological systems in the land area to which they lay claim. However, there certainly are such linkages to the land itself.

¹⁰⁴ Previously, the community at Lababia expressed concern about the damage which logging companies could inflict if they were allowed to exploit the local forests, but this is more to do with seeing what has happened in the neighbouring villages that had allowed commercial logging.

¹⁰⁵ The four outer strips were tied at the corners with rattan to prevent breakage, and the grids were fixed in place with four upturned and trimmed branches from nearby trees. All materials were locally sourced and readily available, minimising the need for transport along the beach.

¹⁰⁶ Beach vegetation consists of grasses (*Ischaemum muticum*, *Cyperus rotundus*, *C. pedunculatus*, *Fimbristylis* and *Remirea*) and creeping plants (*Ipomea pes-caprae*, *Canavalia rosea*, *C. maritima* and *Sesuvium portulacastrum*), the latter sometimes hinders nesting when leatherback turtles become entangled (Rei *et al*, 2003). Leatherback turtles caught in beach vegetation will often die through overheating (Mrosofsky, 1997). Behind the beach foreshore, a belt of small shrubs consisting of *Claerodendron inerme*, *Wedelia biflora*, *Morinda sericea*, *Scaevola taccada* and the parasitic creeper *Cassytha filiformis* is found. Scattered stands of *Casuarina equisetifolia* can also be found, whilst coconut palms (*Cocos nucifera*) are common along consolidated sand ridges.

¹⁰⁷ It is possible that the movement of the Australian continental plate as it shifts northwards and collides with the Pacific plate as it moves west is causing the shoreline to dip into the sea. The landslips observable on the mountains behind the participating communities are evidence of this movement. Another possible issue is the 'greenhouse' effect, which may lead to higher sea levels and subsequent incidences of beach erosion. A physical example of this is the periodic flooding of beaches at Lababia and Paiawa. At Lababia, the sea sweeps over the beach mound and rushes under houses, and destroys gardens, and at Paiawa, large high tides resulted in all leatherback turtle nests being inundated.

¹⁰⁸ Vegetation patterns act as a strong selection pressure driving nest placement seaward (Kamel and Mrosofsky, 2004; Godfrey and Barreto, 1995; Whitmore and Dutton, 1985; Godfrey *et al*, 1996).

provide a variation to the gender ratios¹⁰⁹ produced along the Huon Coast, and may be more stable than the beach at Lababia given the overall beach width¹¹⁰. All beaches have deep-water approaches extending close to the shoreline and surf line¹¹¹. Unfortunately, they are also subject to seasonal or storm-related erosion and deposition (accretion) cycles, which can lead to lost nests when portions of the beach succumb to changes in current direction or velocity.

The peak of nesting activity along the Huon Coast beaches occurs primarily during the 'dry' season of October to March, with peaks nesting in December and January (Hirth *et al*, 1993; Benson *et al*, in press; Kisokau, 2005; Pilcher, 2006) when the sea is relatively calm and most beaches are replete with sand. Conversely, little sand remains at beaches along the Huon Coast during the 'wet' season, due to the effects of wave-induced erosion, and no nesting activity occurs at that time (Benson *et al*, in press). The breaching of rivers along the Huon Coast occurs at different times of the year and at different sites, depending upon the level of rainfall. Leatherback turtle nests located close to these rivers and other natural drainage systems are exposed and destroyed.

Leatherback turtles exhibit weak nesting beach fidelity with individuals laying as much as 100 km apart (Hilterman and Groverse, 2002; Stewart *et al*, 2006; Kamel and Mrosovsky, 2004; Dutton *et al*, 1999). Leatherback turtles that nest along the

Huon Coast also lay eggs at adjacent beaches up and down the Huon Coast (Benson *et al*, in press).

2.6 MONITORING

In the early-1980s, the first attempts to monitor the extent of leatherback nesting populations along the Huon Coast¹¹² occurred in the Busama area at the mouth of the Buang River¹¹³. During the period from November 1982-January 1983 and November-December 1982, 286 nesting leatherback turtles were recorded with an estimated 15 turtles a night nesting along the beach from Busama to Labu Butu (Quinn *et al*, 1983, 1985). The estimated total breeding female population was 1,250 at this time. Quinn and Kojis (1985) later estimated that ten turtles nested each night from November to January between Labu Tale and Busama, with estimates of annual nesting for this area, ranging from 200/year (Quinn and Kojis, 1985) and 300/year (Bedding and Lockhart, 1989). These estimates are considered greater than the results obtained from the current leatherback turtle recovery project and recent aerial surveys.

The VDT first began the monitoring of leatherback turtles at Lababia in 1998-1999¹¹⁴. From 2003 onwards, the WPRFMC has provided funding for the leatherback turtle recovery projects and also supported the establishment of the KICDG office and

its running costs. The WPRFMC has now also incorporated the communities of Busama, Labu Tale and Paiawa, which had begun monitoring with assistance from DEC and VDT under the HCLTN¹¹⁵. The NOAA has also contributed in recent years by way of technical expertise and funding satellite tracking and aerial surveys.

Anecdotal information from villagers along the Huon Coast suggests a decline in nesting leatherback turtle females over recent generations (Benson *et al*, in press; Work, 2002; Hirth *et al*, 1993). At present there is limited time-series of data to suggest trends in shifts in population trends.

In 1998-1999, the monitoring beach at Lababia was originally a 300 m stretch, which was also set-aside as a non-harvesting area. Villagers at the time expressed a distinct lack of enthusiasm for that prohibition, but did not challenge the closed area due to its small size (Wagner, 2002). The leatherback turtle-monitoring beach was then extended to encompass, first one km, then two, and now three km (Table 17). In October 2003, the Lababia community agreed to ban harvesting of leatherback turtle eggs and anyone caught breaking this rule would be fined K 100 (Kisokau, 2005b). Patrols along the whole 10 km length of the beach began in 2004-2005, with the two major clans rotating on a weekly basis to collect field data and information on nesting female turtles in the 3 km sampling plot.

¹⁰⁹ Evidence from Costa Rica suggests that hatching success varies seasonally, decreasing dramatically as the nesting season progresses. This variation can affect the total hatchling production per female and indicates that turtles arriving early in the season tend to produce more hatchlings than turtles arriving later in the season. The strong seasonality of hatchling success can also affect the sex ratio of hatchlings produced on the beach, because relatively fewer hatchlings are produced in the months during which female-producing nest temperatures occur (Santidrian-Tomillo *et al*, 2006). This may not be an issue along the Huon Coast, which has relatively stable temperatures all year round.

¹¹⁰ Nests that are farther away from the shoreline will have lower substrate water content and thus higher success rate (Marco *et al*, 2006). Nests dug at the surf line or in areas of massive beach erosion are almost always completely destroyed (Duque *et al*, 2000). Nests laid below the high tide that are washed over without being washed away can still produce large numbers of hatchlings (Leslie *et al*, 1996), although the hatch rates of inundated nests are often reduced (Whitmore and Sutton, 1985), hatchlings that do emerge are closer to the water and less vulnerable to predation and disorientation.

¹¹¹ Leatherback turtles never nest on beaches with a fringing reef (Pritchard, 1971).

¹¹² Attempts to document leatherback-nesting sites throughout PNG began in the late-1970s through local beach surveys and questionnaires, yielding largely qualitative information (Spring, 1982a; Hirth *et al*, 1993; Pritchard, 1979). The early initiatives in the Buang River area lacked sufficient funding and commitment to maintain their objectives for greater than a few years (Quinn and Kojis, 1985; Bedding and Lockhart 1989). The only other area that has conducted leatherback turtle nesting monitoring has been at Lihir Island in the New Ireland Province (Read, 2002).

¹¹³ Objectives of these earlier projects were to determine the nesting population size and to develop management strategies, which would allow for sustainable egg harvest by communities.

¹¹⁴ During 1999-2002, funding for the leatherback turtle-monitoring project was sourced from Wetlands International-Oceania via the Australian Natural Heritage Trust, the New Zealand High Commission, the Dutch Interchurch Organization for Development Co-operation (ICCO), the GEF Small Grants Project, South Pacific Regional Environment Program (SPREP), and others. The Marine Conservation Action Fund provided funds in 2001 to support DEC in telemetry work and training of village beach monitors in tagging.

¹¹⁵ The HCLTN Mission is that the leatherback turtle population in the Morobe Province is increased and maintained at viable levels, for the benefits of our present and future generations.

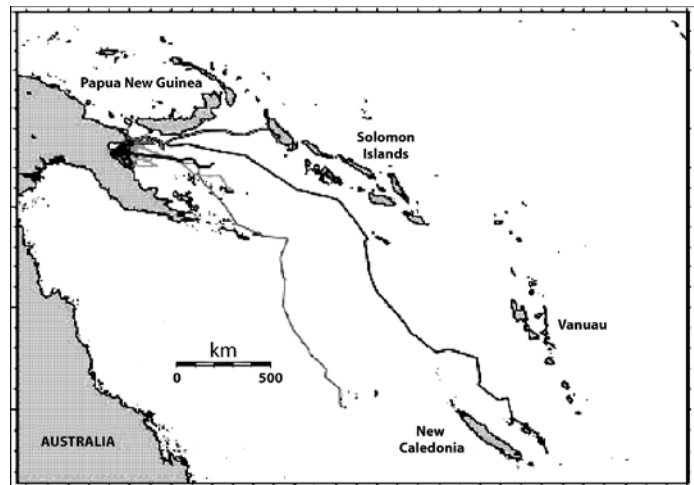
TABLE 17: RESULTS OF YEARLY MONITORING AT LABABIA

PERIOD	REMIGRANTS	NEW TURTLES	TOTAL	%REMIGRANTS	MONITORING BEACH DISTANCE (KM)
1999-2000	0	42	42	0.0	1
2000-2001	28	20	48 (55)	58.3	1
2001-2002	41	48	89 (41)	46.1	1
2002-2003	35	29	64 (56)	54.7	2
2003-2004	43	21	64 (71)	67.2	2
2004-2005	67	8	75 (59)	89.3	2
2005-2006	10	24	34	29.4	3

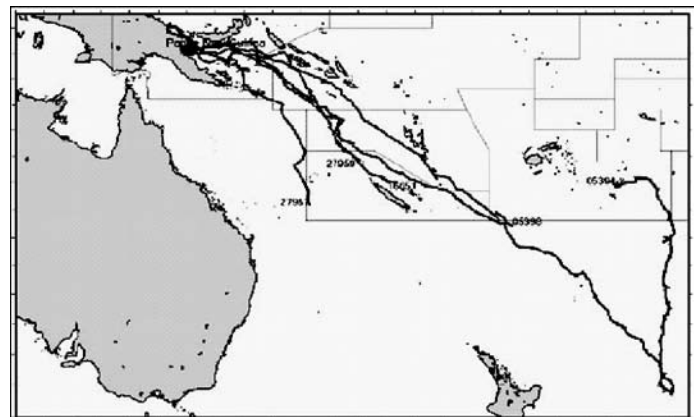
Source: Pilcher, 2006. (Figures in brackets are from Kisokau, 2004, 2005a).

Inter-nesting and migratory movements of female leatherback turtles from Lababia were tracked by satellite telemetry during the 2001-2002 (Map 4) and 2002-2003 (Map 5) nesting seasons¹¹⁶ and were instrumental in documenting beach use, inter-nesting intervals, and variability in nest site selection. Results also indicated that nesting females utilized the waters of the Huon Gulf adjacent to the nesting beach and re-nested outside the monitoring beach. Following nesting, the turtles migrated over deep waters and appeared to be utilizing underwater features (the New Britain and New Hebrides Trenches) en route to the Southern Transition Zone, an area of greater productivity in the high latitude waters adjacent to Australia and New Zealand (Benson *et al*, in press; Benson, 2005).

Aerial surveys have also been conducted during January 2004, 2005 (Benson, 2005; Benson *et al*, in press; Rei, 2005; Rei and Galama, 2004) and 2006, just after the peak of the austral-summer nesting season.

**MAP 4: LEATHERBACK TURTLE SATELLITE TRACKING – 2001-2002**

Source: NOAA

**MAP 5: LEATHERBACK TURTLE SATELLITE TRACKING – 2002-2003**

Source: NOAA

¹¹⁶ Nine were attached during December 2001 and 10 were attached during February 2003.

3.0 LEATHERBACK TURTLE CONSERVATION

With the institutionalization of environmental concerns, leatherback turtles have been increasingly employed as 'flagship' species for conservation by the environmental lobby, and the leatherback turtle is now well established as an iconic symbol to promote the ethos of conservation envisaged by NGOs, and to raise complex management and policy issues (as in the case of the Hawaiian longline fishery¹¹⁷) (Frazier, 2005; Bowen-Jones and Entwistle, 2002). Unlike 'keystone' or 'indicator' species, which have pivotal roles in the way an ecosystem functions, a 'flagship' species such as the leatherback turtle has stronger social dimensions. Other labels such as Critically Endangered are used in mobilizing public opinion¹¹⁸ and more importantly, fund raising¹¹⁹.

The leatherback turtle has also become somewhat of a 'flagship' along the Huon Coast, particularly at Lababia, whereby the Primary School there has adopted the leatherback turtle as the school logo, with the school motto 'Strive to Survive', which not only refers to the leatherback turtle struggle from hatchling to returning nester, but also the recognition of one's own need for achievement through life. The leatherback turtle has also been adopted as the logo for the KICDG.

3.1 INTERNATIONAL MANAGEMENT

There are currently several global instruments and regional agreements that provide a legal framework for the conservation and management of leatherback turtles in the Western Pacific.

These include the:

- 1940 *Convention on Nature Protection and Wildlife Preservation in the Western Hemisphere*;
- 1976 *Apia Convention on the Conservation of Nature in the South Pacific*;
- 1982 (1994) *United Nations Convention on the Law of the Sea* (UNCLOS), which established the Economic Exclusion Zones (EEZ) and areas of jurisdiction in the oceans, and developed general rules for fishery conservation and management;
- 1982 *Convention on the International Trade of Endangered Species* (CITES),
- 1985 *ASEAN Agreement on the Convention of Nature and Natural Resources*;
- 1986 *Convention for the Protection of the Natural Resources and Environment of the South Pacific Region*¹²⁰ (SPREP Convention);
- 1992 *Convention on Biological Diversity* (CBD);
- 1993 *RAMSAR Wetlands Convention*;
- 1993 *FAO High Seas Fishing Vessel Compliance Agreement*, which calls for all flag States to prevent their vessels from undermining agreed fishery conservation and management measures;
- 1995 *United Nations Agreement on Straddling Fish Stocks and Highly Migratory Fish Stocks* incorporates the precautionary approach to the management of pelagic fisheries;
- 1995 *FAO Code of Conduct for Responsible Fisheries* provides principles and standards that considers the impacts of fisheries on biodiversity;
- 1998 *European Union Biodiversity Action Plan*;
- 2001 *Indian Ocean and South East Asia Memorandum on Turtles* (ISOEA); and
- *Convention on the Protection of Migratory Species of Wild Animals*.

Leatherback turtle recovery projects such as those funded by the WPRFMC in PNG contribute to PNG's commitments made under a number of international treaties and conventions. To be truly effective for the recovery of leatherback turtles, these instruments need to consider, among other things: the ecological roles of leatherback turtles and their biological limitations, risk of extinction, the institutional capacity to regulate both consumptive and non-consumptive use, as well as the cultural and social impacts of any interventions, and the overall economic importance of leatherback turtles that nest in the territorial domain of participating communities.

For effective recovery of leatherback turtles that nest in PNG there is also a need to complement strategies that ensure that leatherback turtles are protected in all life stages. Leatherback turtles can be considered a trans-boundary resource because they cross multiple Economic Exclusion Zones (EEZs) during their life-cycle, which means that there are jurisdictional problems, with no central authority to organize conservation and appropriate fisheries practices (Dutton and Squires, 2003).

Currently, the WWF's Bismarck Solomon Seas Ecoregion (BSSE) has developed a non-legal binding tri-national partnership Memorandum of Understanding (MOU) with government representatives from Indonesia, PNG and Solomon Islands, and partners¹²¹. This MOU has been devised to explore ways that governments, institutions and communities can effectively manage and conserve nesting sites, feeding areas and migratory routes in and across these three countries¹²². The MOU will also attempt to address issues such as by-catch, technical capacity, and developing sustainable livelihood options through a

¹¹⁷ Here the use of the leatherback turtle has been termed the 'flagship' species for litigation (Kinan and Dalzell, 2005).

¹¹⁸ For example, the campaign slogan by the Sea Turtle Restoration Project: "Pacific leatherback turtle: 100 million years old, 10 years left".

¹¹⁹ Big International NGOs (BINGOs) such as CI and WWF have designated sea turtles as flagship species crucial for mobilising public support. Annual expenditures on sea turtle conservation are estimated to be at least US \$ 20 million worldwide (Troeng and Drews, 2004).

¹²⁰ The SPREP Convention created a regional approach to the sea turtle protection, the South Pacific Regional Marine Turtle Conservation Project.

¹²¹ The 2002 World Summit on Sustainable Development called for governments, inter-governmental organisations and NGOs to develop partnerships to implement on-ground conservation and sustainable development actions for species and ecosystems in danger of extinction.

¹²² This new MOU broadens sea turtle conservation across the Indian and Pacific Oceans as it supports the existing Memorandum of Understanding on the Conservation and Management of Marine Turtles and Their Habitats of the Indian Ocean and South East Asia.

network of communities and partnering of organizations such as Conservation International (CI), The Nature Conservancy (TNC), NOAA, WPRFMC, SPREP and IOSEA (Wilson *et al*, 2006).

3.2 LEGISLATION IN PNG

The most critical feature of resource management and conservation in PNG has to do with the fact that land and in some cases, marine resources are owned by a large number of clan and sub-clan groups whose tenure rights are recognised in the Constitution¹²³.

The main body of conservation legislation in PNG that is applicable for leatherback turtle conservation and management include the:

- 1963 *Customs (Prohibited Exports) Regulation*, which regulates the export of flora and fauna from fishing, pastoral, agricultural and forestry industries;
- 1974 *Land Groups Incorporations Act*, which allows for the formal recognition of social groups and their territory and natural resources;
- 1974 *Crocodile Trade (Protection) Act* which regulates the taking and breeding of crocodiles and the trade in crocodile products;
- 1976 *Fauna (Protection and Control) Act* which restricts the harvesting of protected wildlife, the devices and methods by which fauna may be taken, and the establishment of localised protective regimes on land and waters under customary tenure;
- 1978 *Conservation Areas Act* which like the *Fauna (Protection & Control) Act* allows for a variety of protective regimes on land under customary tenure;
- 1978 *Firearms Act*, which restricts the use of weapons and explosives;
- 1979 *International Trade (Fauna and Flora) Act* which regulates and restricts the export of CITES listed species;
- 1989 *Village Court Act*, which lists the "prescribed offences" which can be dealt with in Village Courts;

- 1997 *Organic Law on Provincial Governments and Local-level Governments (OLPGLLG)*, which regulates the respective rights and obligations of the various levels of Government in the field of resource management, and the related 1997 *Provincial Governments Administration Act* and 1997 *Local-Level Governments Administration Act*;
- 1998 *Fisheries Management Act*, which regulates the set-up of the NFA, the supervision of pelagic fisheries and local and species-specific fisheries management plans;
- 2000 *Fisheries Management Regulation*.

Given the difficulty of enforcing species-specific conservation regulations in PNG and the lack of resources for DEC to operate effectively, recovery measures for leatherback turtles will continue to lay with NGOs and participating communities. In PNG, there is a need to adopt an approach that strengthens local conservation practices on one hand, but also strengthens or develops appropriate legislative and policy frameworks.

Because the Huon Coast beaches contain the largest leatherback nesting beaches in PNG, Benson *et al* (in press) and Rei (2005) have been advocating the establishment of a large off-shore Marine Protected Area (MPA) within the Huon Gulf. Rei (2005) has also called for all commercial fishing to cease in the Solomon Sea during the leatherback-nesting season and for commercial fishing operators to target the Bismarck Sea instead¹²⁴. Recent consultation with both SPC and NFA show no records (based on observer reports) of leatherback turtle interaction with tuna fishing vessels in PNG's EEZ waters, although there are a number of interactions reported as 'unidentified marine turtle' (though one would think that a leatherback turtle would be readily identifiable compared to the other species).

As noted above, the leatherback turtle is currently the only sea turtle in PNG that is listed as protected fauna under the 1976 *Fauna (Protection and Control) Act* (Kula and

George, 1996), which stipulates that any person who knowingly buys, sells, offers or consigns for sale, or has in possession or control of a protected animal is guilty of an offence and the penalty is K 500. Any person who takes (kills) a protected animal, in contravention of a condition of a permit is guilty of an offence and the penalty is K 40/animal.

The 1976 *Fauna (Protection and Control) Act* also provides for the establishment of Wildlife Management Areas (WMAs) (see Appendix H). WMAs provide a mechanism for local control of fauna on land and in waters held under customary tenure, and have been the most used form of area-based conservation in PNG to date¹²⁵. In order to establish a WMA, the demarcation of social and spatial boundaries in consultation with DEC and LLGs expand, the establishment of a Wildlife Management Committee (WMC) by ministerial appointment and the drawing up of a schedule of rules and penalties is required.

The creation of a WMA for leatherback turtles along the Huon Coast was first advocated by Hirth *et al* (1993) to address leatherback turtle conservation in the Labu Tale area with a 725 m leatherback turtle reserve unofficially established in December 1989¹²⁶.

The final avenue that is applicable to leatherback turtle recovery and needs to be explored further with the participating communities is the development of Ward or Local Level legislation under Sections 42 and 44 of the Organic Law. Under Section 42, village laws can be established that protect renewable and non-renewable natural resources, and develop parks, reserves, gardens, scenic and scientific centres. Section 44 is also relevant in the context of dispute settlement, local environment, domestic animals, flora and fauna, protection of traditional sacred sites, and the imposition of fines for breaches of any of its laws. These sections provide room to draw up local-level conservation laws that could be used to establish (future) permanent beach closures and to ban egg take.

¹²³ Only the open seas, mineral resources, Government land and protected fauna are vested in the State.

¹²⁴ There are currently two longline tuna companies operating out of Lae. These are MAPs Tuna and Frabelle-Frecosmar. The latter has established a cannery and has a fleet of longliners and has recently introduced Philippine-style pump-boats (Kinch, 2006).

¹²⁵ WMAs are really multiple use areas in which biodiversity conservation is a significant aim.

¹²⁶ A beach reserve was also proposed in 1988 that would stretch from the mouth of the Buang River for about 2 km to the Biamu River and a system of fines was to be established for disturbing nesting leatherback turtles and the harvesting of eggs (Wangi *et al*, 1988).

3.2.1 Provincial Mechanisms

The 2002 *Morobe Fisheries Management Authority Act* established the Morobe Fisheries Management Authority (MFMA). Currently, the MFMA is developing a strategy for the next five years called the *Morobe Province Marine Resource Management Plan*, which will detail how marine resources in the Morobe Province will be managed and the policies needed. It could be possible to have management mechanisms or protocols incorporated into this plan.

3.3 THE KAMIALI WILDLIFE MANAGEMENT AREA

In 1992, the VDT with support from WWF, began working with the villagers from Lababia and four nearby communities of Buso, Kui and Siboma and Paiawa in an attempt to head off commercial logging, and assist villagers in establishing alternative livelihood and development projects. Subsequently, the Lasanga Island-Lake Trist Conservation Project (LILTCP) was proposed, which would involve the protection of approximately 250,000 ha of forested land from large-scale logging in return for assistance with eco-friendly development projects (Map 6).

In late 1993, a team from the WWF visited the area, and found that the local people had only a limited knowledge of conservation, a strong hand-out mentality and no sense of ownership over the project (Martin and Taylor, 1993). In addition, they found wide-ranging support for the logging operation. They recommended the withdrawal of WWF support for the project, at least in the form in which it had originally been presented, but were prepared to assist the village of Lababia, whose spokespeople appeared to have a better understanding of conservation issues than those of the other villages. They also appeared to possess the self-motivation to seek alternative forms of development in order that the forest resource could be conserved¹²⁷.



MAP 6: BOUNDARIES OF THE KAMIALI WILDLIFE MANAGEMENT AREA

Source: Martin, 1998.

In actual fact, the people of Lababia were anxious to capitalize on the income-producing opportunities and any other economic spin-offs, which might arise if they could attract the interest of organizations wanting to conserve the forest in their area¹²⁸ (Martin, 1998, in press). However, in retrospect, the villagers at Lababia also saw no contradiction in the coexistence of commercial logging and a conservation project. A contributing factor to this desire for NGO involvement for the implementation of an ICAD and WMA establishment came from watching their neighbors, who had allowed logging, acquire (short-term) wealth and material assets. The problem for villagers at Lababia

is that they had few options to provide themselves with new sources of income¹²⁹. In 1995, the VDT with support from the Rainforest Information Center, BCRMP and other organizations worked out a general agreement concerning a number of conservation and development initiatives, and the Kamiali ICAD¹³⁰ at Lababia was officially launched, with villagers agreeing to establish a WMA over the majority of their land and marine territory and to establish a small conservation zone for the protection of leatherback turtles.

VDT also agreed to sponsor a number of development projects, which were to include an eco-forestry business linked with

¹²⁷ The forested area over which the people of Lababia claim ownership is extremely steep, and contains a lower density of commercial timbers than coastal areas further to the southeast. There are only two relatively small pockets, which have a concentration of commercially valuable and reasonably accessible timbers. These two areas are in the lower reaches of the Saia River and its headwaters. The loggers did make an offer to cut timber in the lower reaches, but the Lababia villagers, who only stood to receive amounts of revenue from the proposal, rejected this. Another reason this offer was rejected was that the people of Lababia would have had to deal with the distribution of royalties, as most of the monies would have went to the *Lumi Ane* as opposed to the *Areme* major clan or the wider community (Wagner, 2002).

¹²⁸ It is doubtful whether WWF or VDT personnel appreciated at the time the economic factors present when the villagers at Lababia rejected the offers of the logging company.

¹²⁹ A geological survey by a major mining company, undertaken more than ten years previously, had also shown little in the way of commercial mining potential in the area.

¹³⁰ Karol Kisokau was hired as Director, and his responsibility was to facilitate the ICAD.

down-stream processing and manufacturing of furniture, a fishing co-operative, a women's bakery co-operative, a small rotating loans scheme, develop tourism, research and training activities centered around the KTCGH that would be built at Kulindi on two ha of leased land, and upgrading of various community services, the most important of which was the community water supply (Wagner, 2002; Martin, 1998).

These activities and promises resulted in the official gazettal on the 6th August 1996, a WMA covering 47,413 ha¹³¹ (29,285 ha of land and 18,128 ha of sea) (see Appendix I).

Implementation over the years has been slow and often contentious, with relationships between those involved in the initiation, planning and implementation of the Kamiali ICAD evolving in a context of differing core values and beliefs, different attitudes to conservation and development, and different expectations of outcome. Development of various proposed elements of the project did not occur in the most efficient sequence, sometimes not eventuating at all, and often did not meet the expectations of the local people. This was understandable, because funding came from a variety of sources for specific items, and was made available at the discretion of the funding agency. Planning was dependent on circumstance, was often ad hoc, and followed a process of experiential learning by VDT staff and the villagers at Lababia.

While villagers themselves were responsible for some of these problems, it was clear, in several instances, that VDT's planning had been less than adequate. As noted above, the village fishing co-operative collapsed, and the small rotating loans project was never implemented. The eco-timber business collapsed, mainly because of the transportation problem. The women's drum-oven bakery project failed. The only

positive outcome of the project was the community water supply, and possibly the KTCGH, though the ownership and operation of this facility is still contentious to this day.

The relationship between the people at Lababia and the VDT could be described as tenuous and, at times, characterized by strong distrust. Inevitably, that distrust focused on those areas where cash incomes or individual prestige were involved. Growing problems of unrealistic expectations from the Lababian community also contributed to mounting problems, whilst the VDT felt like they had been taken for granted, with short-term objectives and cash opportunities remaining the community's priority.

The main issues raised at the time for the villagers at Lababia were the limited amount of cash flowing into their village, and the distribution of that cash. They explained their problems in terms of their relationship with the VDT, and the solution on which they insisted upon was for more power to be given to the chairman of the KCPC, with a Board of Directors (BoD) to be set-up and for transparency in all financial arrangements and agreements¹³². The VDT on the other hand attributed the continual demand for money by the KCPC to the mismanagement of its operating grants. There were also expectations by the VDT staff that the people of Lababia should be grateful and co-operative given the fact the VDT paid for meeting expenses for each committee member who came to Lae (whilst committee members would complain about not being compensated for time spent on village-based ICAD affairs), and that the VDT had put K 8,000 into the village over a two year period.

The people at Lababia however, saw large discrepancies between the benefits, which they had received from the Kamiali ICAD,

and the quality of life enjoyed by the VDT staff. When money started flowing for the Kamiali ICAD and the KWMA¹³³, the VDT had renovated its offices, acquired a number of computers, purchased three vehicles, and was accommodating its staff in what the people of Lababia regarded as high quality town houses (Martin, 1998, in press). Other problems arose, whereby some VDT staff acted in an inappropriate manner, which gave an impression of superiority and project affluence (Martin, 1998, in press). The VDT also on occasions made unilateral decisions that have been against the wishes of the villagers (Wagner, 2002). There was also the constant problem of the inability of the sub-clans at Lababia to co-operate.

The implementation of the Kamiali ICAD had a significant impact on decision-making processes within the community in relation to resource use. At Lababia, the VDT's linkage to the villagers was through the members of the KCPC, which had been established by the village following customary practice to the extent of providing roughly equal representation for the two major clans, *Areme* and *Gara*¹³⁴. The villagers also created the Kamiali Wildlife Management Committee (KWMC), which was charged with the specific responsibility of managing the WMA, though this created a good deal of confusion because of the existence of the KCPC. The KWMC never really got off the ground and was essentially inactive throughout its history (Wagner, 2002).

The Lababia community is not homogenous¹³⁵, and there are several tiers of authority and respect, based around age. The committees formed were initially seen by a number of men as opportunities for positioning themselves to exploit cash income possibilities. On the whole, the committee members were younger (usually in the age group of 32-50) and more highly educated, and their aspirations for change incorporated urban and external

¹³¹ The WMA covers all but 3,300 ha of the land area claimed by the Kamiali. This is the area that is now inhabited by the Salus people.

¹³² The policy of VDT at this time favored a confrontational reaction in the form of letting the people of Lababia 'stew' for a while (Martin, in press). This is similar to the recent response by KICDG to community demands for the establishment of a Board of Directors (BoD) and financial transparency.

¹³³ The VDT obtained funding from a large number of international donor organizations, including the Foundation for the Peoples of the South Pacific, the Rainforest Information Center, the WWF, AusAid, the World Bank, the Swedish Society for Nature Conservation, and the High Commissions of Australia, Canada and New Zealand, the ICCO, the Japanese Government, the John D. and Catherine T. MacArthur Foundation.

¹³⁴ The KCPC was a novel, anomalous and problematic institution, as important community decisions are traditionally made by a council of men who are recognised as leaders in the community by virtue of their personal qualities and their seniority or authority within their respective families and family groups. These men are answerable to the community as a whole, but are also able to make important decisions on their own.

¹³⁵ A consensus of the whole village community will only be sought when an individual or group finds that this is necessary to the furtherance of his or its goals.

influences to a greater degree than those of the big men¹³⁶. They were also aspiring to increase their local influence, and on many occasions these younger men made their own interests paramount rather than those of the people they purported to represent (Martin, 1998). This group was characterized by competition with one another and many adopted adversarial positions within the KCPC and also with the VDT (Martin, 1998). Interestingly, the most capable and respected leaders in the community regularly refused to be nominated (Wagner, 2002).

Even though the KCPC had less authority and legitimacy as a decision-making body than the customary norms, it did coalesce people into thinking about aspects of community planning.

3.3.1 The History of KICDT and KICDG

Since villagers at Lababia had very few development options other than those offered by the Kamiali ICAD, and since they were financially dependent on the VDT, who controlled the flow of funds to the community, their only means of thwarting unilateral decisions was to shut down or suspend the Kamiali ICAD (Wagner, 2002).

To deal with some of the community concerns over ownership of the Kamiali ICAD process and the continual threat of project closure by the Lababia community, the VDT proposed the idea of establishing a CBO that would coordinate all the research activities and projects within at Lababia.

The intention of establishing the CBO was to expand the range of activities which could be managed independently by the villagers, and thus increase their level of responsibility within the Kamiali ICAD. Unfortunately, the

agreement did not at first meet with serious consideration by the VDT because by this time, staff at the VDT found themselves involved in internal conflicts, which threatened to paralyze the organization. It was only when a new Executive Director was hired, and a couple of other staff changes were made, that the VDT responded to the idea in a meaningful way (Wagner, 2002).

One of the main incentives for creating the CBO was the perception by villagers and the VDT alike that a registered CBO would be more readily able to access funds from a variety of donor organizations. The CBO was also to take greater responsibility for developing projects and proposals as well as administering grants and budgets, and thus would need to engage full-time staff.

When the Kamiali Integrated Conservation and Development Trust (KICDT) was born, it was a clone of the VDT, even having a near identical constitution. The structure of the KICDT was also based on the VDT model, with a BoDs setting policy¹³⁷ and day-to-day operations delegated to professional staff and managers for different projects (Wagner, 2002).

The KICDT never really functioned in its own right, as it was still dependent on VDT for technical and administrative support. Many villagers at Lababia began to suggest that the community should contact the donor agencies themselves and thus eliminate the VDT from the funding chain, allowing them to access cash direct. Most of these same individuals also recognized that they did not possess the skills required to communicate effectively with donor organizations or to manage large amounts of money. In the minds of most villagers, donor organizations were powerful but mysterious entities whose motives were poorly understood (Wagner, 2002). When representatives from NOAA visited Lababia in 2001, the KICDT

thought this would be an ideal opportunity to become independent from the VDT and thus were reincarnated as the KICDG¹³⁸ with funding support from the WPRFMC.

The newly created KICDG became the Lababia community development organization, but neglected its mandate of developing eco-tourism, rejuvenating the eco-forestry project, maintaining community infrastructure, etc. In essence, the Lababia community came to think that the WPRFMC was there to support them in its entirety through KICDG. This attitude is partly the neglect of KICDG to conduct proper awareness of what the WPRFMC role was in providing funding and their expectations.

Problems that were once exhibited with VDT have now been duplicated with KICDG (i.e., community dissatisfaction and a lack of transparency). After WPRFMC intervention following a site visit in December 2005, it was determined that KICDG had had not complied with its contractual agreement by not providing adequate project management and direction, neglected its duties as liaison between the project and the community, and neglected its duties towards education and outreach. Subsequently, after much consultation within the Lababia community and with the WPRFMC, the community resolved in January 2006 to remove the KICDG management. In later meetings a new village manager was appointed along with a BoDs¹³⁹. The KICDG further neglected their duties towards education and outreach¹⁴⁰.

The WPRFMC has now determined that the most realistic way to proceed with future nesting seasons is to hire a project manager to assist and direct projects, not only for KICDG, but those administered through VDT and the HCLTN.

¹³⁶ A leader 'leads' by encouraging support amongst his kin and in certain circumstances, the wider community. This is done literally by virtue of the relationships, which he builds and maintains.

¹³⁷ The KICDT was to have a seven-member BoDs, of which four would be village representatives thus having the Lababia community holding a majority through their representatives.

¹³⁸ Karol Kisokau was subsequently re-employed as the Director of KICDG.

¹³⁹ The current BoDs consists of Nero Kupisi, Yang Tana, Jack Nara, David Nado, Peter Ben and Sione Gwai.

¹⁴⁰ Props and plays were developed under SPREP funding in 2001; these are now in a severe state of deterioration.

3.4 ECONOMIC INCENTIVES

In the Western Pacific, there is an increasing focus on using economic incentives or 'compensation'¹⁴¹ to protect leatherback turtle nesting beaches and to offset the opportunity costs of egg harvesting¹⁴². Incentives are not new to communities along the Huon Coast. Previous incentives began in 1988 when tourism activities, the provision of school materials and buildings were first purported (Wangi *et al*, 1988). It was also proposed that leatherback turtle egg harvesting could be replaced by villages involved in chicken farming (Wangi *et al*, 1988). Recent incentives have also been proposed by the SPREP-Wetlands Oceania project in 2002-2003, which advocated the development of tourism, fisheries, agricultural projects, and compensation for egg harvesting and cash prizes for hatchlings (Opu *et al*, 2003).

There has also been significant debate over the benefits of 'direct incentives' and 'indirect incentives' as avenues for motivating communities to either conserve or participate in leatherback turtle recovery projects. Indirect incentive approaches for conservation generally encourage rural communities to maintain biodiversity by helping them to use it sustainably, providing alternative sources of products, income, or social benefits as a means of encouraging communities to take an interest in conservation and co-operate by providing alternative sources of products, income, or social benefits; or by developing business opportunities and markets for products that depend on maintaining ecosystems. The incentives are indirect with respect to their link to conservation objectives in that it is not conservation *per se* that delivers the benefit, but conservation may indirectly result from the pursuit of the benefit¹⁴³. The Kamiali ICAD is an example of an indirect incentive approach and is continually advocated by KICDG:

Conservation can be achieved with the full support and participation of the community if there are incentives to improve the villager's quality of life. Incentives are paramount to the survival of the leatherback species in PNG and may include the building of a resource center, help with school projects, funds for school fees and church materials, or implementation of small eco-enterprises such as eco-tourism (Kisokau and Ambio, 2005).

Some players in the international sea turtle conservation community¹⁴⁴ see paying for direct protection as a practical means of compensating and providing long-term incentives to those who conserve resources of global importance, such as leatherback turtles. With direct payments, international actors make periodic, conditional payments to individuals or groups that supply services of ecological value, such as protecting leatherback turtle nests that successfully generate hatchlings¹⁴⁵ (see Ferraro and Kiss, 2002). This approach is different from the indirect incentive approaches as the benefits are performance-based (i.e., the community only receives the benefits if it honors the agreement) and depend on meeting specified environmental criteria. Therefore, incentives are clear and directly linked to the desired outcomes. The WPRFMC currently employs a form of direct incentives by paying for beach monitors and a more indirect incentive at Lababia through the payment for non-egg harvesting.

Obstacles to using direct incentives are: uncertain land tenure, which is not an issue along the Huon Coast, though internal conflicts may arise; limited experience with and enforcement of legal contracts, which is an issue; limited local opportunities for investments or employment, which is also an issue; the possibility of displacing biodiversity loss to other areas, not an issue; the possibility of financial irregularities, which is an issue; and the possibility of creating social conflict, which definitely has

potential to become a big issue. Another issue that is often raised is the sustainability of the approach. Opponents claim that when funding is exhausted or payments stop, conservation efforts will also cease. Thus the use of direct incentives is often linked to discussions of endowed or trust funds.

Unfortunately, despite reassurances that the people of the Huon Coast have a commitment to the recovery of leatherback turtle populations, the lack of a conservation ethic, combined with a lack of education and awareness despite initial efforts under the SPREP-Wetlands International, it appears that economic considerations are likely to persist as the driving force behind local decisions for participation. Therefore the WPRFMC strategies to recover leatherback turtle populations along the Huon Coast will need to involve tangible long-term financial strategies. Providing salaries in itself for beach monitors is currently not sustainable as the funding the WPRFMC receives is essentially short-term funding, dependent on the US Federal government. As noted above, the reason behind interventions along the Huon Coast is partly driven by the previous litigation events to close the Hawaiian longline fishery. This circumstance may change in the future and thus no longer necessitate any further activities requiring leatherback turtle recovery projects in PNG.

At this present time, this short-term funding essentially eliminates the consideration of long-term community incentive agreements even though long-term community support is necessary. Lack of stable funding for annual recurrent costs is therefore a fundamental threat to sustainable and effective leatherback turtle population recovery and the conservation of strategic nesting sites such as those on the Huon Coast. The challenge for the WPRFMC is therefore to develop strategies that reconcile leatherback turtle recovery activities and livelihoods improvement for

¹⁴¹ Most forms of compensation are usually not tied to conservation performance in a credible and excludable way. Thus compensation is generally a poor conservation tool (Ferraro and Kramer, 1997).

¹⁴² Incentive payments for leatherback turtle conservation are already occurring in Rendovo and Tetepare Island in the Solomon Islands (Gjertsen and Stevenson, 2003), and at Jamursba Medi (Hitipeuw, 2003; Hitipeuw and Pet-Seode, 2004) and Kei Islands in West Papua. At Jambursba Medi, there are constant communities request for assistance to support micro-enterprise and other economic activities (these were previously provided by WWF) including alternative revenue generating activities in the place of activities that would formerly have involved exploiting turtles.

¹⁴³ Unfortunately, empirical and theoretical assessments have indicated that most of these approaches have been ineffective (Wells *et al*, 1998; James *et al*, 1999; Salafsky *et al*, 1999; Barrett *et al*, 2001; Ferraro, 2001; Ferraro and Kiss, 2002).

¹⁴⁴ Troeng and Drews (2004) state that governments, international agencies and NGOs can prevent over-exploitation by creating local economic incentives in favor of adequate management through employment and training, promoting use regulations, establishing fines, facilitating funding, subsidies and/or micro-credits for non-consumptive use where pertinent.

¹⁴⁵ The basic idea is that biodiversity is a valuable good and its protection is a valuable use of resources, and thus should be paid for by those that want conservation or recovery, as one would pay for any valuable good.

local communities, using approaches that are socio-politically acceptable and are both ecologically and economically sustainable.¹⁴⁶

CI through their Global Conservation Fund, the WPRFMC, the NOAA, the Norbert Hardner Foundation and other partners are leading a two-pronged approach to address this issue by examining the cost and structure of existing and potential community agreements¹⁴⁷. For the continued protection of leatherback turtles at Lababia, it has been estimated by Rice (2005) that an invested endowment of approximately US \$723,500 would be needed to provide annual operating costs of US \$36,200 for the leatherback turtle-monitoring project¹⁴⁸. A trust fund for the no egg harvest incentive at Lababia has also been proposed previously; currently they receive K 8,000/year¹⁴⁹ in exchange for foregoing income from turtle egg harvest and actively protecting the nesting beach¹⁵⁰. No such incentive has been paid to the other three communities and may cause future conflict.

3.4.1 Sustainable Egg Use

As the concept of direct incentives is attracting a great deal of attention, so is the notion of conservation through sustainable use¹⁵¹. People along the Huon Coast have in the past (and present) harvested leatherback turtle eggs because they derived benefits such as income, food and the maintenance of livelihoods. Making these uses sustainable and enduring is the essence of conservation through sustainable use. Strict preservation is not a real option¹⁵².

Many sea turtle conservationists and biologists are often opposed to the implementation of sustainable use projects because overuse is a well-recognized threat and non-use may appear easier to implement¹⁵³ (Webb and Vardon, 1996). The Marine Turtle Specialist Group (MTSG) of the IUCN position on sustainable use is a cautious one (Cambell, 2002; IUCN 1995), whilst others within the sea turtle community suggest that given the huge natural wastage of eggs and low survival to adulthood, some form of consumptive utilization is possible (Mrosovsky, 2000b; Cambell, 1998; Hope, 2002).

It is not yet possible to estimate the number of leatherback turtles necessary to support an economically sustainable egg harvest along the Huon Coast. Unfortunately, given the current predicament of leatherback turtle populations in the Western Pacific, and the lack of research data that would inform a sustainable egg-harvest program, interventions like those supported by the WPRFMC prefer that the full complement of eggs be allowed to hatch to replenish the degraded populations.

Once nesting beach and nesting turtle population dynamics are quantified, and if appropriate changes were made to the 1976 *Flora and Fauna Act* (the legislation that bans the sale and take of leatherback products), the WPRFMC could assist participating communities in developing an appropriate egg harvesting regime—to maintain traditional practices—in those areas determined to be sub-optimal for nesting and hatching success.

3.4.2 Non-consumptive Use: Tourism

Eco-tourism is often advocated as a viable non-consumptive use option that could create both conservation outcomes and provide for successful community development, but judging from the Lababia experience this will still remain difficult for some time to come, though the Huon Coast does indeed offer ample eco-tourism ventures that could be used to attract nature adventurous-tourists by a combination of leatherback turtle nesting watching opportunities with rainforests walks, bird-watching, sport-fishing, snorkeling and scuba diving, rafting and cultural experiences, participation in 'traditional' activities and the purchase of artifacts.¹⁵⁴ The KTCGH¹⁵⁵ also offers opportunities for researchers, tertiary biology and environmental science students.¹⁵⁶

Tourism potential for Huon Coast has been explored by the VDT (see Dembis, 2005; Winny, no date), with assistance from the Tourism and Hospitality Department at the Lae Technical College. Tourism attractions have been proposed at Labu Tale, Busama¹⁵⁷, Lababia, Salamaua and Waria.

Economic diversification through eco-tourism could be a long-term objective of the VDT and KICDG with support from the WPRFMC. Currently, transportation and facilities are inadequate to support tourism on a scale that would bring economic benefits to communities along the Huon Coast.

¹⁴⁶ Initiating conservation activities in areas of perceived poverty is not easy. Even when initiatives are well accepted and implemented by communities, a fundamental need exists to build capacity over the long term, if efforts are to be sustained beyond the span of individual projects. As seen at Lababia during its time with VDT and KICDG, the WPRFMC also has to be careful not to exacerbate power differentials within the participating communities.

¹⁴⁷ These include the Arnavons Marine Conservation Area (AMCA) in the Solomon Islands, which is supported by TNC; the KWMA in PNG; and the Jamursba Medi beach in the West Papua Province of Indonesia (Rice, 2005).

¹⁴⁸ CI has already paid US\$40,000 to the now defunct Mama Graun Trust Fund to be invested, which was to be used to cover the annual incentive payment for non-egg harvesting (calculated at 12% of the return on investment).

¹⁴⁹ Pilcher (2005) suggested that within the 2005-2006 budget, the KICDG could have increased this payment K 10,000 as recognition of the community's contribution to conserving leatherback turtles.

¹⁵⁰ For the 2002-2003 season, the UNDP Small Grants Project provided K 3,200 for the no egg-harvesting incentive.

¹⁵¹ Mrosovsky (2000a) suggests that it is time that the MSTG and the sea turtle community in general started to evaluate in a truly constructive and open-minded way the possible benefits of sustainable use approaches to conservation.

¹⁵² Foale (2001) offers a different perspective, stating that any appeals to rural Melanesians not to kill leatherback turtles [or harvest their eggs] on the grounds of the importance of these species to marine ecosystem functions, and ultimately to the long-term food security of local human populations, would entail a certain level of disingenuousness.

¹⁵³ Mrosovsky (2000b) suggests that there is open hostility to the idea of trying utilization-based approaches to turtle conservation.

¹⁵⁴ The production and sale of items with marine turtle motifs associated with the monitoring project could be considered.

¹⁵⁵ The KTCGH offers complete catering services, meeting facilities, guided tours, accommodation for up to 24 people and private amenities. Price of accommodation is K 75/night.

¹⁵⁶ The KTCGH has already hosted a wide range of groups ranging from academic and science institutions (Unitech, NOAA and the WPRFMC), mining companies (Orient Mining, Geoscience Ltd. and Guinn Mining), NGOs (VDT, Eco-forestry Forum, German Development Service, WWF, Centre for Environmental Law and Community Rights, National Volunteer Service, Seven Day Adventist Development and Rural Assistance, Japanese International Community Assistance and Lutheran Development Service), government departments, private companies (Consort Shipping and Eco-tourism Melanesia) and local and international visitors.

¹⁵⁷ VDT established a guesthouse at nearby Bula Falls.

4.0 CONCLUSION

Villagers in the participating communities are interested in improving their quality of life and see modern (Western) consumer goods, services and lifestyles as adding to that quality; their particular social context qualifies the way in which they go about exploiting economic opportunities. The problem for individuals and extended family groups (sub-clans) is to ensure they make the most of the opportunities available from the WPRFMC funded projects. This means their immediate kinship groups are in a position to take advantage of any situations likely to benefit the family group or enhance the prestige of any individual representative¹⁵⁸. Unfortunately, distrust and jealousy are extremely common outcomes of this desire. For instance, the accumulation of prestige (particularly by men) is highly valued and competition for prestige influences relationships in and between villages¹⁵⁹ and the implementing stakeholders (WPRFMC, VDT, KICDG and DEC). There is a sense of uncertainty amongst the participating communities because the WPRFMC is providing economic opportunities that they do not want to lose.

For future success of leatherback turtle recovery strategies in participating communities, it will be necessary for the WPRFMC to further invest in understanding the human components. Usually, the greatest investment of resources, time, and

effort, is in the research and understanding of the biological issues surrounding leatherback turtles, but it is people who are creating the need for management efforts. Another issue for the WPRFMC to consider is the economic effect of cash inputs into the participating communities and the potential for disruption to the community due to distribution and redistribution of cash income, as there is need to maintain a degree of equity necessary to reduce social resonance¹⁶⁰. Even though monies generated by the leatherback turtle recovery projects in the participating communities is filtering out to the wider kin groups, sub-clans and the general community, the possession of money is still a frequent source of conflict.

There is also a need to ensure that the WPRFMC's position is made clear, particularly since there is a sense amongst participating communities that some members view the WPRFMC as the 'new' pathway to development. This may not be the message which the WPRFMC has sought to promote, but it is a logical outcome, particularly at Lababia with its previous interaction with VDT and KICDG¹⁶¹.

One topic that needs further awareness is what the WPRFMC leatherback turtle recovery project is trying to accomplish and for whom. The WPRFMC needs to avoid incidences like the one recently at Lababia, whereby the community withheld one

month of data and raised concerns over whose project is it, which also resulted in statements such as "the donors may have the money, but we own the beach". There is of course difficulties with working with communities that have limited knowledge of conservation principles and limited understanding of the 'conservation' objectives of the 'donor' world.

The current dependence of participating communities relying on the WPRFMC also brings into question the financial sustainability of these projects along the Huon Coast as nesting beach protection depends on long-term support with local communities. Unfortunately, looking down from a historical vantage point and viewing the present and looking towards the future, the WPRFMC will need to find long-term funding or provide input into the development of a trust fund to ensure leatherback turtle recovery projects along the Huon Coast continue, because there is a real risk that when the funding for the leatherback turtle recovery projects run out or if the WPRFMC focus changes, so will the participation from the communities.

There is also the final risk that communities pursuing other economic interests involving natural resource exploitation may encourage members of the participating communities to engage in activities that may be in conflict with recovery aims.

¹⁵⁸ The outcome of this behaviour is competition between kingroups and aspiring individuals often to the detriment of the community group as a whole.

¹⁵⁹ Within a local landowner group this competition can take the form of disputation between villages or, as in the case of a single village, different 'lines' or sub-clans will compete, especially if threats to the village as a whole are not recognised. When disparate group representatives (leaders or prospective leaders) are brought together, the outcome is that of competition rather than cooperation and the internal politics of a community is often masked or opaque.

¹⁶⁰ Normally when money begins to come into a community regularly, there is an inflation of prices in all transactions and people stop volunteering their labor.

¹⁶¹ For example, the community at Lababia now views the incentive payment for no egg harvesting as an 'expected' cash return and has no real association with the leatherback turtle recovery component of the project. Another dimension to this is Pilcher's (2005) suggestion that long-term financial sustainability of the project at Lababia could be generated through the development of a craft industry, training and facilitation of small-scale agricultural projects, revival of the boat transport system, and revival of the KTCGH and eco-tourism ventures. The WPRFMC has now recognised over the course of this season's activities, that when working with communities, there is a need to take care to not raise expectations, strive to contain objectives within realistic bounds, and promote transparency whenever possible.

4.1 RECOMMENDATIONS

The recommendations provided below are those that the author considers important for improving activities. Most of these recommendations have been put forward in Kinch (2006c) and are in no particular order of importance.

- There is definitely a need to restart a concentrated education and awareness program for the Huon Coast. Egg harvesting is still occurring (see Kinch, 2006a), and all other species of sea turtles are regularly taken, along with the occasional dugong (*Dugong dugong*). As part of the awareness program, the use of Participatory Rural Appraisal tools (such as resource mapping, seasonal calendars, resource time lines and trend lines) should be incorporated. Another aspect of this awareness program would be to broaden the focus of awareness beyond just leatherback turtles so as to encompass broader community and marine resource management issues, thus taking a more inter-related and holistic approach.
- Signboards could be erected at regular intervals along monitoring beaches which detail closure of egg takes, thus providing a visual incentive to do the 'right' thing.
- There are equity problems looming in all villages except Paiawa. For social and economic viability of continuing the leatherback turtle recovery projects along the Huon Coast, the WPRFMC will need to ensure that the communities at Labu Tale, Busama¹⁶² and Lababia address equitably the selection of all field personnel. Pilcher (2006) advocates the reduction of beach monitoring teams for the sake of scientific integrity of the data collection, or having the monitoring beaches divided up into shorter stretches with the monitoring area extended. The author supports extending the monitoring areas, as this will increase the amount of data collected and alleviate some of the equity issues without having to resort to other incentive payments.
- Training should be extended to all willing people in each community. A manual or handbook that acts, as a reminder for Team Leaders and Beach Monitors should also be developed. This would also allow 'Training of Trainers' type programs within each community.
- Community-based coastal management initiatives, even where firmly based on community consultation and recognized ownership, cannot be sustained in the absence of supporting national policy and legislation. There is thus a need to explore and re-define, if necessary, the legislation that bans the sale and take of leatherback products (meat and eggs) under the 1976 *Flora and Fauna Act*. There is also a need to promote the establishment of Ward or Local Level legislation under Sections 42 and 44 of the Organic Law. This law allows Wards and LLGs to make legislation that can be used to ban egg take. Finally, the MFMA should be approached and ensure that leatherback turtle conservation is incorporated into the forthcoming *Morobe Province Marine Resource Management Plan*.
- More in-depth beach profiling should be conducted as well as an analysis of heavy nesting areas. From the recent January 2006 trip it was evident that many nests are regularly inundated during high tides. If appropriate changes were made to the 1976 *Flora and Fauna Act* that allowed for the use of traditional resources in a sustainable manner, it maybe possible to develop a sustainable egg harvesting plan that would allow for some nests to be taken for consumption. Alternatively, the development of an egg relocation plan to more suitable areas could also add possible tourism opportunities.
- If the WPRFMC is going to assist with incentive payments, there is a need to formalize this whereby the participating communities are contracted to perform certain activities and they are paid on performance. It maybe possible to build in additional incentives for success of hatchling emergence. This would thus be a mechanism that would allow the other participating communities outside of Lababia to also have an on-going incentive. For this to be successful, however, there will be a need to source additional long-term funding or formerly pursue the development of a trust fund. Given the lack of a conservation ethic or any real concern for the recovery of the leatherback turtle by the participating communities outside the cash benefits provided by employment, this will be the only way to ensure long-term project success.
- Similarly, if the WPRFMC is to continue support for infrastructure improvements or livelihood options, it will be necessary to seek assistance from the various Church development agencies¹⁶³ and Bris Kanda for facilitation, thus allowing the WPRFMC to provide only a supporting role, and not be seen as a development agency.
- There is a need to determine the existing state of the radio system that has been put in place along the Huon Coast by previous government funding. It would be highly beneficial to ensure a more efficient running of the leatherback turtle recovery projects in participating communities if they could communicate with each other and also with the proposed head office in Lae.
- Religion is now an important component of most community lives. There is a need to explore relationships with churches, women's fellowships and youth groups, as these can provide a potent and innovative vehicle for approaching leatherback turtle recovery along the Huon Coast.
- Begin translation of resource materials into *Tok pidgin*. Environmental literacy is important and should be encouraged as it has the potential of providing an important means to create awareness of options for conservation, development and resource management.
- A more in-depth social mapping program should be continued, with particular focus on the way monies generated by the WPRFMC-funded leatherback turtle recovery projects are distributed, other livelihood strategies, and a transport and marketing assessment.

¹⁶² Busama has an added problem with regards to equity. Currently there are 15 Team Leaders that oversee Beach Monitors. Twelve of these are from the six 'streets' in Busama (two from each street and elected by the street). The three others are related to the Field Coordinator who is based at Buli, the monitoring camp. These extra Team Leaders are called Landowner Team Leaders and are the Field Coordinator's son, son-in-law and nephew. There is obvious problems with this, particularly when they require money and override the existing roster system and only employ immediate family members. This is causing significant stress, and other members of the community who own land along the monitoring beach are also asking for their own Landowner Team Leaders.

¹⁶³ One aspect of this could be the development of mini-hydro schemes that would generate electricity for the schools and aid-posts.

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APPENDIX A: ACTIVITY DETAILS

DATE	PLACE	STAKEHOLDER AND/OR ACTIVITY
26/09/2005	Port Moresby	WWF and DEC
28/09/2005	Port Moresby	WWF, DEC and NFA
30/09/2005	Lae	KICDG and VDT
4/10/2005	Lae	DEC
5/10/2005	Lae	Huon Gulf MP, KICDG, VDT, DEC, HCLTN and WWF
6/10/2005	Lae	KICDG, DEC, Community
7/10/2005	Lae, Lababia, Paiawa, Siboma, Lababia	KICDG, VDT, DEC, Communities
8/10/2005	Lababia	Community
9/10/2005	Lababia	KICDG, DEC, Community
10/10/2005	Lababia, Busama, Buli, Lae	Communities and HCLTN
11/10/2005	Lae	KICDG, DEC and VDT
12/10/2005	Lae	KICDG and VDT
10/12/2005	Lae	KICDG, VDT and WPRFMC
11/12/2005	Lae	KICDG and WPRFMC
12/12/2005	Lae, Lababia	Community and KICDG
13/12/2005	Lababia	Community
14/12/2005	Lababia, Busama, Buli, Labu Tale, Lae	Communities, KICDG, HCLTN, VDT and WPRFMC
15/12/2005	Lae	KICDG, HCLTN, VDT and WPRFMC
15/01/2006	Lae	NOAA, WPRFMC
18/01/2006	Lae, Madang, Lae	NOAA, Aerial Survey
19/01/2006	Lae, Labu Tale	Community
20/01/2006	Labu Tale	Community, Socio-economic survey and Nesting beach survey
21/01/2006	Labu Tale, Buli	Communities, Socio-economic survey and Nesting beach surveys
22/01/2006	Buli, Busama	Communities, Socio-economic survey and Nesting beach survey
23/01/2006	Busama	Community, Socio-economic survey and Nesting beach survey
24/01/2006	Busama	Community, Socio-economic survey and Nesting beach survey
25/01/2006	Busama, Lababia	Communities, Socio-economic survey
26/01/2006	Lababia	Community, Socio-economic survey
27/01/2006	Lababia, Paiawa	Communities, Socio-economic survey
28/01/2006	Paiawa, Lae	Community, Socio-economic survey
29/01/2006	Lae	NOAA, KICDG and VDT
21/02/2006	Honiara	NOAA, Tri-National Partnership
22/02/2006	Honiara	NOAA, Tri-National Partnership
30/03/2006	Lae	US Embassy (Bangkok) and KICDG
31/03/2006	Lae, Busama	Communities
01/04/2006	Busama, Buli, Labu Tale, Lae, Buli, Busama	Communities
02/04/2006	Busama, Paiawa	Communities
03/04/2006	Paiawa, Lababia, Lae	Communities
04/04/2006	Lae	MFMA and VDT
07/04/2006	Port Moresby	DEC, CI and WWF

APPENDIX B: HUON COAST LEATHERBACK SOCIO-ECONOMIC SURVEY

Household Name: _____

Village/Hamlet: _____ Ward: _____

How many people are normally resident in this household? _____

Are all members from this village? _____

How many people from this household plan to study this year? _____

What grades? _____ How much are their school fees? _____

How much money did this household give to the church last year? _____

Does this family grow any cash crops? _____ What? _____

Did you sell any last year? _____ How much did you produce? _____

How much money did you get from their sale? _____

Does this family sell any marine resources? _____ What? _____

Did you sell any last year? _____

How much money did you get from their sale? _____

What type of material is this house constructed out of? _____

Does any member of this household go to Lae to sell things? _____

If yes, what things do they sell? _____

On average, how much money do they get? _____ How often do they go? _____

Does any member of this household go to Lae to buy things? _____

If yes, what things do they buy? _____

On average, how much money do they spend? _____

How often and what things do you buy? (Please tick the box you most agree with).

THING	HOW OFTEN			THING	HOW OFTEN		
	EVERY COUPLE OF DAYS	EVERY WEEK	EVERY MONTH		EVERY COUPLE OF DAYS	EVERY WEEK	EVERY MONTH
TEA LEAF							
RICE							
FLOUR							
SUGAR							
BISCUITS							
TIN MEAT							
TIN FISH							
NOODLES							
MATCHES							
SALT							
FRYING OIL							
WASHING POWDER							
SOAP							

Does any member of this household get any money from those who work or live elsewhere?

If yes, how much money do they get?

Does any member of this household get any money from royalty or investment payments?

If yes, how much money do they get?

Does any member of this household work for wages?

If yes, what is their average fortnightly wage?

Does any member of this household own or operate a business?

If yes, what type of business?

Did any member of this household give or receive money (either to buy things or as present) for a feast this year?

If yes, how much money did they give, spend or receive?

Did any member of this household give or receive money (either to buy things or as present) for trading this year?

If yes, how much money did they give, spend or receive?

APPENDIX B: HUON COAST LEATHERBACK SOCIO-ECONOMIC SURVEY

How many of the following items are owned by your household?

ITEM	QUANTITY	ITEM	QUANTITY
Radio		Spears	
Tape player		Spear gun	
Camera		Fishing lines	
Coleman lantern		Fishing lines	
Sewing machine		Under-water torch	
Television		Esky	
Generator			
Solar lighting		Canoe	
		Banana Boat	
		Outboard Motor	

How many gardens does this household have?

Do you have any livestock?

Yes, how many?

What did you eat in the last 24 hrs?

Do you harvest leatherback turtles eggs?

If yes what do you do with them?

Do you have any traditional knowledge related to leatherback turtles?

Did you or any member of your family work on the beach this season?

If yes, who, and how much money did you receive?

Name of Interview:

Date:

APPENDIX C: 'STREET' AND HAMLETS AT BUSAMA

LUTU BUSAMA		AWASA BUSAMA	
STREET	HAMLET	STREET	HAMLET
Kapong	Maus Buassi Wengalumlum Agayumke Awasemke Budu Buim Agapocmke Bukwang Bula Busa Kipikoc Butusaguru Bumapuoc Alusoc Mapang	Yellow	Hoctu Apo gramsung Ngawusu Honse Anamking
Wharf	Balimba Buyahu Biyamum Bulimtu Hockwa	Mango	Asilanki Umboiki Amsalon
Hobaga	Motockgawi Glanglom Gibiemta Luling Bumpku Hocboc	Tenth	Buha Agamati Obutong Buhumpi Somke Kamkumki Eliotu Apuipu Bosum Bialeu Buwalum Sungkarang Gandupu Upalum Gasimking Buki Bwagum Gaiusu

APPENDIX D: DEMOGRAPHIC CHARACTERISTICS FOR PARTICIPATING COMMUNITIES

LABU TALE

AGE GROUP	TOTAL POPULATION	NO. OF MALES	NO. OF FEMALES	SEX RATIO
Total	532	253	279	90.7
0-4	73	37	36	102.8
5-9	52	16	36	44.4
10-19	115	57	58	98.3
20-29	93	44	49	89.8
30-39	78	44	34	129.4
40-49	54	25	29	86
50-59	32	15	17	88.2
60+	35	15	20	75.0
No. aged 18 years +	306	151	155	97.4
% aged less than 15 yrs	36.1	33.2	38.7	
% aged 65 years +	3.9	3.6	4.3	
Median age (years)	22.7	24.1	21.7	
% head of household	100.0	86.5	13.5	
No. of households	89			
Average household size	6.0			

Source: PNG 2000 Census

LUTU BUSAMA

AGE GROUP	TOTAL POPULATION	NO. OF MALES	NO. OF FEMALES	SEX RATIO
Total	784	393	391	100.5
0-4	98	50	48	104.2
5-9	95	52	43	120.9
10-19	155	77	78	98.7
20-29	135	76	59	128.8
30-39	99	50	49	102.0
40-49	55	24	31	77.4
50-59	64	30	34	88.2
60+	83	34	49	69.4
No. aged 18 years +	464	225	239	94.1
% aged less than 15 yrs	35.3	37.7	33.0	
% aged 65 years +	5.7	4.6	6.9	
Median age (years)	23.7	23.2	24.1	
% head of household	100.0	86.2	13.8	
No. of households	145			
Average household size	5.4			

Source: PNG 2000 Census

APPENDIX D: DEMOGRAPHIC CHARACTERISTICS FOR PARTICIPATING COMMUNITIES (CONTINUED)

AWASA BUSAMA

DEMOGRAPHICS	TOTAL POPULATION	NO. OF MALES	NO. OF FEMALES	SEX RATIO
Total	675	334	341	97.9
0-4	64	35	29	120.7
5-9	81	37	44	84.1
10-19	139	67	72	93.1
20-29	116	62	54	114.8
30-39	95	50	45	111.1
40-49	67	33	34	97.1
50-59	56	28	28	100.0
60+	57	22	35	62.9
No. aged 18 years +	408	206	202	102.0
% aged less than 15 yrs	32.9	32.3	33.4	
% aged 65 years +	5.6	4.2	7.0	
Median age (years)	23.9	24.0	23.7	
% head of household	100.0	80.3	19.7	
No. of households	137			
Average household size	4.9			

Source: PNG 2000 Census

LABABIA

AGE GROUP	TOTAL POPULATION	NO. OF MALES	NO. OF FEMALES	SEX RATIO
Total	582	299	283	105.7
0-4	81	39	42	92.9
5-9	95	49	46	106.5
10-19	125	64	61	104.9
20-29	76	39	37	105.4
30-39	85	47	38	123.7
40-49	60	31	29	106.9
50-59	24	9	15	60.0
60+	36	21	15	140.0
No. aged 18 years +	308	163	145	112.4
% aged less than 15 yrs	40.9	38.5	43.5	
% aged 65 years +	3.6	4.0	3.2	
Median age (years)	19.2	19.6	18.7	
% head of household	100.0	81.2	18.8	
No. of households	85			
Average household size	6.8			

Source: PNG 2000 Census

APPENDIX D: DEMOGRAPHIC CHARACTERISTICS FOR PARTICIPATING COMMUNITIES (CONTINUED)**PAIAWA**

AGE GROUP	TOTAL POPULATION	NO. OF MALES	NO. OF FEMALES	SEX RATIO
Total	320	171	149	114.8
0-4	35	20	15	133.3
5-9	47	23	24	95.8
10-19	82	39	43	90.7
20-29	46	32	14	228.6
30-39	48	20	28	71.4
40-49	35	20	15	133.3
50-59	17	12	5	240.0
60+	10	5	5	100.0
No. aged 18 years +	169	94	75	125.3
% aged less than 15 yrs	37.2	35.1	39.6	
% aged 65 years +	3.1	2.9	3.4	
Median age (years)	19.2	20.5	18.1	
% head of household	100.0	87.5	12.5	
No. of households	56			
Average household size	5.7			

Source: PNG 2000 Census

APPENDIX E: TRADE STORE PRICES (IN K)

ITEM	BUSAMA	LABABIA
Bisuits	0.80-1.00	1.10-1.25
Bleach (500ml)	2.50	
Cheese pop	0.70	0.80
Cooking oil (250ml)	2.00	2.70
Cooking oil (500ml)	3.00	
Milk (55g)		2.60
Noodles	1.00	1.30
Rice (1kg)	3.00	3.90
Salt (1kg)	2.00	
Salt (500g)	1.00	
Soap (cake)	1.00	1.20-1.65
Soap powder (200g)	2.00	
Soap powder (30g)	.60	
Sugar (500g)	2.60	3.00
Sugar (1kg)		5.00
Tea (125g)	1.80	1.90
Tin fish-tuna (185g)	2.60	2.90
Tin fish-mackerel (sm)		3.00
Tin fish-mackerel (lg)		5.30
Tin meat (340g)		4.65
Tobacco (spear)	0.50	

APPENDIX F: SPECIES DETAILS FOR FISH CATCHES

SCIENTIFIC NAME	COMMON NAME	SCIENTIFIC NAME	COMMON NAME
<i>Acanthocybium solandri</i>	Wahoo	<i>Lutjanidae</i>	Snappers, jobfishes
<i>Acanthuridae</i>	Surgeonfishes	<i>Lutjanus argentimaculatus</i>	Mangrove red snapper
<i>Acanthurus lineatus</i>	Lined surgeonfish	<i>Lutjanus bohar</i>	Two-spot red snapper
<i>Acanthurus triostegus</i>	Convict surgeonfish	<i>Lutjanus bouton</i>	Moluccan snapper
<i>Aphareus rutilans</i>	Rusty jobfish	<i>Lutjanus fulvus</i>	Blacktail snapper
<i>Arius graffei</i>	Blue salmon catfish	<i>Lutjanus gibbus</i>	Humpback red snapper
<i>Atherinidae</i>	Hardyheads	<i>Lutjanus monostigma</i>	One-spot snapper
<i>Carangoides plagiotaenia</i>	Barcheek trevally	<i>Lutjanus rivulatus</i>	Blubberlip snapper
<i>Caranx ignobilis</i>	Giant trevally	<i>Lutjanus russelli</i>	Russell's snapper
<i>Caranx lugubris</i>	Black jack	<i>Lutjanus timorensis</i>	Timor snapper
<i>Caranx sexfasciatus</i>	Bigeye trevally	<i>Lutjanus vitta</i>	Brownstripe red snapper
<i>Caranx tille</i>	Tille trevally	<i>Megalaspis cordyla</i>	Topedo scad
<i>Cephalopholis cyanostigma</i>	Bluespotted hind	<i>Monotaxis grandoculis</i>	Humpnose big-eye bream
<i>Cephalopholis sexmaculata</i>	Sixblotch hind	<i>Naso unicornis</i>	Bluespine unicornfish
<i>Cephalopholis sonnerati</i>	Tomato hind	<i>Parupeneus barberinus</i>	Dash-and-Dot goatfish
<i>Cetoscarus bicolor</i>	Bicolour parrotfish	<i>Penaeus merguensis</i>	Banana prawn
<i>Cheilopogon spp.</i>	Flying fish	<i>Pentapodus setosus</i>	Butterfly whiptail
<i>Clupeidae</i>	Sprats	<i>Plectropomus areolatus</i>	Squairetail coralgrouper
<i>Diagramma pictum</i>	Painted sweetlips	<i>Polydactylus plebeius</i>	Striped threadfin
<i>Elagatis bipinnulata</i>	Rainbow runner	<i>Pristipomoides filamentosus</i>	Crimson jobfish
<i>Epinephelus coioides</i>	Orange-spotted grouper	<i>Prontobea diacanthus</i>	Black jewfish
<i>Epinephelus lanceolatus</i>	Giant grouper	<i>Scaridae</i>	Parrotfish
<i>Epinephelus merra</i>	Honeycomb grouper	<i>Scarus globiceps</i>	Globehead parrotfish
<i>Epinephelus polyphekadion</i>	Camouflage grouper	<i>Scomberomorus commerson</i>	Spanish mackerel
<i>Epinephelus tauvina</i>	Greasy grouper	<i>Seriola dumerili</i>	Greater amberjack
<i>Etelis carbunculus</i>	Short-tailed (Ruby) snapper	<i>Siganus doliatus</i>	Barred spinefoot
<i>Euthynnus affinis</i>	Kawakawa	<i>Siganus spinus</i>	Little spinefoot
<i>Gnathanodon speciosus</i>	Golden trevally	<i>Siganus spp.</i>	Rabbitfish
<i>Gymnosarda unicolor</i>	Dogtooth tuna	<i>Siganus vulpinus</i>	Foxface
<i>Haemulidae</i>	Grunts, sweetlips	<i>Sphyaena barracuda</i>	Great barracuda
<i>Holocentridae</i>	Squirrelfishes	<i>Sphyaena genie</i>	Blackfin barracuda
<i>Katsuwonus pelamis</i>	Skipjack tuna	<i>Terapon jarbua</i>	Jarbua terapon
<i>Kyphosus cinerascens</i>	Blue sea chub	<i>Thunnus albacares</i>	Yellowfin tuna
<i>Leptoscarus vaigiensis</i>	Marbled parrotfish	<i>Tylosurus crocodilus</i>	Hound needletfish
<i>Lethrinus lentjan</i>	Pink ear emperor	<i>Valamugil buchanani</i>	Bluetail mullet
<i>Lethrinus miniatus</i>	Trumpet emperor	<i>Variola louti</i>	Yellow-edged lyretail
<i>Lethrinus olivaceus</i>	Longface emperor		

APPENDIX G: FOOD CONSUMPTION RECALL

HOUSEHOLDS	LABU TALE	BUSAMA	LABABIA	PAIAWA
1	banana	sago, bandicoot	banana, greens, tapioca	banana, greens, fresh fish
2	banana, greens	sweet potato, banana, tapioca, sago, fresh fish	rice	flour
3	banana, greens	sweet potato, fresh fish	sago, fresh fish	rice, fresh fish
4	banana, greens, fresh fish	sweet potato, greens	sago, greens	sago, fresh fish
5	banana, greens, fresh fish	sweet potato, greens	sago, greens	sago, fresh fish
6	banana, greens, fresh fish, tapioca	sweet potato, greens	sweet potato	taro
7	banana, greens, rice, fresh fish	sweet potato, greens	sweet potato	taro, greens
8	banana, greens, rice, lamb flaps	sweet potato, greens	sweet potato	taro, greens, sago
9	banana, greens, rice, tin fish	sweet potato, greens	sweet potato, banana, tapioca	taro, sago, fresh fish
10	banana, greens, rice, tin fish, fresh fish, noodles	sweet potato, greens	sweet potato, banana, tapioca	taro, tapioca, fresh fish
11	banana, greens, taro, pork	sweet potato, greens	sweet potato, fresh fish	
12	banana, sago, pork	sweet potato, greens	sweet potato, greens	
13	banana, taro	sweet potato, greens	sweet potato, greens, banana, sago, rice	
14	rice, fresh fish	sweet potato, greens	sweet potato, greens, banana, tapioca	
15	rice, greens	sweet potato, greens	sweet potato, greens, fresh fish	
16	rice, greens, tin fish	sweet potato, greens		
17	rice, greens, tin fish	sweet potato, greens, banana		
18	rice, tin fish	sweet potato, greens, banana, sago, fresh fish		
19	rice, tin fish	sweet potato, greens, fresh fish		
20	sago	sweet potato, greens, fresh fish		
21		sweet potato, greens, fresh fish		
22		sweet potato, greens, fresh fish		
23		sweet potato, greens, noodles		
24		sweet potato, greens, rice tin fish		
25		sweet potato, greens, rice tin meat		
26		sweet potato, greens, tapioca, fresh fish		
27		sweet potato, tapioca, fresh fish		
28		tapioca, greens		
29		taro, greens, pitpit		
30		taro, greens, tapioca		

APPENDIX H: 1976 FAUNA (PROTECTION AND CONTROL) ACT

INDEPENDENT STATE OF PAPUA NEW GUINEA Fauna (Protection and Control) Act 1966

Being an Act to make provision for the protection, control, harvesting and destruction of fauna, and for related purposes.

PART I — PRELIMINARY

1. Interpretation.

In this Act, unless the contrary intention appears—

“animal” means a member of a species included in the definition of “fauna” in this section, or a part or product of any such animal;

“approved organization” means a scientific or zoological organization approved by the Minister;

“the Conservator” means the Conservator of Fauna appointed under Section 4;

“fauna” means any species included in the animal kingdom, whether native, introduced or imported, but does not include man;

“land” includes land covered by water and waters within the territorial jurisdiction of Papua New Guinea;

“permit” means a permit issued under Section 10;

“possession”, in relation to a protected animal, includes having the animal in a building, lodging, apartment, field or other place whether belonging to or occupied by the person charged or not, and whether the animal is there for the use of the person charged or of another person;

“protected animal” means a member of a species that is protected fauna, or a part or product of any such animal;

“protected area” means a protected area declared under Section 13;

“protected fauna” means fauna declared to be protected fauna under Section 6;

“Ranger” means the Conservator or a person appointed under Section 20;

“sanctuary” means a sanctuary declared under Section 11;

“taking or killing” means hunting, shooting, killing, poisoning, netting, snaring, spearing, pursuing, taking, disturbing or injuring;

“this Act” includes the regulations.

PART II — ADMINISTRATION

2. Administration of Act

Subject to any directions of the Minister, the Conservator is charged with the administration of this Act.

3. Operation

Nothing in this Act affects the operation of the Animals Act 1952.

4. Conservator of Fauna

The Minister may, by notice in the National Gazette, appoint an officer to be the Conservator of Fauna.

5. Powers, duties, etc., of Conservator.

The Conservator has such powers, functions and duties as are prescribed.

PART III — PROTECTED FAUNA

6. Declaration of protected fauna.

The Minister may, by notice in the National Gazette, declare any fauna to be protected fauna for the purposes of this Act.

7. Protected fauna vested in the State.

Subject to the regulations, all protected animals are the property of the State.

8. Killing, etc., protected fauna.

(1) Subject to this Act, a person who takes or kills any protected fauna or uses any explosive, dog, net or instrument or other means for the purpose of taking or killing any protected fauna is guilty of an offence.

PENALTY: A fine not exceeding K500.00 for each protected fauna.

(2) Subject to this Act, a person who takes or kills any protected fauna by use of a firearm within the meaning of the *Firearms Act 1978* is guilty of an offence.

PENALTY: A fine not exceeding K1,000.00 for each protected fauna.

9. Possession of protected fauna.

(1) Subject to Section 29, a person who knowingly buys, sells, offers or consigns for sale, or has in his possession or control, a protected animal is guilty of an offence.

PENALTY: A fine not exceeding K500.00 for each animal in respect of which the offence has been committed.

(2) Subsection (1) applies whether or not the animal was killed, taken or brought in or received from a place outside the country.

(3) On the conviction of a person for an offence against this section in relation to a protected animal, the animal concerned shall be disposed of in such manner as the court that convicts him directs.

(4) It is a defence to a charge of an offence against this section if the accused person proves that at the time when it came into his possession the animal was lawfully obtained.

10. Permit to take protected fauna.

(1) The Conservator may, on the application of a representative of an approved organization issue to him a permit authorizing the taking of protected fauna in accordance with the permit.

(2) A permit under Subsection (1) may specify—

- the protected fauna that may be taken; and
- the numbers that may be taken; and
- the area within which the fauna may be taken; and
- such further or other conditions as seem necessary or desirable to the Conservator.

(3) A person who takes a protected animal in contravention of a condition of a permit under this section is guilty of an offence.

PENALTY: A fine not exceeding K40.00 for each animal in respect of which the offence has been committed.

PART IV — SANCTUARIES

11. Declaration of sanctuaries.

(1) The Minister may, by notice in the National Gazette, declare an area to be a sanctuary for the purposes of this Act.

(2) In the notice referred to in Subsection (1) or in a subsequent notice in the National Gazette, the Minister may specify animals or classes of animals that may lawfully be taken or killed in the sanctuary.

12. Fauna not to be taken or killed in a sanctuary.

(1) Subject to this Act, a person who takes or kills in a sanctuary an animal other than an animal, or animal of a class, that is specified under Section 11(2) is guilty of an offence.

PENALTY: A fine not exceeding K20.00 for each animal in respect of which the offence has been committed.

(2) In a prosecution for an offence against Subsection (1), the possession of an animal in a sanctuary by a person is *prima facie* evidence that that animal was taken or killed in the sanctuary by him.

PART V — PROTECTED AREAS

13. Declaration of protected areas.

The Minister may, by notice in the National Gazette, declare an area to be a protected area in relation to a species or class of animals specified in the notice.

14. Specified fauna not to be taken in a protected area.

(1) Subject to this Act, a person who takes or kills in a protected area a member of a species or class of animals specified under Section 13 in relation to the protected area is guilty of an offence.

PENALTY: A fine not exceeding K20.00 for each animal in respect of which the offence has been committed.

(2) In a prosecution under Subsection (1), the possession in a protected area of a member of a species or class of animals specified under Section 13 in relation to the protected area is *prima facie* evidence that that prescribed animal was taken or killed in that protected area.

PART VI — WILDLIFE MANAGEMENT AREAS

15. Declaration of Wildlife Management Areas.

(1) Subject to Subsection (2), the Minister may, by notice in the National Gazette, declare an area to be a Wildlife Management Area for the purposes of this Act.

(2) Where the Minister intends to declare an area to be a Wildlife Management Area, he shall—

- consult, as far as is practicable, with the owners of the land within the area to be declared; and
- where the area that he intends to declare is wholly or partly within the area of a Local-level Government, consult with that Local-level Government.

(3) Failure by the Minister to consult with a Local-level Government as required by Subsection (2) does not invalidate a declaration in made under this section.

16. Establishment of Wildlife Management Committees.

In the notice referred to in Section 15 or in a subsequent notice in the National Gazette, the Minister may, in his discretion—

- establish a Wildlife Management Committee for the area and specify the number of members of the Committee; and
- appoint persons to be members of the Committee; and
- specify the manner in which other persons may become members of the Committee; and
- specify a person or officer to be the agent of the Committee.

17. Rules for Wildlife Management Areas.

(1) Subject to Subsection (2), the Minister may, after consultation with a Wildlife Management Committee, make rules for the protection, propagation, encouragement, management, control, harvesting and destruction of fauna in the Wildlife Management Area for which the Committee is appointed.

(2) Where the Minister intends to make rules in respect of a Wildlife Management Area, he shall—

- consult, as far as practicable, with the owners of the land

within the area to be declared; and

(b) where the area he intends to declare is wholly or partly within the area of a Local-level Government, consult with that Local-level Government.

(3) Without limiting the matters in respect of which rules may be made under Subsection (1), the rules may provide for—

- (a) licenses to authorize persons to take or kill any animals; and
- (b) fees for the licenses; and
- (c) a scale or scales or royalties in respect of animals taken or killed in the Wildlife Management Area; and
- (d) the disposal of fees and royalties.

(4) Failure by the Minister to consult with a Wildlife Management Committee as required by Subsection (1), or with a Local-level Government as required by Subsection (2), does not invalidate rules made under this section.

(5) A person who, without reasonable excuse (proof of which is on him), contravenes or fails to comply with a rule made under Subsection (1) is guilty of an offence.

PENALTY: A fine not exceeding K20.00.

18. Functions of agent.

(1) Where the rules made for a Wildlife Management Area provide for the issue of licenses, the agent of the Wildlife Management Committee established for the area shall issue the licenses.

(2) The agent of a Wildlife Management Committee is responsible for receiving any license fees or royalty payments provided for under the rules.

(3) The agent of a Wildlife Management Committee shall account to that Committee for any moneys received by him under Subsection (2).

19. Agent not to receive remuneration, etc.

The agent of a Wildlife Management Committee is not entitled to receive any remuneration or allowance in respect of his duties as agent.

PART VII — RANGERS

20. Appointment of Rangers.

The Conservator may, by notice in the National Gazette, appoint a person to be a Ranger for the purposes of this Act.

21. Powers and functions of Rangers.

Subject to any directions of the Conservator, a Ranger is responsible for the enforcement of this Act, and has such other powers and functions as are prescribed.

22. Power of examination, etc.

(1) Subject to this section, for the purposes of this Act a Ranger may, at all reasonable times and with or without assistants—

- (a) enter on and search any land, building, aircraft, vessel or vehicle on or in which there is reasonable cause to believe that any animal taken or killed in contravention of this Act is or may be; and
- (b) require a person to furnish information concerning, or to produce for inspection, any animal in his possession or under his control; and
- (c) seize and detain for further examination and inspection any animal that has been, or that there is reasonable cause to believe has been, taken or killed in contravention of this Act.

(2) A person who—

- (a) hinders or obstructs a Ranger or a person lawfully assisting a Ranger in the exercise of his powers under Subsection (1); or
- (b) refuses or fails, without lawful or reasonable excuse (proof of which is on him), to furnish information or to produce any animal when required to do so under that subsection, Penalty: A fine not exceeding K200.00.

DEFAULT PENALTY: A fine not exceeding K20.00.

(3) The power of entry and search conferred by Subsection (1)(a) shall not be exercised except under a warrant in the prescribed form, issued by a justice on being satisfied as to the matter specified in that paragraph.

PART VIII — MISCELLANEOUS

23. Exemptions.

(1) Where, in the opinion of the Minister, it is in the circumstances of the country expedient to do so, he may, by notice in the National Gazette, exempt a person or class of persons from all or any of the provisions of Part III, IV or V.

(2) An exemption under Subsection (1) may be absolute or subject to conditions.

24. Rules applying to sanctuaries and protected areas.

(1) The Minister may, in relation to—

- (a) a sanctuary or class of sanctuaries; or
- (b) a protected area or class of protected areas, encouragement, management, control, harvesting and destruction of fauna in the sanctuary or class of sanctuaries, or in the protected area or class of protected areas, as the case may be.

(2) A person who, without reasonable excuse (proof of which is on him), contravenes or fails to comply with a rule made under Subsection (1) is guilty of an offence.

PENALTY: A fine not exceeding K20.00.

25. Appeal from act or decision of Ranger.

(1) A person aggrieved by an act or decision of a Ranger under this Act may, within 28 days after the act or decision comes to his knowledge, appeal to the Conservator.

(2) On an appeal under Subsection (1), the Conservator may—

- (a) in the case of an appeal against an act—
 - (i) uphold the action of the Ranger; or
 - (ii) direct that the Ranger take such other action as to the Conservator seems necessary or desirable; or
 - (iii) annul the act; or
- (b) in the case of an appeal against a decision—
 - (i) uphold the decision; or
 - (ii) vary the decision by substituting another decision that the Ranger could lawfully make; or
 - (iii) annul the decision.

26. Appeal from act or decision of Conservator.

(1) A person aggrieved by an act or decision of the Conservator under this Act (including a decision under Section 25) may, within 28 days after the act or decision comes to his knowledge, appeal to the Minister, whose decision is final.

(2) On an appeal under Subsection (1), the Minister may—

- (a) in the case of an appeal against an act—
 - (i) uphold the action of the Conservator; or
 - (ii) direct that the Conservator take such other action as to the Minister seems necessary or desirable; or
 - (iii) annul the act; or
- (b) in the case of an appeal against a decision—
 - (i) uphold the decision; or
 - (ii) vary the decision by substituting another decision that the Conservator could lawfully make; or
 - (iii) annul the decision.

27. Prescribed device or equipment.

(1) The Minister may, by notice in the National Gazette—

- (a) prescribe or limit the devices, equipment or method that shall be used in the taking or killing of members of a species or class of animal; or
- (b) prohibit or restrict the devices, equipment or method that may be used in the taking or killing of members of a species or class of animal.

(2) A person who takes or kills an animal in contravention of a notice under Subsection (1) is guilty of an offence.

PENALTY: A fine not exceeding K40.00 for each animal in respect of which the offence has been committed.

28. Conservator or authorized person may take fauna.

(1) Notwithstanding this Act, the Conservator, or a person authorized in writing by the Conservator and acting in accordance with the authorization, may take an animal that is—

- (a) a protected animal; or
- (b) an animal in a sanctuary; or
- (c) an animal in a protected area, being a member of a species or class in relation to which the protected area has been declared, for any purpose directly or indirectly connected with the care, protection, promotion or propagation of particular species or classes of animals, or of fauna generally.

(2) An animal taken or killed under Subsection (1) shall be disposed of as the Conservator directs.

29. Fauna may be taken for specified purposes.

(1) Notwithstanding this Act, an animal that is—

- (a) a protected animal; or
- (b) an animal in a sanctuary; or
- (c) an animal in a protected area, being a member of a species or class in relation to which the protected area has been declared, may be taken for a purpose specified by the Minister by notice in the National Gazette, and the Minister may, in the notice or in a subsequent notice in the National Gazette, restrict the taking of animals—
 - (d) to one or more species of animals; or
 - (e) to a sanctuary or class of sanctuaries; or
 - (f) to a protected area or class of protected areas; or
 - (g) to a person or class of persons.

(2) A notice under Subsection (1) may be absolute or subject to conditions.

30. Imported fauna.

A person who, otherwise than in accordance with a direction of the Conservator, liberates an animal imported into the country, is guilty of an offence.

PENALTY: A fine not exceeding K200.00.

31. Regulations.

(1) The Head of State, acting on advice, may make regulations, not inconsistent with this Act, prescribing all matters that by this Act are required or permitted to be prescribed, or that are necessary or convenient to be prescribed for carrying out or giving effect to this Act, and, in particular—

- (a) for the protection, care, preservation and propagation of any species of fauna; and
- (b) prescribing the circumstances in which a person may acquire ownership of protected animals; and
- (c) prescribing the method of laying poison and safeguards in connection with laying poison in order to prevent the destruction of animals; and
- (d) defining the duties of the Conservator and of Rangers appointed under this Act; and
- (e) prescribing penalties of fines not exceeding K100.00 for offences against the regulations.

(2) The regulations may—

- (a) apply to or have operation in the whole or any part of the country; or
- (b) be of general or specially limited application according to time, place or circumstances; or
- (c) be general or restricted to a specified class or subject matter.

APPENDIX I: KAMIALI WILDLIFE MANAGEMENT AREA RULES

Kamiali Wildlife Management Area Rules

Made under the Fauna and Flora (Protection and Control) Act, Chapter No. 154 of PNG Revised Laws. Gazetted on the August 6, 1996, Published in the National Gazette (G77) on September 19, 996.

1. Interpretation.

In these Rules unless contrary intention appears

“Animal”	means a member of a species included in the definition of “fauna” or a part or product of any such animal.
“Area”	means the Kamiali Wildlife Management Area.
“Fauna”	means any species included in the animal kingdom, whether native, introduced or imported, but does not include man.
“Land”	includes land covered by water and waters within the territorial jurisdiction of Kamiali Wildlife Management Area whose boundary commences in a straight line to the mouth of Bitoi River thence changes direction in a straight line to Southwest of the Bitoi Ridge travelling along the side to the Ridge until it meets the Saya river continuing North each to the mouth of the Saya River and then continues between Batterk Island and Musik Island extending straight out into the open sea.
“Protected Area”	means the Kamiali Wildlife Management Area.
“Rule”	means this Rule.
Taking or Killing”	means hunting, shooting, killing, poisoning, netting, snaring, spearing, pursuing, taking, disturbing or injuring.

2. Applicability of Rule

Unless expressly stated in any law or enactment, this Rule has the effect of a law and shall apply to restrict, prohibit or protect the exploitation, abuse or destruction of fauna, flora and any natural resources within the Kamiali Wildlife Management Area.

3. Recognition of Customary Rights

The traditional and customary rights of the people of Lababia and neighbouring villages or hamlets within the Kamiali Wildlife Management Area is hereby acknowledged and recognised.

4. Prohibition and Exclusion of Others

All other person either a Papua New Guinea or an alien of other country or nationality who has no customary and traditional claim of right over the fauna, flora and natural resources within the Kamiali Wildlife Management Area are prohibited from entering the Area to take, kill, disturb, injure or harvest the fauna, flora or other natural resources.

5. Accepted Methods of Fishing

5.1 The people within the Area shall use traditionally made bamboo poles and nets to catch tuna.

5.2 Dugongs shall only be caught with a traditionally made net or hand-held harpoon designed for that purpose.

6. Prohibition and Restrictions of Certain Methods

6.1 No person shall within the Area take, kill, injure or harvest fauna, flora or other natural resources by using:

- (a) shot-gun or fire-arm;
- (b) dynamite or other types of explosives;
- (c) gill-nets; or
- (d) other dangerous substance or chemicals, which are harmful to the environment.

6.2 No person shall encourage, part-take in or conduct any activity, which destroys, removes or damages forests, river sediments and the environment.

6.3 Unauthorised and unapproved excavation, exploration, mining, drilling or prospecting shall not be conducted or undertaken within the Area.


6.4 Turtle eggs shall be collected in accordance with the traditionally accepted methods to avoid extinction or depletion of young ones.

6.5 No soap or detergent shall be used for bathing or washing of clothes in the rivers.

6.6 Clans who have had the continued use of a piece or parcel of land within the Area shall continue to use the land for such purpose to the exclusion of any other person.

7. General

Notwithstanding the rules stated hereinabove, the management shall without notice to anyone determine a rule applicable pertaining to the circumstance prevailing at the given time.



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Leatherback Turtle
Nesting Beach Project

(LABU TALE, BUSAMA, LABABIA, AND PAIAWA),
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