

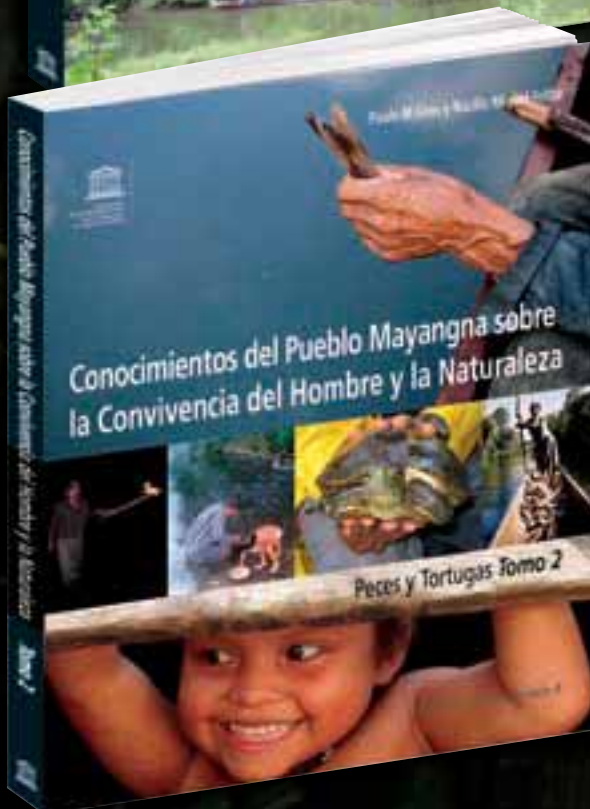


United Nations  
Educational, Scientific and  
Cultural Organization

## A brief presentation of the book

# Mayangna Knowledge of the Interdependence of People and Nature: Fish and Turtles

Paule M Gros and Nacilio Miguel Frithz  
Available in Spanish and Mayangna



*We are an indigenous group living along the banks of the small rivers that constitute the headwaters of the Prinzapolka, Coco and Wawa rivers. We are a humble people yet, at the same time, very proud. ... Our culture is very different from that of other indigenous groups and that of the mestizos. We conserve nature and continue to live surrounded by living beings, both plants and animals.*

Mayangna leaders and representatives



Photo by Memuka Serebent-Djili

## Indigenous lands and the BOSAWAS Biosphere Reserve

One of the last extensive areas of Central American tropical rainforest lies along the border between Nicaragua and Honduras. This transboundary area which includes the BOSAWAS Biosphere Reserve in Nicaragua is known as the Heart of the Mesoamerican Biological Corridor. The second-largest rainforest in the Americas after the Amazon, it is of utmost importance for the conservation of Central American biodiversity.

For centuries, these lands have been the home of the indigenous Mayangna and Miskito. Through their livelihoods based on slash and burn agriculture, fishing and hunting, they have both shaped the local ecological system and sheltered it from destruction. Their knowledge about the local flora and fauna is extensive and in-depth.

### Protecting the Heart of the Mesoamerican Biological Corridor

Since May 2005, the Nicaraguan government has recognised land titles for 86 Mayangna and Miskito communities. This recognition provides rights over agricultural and hunting lands, as well as co-dominion with the State over conservation areas located in the highlands of the Isabela Mountain Range. Together, the indigenous territories and the co-management areas cover most of the core zone of the BOSAWAS Reserve. Many of these indigenous communities have participated in the

organised protection of their lands, thus conserving both the biological and cultural diversities that constitute the Heart of the Mesoamerican Biological Corridor. By marking and patrolling their territorial boundaries they have successfully halted the advance of the agricultural frontier that has converted much of Central America's tropical rainforests into fields and pastures.

*The sustainable practices of the Mayangna and their efforts to stop the advance of the agricultural frontier are confirmed by satellite imagery. In the BOSAWAS Reserve, the Mayangna territories maintain a far greater coverage of primary forest than adjacent non-indigenous areas that are largely denuded (Stocks et al. 2007).* ♻️



Marking the boundaries of the indigenous territories of BOSAWAS. ♻️



Photo by Anthony Stocks



## The UNESCO-LINKS Project: Recording Mayangna knowledge

Following meetings with assemblies of Mayangna leaders and members of the Amak, Arangdak and Santo Tomas de Umra communities, UNESCO's Local and Indigenous Knowledge Systems (LINKS) programme responded to the request of indigenous leaders to record Mayangna knowledge and worldviews. The communities chose to focus the first phase of work on fishes and turtles, which are their primary source of protein and a vital part of the Mayangna way of life.



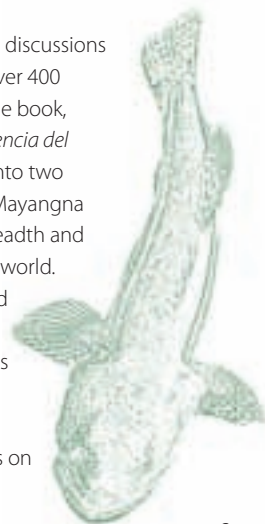
Photos by Paule Gros

### Goals

For the Mayangna and UNESCO, the book has two goals:

- 1) It contributes to the transmission of indigenous knowledge of the natural world to subsequent generations of Mayangna.
- 2) It demonstrates to the scientific community, and the general public, the unique nature of local knowledge and the key role that the Mayangna play in sustainable resource use and biodiversity management of the BOSAWAS Biosphere Reserve.

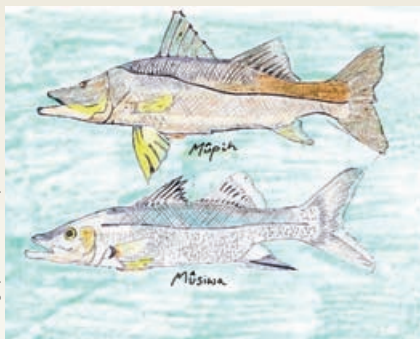
After several rounds of community-level interviews, discussions and reviews, the project has resulted in a book of over 400 pages on Mayangna knowledge and know-how. The book, *Conocimientos del Pueblo Mayangna sobre la Convivencia del Hombre y la Naturaleza: Peces y Tortugas*, is divided into two volumes and published in two language versions: Mayangna and Spanish. It captures in meticulous detail the breadth and depth of indigenous knowledge about the aquatic world. A wide range of information about the 30 fishes and six turtles that frequent Mayangna waterways are presented, weaving together empirical observations on behaviour, habitat, reproduction and migration patterns, with social commentaries on sharing, learning or harvesting, and cosmological reflections on human-animal relations and master spirits.





For *mûsiwa* the snout is rather short, whereas for the common snook, the lower part of the snout is longer and thinner. In other words the face of the common snook is more pointed and elongated than the face of *mûsiwa*.

Adult man from Arangdak



*Mûpih*, the common snook, and *mûsiwa*, also a *Centropomus* sp., are associated together due to their close resemblance. This drawing by a Mayangna artist highlights their distinctive features.

## Synergies between indigenous and scientific knowledge

While some scientific research has been done on the fishes and turtles of the BOSAWAS Biosphere Reserve, no systematic survey has ever been conducted. For this reason, scientific understanding of these animals and their environment remains disparate and approximate, and often based upon extrapolations from research conducted elsewhere in Central America or even farther afield. Mayangna knowledge, on the other hand, is in-depth and locally-relevant. It offers information and interpretations that fill gaps in current scientific data and transform our understanding of the human ecological dynamics of the territory.

### Naming and identifying the fish and turtles of the BOSAWAS Biosphere Reserve

The Mayangna name and identify 30 types of fish and 6 types of turtles, not all of which correspond with scientific species. A specific chapter is dedicated to each fish and turtle type, beginning with their names in Mayangna, Miskito, and local and international Spanish, and the scientific name. As certain types of fish and turtles resemble each other closely, the Mayangna underline those morphological and behavioural features that distinguish one type from another.

# MÛLALAH MÛSA

Nombre en miskito  
**Sahsin, Mulalah**

Nombre común en español local  
**Guapote**

Otros nombres comunes en español  
**Guapote blanco, Lagunero**

Nombre científico  
***Parachromis dovii***

# PLAIS NAINI AL NAINI

Nombre en miskito  
**Plais yari**

Nombre común en español local  
**Sardina**

Otros nombres comunes en español  
**Plateadito, Pejerrey**

Nombre científico  
***Atherinella sardina***

# MÛSA KUKUNI

Nombre en miskito  
**Suara**

Nombre común en español local  
**Anguila**

Otros nombres comunes en español  
**Anguila de pantano, Anevila**

Nombre científico  
***Synbranchus marmoratus***

### In-depth and locally-relevant knowledge

Both the Mayangna and biologists have accumulated their own understandings about the fish and turtles of the BOSAWAS Biosphere Reserve. Sometimes these observations echo each other, other times they clash, but in many instances, science remains silent due to a paucity of scientific data on the BOSAWAS environment.

- The Mayangna give accounts of massive upstream migrations in winter of *susum*, the guatemalan chulín (*Rhamdia guatemalensis*). At certain well-known places along this migration route, *susum* can be captured easily and in large quantities. No record of such a phenomenon appears in the scientific literature.
- The Mayangna describe river habitats located far inland, where they fish for *anghangh*, the burro grunt (*Pomadasys crocro*). According to scientific literature, this species is primarily associated with coastal habitats.
- Mayangna descriptions of *mulalah*, the guapote (*Parachromis dovii*), reveal that the females of local populations are often yellow in colour. While commonplace in BOSAWAS, this colouration is of rare occurrence elsewhere.

Photo by Menuka Scebbon-Didi



A freshly caught *mulalah* or guapote. 🐟

*Mulalah*, the guapote, showing the yellow colour of local populations. 🐟

*Susum*, the guatemalan chulín, during their winter migration upstream. 🐟

Photo by Paule Gros



Photo by Menuka Scebbon-Didi



Drawing by Cristóbal Thamy



A woman fishing with hook and line. 🐟



'Musiwa', the snook fish, is often seen close to the water surface as winter approaches. ↻

## Indicators of seasonal and exceptional events

Due to their reliance on the natural environment, Mayangna are close observers of environmental events and changes. Certain types of fish and turtles serve as indicators of changing seasons or exceptional events.

- When *musiwa*, a snook fish (*Centropomus sp.*), is seen close to the surface and jumping out of the water, this is a sure sign of winter approaching.
- The Mayangna know that *ahsa*, the black wood turtle (right) (*Rhinoclemmys funerea*), is not strong enough to resist strong currents. When they see black wood turtles adrift, one after another, this warns them that a flood is imminent.



Photo by Paule Gros

Drawing by Cristóbal Thamy

### Histories of ecological events

Mayangna knowledge of ecologically-significant events has been passed down through generations. These ecological histories are important for contemporary resource management. One example relates to human introduction of new fishes to river systems. *Pahwa*, the blackbelt cichlid (*Vieja maculicauda*), is not native to the Waspuk River. Some generations ago, large quantities of this important food fish were transported by the Mayangna from the Wawa River to the Waspuk River. The introduction was a success and today *pahwa* are abundant and fished in large numbers. The current name for the fish in Mayangna, *pahwa*, relates to this event as it derives from the term '*pah Wawa*' meaning 'from Wawa'.

When I see that the river carries *ahsa* (*Rhinoclemmys funerea*) adrift and this is seen a second time, it is certain that there will be a major flood.

**Elder man from Nazareth**

Many people say that it (*kisaris*) came from the headwaters of the Coco River, from the Apanas lagoon dam in Jinotega. They say that this fish lived there and when the dam broke, the fish began to spread down the Coco River. Here in the Walakwas River, it (*kisaris*) began to turn up little by little. This is what I have been told.

**Adult man from Arangdak**

The introduction and spread of *kisaris*, tilapia, along the Coco River. ↻



Drawing by Cristóbal Thamy



Mayangna also have knowledge of another more recent introduction. This relates to the invasive fish, tilapia (*Oreochromis sp.*), which is generally referred to by its Miskito name of *krahna*. During the book project, the Mayangna coined their own name for this fish: *kisarís*. *Kisarís* is said to have escaped from fish farms located either in the Apanas reservoir or along the upper course of the Coco River. It invaded the Coco River system during floods caused by Hurricane Juana in 1988. Year after year, the Mayangna have observed this species spreading downstream along the Coco River, occupying one tributary after another. They have documented this invasion, which has been accompanied by declines in native fish species due to competition from and predation by *kisarís*.

In Bocay ... the whole river has been invaded. In the past, there was no *krahna*. But in 1988, there was hurricane Juan. Three years after the hurricane, we returned from Rosita to our place and we found it strange that the fish *krahna* was here.

Elder man from Amak

## Mayangna knowledge and science: side by side

In the book, Mayangna knowledge is presented in the words of the knowledge holders themselves, using direct citations accompanied by the speaker's age, gender and village. Current scientific data are presented alongside the words of the Mayangna, but set aside in coloured boxed texts. Science-based texts do not pass judgement on what the Mayangna say. Nor do Mayangna pass judgement on science. To facilitate mutual understanding and dialogue between Mayangna and scientific knowledge holders, the two sets of knowledge are juxtaposed so that readers can take stock of their convergence or divergence.

Scientific information is presented in colored boxes.

Complementary information from Mayangna knowledge-holders.

Illustrations by Mayangna artists.

Citations from Mayangna knowledge-holders.

**Hábitats y hábitos**

Las paslamas tienen preferencia por las partes lodosas donde se entierran. Se mantienen así, solas y escondidas. Por lo general, se encuentran en las lagunas, pero a veces viven en los ríos y en los caños.

Las tortugas *bolo* viven en lagunas sucias [de agua turbias con vegetación, materia orgánica y partículas en suspensión en el agua] y lodosas. Por eso es difícil mirarlas a simple vista. Estas tortugas no viven en grupos, más bien se mantienen solas. Tienen sus escondites en cuevas, salen a comer y luego vuelven a esconderse.

**Hombre anciano, Arangáid**

Cuando son pequeñas, estas tortugas habitan en el lodo a una profundidad de más o menos tres a cuatro pies [90 a 120 centímetros].

**Hombre adulto, Arangáid**

Elas no viven en el agua como las tortugas blancas. Los lugares donde habitan son los charcos, lodazales y lagunas... Les gustan más los lugares lodosos. Es raro hallarlas en los caños y en los ríos, pero no es imposible. Ellas se crían en el lodo toda su vida, por eso es difícil encontrar una tortuga *bolo* con un caparazón limpio, todo el tiempo tienen lana [algas] y su color es como el lodo. Cuando hallan un buen lugar, ellas se mantienen allí, filias.

**Mujer anciana, Wotóhka**

La presencia de paslamas en una laguna puede advertirse por la aparición de sus excrementos flotando en la superficie del agua.

Estas tortugas salen de noche a comer y a defecar. Si hay en una laguna se nota ese guá, porque se delatan por la presencia de sus excrementos, que salen a flote.

**Hombre adulto, Pafwasi**

**Carácter agresivo**

De acuerdo a los(as) biólogos(as), la tortuga lagarto, siendo de temperamento agresivo no duda en atacar a la gente, especialmente cuando está fuera del agua. En esta situación, se lanza hacia arriba con tanta fuerza que la parte anterior de su cuerpo se levanta del suelo (Ernst y Barbour 1989, Köhler 2003). También indican que la mordedura es fuerte y puede llegar a provocar heridas serias.

**Cuando *bolo*, paslama, grande y fuerte, muerde a una persona no la suelta**

Dicen que este animal cuando muerde a una persona no la afloja hasta que la muerda algún otro animal, se cante como lapa [awa] o que pase una lapa por arriba, entonces abre la boca y suelta a la persona.

**Mujer anciana, Alakúka**

**Ellas no viven en el agua como las tortugas blancas... Les gusta más los lugares lodosos. Es raro hallarlas en los caños y en los ríos, pero no es imposible**



Fishing pahwa with line. ↻

## Sustainable use of biological diversity

Through their unique philosophies, understandings and practical know-how, the Mayangna ensure the sustainable use of resources from their territories. Resource management is based upon social norms and rules about access and appropriate use. These are further reinforced by master spirits who, in the Mayangna worldview, oversee the interactions of human and non-human entities, and intervene when certain limits are transgressed.

Photos by Menuka Scetbon-Didi



Capturing crabs to use as fish bait. ↻

*Liwa pihni* is the 'mermaid'. It exists in a male form. *Liwa al phini*, that attacks women who fish too much, and in a female form, *liwa yal pihni*, that attacks men who fish a lot.

**Adult man from Sikilta**



Photo by Menuka Scetbon-Didi

Cleaning the fish catch. ↻





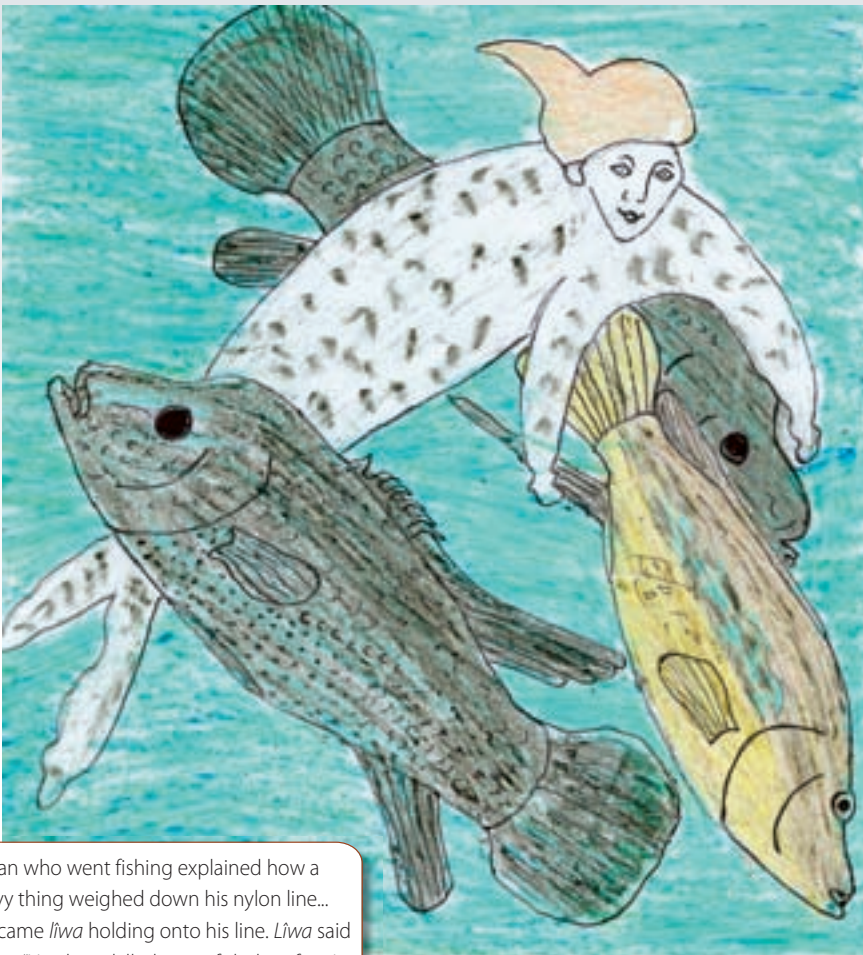
Aquatic resources and waterways are the domain of the master spirit, *liwa*, to whom people must show respect through the appropriate treatment of fish and turtles. *Liwa* controls access. She determines whether individuals go home empty-handed or with abundant catches. The group that the Mayangna classify as 'white fishes' are particularly close to *liwa* and under her influence. This group includes *mûpih* (sabaleta), *mûsiwa* (robalo) and *tirisu* (palometa), along with the turtle *kuah*, the Mesoamerican pond slider (*Trachemys venusta*). To those who harvest carelessly and take too much, *liwa* sends illness, either to them or to their families. She may also kill transgressors or imprison them in her water underworld.

Photo by Meruka Seetbon-Didi



Girl poling a canoe at dawn. 🌅

Drawing by Cristóbal Thamy



The master spirit *liwa* and her fishes. 🌊

A man who went fishing explained how a heavy thing weighed down his nylon line... out came *liwa* holding onto his line. *Liwa* said to him "You have killed many fish therefore I am going to take you away" and this is what happened.

**Adult man from Sikilta**



Women net fishing with help from their children.

Photos by Menuka Scebon-Delfi

# Transmitting Mayangna ecological knowledge through stories

By seeing and doing, Mayangna children acquire ecological knowledge from parents and relatives. From their earliest years, they follow adults on the river, first watching and then actively fishing.

Stories are also an important vehicle for passing on knowledge. Through the story of *kuah*, the Mesoamerican slider, and *ahsa*, the black wood turtle, parents pass on knowledge about these two turtles, which are important sources of food. Children learn about the specific habitat of each animal, and that sliders live with crocodiles and black turtles with water tigers.

When I was ten years old, I began to hunt and fish alone. My father started teaching me when I was still small, when I was five, because I was the eldest son. Everyday, I was out with him. Because of that, I knew how to fish with a harpoon and with bow and arrow from a very young age. As for fishing with hook and line, I started even younger.

Adult man from Arangdak



Fishing with bow and arrow. Learning by seeing and doing.





## The slider and the black turtle

In earlier times, so the Mayangna story goes, the slider and black turtle lived together in the depths of a large river pool. *Yapu*, the American crocodile (*Crocodylus acutus*), also lived in the pool. *Yapu* devoured many turtles, but he showed a clear preference for black turtles. The black turtle decided that in order to survive it would have to flee. It escaped to the headwaters of the river where no crocodiles reside. That is why, today, the slider lives in the lower reaches of the river, alongside the crocodile, whereas the black turtle frequents the streams of the headwaters, where it has befriended *was nawahni*, the water tiger, with whom it shares caves along the banks of the streams.

Photo by Paule Gros



*Kuah*, the Mesoamerican slider. 🐢

The story of *kuah* and *ahsa* weaves Mayangna ecological understanding with the unique Mayangna worldview. It spells out differences in the distribution and preferred habitats of two turtles, as well as their ecological relationship with key predators or 'partners' with whom they co-exist: the crocodile and the water tiger. The latter creature is a mysterious being, unknown to science. It may originate in cosmologies shared widely among Amerindian cultures in which the terrestrial world is mirrored by a watery underworld populated by aquatic counterparts such as the water tiger (jaguar).



# The Way Forward

Publication of these two volumes on *Mayangna Knowledge of the Interdependence of People and Nature* marks the culmination of a long and intensive phase of work. It is also the beginning of new and equally challenging endeavors. Acknowledging the knowledge and experience of indigenous peoples, in this case the Mayangna, has important implications for both education and conservation.

The book creates new opportunities for safeguarding and reinforcing the transmission of indigenous knowledge in both communities and classrooms. It also provides a foundation for enhancing biodiversity management by bringing indigenous knowledge on board alongside science, and by reinforcing recognition of indigenous peoples as resource managers in their own right. The book provides a springboard for addressing these important additional challenges.

## Conocimientos del Pueblo Mayangna sobre la Convivencia del Hombre y la Naturaleza: Peces y Tortugas

By Paule Gros and Nacilio Miguel Frithz  
*Available in Spanish and Mayangna*

**Volume 1:** 284 pages including chapters on 30 types of fish and on Mayangna worldviews.

**Volume 2:** 168 pages including chapters on 6 types of turtles, fishing techniques and uses.

*More than 340 photos; 84 original illustrations by Mayangna artists; 20 maps, diagrams and tables.*

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## LiNKs

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